ONTARIO ENERGY BOARD

EB-2021-0002

IN THE MATTER OF the *Ontario Energy Board Act*, 1998, S. O. 1998, c. 15, Schedule B;

AND IN THE MATTER OF an application for leave to construct natural gas pipeline and associated facilities in the Municipality of Chatham Kent, Municipality of Lakeshore, Town of Kingsville and Municipality of Leamington

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Compendium of Environmental Defence – Volume II

Decision and Evidence Excerpts from EB-2015-0029/0049

November 10, 2023

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Tab	Contents	Page
1.	EB-2015-0049/29 – Board Staff Expert Interrogatory Response Excerpts	3
2.	EB-2015-0049/29 – Transcript Excerpts	8
3.	Documents referenced in interrogatory response in Tab 1	
	a. Chittum, Anna. 2011. Follow the Leaders: Improving Large Customer Self-Direct Programs. ACEEE report No. IE112.	28
	b. U.S. Department of Energy. 2015. Barriers to Industrial Energy Efficiency: Report to Congress.	91
	c. State & Local Energy Efficiency Action Network. 2014. Industrial Energy Efficiency: Designing Effective State Programs for the Industrial Sector.	119
	d. Synapse Energy Economics. Commercial & Industrial Customer Perspectives on Massachusetts Energy Efficiency Programs. Prepared for the Massachusetts Energy Efficiency Advisory Council. April 3, 2012.	237
4.	Decision and Order, EB-2015-0029 / EB-2015-0049, January 20, 2016	476

GREEN ENERGY COALITION INTERROGATORY #12

INTERROGATORY

Reference: Section 5.8.2, p. 83

Question:
Regarding large volume customers:

a. Is Synapse aware of any evidence from Ontario or any other jurisdiction to suggest that large volume customers will acquire all cost-effective savings on their own, without utility DSM program support? If so, please document the basis for the conclusion.
b. If not, is Synapse aware of any evidence from Ontario or any other jurisdiction to suggest that large volume customers typically do not acquire all cost-effective savings on their own, without utility DSM support? If so, please document the basis for that conclusion.
c. Is Synapse aware of any evidence from any jurisdiction to suggest that well-designed self-direct programs for large customers typically have very low NTG ratios (and/or high free ridership)? If so, please provide examples and references.

RESPONSE

a. Synapse is not aware of any evidence to suggest that large volume customers will acquire all cost-effective savings on their own.

b. Synapse is aware that large volume customers (often, from the industrial sector) typically do not acquire all cost-effective savings on their own. See, e.g.:
    - U.S. Department of Energy. 2015. Barriers to Industrial Energy Efficiency: Report to Congress.
    - State & Local Energy Efficiency Action Network. 2014. Industrial Energy Efficiency: Designing Effective State Programs for the Industrial Sector.
    - Chittum, Anna. 2011. Follow the Leaders: Improving Large Customer Self-Direct Programs. ACEEE report No. IE112.
    - Synapse Energy Economics. Commercial & Industrial Customer Perspectives on Massachusetts Energy Efficiency Programs. Prepared for the Massachusetts Energy Efficiency Advisory Council. April 3, 2012. Please refer to Exhibit M.Staff.GEC.12, Attachment 1.

c. The term "well-designed" was not defined in this interrogatory. For the purpose of answering this question, we assume that "well-designed" means maximizing public benefit as specified in

Witnesses: T. Woolf
K. Takahashi
E. Malone
J. Kallay
A. Napoleon

Chittum 2011 (Chittum, Anna. 2011. Follow the Leaders: Improving Large Customer Self-Direct Programs. ACEEE report No. IE112.) That is, a well-designed program focuses on energy savings and has adequate oversight, measurement and verification of savings (using the same M&V standards for other industrial programs), and follow up.

Synapse is not aware of any evidence from any jurisdiction to suggest that well-designed self-direct programs for large customers typically have very low net-to-gross ratios or high free ridership.

ASSOCIATION OF POWER PRODUCERS OF ONTARIO INTERROGATORY #3

INTERROGATORY

Reference:

i. Synapse evidence
ii. EB-2012-0337 Transcript Volume 2 page 122 lines 10-15, extract from Union's oral argument:

> So on to my first issue, Union's position. Union freely acknowledges that power generation customers possess expertise to undertake energy efficiency programs on their own that result in natural gas savings. In Union's submission, this fact should not be seen as a matter of controversy in this proceeding.

Preamble:
APPrO would like to understand Synapse's and Board Staff's views on large volume customer (including power generator) incentives to self-implement energy efficiency programs.

Question:

a. Please provide an itemization of any and all incentives that large volume customers have to improve their overall operational efficiency and reduce fuel consumption outside of any utility sponsored DSM program.
b. Can you confirm that each of the following are valid reasons for large volume customers to directly undertake and invest in energy efficiency and conservation measures:
   i. Increasing profitability and/or lowering costs through direct savings from lower fuel consumption, purchase and demand requirements
   ii. Complying with strict contractual product off-take and sale provisions including:
      1. Heat rate requirements
      2. Production efficiencies
      3. Maintenance, engineering and industry best practice standards
      4. Prudent operating standards
      5. Management standards (including but not limited to ISO)
      6. Reporting requirements
      7. Green or other labeling requirements
      8. The treatment or limited pass through of fuel costs
      9. Avoiding border measures on higher emission export products (including but not limited to measures such as the First Jurisdictional Deliverer measures on electricity importers into Quebec and California)
   iii. Complying with legislative and regulatory requirements including:

Witnesses: T. Woolf
K. Takahashi
E. Malone
J. Kallay
A. Napoleon

1. General environmental regulations
2. Specific facility environmental approvals and permits
3. Emissions reporting and labeling requirements
4. Carbon pricing regimes taking various forms including tax, cap and trade, and/or reduced carbon or carbon neutral procurement requirements

iv. Enhancing competitiveness by lower production costs relative to competitors and imports

v. v. Complying with voluntary initiatives including:

1. Management performance and efficiency standards
2. Corporate social responsibility measures
3. Optimizing investment in, and potentially deferring, untimely infrastructure, replacement, operations and maintenance costs
4. Reporting and green labeling standards, including but not limited to the CDP Program[12] and various Eco-labeling initiatives
5. Customer outreach and education measures

c. Please provide any and all examples of direct large volume customer energy efficiency and conservation measures that Synapse has worked on or otherwise encountered.

d. Please provide your view on the relative cost effectiveness, efficiency, end-use customer impact, and investment in any and all of the measures outlined in (b) and (c) above, relative to paying a third party utility a rate-regulated amount to effect efficiency measure and programs across the applicable industrial rate.

RESPONSE

The response below is from Synapse, who authored the report (and not both Synapse and Board staff as requested in the interrogatory).

a. Refer to Exhibit M.Staff.APPrO.3, part b.

b. Yes, each of the listed items are valid reasons for large volume customers to directly undertake and invest in energy efficiency and conservation measures, except Synapse is not familiar with ii(9).

c. Synapse is generally familiar with a variety of measures, including but not limited to motors, CHP, compressors, pumps, lighting, air handling, process changes, and energy management systems.

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[12] https://www.cdp.net/en-US/Pages/HomePage.aspx

Witnesses: T. Woolf
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A. Napoleon

d. A full response to this question would require extensive effort to compile, and is beyond the scope of Synapse's work. However, we note that even when factors that encourage large volume customers to undertake and invest in energy efficiency and conservation measures are present (such as those listed in part b of this question, and excluding intervention by a program administrator), the literature on this subject indicates that barriers to energy efficiency persist for the industrial sector, and not all viable measures are implemented. Please refer to Exhibit M.Staff.GEC.12. Our report for the Massachusetts Energy Efficiency Advisory Council (see Exhibit M.Staff.GEC.12, Attachment 1) found that one of the main reasons that large volume customers do not implement cost-effective energy efficiency measures is that they have limited access to capital or they prefer to invest their capital in their core area of business.

Witnesses: T. Woolf
K. Takahashi
E. Malone
J. Kallay
A. Napoleon

Ontario

ONTARIO ENERGY BOARD

FILE NO.:	**EB-2015-0029**	**Union Gas Limited**
	EB-2015-0049	**Enbridge Gas Distribution Inc.**

VOLUME:	**4**	
DATE:	**August 24, 2015**	
BEFORE:	**Christine Long**	**Presiding Member**
	Allison Duff	**Member**
	Susan Frank	**Member**

INDEX OF PROCEEDINGS

Description	Page No.
--- On commencing at 9:30 a.m.	1
Preliminary Matters	1
UNION GAS LIMITED - PANEL 3, LARGE VOLUME T. Lynch, B. Goulden, G. Tetreault, Previously Affirmed; D. Dent, Affirmed	3
Examination-In-Chief by Mr. Smith	4
Cross-Examination by Mr. Elson	4
Cross-Examination by Mr. Millar	40
--- Recess taken at 10:54 a.m.	49
--- On resuming at 11:24 a.m.	49
Procedural Matters	49
Cross-Examination by Mr. Mondrow	49
--- Lunch recess taken at 12:49 p.m.	103
--- On resuming at 1:52 p.m.	103
Cross-Examination by Mr. Brett	103
Cross-Examination by Ms. Kyriazis	130
--- Recess taken at 3:17 p.m.	147
--- On resuming at 3:30 p.m.	147
Cross-Examination by Mr. Poch	149
Questions by the Board	173
--- Whereupon the hearing concluded at 4:19 p.m.	176

acknowledge that the competitive motivation argument is inconsistent with the free ridership rates that have been approved by the Board in past hearings?

MR. GOULDEN: Not to be argumentative, but that's the challenge we have, Mr. Elson. We don't necessarily connect the two.

MR. ELSON: So you're not sure, basically?

MR. GOULDEN: No.

MR. ELSON: Okay, thank you. I'd like to propose to you some reasons why large industrial users may not be able to implement all cost effective DSM. The first potential reason may be that the user would have limited capital, and therefore need an incentive to put their scarce resources towards energy efficiency measures.

Would you agree with that potential reason?

MR. GOULDEN: Yes.

MR. ELSON: And another reason for some customers might be that they do not have perfect or complete information about what energy efficiency measures are available and their relative benefits.

Would you agree with that, at least for some customers?

MR. GOULDEN: Yes.

MR. ELSON: And another reason might be that their managers have limited time and other priorities to deal with. Is that a possibility as well?

MR. GOULDEN: Yes. To say it another way, it is not an organizational priority, I think as you're referring to.

MR. ELSON: Thank you. And another might be the corporate managers have incentives to focus on initiatives with a shorter payback period?

MR. GOULDEN: Yes.

MR. ELSON: Could you please refer to tab 8 of our document book? This tab contains an excerpt from the application of EB-2012-0337, which was for Union's DSM plan for 2012 to 2014. I believe the one issue that was unsettled was your large volume program.

And if you could turn to page 23 of the document book, which is three pages into this, I'd like to read from this document here. It says:

> "With the current low price of gas, DSM programming for all customers ensures that energy conservation remains a priority. Despite commodity price fluctuations, a sustained focus on energy-efficiency is important for the long-term environmental sustainability and economic competitiveness of Ontario. Payment of DSM funding ensures there is no internal competition for this budget for other uses within a customer's organization. It is a driver for large volume organizations to leverage ratepayer-funded technical support to seek out conservation opportunities within their facility."

And further down:

> "The proposed plan, and in particular Union's proposals related to direct access, ensures that

ONTARIO ENERGY BOARD

FILE NO.:	**EB-2015-0029**	**Union Gas Limited**
	EB-2015-0049	**Enbridge Gas Distribution Inc.**

VOLUME:	**10**	
DATE:	**September 1, 2015**	
BEFORE:	**Christine Long**	**Presiding Member**
	Allison Duff	**Member**
	Susan Frank	**Member**

MR. NEME: I think so.

MR. ELSON: I'd like to first discussion how this argument relates to the concept of free riders, secondly some of the theoretical underpinnings of this argument and third, the empirical evidence relating to it.

So starting with free riders, can you explain to me how the concept -- how this competitive motivation argument might be connected with the concept of free riders?

MR. NEME: Sure. I think at a high level, the argument would be that if these customers are sophisticated enough, motivated enough, knowledgeable enough that they would do all cost effective efficiency on their own, then by definition any program that you would offer to them would have 100 percent free riders.

MR. ELSON: And so that would mean that the competitive motivation argument is inconsistent with previous Board-approved free rider rates for Union's conservation program. Would you agree with that?

MR. NEME: Yes.

MR. ELSON: I'll move on to the theoretical underpinnings of the competitive motivation argument.

And I believe that the argument is based on the idea again that large volume customers have financial incentives to implement conservation, and I'd like to propose for you some theoretical reasons why the simple hypothesis of the competitive motivation argument doesn't work in the real world.

In particular, I'll propose some reasons to you why large industrial users may not implement all cost effective conservation.

Union agreed with these reasons, but I'd like to also have your expert opinion on them as well.

MR. NEME: Okay.

MR. ELSON: The first reason is that large industrial -- sorry, large volume customers might not implement all cost effective conservation measures because they have limited capital, and therefore need an incentive to put their scarce resources towards energy efficiency measures. Would you agree with that?

MR. NEME: In some cases, that could be a barrier, yes.

MR. ELSON: And another reason might be that they do not have perfect or complete information about what energy efficiency measures are available, and their relative benefits?

MR. NEME: That is also a potential barrier -- or a likely barrier, in at least some cases.

MR. ELSON: And another reason might be that their managers have limited time and other priorities to deal with, meaning that conservation doesn't get the attention that it needs?

MR. NEME: The phrase "that it needs" is a loaded one.

MR. CHERNICK: Perhaps the attention that would be required to reach the point of achieving all cost effective energy efficiency.

MR. NEME: Yes.

MR. ELSON: And another might be that corporate managers have incentives to focus on initiatives with significantly shorter payback periods.

MR. NEME: I think that's a fair statement.

MR. CHERNICK: And that's especially where there are projects that increase output, or the quality of output, the selling price of their output, that it's my understanding that tends to get the attention of industrial managers much more than the efficiency of the process.

MR. ELSON: Would you have any other reasons to add to that list? I know I'm putting you on the spot here, but does anything else come to mind?

MR. CHERNICK: Well, one that I would add to the list is the institutional barriers within the firm, that if the plant manager in Ontario has to go to a chief financial officer in Germany, or Japan, or Texas to get approval for a non-productive investment, that is one that's not going to increase output, and he's going to have to do a lot of paperwork, and he's going to have to spend a lot of his time making up this argument and use up some of his -- whatever political capital he has, he may find other things to do with his time.

And so the mere fact that the plant engineer can convince the plant manager that this would be a good way to spend money doesn't guarantee that capital will be freed up to do it. And industrial firms tend to have separate capital and operating budgets, and have different rules for spending money for capital versus operating costs, when the utility bill comes, in you pay it.

If somebody comes one a bright idea about a -- slapping some more insulation on, or putting a control system on your system, you have to go through a whole 'nother process, and I think frequently would be an obstacle to the implementation of cost effective energy efficiency.

MR. NEME: What he said -- and I would add to that also uncertainty. I think as I noted -- as I noted earlier today, I think it was this morning, businesses and, for that matter home owners, are often approached or bombarded with marketing messages from vendors about things that are good for them.

And it's -- you know, we live in a media age where it's hard to escape that stuff. And it's -- we've developed a healthy dose of scepticism, and the uncertainty about whether the promise from a vendor of what an efficiency service might offer can also be a barrier.

MR. CHERNICK: And the uncertainty is not -- doesn't just apply to the technology. It also applies to the specific application, that if this is a technology that saves money for nine out of ten applications, and that's what the plant manager's read about in Boiler Week or whatever his favourite publication is, and he thinks, oh, great -- and I might be number ten, and then I'm going to have a lot of questions to answer.

And if the utility's chipping in some of the funds, that makes it much easier to convince everybody that it's worth the taking a pretty good bet, but not a certain one.

MR. ELSON: Than you. I'm on my last page here, so I will be done shortly.

But what we've been discussing is some of the theoretical underpinnings of this competitive motivation argument, so the theoretical arguments for and the theoretical arguments against it.

I'd like to now move to the actual empirical evidence and, Mr. Neme, I believe you referred to some of them of this empirical evidence in your report in this proceeding.

MR. NEME: Yes, I did.

MR. ELSON: And also there is some additional evidence in the report that you filed in the most recent Union DSM proceeding.

MR. NEME: That's correct.

MR. ELSON: I've excerpted some of what -- some of those reports in the final tab of this document book here, which is tab 15.

And so on the left-hand side is the report in question. On the right-hand side is either a quote from the report or what you've said about it.

And so I'll just take you through these very briefly. Can you describe the report conclusions for number 1 here and why they're relevant?

MR. NEME: The report concluded that from an analysis of a fairly large number of two dozen gas utility custom C&I programs which tend to be targeted at larger C&I customers, that -- across North America, that the kind of typical or mean median, if you will, free-rider rate was between 30 and 40 percent, which means that for those programs that were analyzed in a kind of thorough, sophisticated, statistically valid way, that roughly a third of the participants would have been free riders, would have done the projects anyway, and two-thirds would not have.

MR. ELSON: And so that's evidence against the competitive motivation argument, because the competitive motivation argument would suggest 100 percent free-rider rate.

MR. NEME: Correct.

MR. ELSON: And your second study here is an evaluation of Utah's large-volume self-directed program, and it found a very low free-rider range; is that correct?

MR. NEME: That's correct.

MR. ELSON: And again, this suggests that the competitive motivation is wrong because it's not finding 100 percent free-rider rate.

MR. NEME: That's correct.

MR. ELSON: And moving to the third publication here, there's reference here to an opt-out possibility in Utah, Wyoming, and Oregon where customers can prove that -- if they can prove that they have implemented all cost-effective DSM they don't have to participate in the program; they get their money back; is that your understanding?

MR. NEME: Mostly. I think the one twist I put on the way you framed it is that in those jurisdictions they came up with a simplified proxy for what -- for what all cost-effective would be. It probably is a lower hurdle than all cost-effective, but it is either an eight- or ten-year simple payback.

MR. ELSON: And in these jurisdictions nobody opted out; in other words, nobody was able to show that they had achieved all cost-effective DSM, however that was defined.

MR. NEME: My understanding is that nobody even tried.

MR. ELSON: And why was that?

MR. NEME: I can only infer that it was not likely to be possible to meet the hurdle.

MR. ELSON: And if you turn over to page 150, the conclusion of that report, it says:

> "To date, no company has taken advantage of these exemptions in any of these states because there are always some cost-effective projects that could be identified during an energy audit."

MR. NEME: There you go. There were a couple of -- that quote suggested there were a couple of studies that suggested that the issue was that there were cost-effective savings available that would have stopped them from getting over that hurdle.

MR. ELSON: And so again, that's empirical evidence against the competitive motivation argument, because the competitive motivation argument would suggest that every one of these large industrial or large-volume users would be opting out in order to save DSM dollars because they'd already implemented all these cost-effective savings.

MR. NEME: Right.

MR. ELSON: And items 4 and 5 were referenced in your earlier evidence, and I've bolded certain portions here.

In effect, both of these reports are saying that there is still significant potential for industrial energy improvement.

MR. NEME: That's correct.

MR. ELSON: And that would conflict with competitive motivation argument, because if they were already doing all of the cost-effective conservation you would assume that there would be very low potential going forward.

MR. NEME: Correct.

MR. ELSON: So those are the studies that you referred to. The remainder of this document are studies that Synapse referred to, so I won't be asking you about those, but I or someone else may be returning to that table.

I'd like to just finally ask you: Based on all of this evidence, the empirical evidence and the theoretical discussion that we had, do you think that Union's large industrial customers will achieve the same volume of gas savings through conservation measures even if Union's program is cancelled?

MR. NEME: No.

MR. ELSON: And how certain of you are this?

MR. NEME: Very.

MR. ELSON: Could you please turn to tab 4 of our document book.

ONTARIO ENERGY BOARD

FILE NO.:	**EB-2015-0029**	**Union Gas Limited**
	EB-2015-0049	**Enbridge Gas Distribution Inc.**

VOLUME:	**12**	
DATE:	**September 3, 2015**	
BEFORE:	**Christine Long**	**Presiding Member**
	Allison Duff	**Member**
	Susan Frank	**Member**

I N D E X   O F   P R O C E E D I N G S

Description	Page No.
--- On commencing at 9:32 a.m.	1
ONTARIO ENERGY BOARD STAFF - PANEL 1, resumed **T. Woolf, K.G. Takahashi, Previously Affirmed**	1
Cross-Examination by Mr. Poch	1
Cross-Examination by Mr. Shepherd	18
--- Recess taken at 11:00 a.m.	58
--- On resuming at 11:18 a.m.	58
Cross-Examination by Mr. Elson	82
Cross-Examination by Mr. Brett	106
Procedural Matters	123
--- Lunch recess taken at 1:00 p.m.	124
--- On resuming at 2:05 p.m.	124
Continued Cross-Examination by Mr. Brett	124
Cross-Examination by Dr. Higgin	132
Cross-Examination by Ms. DeMarco	154
--- Recess taken at 3:19 p.m.	171
--- On resuming at 3:37 p.m.	171
Cross-Examination by Mr. Smith	171
Cross-Examination by Mr. O'Leary	178
Questions by the Board	198
--- Whereupon the hearing adjourned at 4:24 p.m.	203

be a criteria.

And let's just take, for example, that spending is $2 per month, and that produces $1 per month of savings based on a net present value calculation. You would have to include the $2 and the $1 either under an NPV calculation or a straight line, it you prefer not to use NPV?

MR. WOOLF: So when you're looking at the rate impacts, the rates that affect all customers, just -- I'm sorry. I just want to make sure I have your question correct. You would account for the cost increase due to the DSM charge as well as the anticipated downward pressure on rates due to those avoided costs that put such downward pressure on rates?

MR. ELSON: Correct.

MR. WOOLF: Yes.

MR. ELSON: Thank you. I'd like to move on to large volume customers, and this will take off from some of my discussion with Mr. Neme and Mr. Chernick, and if I can ask you to turn to tab 15 of our document book here. And if you could turn to page 151 of the document book.

MR. WOOLF: Yes.

MR. ELSON: I believe, in an interrogatory response to GEC, you indicated that you were not aware of empirical evidence showing that large volume customers would implement all cost-effective DSM on their own. Is that your recollection as well?

MR. WOOLF: Yes. And I would add all cost-effective as defined by a utility in this regulatory setting.

MR. ELSON: And you also cited a number of studies and then an interrogatory response?

MR. WOOLF: Yes.

MR. ELSON: I have listed those studies here starting at No. 6. You can ignore five and onwards. Those were referred by Mr. Neme. And I'd like to just very briefly go through some of those studies with you.

On the left-hand side is the title of the study and a footnote referring to where it can be found, and on the right-hand side is a quote from the study. So the first item here makes reference to manufacturers having limited capital for investments, and in a survey of industrial sector participants, they responded stating that they expect capital investments to have a short payback period of one to three years and, under difficult economic conditions, a payback of 18 months or less. Is that consistent with your experience as well?

MR. WOOLF: Yes. And I'm not surprised to see that that was their finding.

MR. ELSON: And further down in the next paragraph, it says:

> "Even when end use energy efficiency projects do meet corporate investment thresholds, manufacturers may still not go ahead with such projects if they do not have a direct connection with a company's core business."

And that's consistent with your findings as well. Is that fair to say?

MR. WOOLF: Yes, it is.

MR. ELSON: Item No. 7 here, there is reference, starting at the second sentence saying:

"Moreover, industrial staff members often report that it is difficult to effectively navigate corporate project decision-making systems to get management enforcement."

Is that something that you've heard as well?

MR. WOOLF: Yes it is.

MR. ELSON: And, again, that's a barrier for large volume customers to apply at all cost-effective DSM?

MR. WOOLF: Yes.

MR. ELSON: And further down at the first indented bullet, which is the second bullet overall, it says:

"Energy efficiency projects may compete with core business."

The next bullet point says:

"decision-making is often split across business units."

And the third bullet is:

"Skills required to identify and pursue energy efficiency opportunities are not always present."

So these are, again, further barriers for large volume commerce to implement all cost-effective DSM?

MR. WOOLF: Yes.

MR. ELSON: And the eighth item here is the Synapse report that we have already gone through.

Now, the ninth item here is a -- a report that I took

Ms. Malone to during the technical conference, and because Ms. Malone is not on this panel, perhaps I'll take you to it is a well, and that is at tab 12 of the document book.

MR. WOOLF: Yes.

MR. ELSON: If you could turn to page -- well, first to set the framework, this is a report prepared by the Mowat Centre in February 2014. And if you could turn to page 132, I'll read the underlined portion:

> "Figure 29 displays energy efficiency in terms of electricity and natural gas consumption only in total manufacturing for Ontario relative to U.S. and German peers. Out of these 19 jurisdictions, Ontario ranks 17th, or third-last, in terms of energy efficiency."

And you can see, on the right hand, on page 133, that's the figure that it's referring to. And the top bars that are darker refer to electricity usage, and the lower bars that are lighter refer to gas usage.

MR. WOOLF: Yes, I see that.

MR. ELSON: And if you turn back to page 132, this report concludes:

> "To get a more detailed picture, it is, therefore, important to disaggregate the manufacturing sector and compare sub-industries. When this is done for Ontario and its international peers in the U.S. and in Germany, our main result still holds that Ontario lags most international peers in energy efficiency."

Do you see that there?
MR. WOOLF: I do.
MR. ELSON: Now, I asked this question to Ms. Malone, and I'll ask it again to you: Does this indicate to you that there would be a significant amount of DSM potential in the industrial sector in Ontario?
MR. WOOLF: Yes. It's always a little difficult comparing across jurisdictions, and I will just clarify that the information here is in terms of energy productivity, which is comparable to efficiency but not the same. But, in general, what I've seen in many jurisdictions is there is a lot of cost-effective potential from industry, and it looks like from this there might be a lot from Ontario as well.
MR. ELSON: So based on the reports that you submitted in -- or you made reference to in the GEC undertaking response and also based on your experience in analysing DSM programs, I'd like to ask you the following question, and it will have to be based on a fact that came up earlier in cross-examination which is that Union's large volume customers represent roughly 25 to 30 percent ever its business on a volumetric basis. I can tell you that and I can provide a reference from earlier in the transcript.
But based on that, would you agree that Union cannot achieve all cost-effective DSM in its franchise area if its large volume program is cancelled?
MR. WOOLF: Yes, I think that's a fair statement.
MR. ELSON: Thank you. I have no further questions.

FOLLOW THE LEADERS: IMPROVING LARGE CUSTOMER SELF-DIRECT PROGRAMS

Anna Chittum

October 2011

Report Number IE112

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CONTENTS

Acknowledgements ii
Executive Summary iii
Introduction 1
Efficiency Programming 2
  The Importance of Energy Efficiency 2
  Acquiring and Funding Energy Efficiency 4
  What We Ask of Energy Efficiency Programs 4
  Cost-Recovery Mechanisms and the Industrial Sector 5
The Self-Direct Option 6
  The Continuum 6
  Opt-Out and Self-Direct Programs Today 8
The Self-Direct Opportunity 10
  What Should Self-Direct Programs Do? 10
  Ideal Self-Direct Characteristics 12
The Self-Direct Challenge 16
  Unfounded Assumptions 16
  Lack of Data and Evaluation 17
  Unfair Treatment 18
Best Practices and Recommendations 21
  Program Development 21
  Key Program Elements 21
  Program Variation and Goals 22
Conclusions 22
References 25
Appendix I: Program Synopses 31
Appendix II: Model Language 45
Appendix III: Detailed Summary State Chart 49
Appendix IV: Interview Framework 57

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EXECUTIVE SUMMARY

Energy efficiency offers tremendous system-wide benefits at a portion of the cost of new generation resources. Energy efficiency is highly cost-effective, consistently available at one-tenth to one-third the cost of new renewable or fossil-fuel generation. The benefits of energy efficiency to any given public utility system include lower energy prices, reduced grid congestion, reduced energy-related emissions and increased system reliability. Industrial energy efficiency is some of the most cost-effective energy efficiency available, and investments in industrial energy efficiency benefit users in all sectors of the economy.

Like other utility system resources, energy efficiency is enjoyed by all users and paid for by all users. To fund energy efficiency, states typically implement some cost-recovery mechanism (CRM) on a customer's bill. These moneys are pooled together and are then used to fund cost-effective energy efficiency across multiple sectors. In the industrial sector, CRM fees are used to fund technical assistance, energy management, and incentive programs that encourage energy efficiency investments.

In response to requests by their industrial and large commercial sectors, some states allow those sectors to either "opt out" of paying the CRM fee or "self-direct" all or a portion of the fee into internal energy efficiency investments. Firms that choose to opt out or self-direct their CRM fees are often assumed or required to make energy efficiency investments on their own. These unique programs — opt-out and self-direct programs — are the focus of this report.

This report is based on first-person conversations conducted with over 50 individuals closely acquainted with today's opt-out and self-direct programs. Interviewees included administrators of today's self-direct programs, state regulators, energy efficiency advocates, industrial energy users and officials from other state agencies affiliated with a self-direct or opt-out program's administration. The report discusses the self-direct programs in place today and the policy goals we ought to have embedded within our self-direct programs. It discusses the unique opportunities presented by self-direct programs and the leading self-direct programs in place today. The report also discusses the challenges presented by opt-out programs and poorly structured self-direct programs, and concludes with recommendations of how ideal self-direct programs might be structured.

In some particular cases, well-structured self-direct programs are being used as highly useful tools to industrial customers and other large energy users. Self-direct programs can offer certain tools and a level of flexibility that helps overcome long-standing barriers to greater energy efficiency in the industrial sector. When coupled with strong oversight and extensive measurement and verification of claimed savings, these programs can serve an entire public utility system very well.

Unfortunately, most self-direct programs lack at least one of the critical components of these highly successful (but few) self-direct programs. Forty-one states in the US have some sort of a CRM mechanism in place. Of those, 23 have some sort of opt-out or self-direct provision in place. Only a small number of the self-direct programs are structured to maximize cost-effective energy efficiency and ensure that retained CRM fees are used in a manner that benefits all users of a given public utility system.

This report finds that the structures of opt-out and self-direct provisions vary widely. Opt-out provisions allow customers to simply opt out entirely from a CRM program, and do not measure or verify that a customer has made any energy efficiency investments in exchange for their exemption from paying a CRM fee. Self-direct programs usually assume that customers are making their own energy efficiency investments, but do not usually measure and verify those savings in the manner that would have been done had the customer been making those investments within a CRM-funded energy efficiency program.

In contrast to some of the standout programs identified in this report, the majority of opt-out and self-direct programs are either poorly structured, subject to minimal oversight, or not subject to stringent measurement and verification protocols. This report finds that these programs cannot claim with certainty that they are achieving energy efficiency investments equal to that which would have been achieved had the customers remained within existing CRM-funded energy efficiency programming, or that the industrial customer is being well-served by the program.

The choice by state policymakers to implement an opt-out or self-direct program when developing long-term energy efficiency goals and CRM programs is a popular one. Unfortunately the long-term impact of these programs is not very well known, and program structures in place today generally do not ensure that the CRM funds retained by opt-out or self-direct customers are being well-spent.

Allowing large customers to opt out of CRM programs or self-direct their funds without substantial oversight by regulators or adherence to cost-effectiveness tests, as is found in programs around the country, is unfair to other classes of customers. There are some very good examples of self-direct programs that offer large customers the tools they need to make substantial energy efficiency investments and the peace of mind for regulators that public funds are being spent in a manner that benefits the public good.

This report's appendices include summaries of all known self-direct programs in place today, as well as some suggested model language for effective self-direct programs and a detailed chart of CRM and opt-out/self-direct programs as they exist in each U.S. state.

INTRODUCTION

Energy efficiency, and industrial energy efficiency in particular, offers tremendous system-wide benefits at a fraction of the cost of new generation resources. To fund energy efficiency, 41 states implement a cost-recovery mechanism (CRM) on customers' bills to fund energy efficiency programs. In response to requests by the industrial and large commercial sectors, some states allow those sectors to either opt out of paying the CRM fee or self-direct all or a portion of the fee into internal energy efficiency investments.

These opt-out and self-direct options are growing in popularity. Two years ago 15 opt-out and self-direct provisions were identified in a nationwide assessment (Chittum and Elliott 2009). Today 24 U.S. states allow industrial customers and other large energy users such as institutions to opt out or self-direct a portion of their CRM fees. No single style of opt-out or self-direct program exists, and states around the country have developed a variety of program structures in response to their policy goals and the expressed concerns of their industrial sectors.

It is largely unknown whether or not industrial customers and society at large are best served by opt-out and self-direct programs versus traditional CRM-funded programming. The type of data that would help answer that question is not routinely collected by these programs, and even when it is collected, it is often not subjected to the same rigorous external evaluation as traditional CRM-funded programs.

Optimization of industrial energy efficiency is in the interest of every user of a public utility system because it is a highly cost-effective energy resource. Opt-out and self-direct programs that fail to maximize industrial energy efficiency fail all other energy users in a given public utility system. It is therefore imperative that we understand the state of these programs today, and identify examples of successful self-direct programs, the characteristics of successful self-direct programs, and the challenges facing all self-direct programs.

This report presents substantial new primary research conducted on opt-out and self-direct programs. Between December 2010 and July 2011 interviews were conducted with the administrators or regulators of all identified opt-out and self-direct programs in the US. The interview questions are listed in Appendix IV. Detailed synopses of each self-direct offering can be found in Appendix I. A summary chart of key program characteristics can be found in Appendix III.

The primary focus of this report is self-direct programs. The primary research inquiry addressed by this report is the components of self-direct programs critical to their success and efficacy. This research also revealed challenges facing self-direct programs today, and program characteristics that minimize the overall effect such programs can have.

Self-direct programs can be incredibly effective tools to help certain customers maximize their energy efficiency. In some cases, a well-structured self-direct program can encourage a greater level of efficiency investment than would have occurred in a more traditional CRM-funded program. Self-direct programs, when well-structured and well administered, can give industrial companies and other large energy users the tools they need to overcome barriers to greater energy efficiency investments. For this reason, establishing well-structured and effective self-direct programs is a very worthy policy goal. This report offers examples of successful self-direct programs and discussions of self-direct opportunities and challenges.

The goal is to encourage policymakers and self-direct program administrators to improve their self-direct programs or, if desired, establish new self-direct programs that work. While industrial customers stand to gain the most from well-structured and well-administered self-direct programs, other classes of customers stand to benefit as well.

EFFICIENCY PROGRAMMING

The Importance of Energy Efficiency

The energy supply we rely on in the future will be different from the one we rely on today. As the U.S. works to meet its growing energy needs, the nation will face a number of challenges, including aging plants, constraints on existing transmission and distribution systems, stricter environmental regulations, and the ever-changing economics of fuel acquisition and power generation. U.S. energy demand is projected to continue to grow over the next 25 years. This growth is expected to occur regardless of new policies that may be implemented to help curtail greenhouse gases and reduce demand for energy. Such policies may reduce the rate of growth but will not actually reduce energy use relative to today's consumption (EIA 2011a).

Americans are going to need more electricity, and the cost of electricity is not getting any cheaper (EIA 2011c). With the specter of new and forthcoming EPA regulations, much of the country's existing coal-fired electric-generating fleet, which represents about half of the country's electric generation, will either be retired or will require costly retrofits. Retiring these plants will take a substantial amount of generating capacity offline and raise prices for existing generation in some markets (Elliott et al. 2011). Electricity generators and industries are also going to need more natural gas. Even in a low economic growth scenario, natural gas prices are expected to increase over the next two decades (EIA 2011a).

To meet growing energy needs, policymakers have two primary tools: reducing energy demand and acquiring new energy supply. Reducing demand through the implementation of energy efficiency programs is almost always less expensive than developing new fossil fuel-fired, nuclear, or renewable energy resources. A 2009 review of the cost of saved energy from 14 utility-administered electric energy efficiency programs found an average cost to the utility across all sectors to be 2.5 cents per kWh (Friedrich et al. 2009). Cumulative costs, which include the cost to the customer and utility, have been reported in one study as ranging from .8 cents to 5 cents per kWh (VDPS 2007). Such a low cost places energy efficiency as the cheapest energy resource for a utility by a wide margin. Energy efficiency is consistently one-tenth to one-third the cost of new renewable and non-renewable energy generation resources (Friedrich et al. 2009).

New fossil fuel generation sources range from an average of 6.6 cents per kWh for conventional combined cycle natural gas turbines to an average of 13.6 cents per kWh for advanced coal with carbon sequestration. These numbers do not include costs associated with environmental impacts and other externalities. New renewable-based electricity ranges a bit higher, from an average of 9.7 cents per kWh for onshore wind to an average of 31 cents per kWh for solar thermal power (EIA 2011b). It is important to note that none of these costs for generation sources include additional costs associated with transmission and distribution losses and necessary reserves for generation. Including these expenditures would increase the overall cost of delivered energy from any of these resources.

Figure 1 displays one analysis of the full range of levelized costs of one kWh of electricity from energy efficiency and other major sources. The costs for new generation resources in this figure also do not include costs associated with line losses or maintenance of reserves.

Figure 1. Range of Levelized Costs of Electricity Generation Resources

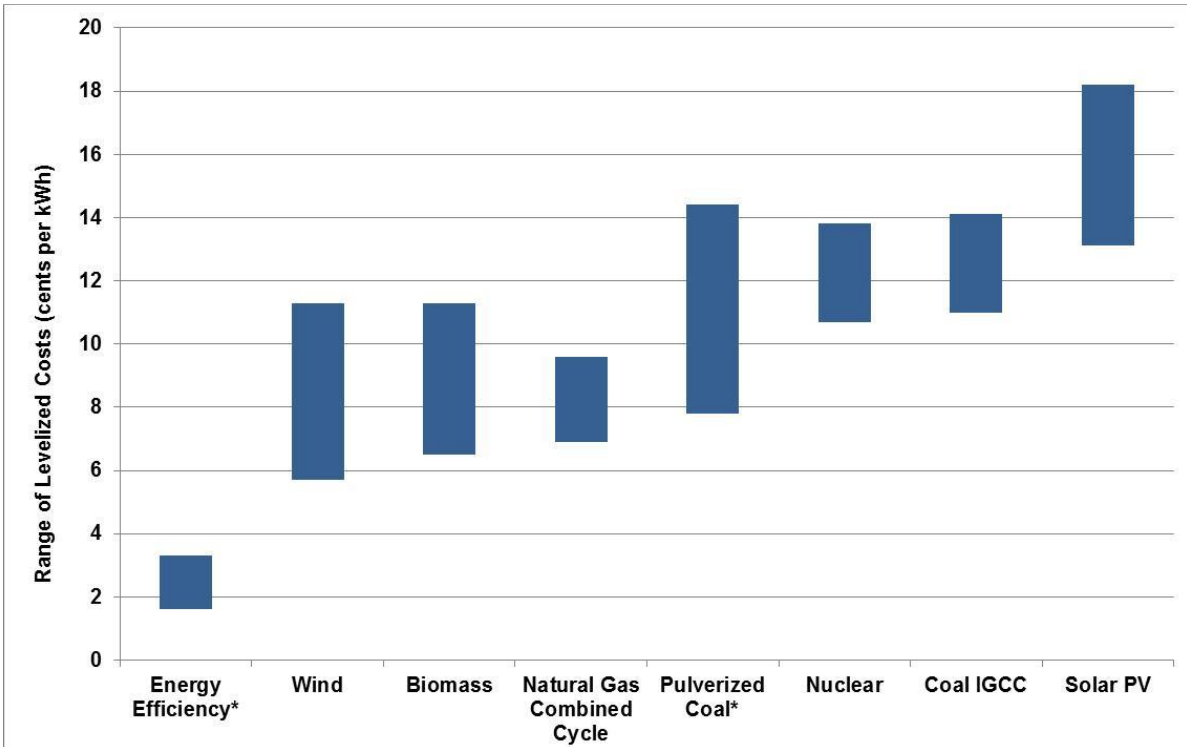


Table notes: Energy efficiency average program portfolio data from Friedrich et al. 2009; all other data from Lazard 2009. High-end range of advanced pulverized coal includes 90% carbon capture and compression.

Energy efficiency offers additional benefits to society besides its low cost:

- It can be brought on line much faster than traditional generation. Each individual energy efficiency investment begins to save energy as soon as it is brought online, unlike larger traditional generation investments that do not become useful until they are completely built, which can take years.
- It helps hedge against future spikes and volatility in energy commodity prices.
- It enhances energy system reliability and puts downward pressure on energy prices.
- Since it is equivalent to delivered energy for a utility, it avoids marginal generation, transmission, and distribution capacity costs, by up to 1.5 times the capacity avoided at a customer's meter. It avoids line losses of about 10% on average, and up to 30% during peak hours (Lazar and Baldwin 2011).
- It reduces the need for new transmission infrastructure.
- It does not suffer from dispatch problems like some renewable resources.
- It reduces overall emissions.
- It can be a powerful economic development tool by generating jobs for people to install and maintain energy efficient equipment and materials.

Policy makers and regulators who recognize the benefits of energy efficiency have increasingly looked to energy efficiency programs to help acquire greater levels of energy efficiency. However, tremendous opportunity for energy efficiency improvements and investments remains in all areas of the country and sectors of the economy.

Acquiring and Funding Energy Efficiency

Many states and utilities[1] have identified energy efficiency as an important system resource because of its low cost and the speed with which it can be deployed. States are increasingly prioritizing the acquisition of cost-effective energy efficiency to improve the affordability and reliability of their energy resources. Energy efficiency is now viewed as a priority when planning for future energy demand despite historically being viewed as supplemental to more traditional generation resources (Kushler et al. 2009). States typically rely on energy efficiency programs, which work with consumers to implement end-use energy efficiency measures, to acquire new energy efficiency resources. Spending on energy efficiency programs in the U.S. has increased every year in the past decade, and total projected energy efficiency budgets for 2010 topped $6.5 billion (Molina et al. 2010, CEE 2010).

Twenty-six U.S. states (Sciortino et al. 2011)[2] have set efficiency savings goals, often in the form of an energy efficiency resource standard (EERS) which sets specific energy savings targets for utilities (Kushler 2006, Kushler et al. 2004). Energy efficiency goals usually seek to obtain the least-cost resources in order to keep the overall cost of energy low for all consumers. The establishment of energy savings goals on the state level is a fairly recent trend. A decade ago energy efficiency programming generally paired monetary spending level goals with cost-effectiveness tests, but did not necessarily establish kWh savings requirements.

Energy efficiency resources are low cost but not free. They typically require an upfront investment in equipment or maintenance or administrative support to acquire the long-term energy savings. With energy efficiency goals in place, utilities, and other entities tasked with meeting these goals, are allowed to recover the costs associated with the energy efficiency program, much the same way utilities can recover the cost of new generation resources.

States employ cost-recovery mechanisms that rely on a small additional fee paid by each customer to pay for energy efficiency. The aggregate funds from the fee are pooled together and used by utilities or other entities to pay for the most cost-effective, or otherwise beneficial, energy efficiency programs across all sectors of the economy. These cost-recovery mechanisms are known by many names, including systems benefit charges, demand-side management tariff riders, energy efficiency riders and public benefits funds. In some cases efficiency program costs are combined with other system costs (such as new generation) and the resultant new costs are reflected in updated rates for consumers. This paper refers to all of these types of mechanisms simply as cost recovery mechanisms (CRMs). According to the primary research, 41 states have some sort of CRM in place to fund efficiency programming in their electric or natural gas sectors.[3]

What We Ask of Energy Efficiency Programs

State regulators approve, and frequently require, public utility funding of energy efficiency programs to provide system and public benefits. Energy efficiency programs can help control energy costs by avoiding the need for new generation and transmission resources. New fossil fuel and renewable generation and transmission facilities are expensive to build, and their costs have historically been borne by all of the customers within the utility's service territory or across the region. Like a new power plant or an investment in transmission infrastructure, energy efficiency programs yield new energy resources that benefit the entire utility system. All customers share the benefits as well as the costs of those resources. Over the past 30 years, regulators, utilities, and the energy efficiency industry have developed rigorous, nationally-accepted practices to measure, verify and evaluate the cost-effectiveness of these programs, to meet statutory requirements that ratepayer funds are prudently spent.

[1] Throughout this report, "utilities" will refer to regulated electric and natural gas utilities, energy efficiency utilities, and other regulated entities that administer CRM-funded energy efficiency programs, such as the Energy Trust of Oregon and the New York State Energy Research and Development Authority.
[2] Throughout this report, "energy efficiency" will refer to both electricity and natural gas efficiency. All EERS programs apply to electricity; some apply to natural gas. For details on EERS policies in each state, refer to Sciortino et al. 2011.
[3] See Appendix III for a list of states with CRMs in place.

Not all energy efficiency is equally cost-effective or equally beneficial. The industrial sector in particular offers some of the most cost-effective efficiency savings available to any given utility (see Goldberg et al. 2009, Energy Trust of Oregon 2011, Kushler et al. 2004). Industrial energy efficiency resources can be half the cost — $/kWh saved — of efficiency resources in other sectors (Kushler 2011). Industrial efficiency measures also have been shown to offer far better benefit to cost ratios than measures in any other sector (VDPS 2007). Therefore maximizing industrial energy efficiency is a priority for utility resource planning and resource acquisition, and for maximizing ratepayer benefits.

Some energy efficiency programs serve statutory objectives beyond just reducing ratepayer costs. Low-income energy efficiency programs, market transformation programs, research and development programs and programs that support education programs in schools are examples of energy efficiency programs that offer positive externalities to society. These programs are sometimes not as cost-effective as industrial energy efficiency programs, but are pursued for their societal benefits (Kushler et al. 2004). These programs also constitute system resources, and are generally paid for by all system users. All sectors benefit from these programs, including the industrial sector. Highly cost-effective industrial energy efficiency programs help balance out a portfolio of programs that include some less cost-effective ones.

Cost-Recovery Mechanisms and the Industrial Sector

Energy efficiency programs are funded primarily by collecting CRM fees from all customers. States with CRMs in place use the aggregated funds to administer a variety of efficiency programs to all sectors. The industrial sector is often served by dedicated energy efficiency programs, which typically offer energy audits, technical assistance, financial incentives, and rebates for investments in energy efficient equipment or adoption of energy-efficient behavior. Other utilities combined their commercial and industrial programs together.

Since CRM fees are most often based on a percentage of a customer’s monthly bill (often 2–5%), energy-intensive industrial firms have long contributed substantially to overall CRM funding pools despite industrial retail rates being much lower than rates for commercial or residential customers. According to current industrial energy efficiency program managers, industrial companies also use substantial amounts of CRM-funded program resources. (NorthWestern Energy 2010, Crossman 2011, Schepp 2011, Chittum et al. 2009).

Some industrial firms around the country have noted at times that they do not receive benefits equal to the amount of CRM funding they contribute. In some cases this is a legitimate viewpoint: industrial program offerings are sometimes not responsive to the needs of customers (Chittum and Elliott 2009). In many recent regulatory filings associated with state energy efficiency regulatory proceedings, representatives of industrial companies or industrial stakeholder groups have submitted filings suggesting that they should not pay CRM fees and should be allowed an option to opt out of the efficiency programs and CRMs (Ambrosio 2011, Haase 2011, IECPA 2009, AZCC 2009).

There are three primary reasons industrial firms believe they should not be subject to CRM fees: 1.) CRM-funded programming is not responsive to their needs. 2.) They already have and will continue to invest in all cost-effective energy efficiency on their own accord. 3.) By paying CRM fees, industrial customers subsidize other rate classes. This report will not determine whether these claims are true, but it is important to understand some of what is known about these issues.

In some instances, the first argument has proven to be true (Chittum and Elliott 2009). However, at least three self-direct programs — in Oregon, Michigan and Wisconsin — reported that customers who had been self-directing or had considered self-directing had chosen to return to paying the CRM fee and using CRM-funded programs because the CRM-funded programs yielded substantial benefits (Stipe 2011, Walker 2011, Schepp 2011). It is worth noting that the CRM-funded industrial offerings in those states all tend to be quite strong.

The second claim — industrial customers will invest in all cost-effective energy on their own, absent any energy efficiency programming — is disputed by many CRM program managers based on their personal experience administering industrial energy efficiency programs. As discussed in the "Self-Direct Challenge" section, self-direct programs themselves offer evidence that the claim is untrue.

The final claim — industrial customers end up subsidizing other rate classes — is a complex one to evaluate. In a recent review of most major energy efficiency programs in the US, utilities acquired 67% of their electric savings from their commercial and industrial customers[4] but only spent 39% of their electric energy efficiency program budgets on those two sectors (CEE 2010). Industrial and commercial customers are enjoying the bulk of programs' energy savings, to be sure. In 2009, US electric sales to industrial and commercial customers by full-service providers accounted for about 59% of all electric sales on a MWh basis, and 55% on a dollar basis (EIA 2011f). Since CRM fees are typically based on a customer's energy consumption (on a kWh or dollar basis), it is possible to suggest that industrial customers contribute, on average, about 55-60% of all CRM fees. It is reasonable to suggest that because industrial and commercial efficiency measures are more cost-effective than those in other sectors, energy efficiency programs get more "bang for their buck" in those sectors and need to spend more of the program dollars in other sectors to achieve a kWh of savings than they do in the industrial and commercial sectors.

Regardless of the above three arguments, the ramifications of letting some large customers choose whether or not to participate in CRM-funded programs are significant. States are increasingly relying on energy efficiency as a low-cost energy resource to meet long-term growth in energy demand and achieve savings targets. Allowing large industrial, commercial or institutional customers to "go it alone" and not participate in CRM-funded programs or well-structured self-direct programs can eliminate a proven low-cost resource, ultimately increasing the cost of energy efficiency savings for everyone.

THE SELF-DIRECT OPTION

The Continuum

As state policymakers have established state EERS and related funding mechanisms, many large energy consumers, especially industrial and large retail corporations, have actively sought to have the option of not paying the CRM fees. As a result, policymakers at the state level have routinely developed "opt-out" options to allow large energy consumers to avoid paying all or part of their assessed CRM funds. In exchange, these consumers are either assumed or required to make their own investments in energy efficiency.

Today, 24 states with CRMs have some option that exempts large energy consumers from paying all or part of their CRM fees or to self-direct the spending of those fees. Some of these programs are called "opt-out" programs, because they allow customers to simply opt out of paying their CRM fees and participating in any energy efficiency programming. Some of these programs are called "self-direct" programs, because they ostensibly allow customers to self-direct some or all of their CRM fees instead of paying into the aggregated pool. These self-direct programs are the primary focus of the remainder of the report.

Many flavors of self-direct program exist. Some states have highly structured and well-considered programs that regularly produce substantial cost-effective energy efficiency savings. Other states have programs that allow companies to opt out of paying their CRM fees, regardless of whether that company ever makes energy efficiency investments. Most self-direct programs are not a strictly defined "type" of energy efficiency program, but rather a point on a continuum of programs that varies dramatically from state to state.

[4] Commercial and industrial data from EIA is combined here for comparison purposes because the complimentary data from CEE is not disaggregated.

Self-direct programs generally have four common elements:

- **They define who is eligible**, either by setting an annual kWh consumption minimum threshold, an average MW demand minimum threshold, or establishing an entire sector or tariff schedule (industrial, transmission customers) as eligible;
- **They offer some "relief" from CRM fees**, by offering an exemption from, rebate against, escrow of, or credit to the CRM fees paid by the participating customer;
- **They are officially sanctioned and administered** by a utility, public service commission or state energy department;
- **They expect some energy savings in return** by assuming, requesting or requiring that the participating customer invest some or all of the saved money back into energy efficiency projects on site.[5]

Though most self-direct programs feature these elements, there are various permutations that are possible. As such, they look and operate very differently from state to state. Self-direct program designs are affected by state energy efficiency goals and mandates, local utility leadership, the opinions and actions of the local industrial sector, and the guidance and involvement of state legislators and regulators.

Since self-direct programs vary widely, it is useful to identify several main categories of self-direct programming because generalizations can be made about each category. Table I presents the opt-out/self-direct continuum and identifies critical categorical distinctions along the continuum, from opt-out to various flavors of self-direct. As we progress to the right across the table, each category yields greater and greater reliability of energy efficiency savings.

Table I: Opt-Out/Self-Direct Program Continuum

	Opt-Out	**Self-Direct**		
Type of program	Opt-out	Less structured	More structured, lower oversight	More structured, higher oversight
Payment of CRM	None	None	Fully/partially on bill	Fully/partially on bill
M&V of savings	None	None/minimal	Minimal, self-reported	Minimal to substantial
How funds used	Firm assumed to use saved CRM funds for energy efficiency	Firm assumed to use saved CRM funds for energy efficiency	Rate credit or project rebate	Personal escrow account, rate credit or project rebate
Follow-up	None	None to minimal	Minimal	Minimal to substantial
Examples	NC, KY	MN, MO	MT, OR	WA, CO

Public Benefit Maximization

Sources: Elliott and Chittum 2009, Young 2011, Stipe 2011, Helmers 2011, Landers and Montgomery 2010, Edwards 2011, Schutt 2011, Walker 2011, Mauney 2011, Landers 2011, Goetze 2011, Romero 2011, Zarnikau 2011, Wankum 2011

Table I separates the true opt-out category from the remainder of the self-direct program categories. These true opt-out programs lack significant structure, and cannot truly be called efficiency "programs." Rather, the opt-out provisions in place in these states allow a company to avoid paying the entire CRM fee, with the company not required to provide any information about the energy

[5] For programs that allow industrial customers to aggregate multiple sites to qualify for a self-direct program, the energy efficiency investments are often made at only one or some sites, and the customer may use their aggregated savings from all sites to pay for the investments at one or some of their sites.

efficiency investments that they have made. In some cases, customers are allowed to opt out for economic competitiveness reasons; that is, they make the case that paying the CRM fee is burdensome to them. There are fewer true opt-out provisions than there are self-direct programs. Most opt-out programs offer customers the option of opting out, though in Texas and Maine large industrial customers — those that take service at the transmission level — are simply not allowed the option of participating in CRM-funded electric efficiency programming. Such treatment is common for natural gas CRM-funded programs, where most gas transportation customers are not included in CRM programs at all.

Moving right across the continuum, the less structured self-direct programs will also often exempt a customer entirely from paying their CRM fees. These programs require the customer submit some documentation stating that the customer has invested in energy efficiency in the past or plans to do so in the future. Often this is a single page letter and a copy of a purchase receipt, but the customer is not required to provide detailed information about the investment, and no thorough external analysis or evaluation of a customer's claimed efficiency savings is performed.

Continuing right across the continuum are more structured programs but with low oversight. These programs typically require that a customer wishing to avoid paying all or part of the CRM actually pay the CRM fees up front, and then submit paperwork to the self-direct program administrator to earn back a rebate or to earn a credit on their utility bill. Though these customers do have to submit evidence that investments have been made, the program administrators report they do not have the time, resources or authority to verify the claimed investments or savings.

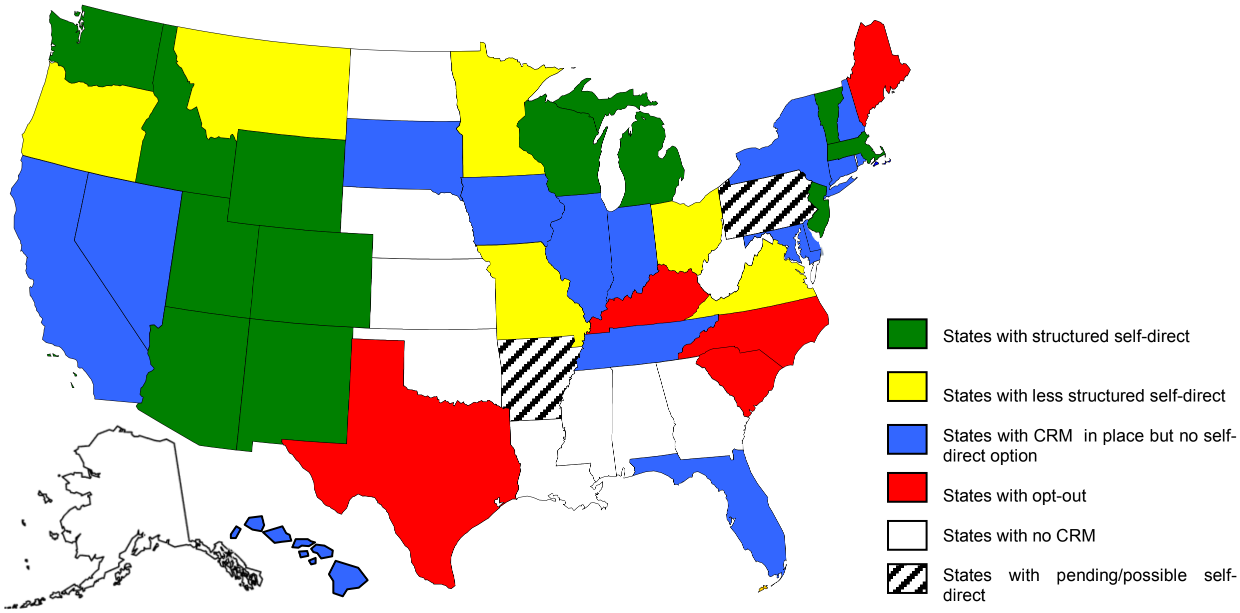
At the far end of the self-direct continuum are the more structured programs with high levels of oversight. These programs can be viewed as true resource acquisition programs, generally subject to evaluation, measurement and verification protocols of the same rigor as other CRM-funded efficiency programs. Customers' CRM fees are often collected and then administered by program staff, funding investments as they are reviewed and approved. These programs usually let a customer self-direct most of their CRM fees, but retain a portion of those fees to fund administration of the program and other programs that serve other public benefits, such as market transformation and low-income programs. Highly structured and well administered programs with substantial oversight offer the best examples of successful and effective self-direct programming.

Opt-Out and Self-Direct Programs Today

In the past several years the number of states with opt-out and self-direct programs has increased from the 15 (identified in Chittum and Elliott 2009) to 25 (profiled in this report). Figure 1 identifies the states where self-direct and opt-out programs can be found currently. It also indicates which states have some sort of CRM in place, but offer no self-direct option.

It is clear that opt-out and self-direct options are gaining popularity, and ACEEE has been approached by other states that are considering these program options. Model self-direct program design guidance is needed because of the potential low-cost energy efficiency opportunity available in industrial sector, and the potential to miss those opportunities with opt-out or poorly structured self-direct programs.

Figure 1: Opt-Out and Self-Direct Program Options in the United States



Sources: ACEEE 2011, APS 2011, Chittum and Elliott 2009, Cross 2011, Stipe 2011, Edwards 2011, Goetze 2011, Goff 2011, Helmers 2011, Landers 2011, Landers and Montgomery 2010, Mich. Comp. Laws 2011, Schepp 2011, Schutt 2011, Timmerman 2011, Walker 2011, Welch and Fraser 2011, Whitehead 2011, Williamson 2011, Xcel Energy 2011, Young 2011

ACEEE's earlier research on opt-out and self-direct programs (Chittum and Elliott 2009) found that while some self-direct programs are very structured and work diligently to verify that self-directed funds are actually spent on cost-effective energy efficiency, most programs were lacking in structure, oversight, or both. Two years later that trend still exists, though some of the newer self-direct programs, such as those found in Michigan, New Mexico and Colorado feature more structure and oversight than earlier programs. Some of the most effective self-direct programs discussed in this report can serve as models for new and emerging offerings.

Table II illustrates how varied the opt-out and self-direct program landscape is currently, listing ten representative self-direct programs and some of their key characteristics. Detailed descriptions and analyses of each opt-out or self-direct program can be found in Appendix I. Self-direct programs have in the past primarily focused on large industrial customers. More recently, self-direct programs have begun to allow other customers to participate, including large commercial and/or institutional customers. As Table II shows, participating companies experience different programs depending on the state.

Besides the expansion into new sectors, several other new trends in self-direct programs can be identified. The first is a trend toward allowing companies to aggregate the loads of multiple facilities in order to meet a self-direct program's minimum threshold. For example, while a state may establish 1 MW average annual demand as the minimum a company must meet in order to participate in the self-direct program, it may also allow a company to aggregate the demands of multiple facilities together to meet the limit. Self-direct programs, along with EERS, are beginning to incorporate natural gas efficiency investments as well as electricity efficiency. Finally, some self-direct programs continue to allow participating customers to receive credit for past efficiency investments when calculating the customer's rebate or credit.

With so many different self-direct options in place, and no established framework for what constitutes a successful and effective self-direct option, the policy question "What should self-direct programs be designed to do?" has remained unanswered.

Table II: Select Opt-Out and Self-Direct Programs and their Critical Characteristics

State	Example administrative body	Eligibility	Who does measurement and verification?	Energy savings goals for customers?	Level of oversight	How much of CRM fee does customer retain?	Level of utility involvement	How is CRM money recouped?	How many customers participating?
CO	Xcel Energy	2MW, 10GWh	Xcel Energy	No	High	Some	High	Rebate per kW or kWh, up to 50% project cost	Less than .5% of eligible
KY	Duke Energy	Transmission customer	None	No	Low	100%	Minimal	Full exemption	13; 100% of eligible companies
MI	All regulated utilities	1MW / 5MW aggregated	Utilities	Yes, same as EERS	High	100% - admin and low-income	High	Partial exemption	47 companies
MT	North-Western Energy	1 MW	None	No	Medium	Up to $500,000 per customer	Minimal — acts as "bank"	Dedicated escrow, quarterly reimbursement	57 companies
NC	Duke Energy	1GWh	No one	No	Low	100%	Minimal	Full exemption	
OH	AEP	700,000 kWh	AEP/PUCO	No	Medium	Up to $225,000 per project / total exemption	High	Rebate or exemption	7 opt out, many more self-direct
UT	Rocky Mountain Power	1 MW/5GWh	RMP	No	High	80%	High	Rate credit	30% of eligible companies
WA	Puget Sound Energy	3aMW, certain schedules	Customer + PSE	No	High	82.5%	High	Dedicated funds, competitive bid	Approx. 44 sites; >75% of eligible
WI	All regulated utilities	1 MW	Company + Public Service Commission	Yes	High to Medium	100% - admin and renewables	Medium	Escrow, milestone payments	0

Sources: Helmers 2011, Cross 2011, Landers 2011, Edwards 2011, Chittum and Elliott 2009, Haemmerle 2011, Mauney 2011, Romero 2011, Schutt 2011, Walker 2011

THE SELF-DIRECT OPPORTUNITY

What Should Self-Direct Programs Do?

Self-direct programs should be designed to achieve desired policy goals. Just establishing a program and calling it "self-direct" does not guarantee the program offerings will truly encourage energy efficiency in the industrial sector or yield cost-effective energy savings. A self-direct program *can* be a reliable resource acquisition program[6], able to produce dependable and measurable energy savings. Well-developed self-direct programs can indeed inspire industrial firms and other participating companies to make substantial energy efficiency investments and help reach state energy efficiency goals that benefit everyone, including themselves. It appears that in some cases, self-direct programs can yield greater savings from certain customers than would have been achieved through traditional CRM programs. They can also leverage a facility's internal technical expertise to multiply the impact of the program dollars dedicated to energy efficiency, perhaps even at a lower cost when compared to CRM-funded programs.

A self-direct program can be a very unique, helpful, and attractive offering to an industrial firm that wishes to make investments in energy efficiency. Self-direct programs can help bridge the gap between existing commercial/industrial energy efficiency programs offered by local utilities and the needs of industrial and other large energy consumers, especially in places where the existing utility program offerings are not very strong. Good self-direct programs allow customers more flexibility in the use of their CRM fees, thereby enabling them to:

- More fully leverage their own internal technical expertise;
- Better make the case for internal support of energy efficiency investments;
- Multiply the impact of program dollars dedicated to energy efficiency;
- Implement projects over longer time periods and enjoy funding for larger percentages of project costs as compared to than traditional CRM programs;
- Meet their facility's individualized energy needs; and
- Capture traditionally hard-to-reach energy efficiency savings.

CRM cost-effectiveness tests and methods for evaluating project costs generally account for a measure's full costs and benefits compared to new generation. Thus, self-direct programs that use a utility's in-place CRM cost effectiveness criteria will likely encourage certain projects that would not have passed an internal payback period test by a customer who was simply comparing the cost and benefits of a project to the cost of avoided energy purchases. Opt-out programs in particular rely simply on a customer's internal investment decision-making criteria. While an opt-out customer might decide that a certain measure does not meet her own internal criteria, it might be beneficial enough to the energy system at large that the utility would find it met its investment criteria. A good self-direct program should not leave those projects languishing.

Self-direct programs have been developed in response to claims by large industrial firms that they will, as a smart business practice, continue to invest in all cost-effective energy efficiency. A self-direct policy framework should measure and verify these savings and be able to incorporate them into long-term energy system planning. The industrial sector offers substantial savings opportunities; whether or not those opportunities are taken advantage of can impact overall system demand for years into the future. Tracking the effect of energy efficiency investments made by self-directing customers enables policymakers to gauge the long-term energy demand of the industrial sector.

Self-direct programs should be able to answer the question, "Is this program yielding the same or better energy efficiency savings than would have been acquired with a traditional CRM-funded efficiency program?" Some large industrial customers have called CRMs "penalties." CRMs are established by utility regulators as a fair condition of electricity or natural gas service to pay for a system-wide resource. Paying little or no CRM fees is a special privilege that customers may earn by offering a countervailing guarantee of performance, like every other use of CRM fees. Quality data collection, a hallmark of today's CRM programs, is one way policy makers and regulators can determine whether a self-directing customer or a self-direct program as a whole is earning the special privilege. To help answer the above question, self-direct programs should be collecting data that will enable an "apples to apples" comparison.

[6] A "resource acquisition program" is a program that can be counted on to deliver a reliable amount of energy savings. An energy efficiency resource acquisition program can then be compared to the acquisition of other energy resources for purposes of energy system resource procurement.

Finally, self-direct programs and the CRM-funded programs serving the utility's service area should help the customer make informed decisions about whether or not to avail themselves of the self-direct option. A customer should be well informed about the services and benefits forgone by opting for self-direct and should be clearly informed of the risks of non-compliance with the terms of a self-direct program. In the cases where a CRM program would clearly better serve a customer, a self-direct program should be able to suggest that a customer might prefer not to self-direct.

Ideal Self-Direct Characteristics

A number of current, successful self-direct programs offer robust and replicable examples of how to structure self-direct programs that work. These programs are effective for a variety of reasons, and have creatively responded to their customers' needs. More successful self-direct programs feature several particular characteristics that make them good at capturing energy efficiency savings. The administrators of today's successful self-direct programs:

- Run them as a resource acquisitions effort,
- Make them flexible,
- Offer CFOs a reason to care,
- Develop smart reimbursement plans,
- Use a stick — if necessary, and
- Stay close and collect meaningful data.

Run Them as a Resource Acquisition Effort

Measurable energy savings can be achieved, though most self-direct programs do not evaluate, measure or verify information pertaining to installed savings. Instead, self-direct programs tend to track the amount of money spent on energy efficiency by self-directing customers, paying far less attention to the amount of energy (e.g. kWh or therms) saved. Like traditional CRM-funded programs, self-direct programs can operate like resource acquisition programs: delivering reliable savings while satisfying desired cost-effectiveness tests.

A useful first step in running a self-direct program that operates like a resource acquisition program is to set some energy saving goals for customers. These goals could be based on state-level efficiency goals for utilities, as in Michigan, or on other parameters, as at Oregon's **Eugene Water and Electric Board (EWEB)**. At EWEB individual self-directing customers develop energy savings goals in collaboration with the utility's staff. EWEB wants to keep the energy savings goals simple to understand and administer, and so it looks at the load shares of their self-directing customers and develops energy savings goals based primarily on the percent of load a customer represents. The customer's load profiles and the average customer conservation activity in the previous year provide EWEB with enough data to develop five-year energy savings goals for their self-directing customers. Annual true-ups of the savings help keep the goal in sight, and EWEB notes that they are acquiring more efficiency from their two self-directing customers than they had in the past when the customers were using EWEB's standard CRM program offerings (Welch and Fraser 2011).

EWEB staff, and staff at other programs that ask self-directors to meet actual energy savings goals, say that developing concrete savings goals help improve the working relationship between the customer and the self-direct program administration. Instead of focusing on dollars, these goals keep the conversation focused on energy. When customers buy into the idea of energy savings goals, they learn to squeeze more energy savings out of a dollar. Their internal goals are different than those of a typical self-direct program that simply asks that customers spend a certain amount of money. The customer is empowered to learn more about making the most cost-effective investments towards his energy goal instead of just trying to satisfy a monetary spending goal. The self-direct program's goals are aligned with those of the customer, and interactions between the two entities are more amicable.

Make the Program Flexible

As with EWEB's savings goal, most self-direct programs establish program periods that span one or more years. The inclusion of multiple years to a program period is one way self-direct programs can offer more flexibility to customers who often study and make investments in different components of a new project over a period of time that spans more than one year. Customers can then plan their energy efficiency investments well ahead of time. This allows them to schedule efficiency investments during planned plant downtimes which may happen very infrequently, avoiding the high costs of lost production during a shutdown done exclusively for energy retrofit purposes.

Rocky Mountain Power takes the goal of flexibility one step further and operates a self-direct program that is project-based instead of year-based. Customers are not presented with an either/or option when choosing whether or not to self-direct. Instead, they may choose to self-direct specific projects, and use CRM-funded programs for other projects. This structure keeps industrial firms connected to and communicating with Rocky Mountain Power, and customers may choose from Rocky Mountain Power's full suite of CRM-funded tools for projects they do not self-direct. While some self-direct programs leave customers entirely on their own, Rocky Mountain Power staff says that only a few customers really are savvy enough to maximize their energy efficiency. The flexible self-direct offerings of Rocky Mountain Power allow customers to access the utility's technical assistance and expertise as needed (Helmers 2011).

Offer the CFOs a Reason to Care

A constant challenge for industrial energy efficiency programs is making the business case for energy efficiency to the holder of a company's purse strings. A facility manager may understand the importance and advantage of substantial energy efficiency investments; a CFO may see a slightly longer payback than other non-energy projects and conclude energy efficiency is a poor use of internal funds. While an energy efficiency program might be comfortable supporting an investment with a five-year payback period (compared to a power plant investment with a financial lifetime of multiple decades) an individual company or CFO may not.

The CRM fee is often just seen as a component of a utility bill and thus an operating expense, further exacerbating the challenge of convincing internal decision makers to engage with CRM-funded programs. The CRM fee is part of the general operations and maintenance (O&M) budget. Since it is such a small portion of a facility's monthly energy bill (usually 2-5%), it is generally paid without much thought, whether or not a company actively uses CRM-funded programs. Whether those programs are worth that fee is not something a CFO bothers with. A CFO would likely prefer to simply see the company's monthly energy bill lowered by removing the CRM charge.

A good self-direct program moves the CRM fee, and energy efficiency funding generally, out of the O&M budget and into the capital expenditures budget. It does this by separating the CRM fee from the rest of the utility bill and showing the customer that the self-direct-able portion of the CRM fee is a dedicated amount of money specifically able to fund energy efficiency projects. This gives facility managers an opportunity to show corporate leadership that the CRM fee is a tangible and manageable amount of money. It is no longer simply embedded in an energy billing rate, lost amid the noise of monthly expenses.

A good self-direct program also helps a customer overcome higher internal hurdle rates — that is, the minimum return a company requires before it makes an investment. It does this by setting aside money specifically for energy efficiency, which the customer must use or forfeit, and encouraging and providing funds for projects that make sense even with a long payback period. The **New Jersey Clean Energy Program** self-directed pilot program empowers customers to tackle both of the above issues by asking them to develop portfolios of desired energy efficiency investments, and funding the portfolio of investments up to certain program maximums.

The New Jersey program is a multi-phase one. After an initial investment plan is developed by the self-directing customer, the New Jersey program sets aside dedicated funds to fund the portfolio. In this way the self-directing customer is encouraged to invest in projects with longer payback periods, because the self-direct program is effectively financing the investments. The internal hurdle rate for investments is minimized in importance, because the funds are coming from an external source. And CFOs are happy to approve and seek energy efficiency investments, because they understand that the money is theirs to use or lose. This type of structure is an effective way to help overcome the entrenched investment-making decisions in industrial firms that can sometimes hinder greater energy efficiency (Ambrosio 2011).

Develop a Smart Reimbursement Plan

Each self-direct program offers its customers a slightly different mechanism of reimbursement for some or all of their CRM fees. While each type offers different benefits, some are more likely to encourage cost-effective energy efficiency than others, especially when coupled with other effective program structures.

Grants and rebates, which fund energy efficiency investments either before or after they are implemented, are common among self-direct programs. They can be simple to administer and generally require that a customer continue to pay their CRM fees on their monthly bills. They offer companies lump sum payments for promised or completed efficiency investments, and are most similar to traditional incentive programs.

Rate credits offer customers a credit against the CRM fees they pay on their monthly bills, usually as a result of demonstrated energy efficiency investments. Rate credits offset part of or the entire CRM fee, and can encourage customers to continue pursuing new energy efficiency projects as they become accustomed to the reduced monthly bills. Rate credits reduce the company’s utility bills over time, but still make energy efficiency happen. They can also provide a construct for an internal funding pool for energy efficiency, if a company chooses to earmark the monthly discounts as positive cash flows.

A competitive bidding process aggregates the funds from all self-directing customers. Proposed projects are submitted in for bid and self-direct program administrators decide the best use for the funds, focusing typically on cost-effectiveness and overall energy savings. This type of structure can be effective because it leverages the competitive nature of participating companies. Companies do not want to be left out of the community activity of making energy efficiency investments.

Puget Sound Energy administers one of the more creatively structured self-direct programs in the nation by combining grants with a competitive bid process. Self-direct programs operate with five year windows. PSE works with self-directing customers to track CRM contributions for future use, and allows them to earn an incentive against their tracked contributions whenever an approved project is completed. The program begins with a non-competitive phase during which customers are guaranteed access to their portion of CRM fees. At the end of the non-competitive phase, all remaining funds not committed to projects are aggregated together and disbursed via a competitive bid process among all self-direct customers, encouraging highly cost-effective projects. PSE found that once the competitive bid process neared and a deadline loomed, projects “went like gangbusters” because many companies did not want to relinquish any of their own “use it or lose it” funds to a multi-customer pot of money — particular when it might be used by a competitor.

One important experience of the PSE program has been the very large volume of competitive projects that have been proposed during the competitive bid process. For example in 2009 self-direct customers proposed cost-effective energy efficiency investments of over four times the amount of funding actually available in the multi-customer pot of money. PSE has found that this is common during their competitive bid process, and is evidence of the large supply of cost-effective energy efficiency in the industrial sector not being captured by existing programs (Landers and Montgomery 2010).

PSE says its self-direct program is acquiring energy efficiency at a cost equal to its other CRM-funded programs and that the program is actually acquiring more efficiency than would have otherwise been acquired. This is because the PSE self-direct program customers leave “money on the table” when they do not invest in energy efficiency. Customers just paying a CRM fee may be content paying the monthly bill and not taking advantage of CRM programs and services. The PSE self-direct program brings that same amount of money to their attention and specifically sets it aside for energy efficiency. The PSE program is an excellent example of how to leverage the flexibility inherent in a self-direct program (Landers and Montgomery 2010, Landers 2011).

Use a Stick — If Necessary

Most self-direct programs do not penalize customers for failure to meet energy savings goals. Nor do they check on equipment after it is installed to make sure it is capturing claimed energy savings. While such structures may not be necessary, some self-direct program managers have found that pairing a stick with the carrot — that is, the privilege of self-directing their CRM fees — they can better encourage customers to meet energy savings goals or use up all of their allotted CRM funds. The stick or penalty becomes a tool that facility managers can take to their corporate leadership, allowing them to impress upon the company’s financial decision-makers the importance of making substantial investments in energy efficiency.

Penalties in self-direct programs vary, depending on the type of reimbursement plan in place. Where a company earns rate credits or rebates in advance of project implementation, a penalty may be incurred if the planned project does not come to fruition. Customers may have to pay back the portion of the rate credit or rebate attributable to the project that was not implemented. Self-direct programs such as the one found in **Michigan** ask customers to meet set energy savings targets. If a customer fails to meet its targets it must repay CRM fees in proportion to the shortfall. The Michigan program takes into account the reasons behind the customer’s failure to meet the energy savings goals and may lessen or deepen the penalty based upon an assessment of the customer’s actions. Though the Michigan program features the repayment structure, utilities there have been hesitant to use it, for fear of political consequences (Michigan S.B. 213, Walker 2011).

At **Puget Sound Energy** the “stick” is simply customers lose the CRM funds they have paid if the money goes unused. Other self-direct programs use this method as well to encourage maximization of energy efficiency among their customers. Customers are loath to give their money to another entity and once they understand they have a dedicated amount of money to use on energy efficiency projects, they will do almost anything to avoid leaving “money on the table.” Customers are incentivized to determine a use for their money quickly, lest they end up relinquishing it to a neighbor or competitor (Landers 2011).

Stay Close and Collect Meaningful Data

Many self-direct programs, and all opt-out programs, make a one-time decision about a customer’s self-direct status and then conduct little to no follow-up, or follow up within several years. While this requires few program administrative resources, it does not allow a utility or regulator to assess the impact of the self-direct program. It also does not allow program administrators to assess whether the self-direct program is serving its target customers well.

Perhaps most alarmingly, keeping self-directing customers at an arm’s length prevents program administrators from collecting the kind of useful data that are collected in CRM-funded programs. Program administrators need to know:

- The type of investments,
- The cost of each investments,
- The overall cost of energy saved,

- The amount of energy saved by each individual measure, and
- The overall amount of energy saved.

These are important data points that can help utilities and policymakers better craft and administer energy efficiency programs in the future. If a self-directing customer is not acting in good faith, its behavior can have system-wide impacts. Failing to acquire the most cost-effective energy efficiency can put upward pressure on energy prices and generally increase the overall cost of efficiency programming.

Xcel Energy's self-direct program, administered in its Colorado and New Mexico service territories, maintains strong relationships and communication with its self-direct customers. It engages in substantial communication with its self-direct customers at the beginning of their self-direct application, identifying necessary data points early on in project development. Xcel requires pre-installation energy monitoring and regularly reviews and evaluates self-direct program performance. Xcel tasks its highest level engineers to review self-direct project engineering analyses and energy monitoring plans. The result is that Xcel is equally as confident in the self-direct program's claimed savings as in those claimed in the more traditional CRM-funded incentive programs. Such confidence in savings is rare among self-direct programs (Romero 2011).

The above examples illustrate that self-direct programs can be well constructed and successful in encouraging cost-effective energy efficiency. Some self-direct program managers are confident that their programs are producing savings of similar quality to those achieved through more traditional programs, though data is not usually collected to yield true "apples to apples" comparisons among self-direct programs and more traditional CRM-funded energy efficiency programs. It is clear that in some cases the flexibility and unique tools offered by self-direct programs enable greater efficiency than would have been achieved with more traditional programming. In a few select states, self-direct programs have developed into highly effective tools in a state's suite of energy efficiency programming.

The Self-Direct Challenge

As noted in the previous section, examples of successful self-direct programs exist. Unfortunately, developing and administering a self-direct program can be a challenge. Most self-direct programs and all opt-out programs feature a number of characteristics that are troubling to those interested in maximizing cost-effective efficiency across all sectors. The successful self-direct programs noted in the previous section are the exceptions to this rule. For self-direct programs to establish themselves as essential components of a state's energy efficiency efforts, the following challenges will need to be addressed:

- Unfounded assumptions on which the programs are predicated,
- Lack of data and evaluation within programs, and
- Unfair treatment of self-direct customers and other classes of customers.

Unfounded Assumptions

Self-direct programs are predicated on some assumptions about industrial energy efficiency that are largely unfounded, or at least not substantiated by available data. The assumptions are that industrial companies are better at acquiring energy efficiency than CRM programs and will always acquire all cost-effective energy efficiency on their own, absent any efficiency programs. These assumptions, repeatedly promoted by some industrial sector stakeholders during energy policy discussions, have provided the policy basis for opt-out and self-direct programming in almost every state with such an option, despite their shaky foundations. Instead of establishing self-direct programs because they are effective energy efficiency programs in their own right, self-direct programs have tended to be developed as a response to these assumptions, put forth by some vocal members of the industrial sector.

Industrial Customers Do Efficiency Better

The first assumption on which opt-out and self-direct programs are based is that industrial companies are better at capturing cost-effective energy efficiency than CRM-funded programs. This assumption also includes the inherent belief that CRM-funded programs are not capable of serving the industrial sector well. In many states, evidence suggests otherwise. ACEEE has studied industrial energy efficiency programs for years, and has, over the years, consistently identified industrial energy efficiency programs that are tremendously effective at capturing energy efficiency from their customers (see Chittum et al. 2009, York et al. 2008). Though it is clear that some CRM-funded programs are not as effective as others, examples of CRM-funded programs serving their industrial sectors well are easily found.

In fact, self-direct programs themselves tend to refute this assertion. In Wisconsin, where industrial energy efficiency programs have historically been quite strong, no single customer has chosen to take advantage of the self-direct program. Wisconsin's policy-makers and administrators of the CRM-funded programming attribute the lack of interest in the self-direct option to industrial companies' perceptions that Wisconsin's Focus on Energy programs serve them well and provide benefits equal to or greater than their individual CRM fees (Schepp 2011, Schutt 2011). In Oregon, companies have increasingly stopped using the self-direct program and instead chose to pay into the CRM-funded programming offered through the Energy Trust of Oregon. Customers have noted that they made the switch to take advantage of the Energy Trust's incentives and technical assistance. This has been especially true as the Energy Trust has developed more industrial-focused offerings (Crossman 2011, Stipe 2011).

Industrial Companies Will Maximize Cost-Effective Efficiency

Another assumption frequently made during the development of opt-out and self-direct programs is that industrial customers will always do all cost-effective energy efficiency because doing so makes good business sense. This claim is typically followed by the assertion that the CRM fee is a "penalty" (Chittum and Elliott 2009, Schwartz 2011, Crossman 2011, Lazar 2010). While industrial firms in the U.S. have continued to become more energy efficient per unit of product output, they have not necessarily captured all cost-effective energy efficiency. Again, opt-out and self-direct programs have proven this to be true. In Utah, Wyoming and Oregon, customers can opt out of all or part of their CRM fees if they can prove that they have in fact done all cost-effective energy efficiency. In the case of Utah and Wyoming, "cost-effective" means that a project has a simple payback of eight years or less; in Oregon it is ten years. To date, no company has taken advantage of these exemptions in any of these states, because there are always some cost-effective projects that could be identified during an energy audit (Helmers 2011, Stipe 2011).

Lack of Data and Evaluation

Measuring and evaluating the true costs and benefits of energy efficiency programs and projects is critical to maximizing efficiency's public benefits. Conducting data collection and analysis ensures money is not wasted that could otherwise be used to acquire efficiency. Customers of all classes paying a CRM fee to support system-wide energy efficiency want to know that their dollars are not being wasted. Similarly, when customer rates increase because a new power plant is built, customers want to know that the power plant is running as effectively as possible. Performance data must be collected to know this.

Opt-out programs collect little to no data, and self-direct programs often do a poor job of collecting and analyzing data. This is due largely to the structure of self-direct programs, which generally allow for few if any dedicated staff and few additional resources. Most but not all self-direct programs retain a percentage of a customer's CRM fee to cover program administrative costs, though the amount retained can be quite small and insufficient to pay for all desired program administrative activities. These collections range from about 5% to 20% of a customer's CRM fee. Self-direct programs are also often challenged by competitive concerns of participating customers who may not wish to share data about their operations. Collecting data or verifying data submitted by customers takes time and effort, and self-direct programs are typically shoestring operations that may employ one or two full-time individuals to process paperwork.

Only a handful of self-direct programs evaluate overall program performance, which can offer comparisons between the self-direct program and the alternative CRM-funded program. Most self-direct programs do not collect data on pre-installation energy use of a company's systems to which energy efficiency improvements are applied and therefore, programs cannot develop baseline energy use assessments in order to ascertain the impact of the self-direct program.

Self-direct programs that do ask for more detailed data on specific projects before they provide a reimbursement have to rely on a company's internal or third party energy analysis. Some self-direct programs are better than others at reviewing the customer-provided data on installed measures, but many do not conduct their own measurement and verification of the claimed savings. Several opt-out and self-direct programs give credit for projects that are planned for the future, and very few of those conduct substantial follow-up with customers to verify one, two or three years down the road that planned projects were completed.

Industrial energy efficiency programs already suffer from a general dearth of data. Limited data collection from opt-out and self-direct programs yields missed opportunities to learn more about what works and what fails in the industrial sector. In South Carolina, Duke Energy allows customers to opt out of paying the CRM fee after they submit a letter stating that they have or plan to implement cost-effective energy efficiency investments. No proof is required beyond the letter. Duke staff acknowledge that collecting more data might be useful for their program planning purposes but they are not tasked with data collection or program evaluation and do not have the resources to dedicate to it (Mauney 2011, Duke Energy 2011b).

In some states, such as Montana, different entities are responsible for different aspects of the self-direct program. While one party may assume that the other is more engaged in monitoring and reviewing the energy efficiency investments of self-direct customers, the other party may assume the opposite. In Montana, the utility administering the self-direct program assumes that the state agency reviewing self-direct reimbursement claims is conducting some verification of claimed savings. The utility is not authorized to conduct project savings evaluations, and, in fact, neither is the state agency. The state agency does not evaluate the investments or review them for accuracy of claimed energy savings (Edwards 2011, Trasky 2011, Young 2009).

Beyond understanding how well self-direct programs are working, data from self-direct projects and programs can help a state or region plan for the long term impact of industrial customers' energy use and energy savings. Without proper data collection, there can be no meaningful analysis, no reliable measurement and no useful evaluation of a program's societal worth.

Unfair Treatment

Opt-out and self-direct programs can be unfair to other customer classes. No other class of system user is allowed to opt out of paying for a system benefit or escrow their CRM payments. This is true regardless of the actual amount of benefit each user enjoys. Since all ratepayers enjoy the benefits of energy efficiency, in the form of lower demand for new resources, reduced environmental impacts of energy supply, reduced power and fuel costs and other factors, it is arguably fair that all ratepayers pay for it. All other system resources, such as new generation assets, are generally paid for by all customers.

Some self-direct programs and all opt-out programs take certain select companies out of the communal framework and, if those companies fail to make energy efficiency investments with their saved CRM fees, deprive customers in the remaining classes from the benefits of low-cost industrial energy savings. Opt-out programs in particular allow customers to pay nothing toward energy efficiency and acquire no new efficiency without penalty. Self-direct programs that fail to acquire the amount of efficiency that would have been acquired via a CRM-funded program also do the other classes of customers a disservice. On the other hand, the few self-direct programs that appear to encourage greater levels of efficiency investments among participants bring a greater level of shared energy efficiency benefits to all customers.

Granting Credit for Historic Savings

The primary role of energy efficiency programming is to procure new energy savings. Energy efficiency programs exist because energy efficiency is low-cost and offers ancillary benefits. Self-direct programs that allow free ridership — they pay for energy efficiency that would have been acquired absent any programming — are not serving an overall public good but are instead providing participating customers with added income, at the expense of more efficiency that could have been achieved with additional efficiency programming.

One of the most visible ways opt-out and self-direct programs allow free ridership is through the crediting of historical investments in energy efficiency. North Carolina, South Carolina, Oregon, and Ohio are examples of states whose opt-out and self-direct programs give or have given credit to previously installed energy efficiency investments, implemented prior to the commencement of the opt-out or self-direct program. Giving such credit does not acquire a single new kWh, and it reduces the overall efficiency benefits of a self-direct program. Large industrial customers contend that granting such credit is the only fair way to adequately credit early action on energy efficiency, but there is no reason that large customers need to be credited for earlier investments, since they already benefit from the long-term energy savings which presumably were cost-justified based solely on avoided utility costs.

Giving credit for previous investments is most often done when an opt-out or self-direct program is first established, often in an effort to satisfy industrial customers. Offering such credit is a preferential treatment of a single class of customer and does not serve any energy-saving purpose. It is a politically useful program characteristic, but it does not ensure that new cost-effective energy is procured for the benefit of all. Giving recently installed measures credit in a self-direct program may be a useful political tradeoff to implement new long-term energy efficiency CRM program and savings goals if implemented for a very small window of time, such as one year, and only for outlier investments recently made that greatly exceed the normal average annual efficiency expenditures by those customers.

The Opportunity Costs of Opt-Out and Self-Direct Programs

In recent years states have moved away from setting spending amounts and just watching the dollar amount spent on efficiency In doing so they have moved toward setting specific energy savings goals for their utilities and monitoring kWh saved, treating energy efficiency as a highly reliable system resource and an integral part of an overall resource acquisition strategy (Sciortino et al. 2011). In contrast, most self-direct programs require dollar-for-dollar parity, asking or allowing customers to spend an amount equal to what they would have paid in CRM fees, regardless of the amount of kWh that spending acquires. These structures can make savings by self-direct customers harder to project or plan for, and harder to count on as a system resource. In states where no entity "claims" the savings acquired through a self-direct program, incentives for utilities to encourage energy efficiency, if they exist, will not apply to self-direct savings.[7]

[7] See ACEEE's 2011 report, *Carrots for Utilities,* for more information on shareholder financial incentives designed to encourage investor-owned utilities to provide energy efficiency programming: http://aceee.org/research-report/u111.

Only a few self-direct programs — Michigan, Wisconsin, Eugene Water and Electric Board and Vermont's Self-Managed Energy Efficiency Program — set individual kWh or kW goals for customers and base reimbursement levels on the progress the customer makes toward the goal (Welch and Fraser 2011, Mich. Comp. Laws 2011, Chittum and Elliott 2009, Goetze 2011, Schutt 2011). Most self-direct programs do not set individual customer energy savings goals, or do not link a customer's reimbursement of CRM fees to the meeting of those energy savings goals.

As an opt-out or self-direct customer, spending the same amount of money on energy efficiency measures as they would have spent on CRM fees does not necessarily yield the same amount of energy savings as would be acquired through a CRM-funded program. CRM programs are subject to extensive cost tests and are rigorously vetted to ensure that the dollars spent through CRM programming are in all consumers' best interest. When opt-out or self-direct customers are not required to meet the same cost-effectiveness tests as CRM programs, they will make energy efficiency investment decisions based on their avoided energy costs — their current retail rates. CRM programs set cost-effectiveness rules and make decisions about the economic viability of an individual energy efficiency investment after considering the full cost of new generation resources, since energy efficiency can mitigate or reduce the need for new generation. Energy efficiency projects make much more economic sense when compared to new generation, and so CRM programs can justify investing in energy efficiency projects with longer payback periods. Far fewer energy efficiency projects will be economically justified by individual customers in opt-out programs and self-direct programs that do not require projects be considered within a framework that includes TRC, since they will not have an incentive to invest in projects with longer payback periods.

Few self-direct programs can answer the question, "Could this money be better spent elsewhere?" Only some programs — notably those in Arizona, Washington, Wisconsin, Ohio, Colorado, Utah and Wyoming — require that some cost-effectiveness test be met (Chittum and Elliott 2009, Schutt 2011, Helmers 2011, Landers and Montgomery 2010, Romero 2011, Cross 2011, Williamson 2011). However, just satisfying a cost-effectiveness test offers no guarantee that the self-direct projects are achieving the amount and type of savings that would have been achieved in a traditional CRM program. Additionally, in some self-direct programs, cost-effectiveness tests are based on self-direct customers' own internal decision-making requirements. So while an industrial firm may chose not to make an investment based on its internal cost of capital, the measure might be accepted as fundable and feasible by a well-structured self-direct program using a cost-effectiveness test that includes s. This illuminates why participation in a CRM program or good self-direct program

Opt-out and self-direct programs are not benign policy decisions. Industrial firms offer tremendous efficiency opportunities, and not maximizing those highly cost-effective opportunities can have far-reaching negative effects. Industrial efficiency measures also can offer much higher benefits to costs than measures implemented in any other sector (VDPS 2007). Taking the extensive industrial savings out of both the numerator and denominator of overall year-to-year system savings calculations can eventually increase the overall cost of savings and deprive other classes of customers of the benefits of industrial savings. Additionally, opt-out and self-direct customers often represent substantial system loads and contribute significantly to CRM funding pools. For instance, nearly one third of all CRM fees are self-directed within NorthWestern Energy's Montana territory (NorthWestern Energy 2010). While those firms may be making smart decisions with their funds, they also may not. One-third of NorthWestern's funds are not subject to the kind of scrutiny its CRM-funded programs are.

Self-direct programs run by utilities and those typically tasked with acquiring energy efficiency in a state tend to be more structured and view themselves as more effective than those run by energy offices or other entities operating programs on a more sporadic basis. Utilities and other program implementers already know the market and they know the kinds of investments that self-directing customers have already made. They have experience collecting data from the sector and may already have information on a company's baseline energy consumption. In states like Arkansas, where self-direct program structures being considered explicitly do not include the involvement of a utility, the overall efficiency benefits of a self-direct program could be limited from the beginning.

To summarize, data to determine whether self-direct programs are good policy decisions is usually not collected and does not exist for most self-direct (and all opt-out) programs. As such there may be no reliable way to calculate the opportunity costs of most self-direct programs. Without this data it is impossible to know whether self-direct programs are acquiring savings equal to — or even exceeding — what would have been acquired in a CRM-funded program.

Best Practices and Recommendations

There are no perfect self-direct programs, but there are many programs that are good at what they do. Current and future administrators of self-direct programs can learn from the experiences of existing self-direct programs. Below are several best practices and general program design recommendations that current and future self-direct programs ought to consider when building or updating their programs.

Program Development

The voice of large energy consumers is typically quite prominent as new self-direct programs are developed. Letters from large energy consumer coalitions support opt-out provisions or minimally structured self-direct programs in many state-level cases. While the concerns of the industrial and large commercial stakeholders are important for policymakers to consider, there is usually less representation from other customer classes during discussions on large consumer treatment. It is critical, then, that state regulators and policymakers, as representatives working on behalf of all of the state's residents, work to develop offerings to large energy consumers that are still fair to all other classes of customer.

Key Program Elements

Energy efficiency anywhere benefits everyone in an energy system. Industrial energy efficiency savings tend to be the most cost-effective, and thus offer the entire system increased energy efficiency at a low cost. Therefore, a self-direct program that maximizes cost-effective energy efficiency in the industrial sector is an ideal policy goal. To achieve such a program, self-direct program administrators should:

- Develop a program structure that allows facility managers to treat their CRM fee payments as dedicated funds for energy efficiency, either through dedicated escrow accounts, rebates earned only upon project completion, or rate credits earned concurrently with measurable energy efficiency investments and/or energy savings;
- Include a mechanism to recoup paid funds from self-direct customers if it is determined that savings were claimed erroneously or if planned savings did not actually occur;
- Collect and establish self-direct customers' baseline energy use data;
- Focus on energy savings rather than funds expended towards energy efficiency;
- Measure and verify all claimed savings, using the same standards for data collection as industrial CRM-funded energy efficiency programs;
- Retain a portion of a customer's CRM fees to ensure self-direct customers contribute to fund a program's administrative costs and other prioritized program costs (such as low-income programming or market transformation) that all other customer classes pay for via their CRM fees;
- Generally not allow credit for efficiency investments made prior to the commencement of a self-direct program;
- Offer self-direct customers multi-year time frames (e.g., 4 years) in which to expend aggregated CRM fees. If the fees go unutilized, make them available to other customers for cost-effective projects; and
- Employ the same cost-effectiveness tests for self-direct projects as are used for other CRM programs, and develop a reliable account of the cost of saved energy within the program.

Program Variation and Goals

Self-direct programs may vary between states depending on the state's unique needs. However, it is critical that the goals of a self-direct program be well articulated prior to the iterative process usually relied upon to develop and finalize a self-direct program's structure. Such a process can often stay so focused on the details that the larger overall policy goal is lost or never established.

Treating self-direct programs as "throw-away" programs by denying them at least some staff or not counting on them for resource acquisition purposes sends the message to self-directing customers that a utility, regulator, or policymaking entity does not care what they do. Such a statement can have long-term negative consequences, because industrial energy efficiency goals are not taken seriously and as a consequence more power plants are needed: power plants that are typically more expensive per kWh than energy efficiency programs (see Figure 1).

Self-direct programs might consider joining the larger policy trend that is migrating away from setting spending goals in energy efficiency programming and toward a focus on meeting actual energy savings goals. Specific goals for each self-directing customer, and smart aggregation of a self-direct customer's CRM fees, can yield savings that surpass those that could be achieved within a CRM-funded program. Measuring actual energy savings of installed measures, as opposed to simply tracking estimated savings, would also help self-direct programs know the true impact of customer energy efficiency investments.

Successful self-direct programs engage self-direct customers and give them added flexibility that they cannot enjoy through traditional CRM-funded programs. These self-direct programs help industrial customers overcome higher internal investment hurdles and help them make long-term investments in their facilities. Exemplary self-direct programs encourage their customers to maximize cost-effective energy efficiency not just because they are required to, but because increasing energy efficiency benefits everyone, including the individual customer.

Self-direct programs are often the result of political processes and may not always be perfect. But they can ensure that funds intended to acquire cost-effective energy efficiency do capture efficiency for the benefit of all.

CONCLUSIONS

There is substantial evidence that very successful and effective self-direct programs exist in some states. However, many self-direct programs are not ideally designed to maximize energy efficiency and many are developed with little thought towards structure or effects. The self-direct programs that are successful are thoughtfully designed by people familiar with industrial decision-making and are often well-utilized by industrial and large commercial customers to acquire cost-effective energy efficiency in those sectors. In some states, well-structured and adequately measured self-direct programs appear to have achieved energy savings equal to or greater than what would have been achieved without a self-direct option. For this reason, policies should support well-structured self-direct options. An opt-out program, however, is never a wise policy decision.

Designing and running an effective self-direct program can be a challenge. The results in this report establish that most self-direct programs lack at least one of the critical components identified as necessary to maximize the cost-effective energy efficiency in their target sectors. Many self-direct programs are hamstrung by minimal staffing and by regulated or legislated structures that do not allow for accurate measurement and evaluation of the program's impacts. Many self-direct programs are held to lower standards of data collection and analysis than the typical industrial and large commercial efficiency programs. Further, many self-direct programs are not subject to the same rigorous cost tests found in other efficiency programs that ensure public benefit funds are being well spent.

While a self-direct option may indeed be an adequate tool to acquire cost-effective energy efficiency in these sectors, the assumptions and arguments used to support the establishment of a self-direct program are often inaccurate and unfounded. Worse, the data to determine whether self-direct programs are beneficial to society simply is often not collected.

The self-direct option was developed largely as an alternative to opt-out provisions, which allow users to completely opt out of paying for system-wide energy efficiency. Self-direct programs respond to the belief among some industrial and large commercial energy users that some utility-administered energy efficiency programs are not responsive to their needs. Self-direct programs are mostly designed to serve a small number of large energy-using customers. Policymakers have rarely established self-direct programs as primary means to acquire efficiency savings. When states have established new energy efficiency goals and programs, the self-direct option has been, in nearly every case, developed in response to requests from large energy users.

The goal of energy efficiency programs and policies is to achieve energy savings in a cost-effective manner. Since industrial energy efficiency is among the lowest cost energy resource, maximizing efficiency in the industrial sector is critical to meeting these goals. Energy efficiency benefits all users within a utility system, regardless of where the actual end-use efficiency investment takes place. Self-direct programs that fail to leverage and take advantage of the highly cost-effective energy efficiency opportunities in the industrial, commercial and institutional sectors do a disservice to every energy consumer.

The good news is that self-direct programs can be very effective energy efficiency programs, and some have proven themselves as creative programs that serve the hard-to-reach industrial sector quite well. In some cases these program even appear to serve their industrial customers and other large energy users even better than other CRM-funded offerings.

Self-direct programs should be viewed as a privilege offered to large energy users since they provide flexibility not accorded to other consumers. With privilege comes responsibility, so participants in self-direct programs should be expected to meet a reasonable level of reporting and savings validation so the benefits of the program are assured to all other energy users. As increasing numbers of states establish self-direct programs, it is imperative that rigorous performance requirements be in place to assure that all consumers are receiving the benefits from the low-cost energy efficiency resource. The opportunity cost of allowing companies to self-direct will remain unknown without strict requirements.

There are exemplary self-direct programs that offer large energy consumers all the benefits of a self-direct program while providing the rest of society a low-cost energy resource. Successful programs represent a model for developing effective industrial self-direct programs and provide evidence that, when done right, self-direct programs can be true assets to states' and utilities' suites of energy efficiency programming.

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APPENDIX I: PROGRAM SYNOPSES

Arizona
(Williamson 2011, APS 2011, ACC 2009)

In Arizona, the Arizona Public Service Company administers a self-direct program that requires that all eligible projects meet existing cost-effectiveness standards applicable to CRM programs. Customers may aggregate multiple facilities together to meet the required minimum of 40 million kWh per year. Customers have access to 85% of their CRM fees, including the DSM cost-recovery amounts embedded in rates. Customers may fund up to 100% of project costs. After contributing CRM fees for one year, customers are given two years to file an energy efficiency project application. They may use all the aggregated CRM fees from that year — minus 15% that is retained for administrative costs, low-income programs and measurement and verification.

If a large enough project is developed and the existing self-direct pool of money from the single year does not cover 100% of project cost, customers may continue to self-direct their CRM fees until the project's cost is covered, for a period of up to ten years. Measurement and verification of project savings is conducted by APS staff in a fashion identical to what is conducted for CRM projects. If customers choose not to continue to self-direct for the following year, they are defaulted back into APS's standard CRM programs. If funds are not used by the self-directing customer, the funds are returned to the overall CRM funding pool. The program has been used by one customer.

Colorado and New Mexico
(Romero 2011, Xcel Energy 2011)

In many respects, Xcel Energy runs its self-direct program like any other industrial offering. The same staff offer custom, prescriptive and self-direct programs to industrial and large commercial customers with average demand greater than 2MW and annual consumption greater than 10 GWh. Companies can aggregate to meet the minimum thresholds and in Colorado, self-direct customers are generally already large enough to be served by one of Xcel's 15 large account managers. Several hundred customers are large enough to qualify for the self-direct program, but less than .5% have chosen to actually self-direct. Ten self-direct projects were completed in 2010.

Self-direct customers continue to pay their assigned CRM fee, and self-direct projects are reimbursed through a rebate. Customers may earn rebates of up to 50% of the incremental project costs, either $525kW or 10 cents per kWh. If customers choose to self-direct, they may not take advantage of Xcel Energy's other incentive and rebate programs. The self-direct rebates are richer than those offered through other incentive programs, in exchange for the in-house engineering analysis required of a self-direct customer.

Xcel Energy holds its self-direct customers to the same cost-effectiveness tests as any of its other efficiency customers. While self-direct customers provide their own engineering analysis, they must meet the same total resource cost tests as all the other industrial and commercial offerings. Customers can get pre-approval for self-direct projects, and have two years to complete the project and earn their rebate. Xcel is responsible for reviewing project implementation and monitoring plans and project total resource cost analyses. It tasks its most senior engineer with review of all major technical details, and works directly with the self-directing customer to come to an agreement on what data will be required of the project.

Results and Discussion
Xcel Energy did not have energy savings goals for its self-direct program in 2009, but in 2010 it exceeded its goals by 200%. Due to the close proximity of Xcel Energy engineers to self-direct customers, Xcel Energy is "just as confident" in the savings reported by self-direct customers as in savings acquired through its other efficiency programs. It views its self-direct program as equally responsible for producing efficiency that maximizes ratepayer funds and believes the self-direct program is a "good steward" of ratepayer funds.

To further ensure ratepayer funds are used in a manner that maximizes system efficiency, Xcel Energy does not offer credit through its self-direct program for previously made efficiency investments. Xcel Energy believes that their self-direct program can only claim savings that they have "influenced," and expects their regulators will hold self-direct program savings to the same scrutiny for free ridership as they do Xcel Energy's other efficiency programs. Attention to rigorous evaluation and cost-effectiveness standards within their self-direct program stood out among most other self-direct programs.

Xcel Energy reports that they are receiving an increasing number of applications to the Colorado self-direct program. The New Mexico self-direct program only began this year and no one has taken advantage of it thus far.

Idaho
(Anderson 2011, Pengilly 2011)

Idaho Power offers its largest customers an option to self-direct the 4.75% energy efficiency rider that appears on all customer bills. Only a small number of customers take advantage of this program, which forecasts out a company's efficiency rider contributions over the course of three years and makes 100% of those funds available to fund up to 100% of project costs. If a company has not used its dedicated self-directed funds after three years, the funds are released to the utility's general fund for energy efficiency.

Self-direct projects are subject to the same criteria as projects in other efficiency programs. Either Idaho Power's own internal engineers or a company's selected third party engineers will review the project. Idaho Power checks to ensure the project has been physically completed prior to releasing payment. In some cases this means engaging in follow-up metering to ensure the claimed savings are accurate.

Results and Discussion
The very small number of self-directing customers represents only a small portion of the utility's load. It is not a heavily used program and is not relied upon for significant industrial savings.

Kentucky
(Storck 2009, KRS 2011, Haemmerle 2011)

Duke's opt-out program in Kentucky is applicable only to electric customers that take transmission service on Rate TT. Duke describes these customers as those with "energy intensive processes" and thus eligible, under the existing statutory language, to opt out of paying for energy efficiency programming. The Kentucky Revised Statutes state that the Kentucky Public Service Commission "shall assign the cost of demand-side management programs only to the class or classes of customers which benefit from the programs" and that customers with "energy intensive processes" who choose to make cost-effective efficiency investments instead of participating in the existing demand-side management programs "shall not be assigned the cost" of those programs.

Customers that opt out of paying the energy efficiency rider must indicate that they either have or will in the future make cost-effective energy efficiency investments in their facilities. Duke does not measure and verify these savings, and customers that opt out may not take advantage of other Duke energy efficiency programming.

Results and Discussion
Currently thirteen customers take TT service and are thus eligible to opt out of the energy efficiency programs, and all of them opt out.

Maine
(Efficiency Maine 2010, Voorhees 2011, Burnes 2011)

Though large industrial customers that take transmission and sub-transmission service do not pay into Maine's CRM programming, federal stimulus funds and collected money from the Regional Greenhouse Gas Initiative have allowed Efficiency Maine to offer energy efficiency programming to the state's largest industrial customers. However, the customers still do not pay into the CRM. The Efficiency Maine incentives and custom grant programs are now used by large industrial customers, and if the additional non-CRM funding is exhausted, the customers will no longer be able to use the efficiency programs.

Since being allowed to use Efficiency Maine programs, industrial customers have used them to do everything from making routine repairs to funding major upgrades.

Massachusetts
(Mosenthal 2011)

Large electric customers in Massachusetts can access a self-direct program called the Accelerated Application Process. Customers still pay their CRM fees, but then have access to 85% of those fees over the course of two years to fund energy efficiency investments. The remaining 15% is retained to fund the administration of the program. Customers develop the projects on their own, and must adhere to some measurement and verification processes and protocols.

Large gas customers do not pay any CRM fees, but are currently pursuing a self-direct-styled program.

Results and Discussion
The electric self-direct program was previously used by some larger industrials and area educational institutions, but interest in the program has waned since many of the participants determined that they could receive greater benefits from remaining in the traditional CRM-funded programming.

Michigan
(Walker 2011, Mich. Comp. Laws 2011, MPSC 2010, SB 213)

Michigan's self-direct option, which was codified in 2008 in conjunction with the state's EERS, is unique among all self-direct programs. Michigan's self-direct program requires that large consumers develop and implement their own energy efficiency savings plans consistent with the energy savings goals required of electric utilities as part of the state's EERS. All but the absolute largest self-direct customers must secure the assistance of an "energy optimization service company" to help assess current energy use and develop the energy savings plan.

Customers with annual demands of 1MW or an aggregated demand among multiple facilities of 5MW may participate in the self-direct program. Over the next few years these peak demand requirements will be further reduced, allowing a greater number of customers to participate in the self-direct program.

Self-direct customers do not pay fully into the CRM fees in exchange for the execution of their energy savings plan, but they do pay a portion of their assigned fees to cover administration of the self-direct program. Customers submit their energy savings plans for review by their utility, and the utility approves the plan and reports aggregated program data to the Public Service Commission.

Results and Discussion
During the first two years of the self-direct option in Michigan, 77 companies signed up statewide. This year the number has dropped to 47, in part because some of the original self-directing companies signed up for self-direct prior to fully understanding the energy efficiency programming that would be offered by their local utility. Companies have also become more reluctant to take on the risk associated with not meeting savings targets within the self-direct program.

The requirement that individual companies meet the same energy savings targets as large utilities has proven difficult to administer in some cases. One of the biggest hurdles is that self-direct customers presently cannot carry over savings from year to year. However, draft rules in place will extend the self-direct window up to five years, allowing customers to make big investments in some years and enjoy a guaranteed self-direct status in future years as they enjoy the savings from the large investment.

For the most part, the self-direct program has yielded reliable and expected savings, and customers have met their savings goals. However, it is unclear whether or not the claimed saving are truly occurring in each self-directing facility. Utilities have proven reluctant to aggressively “police” their customers, but no other entity is responsible for ensuring that claimed savings are occurring.

An additional challenge for the self-direct programs in Michigan is that no companies have applied to become qualified and certified as energy optimization service companies. State regulators are addressing this issue currently.

Minnesota
(Haase 2011, Minnesota Session Laws 2011)

Minnesota offers a self-direct option to its largest customers, allowing full exemption from their assigned CRM fees. Customers with 20MW average electric demand or 500MCF of gas consumption may participate. In addition to meeting these threshold requirements, customers must show that they are making “reasonable” efforts to identify or implement energy efficiency, and that they are subject to competitive pressures that make it helpful for them to be exempted from the CRM fees.

Participating customers must submit new reports every five years to maintain their exempt status. These reports identify the type of equipment purchased in the last five years, the facility’s consumption and energy productivity trends. The utility is only minimally involved in the self-direct program administration; the state’s Department of Commerce functions as the manager of self-direct accounts and the arbiter of whether a company qualifies for self-direct and is satisfying its obligations.

Results and Discussion
12 customers are taking advantage of the self-direct provision and the program administers have a basic understanding of the efficiency investments that are being made by those that are exempt from paying the CRM. An effort to get additional assessment of claimed savings by an external third party has recently been made by the Department of Commerce, which acknowledges that the energy savings information collected from its self-direct participants is minimal, and substantially less than what would have been collected had they remained in a CRM-funded program.

Every five years companies are reassessed for their eligibility to participate in the self-direct program. To date no companies have been removed from the program for failing to satisfy eligibility requirements.

Missouri
(MOGA 2009, Wankum 2011, MCSR 2009, Sivils 2011, Laurent 2011)

In Missouri, Senate Bill 376, adopted in 2009, established the Missouri Energy Efficiency Investment Act, which permitted utilities to develop and administer energy efficiency programs that achieve “all cost-effective demand-side savings.” Embedded within this bill was an opt-out provision that allows customers a full exemption of all CRM fees, called the Demand Side Investment Mechanism. There are three ways to qualify for opt out from utility demand-side and energy efficiency programs: customers may indicate they have a demand of at least 5,000kW in the previous twelve months; they may show that they are an interstate pipeline pumping station, regardless of size; or they may show that they have a “comprehensive” demand or energy efficiency program in place that is saving an amount at least equal to “utility-provided programs,” and that they have a demand of at least 2,500kW in the previous twelve months.

A rule in the Missouri Code of State Regulations gives more clarity to how the opt-out program shall be administered. In particular, the rule requires that companies that wish to qualify for opt-out under the 2,500kW/comprehensive DSM plan category must submit their plan to the Missouri Public Service Commission for review. The Commission is to provide the customer with a decision within 30 days. Customers wishing to opt out under either of the other two categories simply provide notification to their utility that they wish to opt out. There is no follow-up or ongoing monitoring of the efficiency investments made by any opt-out customers due to a dispute among interested parties regarding statutory authority.

Results and Discussion

There was a time period of under two years in which the statutory authority for the opt-out provision, SB 376, allowed opt-out, but the rules requiring that the Public Service Commission be notified when companies ask to opt out were not in place. During that time, some customers did choose to opt out, but there was no requirement that these notifications be sent to the Public Service Commission Staff on an ongoing basis. Kansas City Power and Light has two self-direct customers, Ameren Missouri has nine.

Since the rules became effective in May 2011, four customers have chosen to opt out, and none have asked to opt out under the 2,500kW provision. The opt-out mechanism is “still evolving,” as the Public Service Commission has not yet been asked to review a company’s energy efficiency and demand-side plan.

Montana

(Young 2009, Young 2011, Edwards 2011, NorthWestern Energy 2010, Trasky 2011)

NorthWestern Energy’s Large Customer self-directed program operates as a sort of escrow account, allowing customers to direct their CRM funds into an account specifically earmarked for their future use. Customers with demand larger than 1MW are allowed to self-direct their CRM funds. Once a self-direct project is complete, the self-directing company submits the appropriate paperwork and NorthWestern Energy issues payment to the customer on a quarterly basis in order to cover project costs up to their annual CRM contribution, which itself is capped at a $500,000 annual maximum contribution. Companies have two years to use their funds and unused funds are returned to the larger pool of CRM revenues which NorthWestern directs to qualifying low-income energy efficiency projects in following years.

NorthWestern administers the funds but no pre-qualification or measurement and verification is provided by, nor required of, the utility. Self-direct customers file annual reports with the Montana Department of Revenue. The department makes these reports available for public consumption, and a public “challenge” process is provided. Additional scrutiny or review of self-direct projects is not required or performed absent a public challenge.

Results and Discussion

The NorthWestern Energy self-directed program appears to be quite popular among eligible companies. In 2010, of 56 customers on the self-direct program, 50 self-directed all of their eligible funds toward specific projects. Since 2009, all but one of the eligible companies chose to self-direct their CRM funds. Only one company has annual electric consumption the yields the full maximum $500,000 annual CRM contribution. NorthWestern Energy believes that the majority of the participating customers are incentivized through the self-direct program to make efficiency investments that they would not have otherwise made. Since the companies must pay the CRM anyway, they understand that they have to use the funds or lose them, and that motivates company decision makers to use the funds on new efficiency projects or other qualifying activities that deliver value to the company. Additionally, few of these customers would qualify for Northwestern’s CRM-funded efficiency programming as those programs are limited to supply customers and most of the self-direct customers buy energy supply in the wholesale market rather than from NorthWestern. At the end of 2010, $23,028 of unused Large Customer funds were directed to low-income programs. Large Customer companies also self-directed an additional $156,734 to low-income projects.

An unanswered question about the NorthWestern program is to what extent the energy savings claimed by self-direct customers actually occur. In 2010 the Large Customer group contributed $2,740,668 in CRM charges — or about one third of all CRM funds — and self-directed nearly all of those monies. Montana statute and administrative rules do not require evaluation of self-directed activities. The state's Department of Revenue, which is tasked with acting as a "watchdog" of the program, is also not tasked with conducting verification of these efficiency investments. Since the reports issued by self-directing customers are generally "bare bones" ones — with information about the type and amount of expenditure — it is impossible to know whether the self-direct program is acquiring cost-effective energy savings. NorthWestern does not report self-direct energy savings as part of its energy efficiency portfolio.

Large customers of other electric utilities in Montana are also allowed to self-direct CRM funds according to Montana law.

New Jersey

(Ambrosio 2011, NJCEP 2010, TRC 2011)

In New Jersey a pilot self-direct program run by TRC for the CRM-funded New Jersey Clean Energy Program targets large customers in multiple sectors. The budget for the pilot in 2011 is $20 million. To qualify for the program, customers must have contributed at least $300,000 in CRM funds during the 2010 calendar year. Customers may aggregate multiple buildings or sites together to meet the threshold. Individual facilities must have an annual billed peak demand of 400kW or greater as well. Additionally, all applicants will be ranked by the value of CRM contributions in 2010, and approximately the 25 top contributors will be allowed to participate in the program pilot.

The pilot program will reserve a specific amount of CRM contributions for use as a grant towards future energy efficiency investments. This reserved amount may be any of the following: an amount based on the customer's previous CRM contributions, an incentive per saved kWh or Therm, a percentage of the total project cost, or $1 million. The minimum grant per participant is $200,000.

Participants in the program may develop a draft self-direct investment plan, called a Draft Energy Efficiency Plan (DEEP), outlining, among other things, the proposed projects and its estimated savings and costs in dollars and energy, the facility's baseline energy use and a description of additional financing the project will receive. Upon approval of the DEEP, program funds are reserved for the customer.

Funds are committed to the customer only once a customer completes a Final Energy Efficiency Plan (FEEP), which must be certified by a professional engineer and incorporate measurement and verification plans. Once the DEEP is approved, customers have 120 days to submit the FEEP.

Once the FEEP has been approved, customers have one year to install the measure(s) and satisfy the remaining program requirements. Incentives are paid once the customer submits all of the invoices for the installed measure(s), the complete measurement and verification report described in the FEEP, certified by a professional engineer, a certificate of compliance with the prevailing wage, and any descriptions of differences between the project as completed and what was described in the FEEP. If necessary, customers may be granted a six-month extension to install the measure(s).

All projects must demonstrate a simple payback of eight years, and no credit is given for previously installed measures. Combined heat and power projects are eligible for this program.

Customers electing to participate in the self-direct program may not take advantage of other New Jersey Clean Energy Program programs. Self-direct customers may take advantage of other incentive programs offered by other state and local entities, but the total incentives may not exceed 100% of the project costs.

Evaluation, measurement and verification will be similar to that of other projects funded by the New Jersey Clean Energy Program. While measurement and verification may be done by the customer's external engineers, TRC will have a dedicated program manager to monitor and reviews all FEEPs and measurement and verification reports. Customers must comply with all external evaluation activities as requested. Pre- and post-inspections will be conducted as needed.

Results and Discussion

New Jersey's self-direct program is a pilot program, launched in August 2011. The program is anticipated to support approximately 25 projects. The program's savings goals for 2011 are 172,538DTH and 36,046MWh.

The program was designed in response to the desires and concerns expressed by industrial customers, and will likely include customers in the institutional and commercial sector as well. It has been designed to respond to concerns by industrial customers that traditional CRM-funded programs have not lined up with their internal budgeting processes. The pilot program will be evaluated for its ability to work with customer's internal budgeting timelines and investment decision-making activities. The hope by program developers is that the program will encourage greater participation by the state's largest energy users by simplifying the process for receiving incentives for investing in energy efficiency.

Ohio

(Moser 2011, AEP 2011a, Cross 2011, Duke Energy 2011a, AEP 2011b)

Ohio offers different self-direct and opt-out provisions depending upon which utility a customer takes their service from. In the state of Ohio, customers pay an energy efficiency rider on their bill, which serves as a CRM and funds energy efficiency programming in multiple sectors. With the development of new energy efficiency goals and funding mechanisms, Ohio also developed a set threshold — 700,000KWh — at which customers of the state's regulated utilities must be offered the option of opting out of paying into CRM programs.

At AEP, both a self-direct and an opt-out program are offered. The self-direct program offers customers an incentive for previously implemented energy efficiency measures. The one-time incentive is 75% of whatever the calculated incentive under AEP's prescriptive or custom incentive program would be. Projects must have been implemented after January 1, 2008. The AEP program is a consistent "look back" program, and pays customers for projects they have already implemented. New program years will have new "look back" periods, but will move forward as the program year moves forward. Project submitted for incentives must produce 100% of the stated energy savings and/or a reduction in peak demand over a five year time period.

The maximum incentive limit at AEP for self-direct projects is $225,000, and there are limits for individual business entities depending upon which tariff an entity is covered by. Projects must pass a utility cost test and are considered for their payback period. AEP prefers to see self-direct projects fall within a payback period of one to seven years. Customers taking the one-time incentive are still eligible to participate in the utility's other energy efficiency programs because they are still paying the CRM fee.

AEP also offers customers a full exemption — or opt-out — from the CRM fees for a defined number of months. Duke Energy and Dayton Power and Light also offer customers an opt-out provision provided they meet the 700,000KWh threshold. Duke Energy requires that customers submit an application stating that they have implemented savings projects or will implement projects that will meet energy savings and/or peak reduction benchmarks that scale up slightly over future years. FirstEnergy also allows customers a full exemption from the CRM fees if they report they have or plan to meet certain energy savings and demand savings benchmarks.

Results and Discussion

At AEP, providing customers with incentives for energy efficiency investments they have already made appears to qualify the self-direct program as a free rider incentive program, rather than a more typical self-direct program. Between 2009 and 2011, 577 projects received incentives from the self-direct program, totaling 180,273,135 saved kWh. The total incentives issued during that period were $10,164,093, which exceeded the $9,000,000 goal the program set for that same period.

The AEP program is described as a "seed money" program, designed to put money into the market to fund additional energy efficiency. The idea behind the AEP program is that the incentives offered to companies that participate in the self-direct program will be used to fund new investments in energy efficiency or renewable energy going forward. However, there are no requirements that the funds be used as such. It is therefore not a resource acquisition program, and AEP does not set energy savings goals for the program. A recent survey by self-direct customers found that 62% of them said they have used or will use some of their incentive funds for new energy efficiency measures.

The AEP program is designed to always have a rolling three-year look back period, with the understanding the some customers will always be new to the program offerings and will have recently made energy efficiency investments. The expectation is that as more customers make their cost-effective energy efficiency investments and are brought into the full suite of AEP energy efficiency programs, there will be less and less demand for the self-direct incentive program and more demand for incentives that encourage new projects.

AEP's opt-out provision, which is a full exemption from the energy efficiency rider, was taken by seven customers during the first year it was offered, but by zero customers since. AEP strongly discourages people from taking the opt-out provision. FirstEnergy's opt-out program has been used by a handful of large customers, and Duke Energy and Dayton Power and Light have seen their opt-out provisions used by zero and one customer, respectively.

Oregon — Eugene Water and Electric Board
(Welch and Fraser 2011, Welch 2010)

The Eugene Water and Electric Board's (EWEB) unique self-direct program makes the important distinction between financial parity and energy savings parity. Most self-direct programs aim to have the self-directors spend on efficiency measures a dollar amount equal to or similar to what they would have spent on systems benefits charges as typical full rate-paying customers.

In contrast, EWEB eschews any discussion of financial parity and instead develops customized energy savings goals with each self-directing customer. These goals are contractual obligations to achieve a certain kWh of savings annually and each project is validated by a measurement and verification (M&V) plan. The goals are based largely on the percentage of load each customer represents and the average conservation savings achieved by the industrial sector in prior years. If customers fail to meet these goals, they must repay a proportional amount of the rate credit back. While such customized efforts might be difficult for larger utilities, EWEB's two self-direct customers make such an approach manageable.

EWEB's self-director customers continue to pay the regular conservation rate (CRM) of 5%, but receive a rate credit on each monthly bill equal to conservation fee minus utility M&V costs. In this way, companies are directly encouraged to implement efficiency projects because otherwise they'll simply be "losing" their 5%. Such an approach helps facility managers sell efficiency projects to a company's decision-makers, because not meeting the goal will require self-direct customers to pay EWEB a penalty proportional to the unmet goal. When self-direct customers meet their goal, they keep most of the conservation fee and the project benefits. Conversely, an unmet goal results in a payment to EWEB and no benefits from the conservation project. This leverage of a penalty payment with no project benefits has been used to obtain internal corporate funding for projects. The self-direct customers use their own money to pay for the efficiency projects. They may also bank energy savings forward, into future years if applicable.

This strategy could also be used for new construction by calculating the present value of the future rate credit, and incorporating that value into the incremental conservation construction costs. For example, a data center could have an incentive to spend more money during its initial construction phase and increase a building's initial efficiency, since it would receive a future benefit by meeting a savings goal and enjoying a rate credit.

Results and Discussion

The pulp and paper mill was contributing about $800,000 annually in conservation charges, and the semiconductor manufacturer was contributing about $400,000 annually. Prior to their involvement in the self-direct program, the mill was implementing efficiency projects and taking advantage of rough parity between its contributions and the EWEB incentives and services it enjoyed. The semiconductor facility was engaged in very minimal efficiency improvements and was thus receiving only $30,000 or less in incentives and EWEB labor annually.

The paper mill's annual conservation goal was 3.25 million kWh, which it met on average during the self-directing period. This was, on average, more savings than the mill had achieved prior to becoming a self-director. Between 1991 and 2004, the mill had achieved an average annual savings of 2.9 million kWh. The semiconductor facility's annual goal was 1.75 million kWh, which it also met on average during the self-directing period.

In general, EWEB views its rate credit self-direct program as a success, but wonders how well the model will work once customers begin to "run up the resource cost curve." EWEB believes that it achieved the conservation at the two self-directing customers at a cost equal to or lower than the cost of achieving the same savings through its traditional incentive programs. The program views the results at the semiconductor facility as very successful, since the facility had achieved nearly zero conservation in the years prior to the implementation of the rate credit program.

EWEB does not believe its self-direct program has had a negative impact on the administration of its traditional CRM programming. While the traditional CRM programs had smaller budgets once the two self-directors began enjoying their rate credits, the CRM programs also paid out less money in incentives, yielding a neutral net effect on the CRM program. EWEB notes that they may face new challenges in developing rational and mutually accepted energy savings goals for self-directing customers. For now, EWEB intends to maintain this approach to self-direction and use it as a mechanism to strengthen its relationship with its self-directing customers.

Oregon — Oregon Department of Energy

(Crossman 2011, Stipe 2011)

In Oregon, the self-direct option for the largest customers (those with more than 1aMW electricity usage annually) can opt to self-direct their CRM charges. Such large customers are automatically added to the self-direct program and must prove that they are making efficiency investments in order to continue to enjoy a rate credit on their bills. Customers can earn credits up to 68% of their CRM charges on their utility bills to offset efficiency project costs. Once such projects have been fully credited customers must continue to make new investments or they will begin to be billed normal CRM charges.

Administration of the program is "bare bones," and customers generally self-report their efficiency measures into a computer system over the Internet. There is no pre- or post-monitoring of energy efficiency measures. The program does not monitor data in a manner that allows it to know the cost of saved energy within the self-direct program.

An option is also offered to customers who would argue that they have done all cost-effective efficiency. These customers can be eligible for a credit of 54% of their CRM fees.

Results and Discussion

While the Energy Trust of Oregon administers the largest industrial energy efficiency program in the state (funded with CRM moneys) the Oregon self-direct program is entirely administered by the Oregon Department of Energy. Because of this, coordination and information sharing between the traditional industrial and large commercial CRM-funded efficiency programs and the self-direct program suffers. The Energy Trust and other efficiency programs do not always know which facilities are self-directing, or whether they will need to deploy new efficiency projects in the near future in order to maintain their self-direct benefits.

Currently 66 companies are eligible to self-direct, though the majority of them are earning no self-direct credits, so they are effectively paying the normal CRM charges. Of the five largest users that have self-directed in recent years, three have evidently decided that they were better served by paying the CRM and are now taking advantage of the full suite of Energy Trust of Oregon services and incentives. There have been no new self-directing customers in four years, though large institutional customers are now eligible to self-direct if they satisfy the 1aMW threshold. Only one customer has made a “realistic” inquiry into the 54% credit provision.

In the nine years the self-direct program has operated, the administrator has not seen any incidences of “mistreatment” in the program, though rigorous measurement and evaluation of claimed savings is not conducted.

Texas
(Ferland 2011, PUCT 2010, Zarnikau 2011)

In Texas, for-profit customers that take electric service at the transmission level are not allowed to participate in utilities’ energy efficiency programming, and therefore do not pay for it. Instead, industrial customers develop their own energy efficiency plans if desired, and work with third party providers to implement and finance energy efficiency investments. There is no measurement or monitoring of the investments these large customers do or do not make.

Results and Discussion
Some industrial customers that are not allowed to participate in Texas’ energy efficiency programs would like to be able to have the option of participating. Certain large commercial customers have argued in recent regulatory filings that they should be granted an opt-out provision, but no such provision has been developed to date. In response to requests to create an opt-out provision for commercial customers, the Public Utility Commission of Texas noted that such a provision would be difficult for utilities to administer, and that “there is a risk that a customer might opt out after obtaining the benefits [of the energy efficiency programs], so that it would not share the costs in the same way that other customers do.”

Utah, Wyoming
(Helmers 2011)

Rocky Mountain Power (RMP) views its self-direct option as one of a suite of programs targeted at industrial and large commercial entities. RMP’s self-direct program is a project-based rate credit program that offers up to an 80% credit of eligible project costs back to customers as a rate credit against the 3.7% CRM charge all customers pay. Customers earn a credit up to 100% of their CRM charge, but do pay a flat $500/project administrative fee for each self-directed project. RMP lets customers choose to engage its self-direct and other, more traditional CRM programs, simultaneously provided the different programs are used to deploy different projects.

RMP believes that over 25% of its eligible customers are participating in the self-direct program, and interest has increased as the CRM charge has risen. Interestingly, RMP allows customers to aggregate multiple meters to meet the program’s minimum use requirements, and customers can also spread the rate credit among multiple meters if desired. One example of this approach can be found among a large chain of convenience stores, which has aggregated its load together to qualify.

Eligible self-direct projects must have a payback of 1-5 years and must meet other cost-effectiveness tests as required.

Results and Discussion
RMP finds its self-direct program to be highly cost-effective, with Total Resource Cost test results very similar for self-direct projects as other CRM projects. It believes that its rate credit approach encourages greater efficiency among its participants, because as a self-direct customer begins to near the end of a current credit period, they seek out new efficiency projects so as to avoid paying the full CRM. RMP finds customer satisfaction to be very high in its self-direct program and doesn't believe the administration of the self-direct program has any negative effects on the administration of its other CRM programs.

RMP also offers a self-direct approach that is a true opt-out. If a customer can prove, using an external auditor, that they have achieved all cost-effective efficiency, they may receive a 50% credit of all CRM charges for two years. Tellingly, not a single customer has taken this credit since its offering.

Vermont
(Goetze 2011, VDPS 2011, VPSB 2011)

In 2009 the Vermont Public Service Board, Vermont's utility regulatory body, passed a series of orders that established an option for large energy consumers to self-administer their energy efficiency programs. The first program allows consumers who pay an average annual energy efficiency charge (EEC) of at least $5,000 to apply to the Board to self-administer their energy efficiency programs through the use of an Energy Savings Account (ESA). Customers may be eligible to participate in an ESA if they contributed at least $5,000 in EEC fees in the prior 12 months. Customers may aggregate together multiple meters belonging to one single business entity. Customers apply to join the ESA program, and their application must be approved by the Vermont Public Service Board and the Vermont Department of Public Service.

Consumers participating in the program continue to pay their EEC fee, but may transfer up to 70% of their EEC to the ESA to fund efficiency projects at their facilities. Consumers are required to use the funds within 24 months, after which, unless a consumer receives a waiver from the Department of Public Service, the unused funds are forfeited by the consumer. Every three years, ESA customers must prove they continue to qualify to participate in the ESA program.

All projects must past cost-effectiveness tests equivalent to those used to approve energy efficiency investments made by other entities using the state's EEC fees. Vermont's energy efficiency utility is responsible for substantial review of the projects and evaluation activities. Pre- and post-installation reviews are required.

Vermont's second program established a three-year pilot self-managed energy efficiency program (SMEEP) that allows eligible consumers to be *exempt* from the EEC provided that the consumer commits to spending an annual average of no less than $3 million over a three-year period on energy efficiency investments. Additionally, consumers must demonstrate that they have a comprehensive energy management program with annual objectives. Customers can be eligible for the SMEEP if they are transmission customers, or customers in the industrial class, and paid over $1.5 million in EEC charges in 2008. Customers may also satisfy the requirements of SMEEP eligibility by becoming certified under the ISO 14001 standard. Customers must pay a $50,000 fee to participate in the SMEEP.

Results and Discussion
Currently one company is using the ESA program, and one company is using the SMEEP program. IBM is the company using SMEEP, which was largely designed to accommodate the computer giant.

Virginia
(Dominion 2010, HB 2506 2009)
Customers of Dominion Power in Virginia may qualify for the opt-out program available there by having average demands between 500kW and 10MW. Customers over 10MW do not participate in the state's energy efficiency programming by law.

Once customers have elected to opt out of the energy efficiency programming, they may not take advantage of existing energy efficiency programming nor be charged for the programming. Customers must show that they either have already made energy efficiency investments or plan to in the future. Customers must submit measurement and verification reports yearly in support of their choice of non-participation in the CRM-funded programs. There are no cost-effectiveness tests required of projects.

Washington
(Landers and Montgomery 2010, Landers 2011)

Puget Sound Energy's self-direct program is unique in the country in that it is a long-term program (spanning five years) that combines a dedicated incentive funding structure based on customer contributions with a competitive bidding process for unclaimed funds. Companies that take service from PSE under several rate schedules are eligible for the self-direct program, but most become eligible due to their taking of 3-phase service at greater than 50,000 volts.

Self-direct customers continue to pay their CRM, but PSE tracks individual customer contributions for their specific use. Customers have access to 82.5% of their CRM fees. PSE retains 7.5% for administration of the program, and 10% to fund market transformation activities of the Northwest Energy Efficiency Alliance. While participants in other PSE commercial and industrial programs are limited to maximum incentives of 70% of measure cost, self-direct customers may fund up to 100% of measure cost.

After an initial non-competitive phase (e.g. 24 months) of a program cycle, all unused funds are pooled together into a public pool of funds, and PSE issues a competitive RFP for program-eligible customers to compete for remaining funds. The projects funded as a result of this competitive bid process are generally more cost-effective than those funded during the first two years, as customers compete against each other to make a case for their projects.

All projects must meet PSE's avoided cost requirements. Though the customer submits their own proposal and measurement and verification plan, PSE reviews the proposal and plan. Upon approval, PSE enters into a funding allocation agreement with the company and conducts a post-installation inspection after the measure is implemented. It is very confident that claimed savings are occurring.

Results and Discussion
Each year, more customers qualify for the self-direct program, and for the 2010-2013 program period, 54 customers are currently eligible. PSE has already awarded over $12 million in project incentives for this group of customers, and projects 42,000 MWh/year in annual savings for the group.

PSE reports that right before the competitive bid process, projects "go like gangbusters" because customers desire to use their funds up to avoid losing them to other companies, including competitors.

PSE believes its self-direct program is actually achieving greater savings among participating customers than would have been achieved had they simply used its basic commercial and industrial offerings. Participation rates are also higher in the self-direct program among eligible customer classes than in other programs. This high level of savings and involvement is due to an understanding among firms that their CRM funds are there to lose, and that if they don't use the money to make energy efficiency investments, someone else will.

PSE relies on trade allies such as energy service companies (ESCOs) to help self-direct customers identify and implement energy efficiency projects. As the program matures, it is seeing a shift toward longer payback projects, in part because more commercial customers have begun to participate in the self-direct program. Commercial customers can sometimes tolerate longer payback periods and are interested in some investments that are less cost-effective than those typically found in the industrial sector.

Wisconsin
(WSPC 2009, Schutt 2011, Schepp 2011)

Wisconsin offers its largest energy customers the opportunity to self-direct their CRM funds. Customers must develop a self-direct plan and submit it to the PSC for approval. Self-direct program plans must meet cost-effectiveness standards and include detailed M&V plans. Approved customers implement their plans, adhere to the stated M&V design and submit quarterly reports to the PSC. The amount available for self-directed efficiency measures varies depending on the utility, and the PSC relies on a formula to determine the percentage of CRM that a customer is entitled to use for the program. Upon successful implementation of a self-direct program, and verification of measured savings, participants receive reimbursement checks drawn against their dedicated escrow accounts held by their respective utility. The PSC also may ask that any unused funds be returned to fund additional efficiency programs, such as Focus on Energy.

Results and Discussion
To date, no companies have chosen to self-direct, though the self-direct program was developed in response to requests by large energy consumers. In most cases, large customers have reported that the self-direct program did not offer enough benefits over existing CRM programs, such as Focus on Energy, to warrant a change to self-direct status. Large customers also reported that they found the administrative burden of developing their own implementation and M&V plan too burdensome.

APPENDIX II: MODEL LANGUAGE

Each state or service territory that decides to implement a self-direct option will likely find that their specific geographic needs can be best met by a unique self-direct program structure. ACEEE does not recommend one particular self-direct program approach, but has identified some useful program language to help achieve certain desired aspects within a self-direct program.

The following are selected excerpts from relevant regulatory or legislative language establishing and defining self-direct programs:

Defining eligibility

"Eligibility requirements for the exemption are as follows:

- In 2009 or 2010, the customer must have had an annual peak demand in the preceding year of at least 2 megawatts at each site to be covered by the self-directed plan or 10 megawatts in the aggregate at all sites to be covered by the plan." (Michigan)

"Customers are eligible for the [self-direct program] option if they have made [CRM] payments…of at least $5,000 in the 12 months preceding the customer's request to participate.

- A single business (a single legal entity) with more than one electric account may combine the [CRM] amounts paid on multiple accounts to determine this eligibility.
- Alternatively, a business may be deemed eligible if the preceding three-year average [CRM] amount paid proceeding the customer's application is equal to or greater than $5,000.
- A customer in a new building (with an active electric account) may be deemed eligible to participate if by mutual agreement of the [regulatory body] and the [utility] the projected [CRM] payment will be equal to or greater than $5,000." (Vermont)

Defining eligible expenses:

"For market-driven projects, "Qualified Expenses" are defined as one hundred percent (100%) of the incremental costs associated with identifying, investigating, analyzing, designing, implementing, and/or installing societally cost-effective electric efficiency projects at facilities owned, operated, or controlled by the customer and where the [self-direct program] is in effect. These costs may include the customer's internal design and engineering labor, outside design, engineering and installation labor and equipment costs. However, costs other than actual incremental material and installation labor costs shall only be treated as "Qualified Expenses" for amounts up to 25% of the total project costs.

For market-driven projects, incremental costs are defined as the difference between the actual cost of the equipment, installation labor, engineering, design, and commissioning and the cost of the equipment, installation labor, engineering, design, and commissioning that would meet the current design and construction standard practice (the "baseline cost").

2. For "retrofit" projects, "Qualified Expenses" are defined as costs associated with identifying, investigating, analyzing, designing, implementing, and/or installing societally cost-effective electric efficiency retrofit projects at facilities owned, operated or controlled by the customer and where the [self-direct program] is in effect. These costs may include the customer's internal design and engineering labor, outside design, engineering and installation labor, and equipment costs. However, costs other than actual incremental material and installation labor costs shall only be treated as "Qualified Expenses" for amounts up to 25% of the total project costs. Furthermore, for retrofit projects, "Qualified Expenses" shall be capped at an amount equal to the contribution to total project costs that would result in an estimated 18-month simple payback on the customer's project investment. Payback shall be calculated based on anticipated energy and non-energy benefits, including, but not limited to, reductions in operating and maintenance costs, fossil fuel savings, electricity savings, environmental compliance cost savings, labor savings, and savings from avoidance of future equipment replacements." (Vermont)

Encouraging and claiming energy savings:
In Michigan, all regulated utilities are required to develop their own energy optimization plans, which must meet preset energy savings goals. Self-directing customers must also develop such a plan. Regarding self-directed customers:

“All of the following apply to a self-directed energy optimization plan:

- The self-directed plan shall be a multiyear plan for an ongoing energy optimization program.
- The self-directed plan shall provide for aggregate energy savings that for each year meet or exceed the energy optimization performance standards based on the electricity purchases in the previous year for the site or sites covered by the self-directed plan.
- Under the self-directed plan, energy optimization shall be calculated based on annual electricity usage. Annual electricity usage shall be normalized so that none of the following are included in the calculation of the percentage of incremental energy savings:
    - Changes in electricity usage because of changes in business activity levels not attributable to energy optimization.
    - Changes in electricity usage because of the installation, operation, or testing of pollution control equipment.
- The self-directed plan shall specify whether electricity usage will be weather-normalized or based on the average number of megawatt hours of electricity sold by the electric provider annually during the previous 3 years to retail customers in this state. Once the self-directed plan is submitted to the provider, this option shall not be changed.
- The self-directed plan shall outline how the customer intends to achieve the incremental energy savings specified in the self-directed plan.

Projected energy savings from measures implemented under a self-directed plan shall be attributed to the relevant provider’s energy optimization programs for the purposes of determining annual incremental energy savings achieved by the provider…as applicable.” (Michigan)

Ensuring cost-effective efficiency projects:
“[Self-direct] customers are expected to demonstrate their ability to successfully administer their electrical energy efficiency efforts over time. [Self-direct] customer performance will be measured in the following areas of self-administration:

- Participating [self-direct] customers must complete cost-effective energy efficiency projects
- Participating [self-direct] customers must submit requests for reimbursement of qualified expenses, thereby utilizing available funds within 24 months of being deposited into their [self-direct] account, or risk forfeiture of funds due to insufficient activity.
- Participating [self-direct] customers must achieve an average net present value of electric benefits per dollar of “available funds” used that is equal to or greater than analogous [CRM-funded] initiative for the most recent rolling three year average for completed projects.
- Participating [self-direct] customers must renew its demonstration of compliance with eligibility criteria every three years.
- Participating [self-direct] customers must provide monthly documentation of their [earned credit] and [CRM] payment to the [utility] and [regulatory body].” (Vermont)

“All customers completing projects through the [self-direct] option must achieve an average net present value of electric benefits per dollar of "Available Funds" used that is greater than or equal to that of the analogous [CRM-funded] initiative for the most recent rolling three-year average. Failure to achieve this standard will be cause to discontinue customer's participation in the [self-direct] option. Multiple projects may be aggregated within a three-year participation period in order to meet the net present value threshold. For these purposes, the [applicable utility]'s average net present value of electric benefits per dollar of "Available Funds" used will be determined by the Department.” (Vermont)

Ensuring oversight by regulatory commission:
"An electric provider shall provide an annual report to the commission that identifies customers implementing self-directed energy optimization plans and summarizes the results achieved cumulatively under those self-directed plans. The commission may request additional information from the electric provider. If the commission has sufficient reason to believe the information is inaccurate or incomplete, it may request additional information from the customer to ensure accuracy of the report." (Michigan)
"If a customer has submitted a self-directed plan to an electric provider, the customer, the customer's energy optimization service company, if applicable, or the electric provider shall provide a copy of the self-directed plan to the commission upon request." (Michigan)

Addressing privacy concerns:
"A self-directed energy optimization plan shall be incorporated into the relevant electric provider's energy optimization plan. The self-directed plan and information submitted by the customer under subsection (x) are confidential and exempt from disclosure under the freedom of information act, 1976 PA 442, MCL 15.231 to 15.246." (Michigan)

Defining a program's access to information and customer obligations:
"Customers are responsible for developing project proposals, including estimates of electrical savings and projects costs. Selection and use of a third party to develop, build, install or verify the project, will be the Customer's responsibility. Upon acceptance by the Company, the Customer shall complete the project over the mutually determined time frame, to allow for verification of the Measure installation by deadlines established by the RFPs. The Customer agrees to provide the Company access to information necessary to verify energy savings and cost-effectiveness." (Puget Sound Energy)

Using competitive and non-competitive phases:
"Each program cycle is comprised of a multi-year non-competitive phase followed by a competitive phase followed by a period of time that will allow for Customers to complete projects.

The amount available to each eligible Customer in the non-competitive phase is an allocation of the total funding available under this schedule. The allocation is based on the amount of revenues that are estimated to be collected from the Customer under Schedule 120 of this Tariff through xxx date. The individual Customer shall propose the funding of eligible Measures with the allocated funding during the non-competitive phase of each program cycle.

Individual allocations not proposed for use by the Customer during the non-competitive phase will be available to all Customers eligible [for the program]." (Puget Sound Energy)

Cited resources:
Michigan language:
http://www.legislature.mi.gov/documents/2007-2008/publicact/pdf/2008-PA-0295.pdf

Puget Sound Energy Schedule 258:
http://www.pse.com/aboutpse/Rates/Documents/elec_sch_258.pdf

Vermont guidance:
http://efficiencyvermont.com/stella/filelib/ESA_Comprehensive_Guide_2011.pdf and
http://psb.vermont.gov/sites/psb/files/ESA_Order_attachment.pdf

APPENDIX III: DETAILED SUMMARY STATE CHART

State	CRM Structure	Offer self-direct/ opt-out at all?	$ Parity or kWh?	How $ structured?	Administer-ing entity	Threshold	Who does M&V?	Who claims sav-ings?	Self-Directors Pay Admin/ Low Income?	S-Ds can use some PBF pro-grams?	Notes	How many/ what kind of cos. opt out?
Alabama	None	N/A										
Alaska	None	N/A										
Arizona	Utility-defined SBC and/or rate adjustment	Yes	Parity	Use 85% of annual CRM contributions + DSM charges recovered in base rates over following 2-yr period for 100% eligible project costs	Arizona Public Service Company	40 million kWh annual; can aggregate	APS	APS	Yes	No		
Arkansas	Utility-based EE charges	Pending									Collaborati ve formed, proposal has been filed. Like-ly will not look to utilities to administer.	
California	Public goods charge, cost recovery on rates	No										
Colorado	DSM rider	Yes	Rebate per kWh	Rebate; 50% project cost; per kW or kWh	Xcel Energy	10GWh annual and 2MW demand	Customer / Xcel	Xcel	Yes	No		A "few" customers have applied.
Connecticut	SBC, .3 cents/ kWh	No									Only allowed if they begin to self-generate	

State	CRM Structure	Offer self-direct/ opt-out at all?	$ Parity or kWh?	How $ structured?	Administer-ing entity	Threshold	Who does M&V?	Who claims sav-ings?	Self-Directors Pay Admin/ Low Income?	S-Ds can use some PBF pro-grams?	Notes	How many/ what kind of cos. opt out?
Delaware	Efficiency utility funded by bonds? Not really PBF? Green energy program.	No										
District of Columbia	Sustain-able Energy Trust Fund	No										
Florida	EE Cost-recovery surcharge	No										
Georgia	None	N/A										
Hawaii	PBF for HECO only	No										
Idaho	4.75% EE tariff rider	Yes	Parity	100% funds, 100% project cost	Idaho Power	Special contracts customers only	Idaho Power, third party	Idaho Power	No	Yes		Avista has one customer; Rocky Mountain Power has a few
Illinois	Cost-recovery tariff	No									Can for gas, cannot for electricity	
Indiana	Energy efficiency surcharge	No									Industrial groups continue to lobby but never allowed	
Iowa	Cost recovery rider	No									Have been inquiries about it in the past ten years, but	

State	CRM Structure	Offer self-direct/ opt-out at all?	$ Parity or kWh?	How $ structured?	Administer-ing entity	Threshold	Who does M&V?	Who claims sav-ings?	Self-Directors Pay Admin/ Low Income?	S-Ds can use some PBF pro-grams?	Notes	How many/ what kind of cos. opt out?
											always opposed by utilities and consumer advocates. Only for customers that transport their own natural gas.	
Kansas	None	N/A										
Kentucky	Tariff rider	Yes	Parity	True opt-out	Duke	All Rate TT (transmission) customers may opt out	Customer	Custo mer	No	No		13 companies eligible, all have opted out
Louisiana	None	N/A										
Maine	SBC	Yes	Parity	May use RGGI funds		Transmission/ sub-transmission customers	Efficiency Maine	Efficien cy Maine		Yes	Trans-mission and sub-trans-mission customers had previously not been allowed to participate in CRM programmi ng. Now may opt in, though still don't pay CRM. Use RGGI funds instead	Many that had previously not used programs are now using programs

State	CRM Structure	Offer self-direct/ opt-out at all?	$ Parity or kWh?	How $ structured?	Administer-ing entity	Threshold	Who does M&V?	Who claims sav-ings?	Self-Directors Pay Admin/ Low Income?	S-Ds can use some PBF pro-grams?	Notes	How many/ what kind of cos. opt out?
Maryland	DSM rider or surcharge	No										
Mass-achusetts	SBC; .25 cents/kWh	Yes	Parity	Pay CRM, access to 85%	Utilities		Customer		Yes	No	Two-year program period	Very few
Michigan	Energy Optimization Charge: per meter charge	Yes	kWh goals	Discounted Energy Optimization Charge. Retained funds go toward kWh goals.	Utilities	1MW/single; 5MW/aggregate	Customer	Utilities	Yes	No		47 participating, down from 77 when program first offered
Minnesota	Conservation cost recovery in rates	Yes	Parity	Full exemption	Department of Commerce	20MW or 500MCF gas annually	Only once every 5 years, not really M&V; company does own		No	No		12 companies
Mississippi	None	N/A										
Missouri	Cost recovery in rates	Yes	Parity	Exemption from DSM programs	Utilities, Public Service Commission	5,000 KW demand or 2,500KW demand + EE plan in place	Customer		No	No		KCP&L: 2 cos.; Ameren: 9 cos.
Montana	Universal SBC - .0009/kwh	Yes	Parity	USB into escrow account, quarterly reimbursement checks	Department of Revenue	1 MW	Department of Revenue	Not utility	No	No		2009: 55 of 56 eligible customers took it. 2010: 57 on program, 50 used up all CRM charges
Nebraska	None	N/A										

State	CRM Structure	Offer self-direct/ opt-out at all?	$ Parity or kWh?	How $ structured?	Administer-ing entity	Threshold	Who does M&V?	Who claims sav-ings?	Self-Directors Pay Admin/ Low Income?	S-Ds can use some PBF pro-grams?	Notes	How many/ what kind of cos. opt out?
Nevada	Cost recovery in rates	No										
New Hampshire	SBC	No										
New Jersey	SBC	Yes	Parity	Grant up to 75%	New Jersey Clean Energy Program	50,000,000k Wh or 250,000DTH	NJCEP	NJCEP	Yes	No	Program to launch in fall 2011	Brand new program
New Mexico	Rates	Yes	Rebate per kWh	Rebate; 50% project cost; per kW or kWh	Xcel Energy	10GWh annual and 2MW demand	Xcel/Custo mer	Xcel	Yes	No	Brand new, just like Xcel program in CO. Developed in 2011	No one using it yet.
New York	SBC	No										
North Carolina	EE rider	Yes	Parity	Exemption from rider	Duke Energy	Commercial accounts over 1,000 MWh; all industrial	None	None	No	No	May opt out if state you have made, or plan to make, energy efficiency investment s in facilities.	
North Dakota	None	N/A										
Ohio	EE rider	Yes	Parity/r ebate	Incentive payment or CRM exemption	Utilities/PUC O	Varies, large industrial generally	Utilities/PU CO	Utilities	Yes/No	Yes/No		
Oklahoma	None	N/A										

State	CRM Structure	Offer self-direct/ opt-out at all?	$ Parity or kWh?	How $ structured?	Administer-ing entity	Threshold	Who does M&V?	Who claims sav-ings?	Self-Directors Pay Admin/ Low Income?	S-Ds can use some PBF pro-grams?	Notes	How many/ what kind of cos. opt out?
Oregon	3% public purpose charge	Yes	Parity	Rate credit	OR Dept. of Energy	8760 MWh (1aMW)	ODOE	ODOE (but ETO can use to meet overall long-term indus-trial goals)	Yes	If they max out PBF credits; get half incent-ive	Can use up to 68% of CRM payment on new EE measures.	66 companies eligible, few earning rate credits
Oregon [EWEB]	5% conser-vation rate	Yes	kWh goals	Rate credit	EWEB	Individually negotiated contracts	EWEB + 3rd parties if needed	EWEB	Yes	Yes, if do addition al savings		Two facilities (40% of industrial load share)
Pennsylvania	EE funding pending	N/A									Utilities developing EE plans in response to Act 129. Requests for considerati on of self-direct/opt-out provisions have been made.	
Rhode Island	PBF; .556 cents/kWh	No										
South Carolina	Rate structure	Yes	Parity	Exemption	Duke Energy	Industrial accounts	Customer	None	No	No		
South Dakota	Rate structure	No										
Tennessee	Rate structure	No										

State	CRM Structure	Offer self-direct/ opt-out at all?	$ Parity or kWh?	How $ structured?	Administer-ing entity	Threshold	Who does M&V?	Who claims sav-ings?	Self-Directors Pay Admin/ Low Income?	S-Ds can use some PBF pro-grams?	Notes	How many/ what kind of cos. opt out?
Texas	EECRF	Yes	Parity	Exemption	PUCO	Transmission-level customers	None	None	No	No		
Utah	4.6% PBF	Yes	Parity	Rate credit	Rocky Mountain Power	1MW peak / annual 5,000 mWh	RMP	RMP	Yes: flat $500/project admin fee	Yes, not for same projects	1-5 year simple payback required	25-30% of eligible cos. participating. Primarily industrial, one large convenience store chain
Vermont	Energy efficiency charge (EEC)	Yes	Parity	Pay CRM, earn reimbursement	Utilities, VPSB	If EEC is > $5,000/year	Utilities		Yes	No	Also offers SMEEP: full exemption for largest companies	ESA: one company; SMEEP: one (IBM)
Virginia	Cost recovery rates	Yes	Parity	Exemption	Utilities, SCC	50kW to 10MW	Customer	None	No	No	No cost-effectiveness tests	
Washington	Utility tariff riders	Yes	Parity	Grant lump sum payment/competitive bid	Puget Sound Energy	3 aMW annual	Customer, PSE	PSE	7.5% admin, 10% NEEA	Some after 2 yrs.	After 2.5 years: competitive bid for remaining funds	44 eligible, >75% participation in 2010-2013 cycle
West Virginia	None	N/A										
Wisconsin	Per meter fee	Yes	Parity	Escrow and milestone payments	Wisc. Public Service Commission	1MW monthly demand min / 10,000 Dth of gas + $60K in monthly elec/gas bills	Customer		Pay for some RE portion of CRM		Customers must submit energy savings plan	None participating
Wyoming	Energy efficiency surcharge	Yes	Parity	Rate credit	Rocky Mountain Power	1MW peak / annual 5,000 mWh	RMP	RMP				

Table sources: ACEEE 2011, ACC 2009, AEP 2011a, AEP 2011b, Ambrosio 2011, Anderson 2011, Bell 2011, Borum 2011, Burnes 2011, Cross 2011, Crossman 2011, D'Aloia 2011, Dominion 2010, Duke Energy 2011a, Dunn 2011, Edwards 2011, Goetze 2011, Goff 2011, Haase 2011, Haemmerle 2011, Harris 2011, Helmers 2011, Landers 2011, Laurent 2011, Lawrence 2011, Malley 2011, Malone 2011, Marcylenas 2011, MCSR 2009, MOGA 2009, Mosenthal 2011, Moser 2011, NJCEP 2010, Noonan 2011, Pengilly 2011, Pennsylvania Public Utility Commission 2011, Romero 2011, Schepp 2011, Schutt 2011, Sebastian 2011, Sivils 2011, Stipe 2011, Takanishi 2011, Timmerman 2011, Trasky 2011, VPSB 2011, Walker 2011, Wankum 2011, Welch and Fraser 2011, Whitehead 2011, Williamson 2011, WSPC 2009, Young 2011, Zarnikau 2011, Zuraski 2011.

APPENDIX IV: INTERVIEW FRAMEWORK

1. General structure of self-direct program
    a. Who qualifies?
    b. Minimum usage/size?
    c. Other sectors participating besides industrial?
    d. Number of clients participating (what is percentage of load, if available?)
    e. Can you get kicked out of this self-direct program? Who makes that decision?
2. Who claims self-direct savings?
3. How large (what percentage of monthly bill) would CRM fees be for self-direct customers?
    a. Do self-directors pay any of it?
        i. To support low income programs or other societal benefits?
        ii. To cover program's administrative fees?
    b. Can self-directors use any CRM-funded programs?
4. How much access to internal technical assistance do self-directors have?
5. How did you develop savings targets (if used)?
6. Cost of savings — anyway to calculate or compare to more traditional CRM-funded programming? What data is available to make such a comparison?
7. Do you focus on energy savings or dollar for dollar parity?
8. Can companies receive credit for previous investments?
9. Rate credit / escrow / rebate structure
    a. How exactly works
    b. What do companies submit prior to reimbursement?
    c. Allow full exemption?
    d. Feedback from companies on this?
10. Who conducts evaluation of the program? Who is responsible for measurement and verification?
11. What can you say about the impact of self-direct on other industrial program offerings?
12. What are long term prospects for the self-direct program?
13. Is it producing the savings you hoped/planned for? Did you plan for a certain amount of savings?
14. Macro findings/thoughts about the program in general

U.S. DEPARTMENT OF ENERGY

Barriers to Industrial Energy Efficiency

Report to Congress
June 2015

United States Department of Energy
Washington, DC 20585

Message from the Assistant Secretary

The industrial sector has shown steady progress in improving energy efficiency over the past few decades and energy efficiency improvements are expected to continue. Studies suggest, however, that there is potential to accelerate the rate of adopting energy efficient technologies and practices that could reduce energy consumption in the industrial sector by an additional 15 to 32 percent by 2025. There are barriers that impede the adoption of energy efficient technologies and practices in the industrial sector. This report examines these barriers and identifies successful examples and opportunities to overcome these barriers.

I extend my appreciation to the many stakeholders across industry, non-profit organizations, and the public sector for their support, feedback and strategic interest in industrial energy efficiency. Contributions from these stakeholders helped identify the most serious barriers and helped develop recommendations that can have a large impact on improving energy efficiency in the industrial sector.

This report is being provided to the following Members of Congress:

- **The Honorable John A. Boehner**
  Speaker, House of Representatives

- **The Honorable Joseph R. Biden**
  President of the Senate

- **The Honorable Fred Upton**
  Chairman, House Committee on Energy and Commerce

- **The Honorable Frank Pallone**
  Ranking Member, House Committee on Energy and Commerce

- **The Honorable Lisa Murkowski**
  Chair, Senate Committee on Energy and Natural Resources

- **The Honorable Maria Cantwell**
  Ranking Member, Senate Committee on Energy and Natural Resources

If you have any questions or need additional information, please contact me or Mr. Brad Crowell, Assistant Secretary for Congressional and Intergovernmental Affairs, at (202) 586-5450.

Sincerely,

Dr. David T. Danielson

Executive Summary

The industrial sector accounts for the largest share of energy consumption in the United States, and energy efficiency improvements in this sector can significantly reduce the nation's demand for energy. In 2012, the industrial sector accounted for 32 percent of all energy consumption, and by 2025 this share is expected to exceed 36 percent. In 2012, manufacturers accounted for 74 percent of industrial energy consumption, which represents 24 percent of all energy consumed in the United States.

The industrial sector has shown steady progress in improving energy efficiency over the past few decades, and energy efficiency improvements are expected to continue. Studies suggest, however, that there is potential to accelerate the rate of adopting energy efficient technologies and practices that could reduce energy consumption in the industrial sector by an additional 15 to 32 percent by 2025. This reduction in industrial sector energy consumption is equivalent to a reduction in national energy consumption of 6 to 12 percent by 2025.

There are barriers, however, that impede the adoption of energy efficient technologies and practices in the industrial sector. This report examines these barriers and identifies successful examples and opportunities to overcome these barriers. The report was prepared in response to Section 7 of the American Energy Manufacturing Technical Corrections Act (Act), which directs the Secretary of Energy to conduct a study,[1] in coordination with the industrial sector and other stakeholders, of barriers to the deployment of industrial energy efficiency.

Three groups of energy efficiency technologies and measures were examined:

- Industrial end-use energy efficiency
- Industrial demand response
- Industrial combined heat and power

The conclusions of this collaborative effort, summarized below, demonstrate the important role that industrial energy efficiency has in the U.S. and highlight its potential to continue to assist American industrial sectors with being strong, clean and efficient for decades to come. A total of 42 barriers were identified that affect the deployment of industrial energy efficiency across all three groups, and many examples and opportunities were identified to address these barriers. There may be additional barriers and opportunities not captured in this document, and this list should not be viewed as fully exhaustive.

[1] The study is contained in Appendix A.

This report results from a collaboration of the DOE with nearly 50 experts from industry, combined heat and power operators, environmental stewardship organizations, associations of state governmental agencies, and federal governmental agencies.

BARRIERS TO INDUSTRIAL ENERGY EFFICIENCY

Table of Contents

Executive Summary iii

I. Legislative Language 1

II. Background 3

III. Barriers to Industrial End-Use Energy Efficiency 5

IV. Barriers to Industrial Demand Response 7

V. Barriers to Industrial Combined Heat and Power 9

VI. Economic Benefits of Energy Efficiency Grants 11

VII. Energy Savings from Increased Recycling 13

VIII. Summary of Barriers, Opportunities, and Successful Examples 15

Appendix A: The Study, 'Barriers to Industrial Energy Efficiency' 21

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I. Legislative Language

This report was prepared in response to Section 7 of the American Energy Manufacturing Technical Corrections Act (Public Law 112-210). Section 7 of the Act is titled, "Reducing Barriers to the Deployment of Industrial Energy Efficiency," wherein it is stated:

(a) Definitions – In this section:

1) Industrial Energy Efficiency – The term "industrial energy efficiency" means the energy efficiency derived from commercial technologies and measures to improve energy efficiency or to generate or transmit electric power and heat, including electric motor efficiency improvements, demand response, direct or indirect combined heat and power, and waste heat recovery.

2) Industrial Sector – The term "industrial sector" means any subsector of the manufacturing sector (as defined in North American Industry Classification System codes 31-33 (as in effect on the date of enactment of this Act)) establishments of which have, or could have, thermal host facilities with electricity requirements met in whole, or in part, by onsite electricity generation, including direct and indirect combined heat and power or waste recovery.

(b) Report on the Deployment of Industrial Energy Efficiency

1) In General – Not later than 2 years after the date of enactment of this Act, the Secretary shall submit to the Committee on Energy and Commerce of the House of Representatives and the Committee on Energy and Natural Resources of the Senate a report describing:

(A) the results of the study conducted under paragraph (2); and

(B) recommendations and guidance developed under paragraph (3).

2) Study —The Secretary, in coordination with the industrial sector and other stakeholders, shall conduct a study of the following:

(A) The legal, regulatory, and economic barriers to the deployment of industrial energy efficiency in all electricity markets (including organized wholesale electricity markets, and regulated electricity markets), including, as applicable, the following:

(i) Transmission and distribution interconnection requirements.

(ii) Standby, back-up, and maintenance fees (including demand ratchets).

(iii) Exit fees.

(iv) Life of contract demand ratchets.

(v) Net metering.

(vi) Calculation of avoided cost rates.

(vii) Power purchase agreements.

(viii) Energy market structures.

(ix) Capacity market structures.

(x) Other barriers as may be identified by the Secretary, in coordination with the industrial sector and other stakeholders.

(B) Examples of—

(i) Successful State and Federal policies that resulted in greater use of industrial energy efficiency;

(ii) successful private initiatives that resulted in greater use of industrial energy efficiency; and

(iii) cost-effective policies used by foreign countries to foster industrial energy efficiency.

(C) The estimated economic benefits to the national economy of providing the industrial sector with Federal energy efficiency matching grants of $5,000,000,000 for 5- and 10-year periods, including benefits relating to—

(i) estimated energy and emission reductions;

(ii) direct and indirect jobs saved or created;

(iii) direct and indirect capital investment;

(iv) the gross domestic product; and

(v) trade balance impacts.

(D) The estimated energy savings available from increased use of recycled material in energy-intensive manufacturing processes.

3) *Recommendations and Guidance —The Secretary, in coordination with the industrial sector and other stakeholders, shall develop policy recommendations regarding the deployment of industrial energy efficiency, including proposed regulatory guidance to States and relevant Federal agencies to address barriers to deployment.*

II. Background

Section 7 of the American Energy Manufacturing Technical Corrections Act directs the U.S. Department of Energy (DOE) to undertake a study "in coordination with the industrial sector and other stakeholders" on barriers to industrial energy efficiency. DOE is directed to "develop policy recommendations regarding the deployment of industrial energy efficiency, including proposed regulatory guidance to States and relevant Federal agencies to address barriers to deployment."

In the Act, the industrial sector is defined to be manufacturing subsectors as described in North American Industry Classification System (NAICS) codes 31–33.[2] The manufacturing sector (NAICS 31–33) is broadly defined to include business establishments that use mechanical, physical, or chemical processes to create new products. Business establishments in the manufacturing sector are frequently called plants, factories, or mills, and cover a wide size of operations, ranging from small bakeries to integrated steel mills. The key distinction between manufacturing business establishments (NAICS 31–33) and businesses in other NAICS sectors is that manufacturers transform raw materials into new products.

The manufacturing sector is an important segment of the U.S. economy and is responsible for driving a significant amount of economic activity. Metrics that highlight the importance of manufacturing in the United States include (2013 data unless noted otherwise):

- Contributed $2.08 trillion, or about 12.5 percent, to U.S. gross domestic product.
- Supported more than 17.4 million jobs.
- Created high paying jobs—in 2012, compensation for manufacturing jobs was more than 25 percent higher than the average compensation for all U.S. jobs.

Data from the Energy Information Administration (EIA) shows that the industrial sector accounts for the largest share of energy consumption in the United States. In 2012, the United States consumed approximately 95 quads of energy, with the industrial sector accounting for 30.6 quads, or 32 percent of the total. Of this 32 percent, manufacturers accounted for 74 percent, equal to 22.6 quads of energy or 24 percent of all energy consumed in the United States.

EIA forecasts that total energy consumption will grow to about 102 quads in 2025, with nearly all of the growth coming from the industrial sector. From 2012 to 2025, energy consumption in

[2] EIA's definition of the industrial sector includes agriculture, mining, construction and manufacturing. The Act defines the industrial sector more narrowly to only include manufacturing.

the industrial sector is forecast to increase from 30.6 quads to 37.4 quads – a 22 percent increase. In 2025, energy use in the industrial sector is expected to exceed 36 percent of total energy consumption in the United States.

Given the scale of energy use in the industrial sector, energy efficiency improvements in this sector can significantly reduce the nation's demand for energy. While the industrial sector has shown steady progress in improving energy efficiency over the past few decades, studies suggest that industrial energy efficiency could be accelerated, reducing industrial energy consumption by an additional 15 to 32 percent by 2025 compared to EIA forecasts. This level of energy reduction in the industrial sector translates to a reduction in national energy consumption of 6 to 12 percent by 2025.

There are barriers, however, that impede the adoption of energy efficient technologies and practices in the industrial sector, and these barriers limit opportunities to capture additional energy savings. DOE recognizes that barriers to deployment of industrial energy efficiency involve complex, often controversial, issues. The intent of this report is not to prioritize or make value judgments of the barriers. Rather, the objective is to identify and discuss barriers that impede deployment of energy efficiency in the industrial sector and identify successful examples and opportunities to overcome these barriers.

For this report, industrial energy efficiency is divided into three groups:

- Industrial end-use energy efficiency
- Industrial demand response
- Industrial combined heat and power (CHP)

For each group, barriers are discussed and successful examples are identified to overcome many of these barriers. This study also discusses economic benefits of an energy efficiency grant program and energy savings from increased recycling. These latter two topics are both specified in the legislative language.

This report results from a collaboration of the DOE with nearly 50 experts from industry, combined heat and power operators, environmental stewardship organizations, associations of state governmental agencies, and federal governmental agencies. Contributions from these stakeholders significantly improved the depth and breadth of the report and study.

III. Barriers to Industrial End-Use Energy Efficiency

Industrial end-use energy efficiency includes a broad range of energy-efficient technologies and management practices that can be implemented in the manufacturing sector to reduce energy consumption. Examples that illustrate the diversity of technologies and practices include advanced electric motors and drives, high efficiency boilers, waste heat recovery, energy-efficient lamps and lighting controls, modernization or replacement of process equipment, improved process performance through the use of sensors and controls, and implementation of systematic energy management systems.

Barriers that impede implementing industrial end-use efficiency are summarized in the following categories:

- Economic and financial
- Regulatory
- Informational

Economic and Financial Barriers

- *Internal competition for capital.* Manufacturers often have limited capital available for end-use efficiency projects and frequently require very short payback periods (one to three years).
- *Corporate tax structures.* U.S. tax policies, such as depreciation periods, the treatment of energy bills, and other provisions can be a deterrent.
- *Program planning cycles.* There can be a mismatch between industrial planning cycles and utility and state energy efficiency program cycles, which can hinder industrial sites from moving forward with an energy efficiency project.
- *Split incentives.* Companies often split costs and benefits for energy efficiency projects between business units, which complicates decision-making.
- *Failure to recognize non-energy benefits of efficiency.* Not considering non-energy or co-benefits of an end-use energy efficiency project weakens the business case.
- *Energy price trends.* Volatile energy prices can create uncertainty in investment returns, leading to delayed decisions on energy efficiency projects.

Regulatory Barriers

- *Utility business model.* The structure of utility cost recovery and lost revenue mechanisms can reduce a utility's interest in promoting industrial energy efficiency projects.

- *Industrial participation in ratepayer-funded energy efficiency programs.* Opt-out programs or loosely defined self-direct programs allow industrial customers to not participate in traditional energy efficiency programs.
- *Failure to recognize all energy and non-energy benefits of efficiency*. There can be unrecognized energy benefits and non-energy societal benefits associated with improving energy efficiency. If these benefits are omitted, there can be under-procurement of industrial energy efficiency resources.
- *Energy resource planning.* Not requiring cost-effective energy efficiency to be considered as part of the integrated resource planning process can slow the evolution or expansion of industrial energy efficiency programs.
- *Environmental permitting.* Uncertainty, complexity, and costs associated with permitting processes such as New Source Review can deter facilities from moving forward with energy efficiency projects.

Informational Barriers

- *Adoption of systematic energy management system.* Some manufacturing plants lack information on the benefits of modern energy management systems. These plants fail to capture the value of cost-effective energy savings that can be achieved by these systems.
- *Awareness of incentives and risk.* Lack of knowledge of available Federal, state and utility incentives for end-use efficiency measures can lead to missed opportunities.
- *Metering and energy consumption data.* Lack of disaggregated energy consumption data, such as process unit and equipment-level energy consumption data, and tools to evaluate such data, can prevent identification and evaluation of opportunities.
- *In-house technical expertise.* Lack of in-house technical expertise or the resources to hire outside staff for the development and operation of end-use efficiency projects can hinder deployment.

The barriers listed above are focused on industrial end-use energy efficiency. It is important to note that there is some overlap between barriers as they are applicable to multiple energy efficiency groups. For example, internal competition for capital is discussed as a barrier for both end-use energy efficiency and combined heat and power (see **Table 4** for a list of overlapping barriers). In this report, most barriers are discussed under a single energy efficiency group. The categorization of a particular barrier to a single energy efficiency group is based on factors that include where stakeholders frequently associated the barrier, and how the barrier is frequently discussed in reference material.

IV. Barriers to Industrial Demand Response

Demand response is defined as:[3]

> *Changes in electric usage by end-use customers from their normal consumption patterns in response to changes in the price of electricity over time, or to incentive payments designed to induce lower electricity use at times of high wholesale market prices or when system reliability is jeopardized.*

The definition of demand response includes changes that might involve a reduction in electricity demand, a shift in demand, or even an increase in the demand for electricity. In the past, traditional demand response programs were focused on reducing electricity use during peak time periods (e.g., a hot summer afternoon). In recent years, technology advancements and new electricity market structures have allowed a greater level of communication and interaction between electricity consumers and utilities, and the definition of demand response has evolved from a focus on reductions in electricity demand to now include changes in electricity demand.

Barriers to increased industrial demand response are summarized below.

Economic and Financial Barriers

- *Limited number of customers on time-based rates.* Participation in demand response programs can be limited if customers are not on time-based rates.
- *Lack of sufficient financial incentives.* Some demand response programs may not provide a sufficient financial incentive to encourage participation.
- *Failure to fully account for demand response benefits.* Valuing the benefits of demand response, and determining how to attribute the benefits, can be complex.

Regulatory Barriers

- *Utility cost recovery structure.* The traditional regulatory model can discourage demand response if utility revenue is linked to financial returns derived from building new infrastructure.
- *Program requirements and aggregation.* Some potential participants in demand response programs are deterred due to numerous program requirements and terms that vary significantly, or aggregation rules that limit smaller industrial facilities.

[3] Definition of demand response from FERC, Web link.

- *Lack of standardized measurement and verification.* Absence of standard measurement and verification procedures can negatively impact demand response contract settlement, operational planning, and long-term resource planning.
- *Electricity market structures that limit demand response.* Some electricity markets focus on supply side resources, and demand response may not be allowed to participate in certain markets, or there may be other barriers to participation.
- *Inclusion in state energy efficiency resource standards (EERS).* Not including demand response in EERS programs may limit growth.

Informational Barriers

- *Knowledge and resource availability.* Lack of knowledge of federal, state, and utility incentives for demand response programs and lack of an understanding of programs can result in low participation. In addition, insufficient in-house technical expertise can also hinder participation.
- *Lack of widespread adoption of interoperability and open standards.* Many different devices and systems need to communicate in a robust demand response program. Demand response programs are hindered if technologies from different vendors do not interoperate seamlessly. Several types of interoperability standards have been established such as SEP 2.0, OpenADR, and Green Button, and they are being adopted in the market. However, more widespread use of open standards is necessary to align communication across devices.
- *Administrative burden.* The amount of time and effort required to participate in a demand response program can be a deterrent, especially for smaller industrial companies.

V. Barriers to Industrial Combined Heat and Power

Combined heat and power, also known as cogeneration, is the simultaneous production of electric and thermal energy from a single fuel source. Instead of purchasing power from the grid and then producing thermal energy onsite in a furnace or boiler, a CHP system produces both forms of energy—electricity and useful thermal energy (e.g., hot water or steam).

CHP systems are described as either topping or bottoming cycles. In a conventional topping-cycle system, a fuel (e.g., natural gas) is combusted in a prime mover, such as a gas turbine or reciprocating engine. The prime mover produces mechanical energy in the form of a rotating shaft, and this mechanical energy drives a generator that produces electricity. The thermal energy that is not used to generate electricity (e.g., exhaust heat) is captured from the prime mover and used for an end-use need such as process heating, hot water heating, or space conditioning. In a bottoming cycle, also referred to as waste heat to power (WHP), fuel is combusted to provide thermal input to a furnace or other industrial process and some of the heat rejected from the process is then used for power production.

Within the context of this report, the topic of waste heat recovery is limited to WHP. Most industrial WHP applications are bottoming cycle systems as described in the previous paragraph. Industrial WHP can also include systems in which heat is recovered from the exhaust of an engine or turbine generator and used to generate additional electricity through an organic Rankine cycle or similar technology. This type of system is less common in industrial applications and is not a CHP system, because there is no thermal energy delivered to an end-use. That said, the barriers to implementing non-CHP WHP are similar to those that apply to CHP, such as interconnection and utility rate structures. Therefore, both types of WHP are addressed in conjunction with the discussion of CHP, and both types of WHP are addressed by policy recommendations included in this study.

Barriers to CHP are summarized below.

Economic and Financial Barriers

- *Internal competition for capital.* Payback expectations and capital budget constraints influence CHP investment decisions.
- *Natural gas outlook.* The availability and long-term price forecast for natural gas impacts investments in CHP.

- *Accounting practices.* Emphasis on minimizing upfront capital costs, and the "split-incentive" between capital improvement and operation and maintenance (O&M) budgets.
- *Financial risk.* Industrial facilities may have a hard time finding low-cost financing due to financial risks.
- *Access to favorable tax structures.* Lack of financing instruments such as Master Limited Partnerships or Real Estate Investment Trusts.
- *Sales of excess power.* The inability to sell excess power or access to reasonable sales agreements for excess power.

Regulatory Barriers

- *Utility business model.* The structure of utility cost recovery and lost revenue mechanisms can reduce a utility's interest in promoting industrial CHP projects.
- *Environmental permitting and regulatory issues.* Output-based regulations (lb/MWh versus lb/MMBTu) and New Source Review permitting requirements.
- *Inconsistent interconnection requirements.* Lack of standardized interconnection requirements can impede CHP.
- *Lack of recognition of environmental benefits.* Lack of financial value for the potential emissions benefits of CHP.
- *Failure to recognize the full value of CHP in regulatory evaluations.* Utility procurement and resource plans may omit some value streams provided by CHP.
- *Standby rates.* Structure of standby rates that are not designed to closely preserve the nexus between charges and cost of service.
- *Exclusion from clean energy standards.* CHP's eligibility under CEPS programs.
- *Capacity and ancillary services markets.* Electricity markets and programs may limit CHP's ability to participate.

Informational Barriers

- *Awareness of available incentives.* Insufficient knowledge of federal, state and utility incentives and eligibility requirements for CHP projects.
- *Technical knowledge and resource availability.* Lack of in-house technical expertise or the resources to hire outside staff for the design, development, and operation of a CHP system.

VI. Economic Benefits of Energy Efficiency Grants

The Act requests the development of estimated economic benefits from Federal energy efficiency matching grants:

> *[… shall conduct a study of …the] estimated economic benefits to the national economy of providing the industrial sector with Federal energy efficiency matching grants of $5,000,000,000 for 5- and 10-year periods, including benefits relating to—*
>
> *i. Estimated energy and emission reductions;*
> *ii. Direct and indirect jobs saved or created;*
> *iii. Direct and indirect capital investment;*
> *iv. The gross domestic product; and*
> *v. Trade balance impacts.*

The economic benefits analysis was completed based on the following key assumptions:

- $5 billion of Federal matching grants allocated equally over 10 years (i.e., $500 million per year).
- Participant cost share is 80 percent for a base case. With this assumption, the total funding pool is $25 billion or $2.5 billion per year.
- 50 percent of funds are allocated for combined heat and power projects, and 50 percent of funds are allocated for energy efficiency and demand response projects.

All funds for this hypothetical grant program are used for deployment of commercially available technologies. In practice, a grant program could be set-up to allocate funds for related activities that complement commercially available technologies and stimulate industrial energy efficiency. For example, a modest percentage of funding could be allocated for marketing and outreach, and also for research and development, while preserving the majority of grant funds for deployment.

The results of the analysis indicate that a $5 billion Federal matching grant program implemented over a 10-year period ($500 million of Federal funding invested each year) will reduce annual energy consumption by 119 to 300 TBtu in Year 5, and 237 to 600 TBtu in Year 10. This reduced energy consumption is expected to save participating manufacturers $3.3 to $3.6 billion per year in Year 5, and $6.7 to $7.1 billion per year in Year 10 (single year savings are $670 to $710 million per year). Annual CO_2 emissions are expected to be reduced by 24 to 38 million metric tons in Year 5, and 48 to 75 million metric tons in Year 10. The grant program is expected to support approximately 9,700 to 11,200 jobs per year, which equates to 3.9 to 4.5

jobs per million dollars of investment. The GDP impact is expected to be in the range of $374 to $452 million per year.

The results shown above correspond to a base case scenario with 80 percent participant cost share. An alternative scenario was evaluated based on 50 percent participant cost share and is described in the study. In general, the economic impacts for the 50 percent cost sharing scenario are not as great as the 80 percent cost sharing scenario because of reduced capital leverage from the Federal funds.

The economic analysis did not consider impacts that might be derived from increased awareness that would be generated as a result of a $5 billion Federal grant program. Based on observations from the American Recovery and Investment Act and other energy efficiency incentive programs, there is frequently a “spillover” effect that creates activity by market participants that do not receive incentive payments. In the case of the hypothetical $5 billion grant program, some manufacturing plants would likely move ahead with industrial energy efficiency projects even though they do not receive grant funds. These plants could decide to move ahead with an energy efficiency project that they would not otherwise consider because of increased awareness and education resulting from the grant program. Due to modeling limitations, this spillover effect was not captured in the analysis completed for this study.

VII. Energy Savings from Increased Recycling

The Act requests an estimate of the energy savings available from increased use of recycled material in energy-intensive manufacturing processes.

EPA defines recycling as collecting and processing materials that would otherwise be thrown away and turning these materials into new products. It excludes the reuse of products (e.g., clothes and furniture donated to charitable organizations for use by others), as well as the use of the waste product as a fuel source. Recycling provides opportunities to reduce energy use, decrease carbon dioxide emissions, and minimize the quantity of waste requiring disposal. While many products are recycled, this report focuses on how energy can be saved by recycling in the following energy-intensive industries:

- Paper
- Aluminum
- Glass
- Steel
- Plastics

These five energy-intensive industries generate substantial waste products. These industries account for 53 percent of total waste products in the municipal solid waste stream. However, the products of these industries are also the most recovered, accounting for 67 percent of total municipal solid waste recovery. Still, substantial amounts of waste products coming from these industries could be recovered, which could in turn yield significant energy savings.

The analysis was limited to primary recycling (also called closed-loop recycling), where recycled products are mechanically reprocessed into a product with properties equivalent to the original product. Further, the analysis evaluated the impacts of increased recycling using only currently deployed technologies. Several studies are referenced in the recycling section, and these studies support the conclusion that adjusting a manufacturing “input” (in this case, recycled materials) can be a critical strategy for increasing the energy efficiency of energy-intensive manufacturers.

The recycling analysis only considered recycling of post-consumer scrap, which is material that has been used by end-users and can no longer be used for its intended purpose. Two scenarios were evaluated: modest and aggressive. The modest scenario assumed that recycling rates remain well within the boundaries of existing technology and material availability limitations, and the aggressive scenario pushed these boundaries (see appendix A for more information on the scenarios). It is important to note that the recycling rate assumptions for the moderate and aggressive scenarios are not based on industry data. Rather, the authors of the study considered data on current recycling rates and the technical recycling limits, and developed the recycling rate assumptions for the scenarios within those ranges of data.

The recycling analysis included a breakdown of three types of plastics with a high potential for increased recycling:

- *Polyethylene terephthalate (PET).* PET is used for soft drinks packaging (PET bottles) and synthetic fibers.
- *High-density polyethylene (HDPE).* HDPE is used to make plastic jugs.
- *Low-density polyethylene (LDPE)/linear low-density polyethylene (LLDPE).* LDPE is used for plastic bags, and LLDPE is used for stretch wrap.

The recycling analysis shows that the following three manufacturing sectors have the potential to increase energy savings by more than 10 percent in at least one of the two scenarios:[4]

- Plastics (PET): 32 percent savings in aggressive scenario; 17 percent savings in modest scenario
- Steel: 15 percent savings in aggressive scenario; 6 percent savings in modest scenario
- Aluminum: 12 percent savings in aggressive scenario; 3 percent savings in modest scenario

While PET manufacturing shows the highest energy savings percentage (32 percent in aggressive scenario), the total energy savings are greatest for the steel industry because the amount of energy used for steel production is greater than the amount of energy needed for plastics production. For the steel industry, energy savings are estimated at 118 TBtu for the aggressive scenario, and 43 TBtu under the modest scenario. In terms of total energy savings, the steel industry is followed by paper, plastics (PET, HDPE, and LDPE/LLDPE combined), aluminum, and glass.

[4] The other sectors show energy savings from increased recycling but the savings are below 10 percent.

VIII. Summary of Barriers, Opportunities, and Successful Examples

Table 1, Table 2, and Table 3 summarize barriers for end-use energy efficiency, demand response, and CHP. These tables also show opportunities to address many of the barriers along with successful examples. In some cases, barriers do not have straightforward solutions, and for these barriers no opportunities or examples are provided. In each table, the barriers are divided into three types:

- Economic and financial
- Regulatory
- Informational

Table 1. Opportunities and Successful Examples for End-Use Energy Efficiency

Type of Barrier	Description of Barrier	Opportunities and/or Successful Examples
Economic and Financial	Internal competition for capital	Opportunity: Provide or support alternative financing structures, such as on-bill financing. Examples: • Minnesota Power provides industrial users in northeastern Minnesota with on-bill financing for energy efficiency projects. • Walmart Supplier Energy Efficiency Program – Walmart helps encourage end-use efficiency investments in their supply chain. • Cummins has an internal capital fund devoted to energy efficiency improvements.
	Corporate tax structures	Example: Netherlands adopted the Random Depreciation of Environmental Investments Measure in 1991, which offers accelerated depreciation for certain energy efficient assets.
	Program planning cycles	–
	Split incentives	Example: J.R. Simplot – recognizing the “split incentive problem,” the company now trains employees in best practices and has adopted an Energy Champions program.
	Failure to recognize non-energy benefits of efficiency	Opportunities: • Provide guidance describing how energy efficiency can qualify for emissions reductions credits in specific regulatory schemes. • Publish papers on approaches to recognize the non-energy benefits of end-use efficiency. • Pilot explicit consideration of co-benefits as part of the energy efficiency cost calculation.
	Energy price trends	–
Regulatory	Utility business model	Opportunity: Consider, where appropriate, various methods that may align customer and utility incentives to achieve greater savings from energy efficiency.

Type of Barrier	Description of Barrier	Opportunities and/or Successful Examples
	Lack of industrial participation in ratepayer-funded energy efficiency programs	Opportunities: • Consider facilitating collaborations between utilities and their industrial customers, such as strengthening Measurement and Verification (M&V) protocols for self-direct programs, to ensure industrial customer efficiency efforts are documented. For example, using the SEP M&V protocol. • Evaluate industrial customer participation in energy efficiency programs, such as revolving fund programs. • Consider including energy efficiency in Clean Energy Portfolio Standards (CEPS), such as through an Energy Efficiency Resource Standard (EERS), if consistent with state policy goals.
	Failure to recognize all energy and non-energy benefits of efficiency	–
	Energy efficiency not included in energy resource planning	Opportunities: • Include end-use efficiency as part of utility integrated resource plans and state planning. • Independent System Operators/Regional Transmission Organizations can work closely with states and utilities to ensure proper accounting for existing energy efficiency resources. Example: CHP/ WHP and other forms of end-use efficiency are included in Integrated Resource Plans in Massachusetts, Connecticut, and in a few other states.
	Environmental permitting	Opportunities: • Review the New Source Review process to consider ways to encourage end-use efficiency improvements within the legal framework specified under the Clean Air Act and other statutes. • Review the implementation of New Source Review to ensure that U.S. EPA guidance is followed.
Informational	Adoption of systematic energy management system	Example: Nissan worked with the U.S. Energy Department to implement an energy management system that meets all requirements of Superior Energy Performance (SEP) and Independent System Operators 50001 at its vehicle assembly plant in Smyrna, Tennessee.
	Lack of awareness of incentives	Opportunities: • Increase outreach on existing industrial energy efficiency programs. • Develop energy efficiency technical and economic potential studies to show current and future market opportunities resulting from incentives.
	Metering and energy consumption data	Example: Some organizations, such as 3M and PPG Industries, have begun to allocate energy costs to individual business units and/or production lines based on submetered energy data.
	Lack of in-house technical expertise	Opportunities: • Expand technical assistance to industrial facilities through the Better Plants program, and other programs such as the Superior Energy Performance program and Industrial Assessment Centers. • Expand technical assistance to industrial companies through the ENERGY STAR Industrial program. • Expand technical assistance under the Manufacturing Extension Partnership.

Table 2. Opportunities and Successful Examples for Demand Response

Type of Barrier	Description of Barrier	Opportunities and/or Successful Examples
Economic and Financial	Limited number of customers on time-based rates	Opportunity: Ensure that customers have access to market pricing signals. Example: Cement makers praise the Texas demand response program, which links consumer credits or rebates to real time market prices for electricity.
	Lack of sufficient financial incentives	–
	Failure to fully account for demand response benefits	Example: California has developed demand response cost-effectiveness tests, but there are no widespread standards on valuing avoided T&D due to demand response.
Regulatory	Utility cost recovery structure	Opportunity: Consider, where appropriate, various methods that may align customer and utility incentives to achieve greater savings from energy efficiency.
	DR program requirements and aggregation	Opportunity: Consider opportunities to allow for increased participation in demand response programs (i.e. review size thresholds and other requirements).
	Lack of standardized measurement and verification	Opportunity: Consider codifying North American Energy Standards Board guidance when selecting appropriate measurement and verification standards for retail demand response programs.
	Electricity market structures that limit demand response	Example: Studies have shown that implementing a capacity market in the Electricity Reliability Council of Texas that allows for demand response participation could help increase grid reliability and lower electricity costs for consumers.
	Exclusion from state energy efficiency resource standards	Opportunity: Consider the inclusion of demand response as an eligible resource in a state EERS (as a separate target, not comingled with other resources), if consistent with state policy goals. Example: Arizona's EERS program allows for demand response as an eligible activity.
Informational	Lack of knowledge and resource availability	Opportunity: Increase outreach to industrial end-users on demand response opportunities, such as through existing programs and the development of resources explaining participation requirements.
	Lack of interoperability and open standards	Opportunity: Develop a standard platform to enable communication. Example: OpenADR represents an open and standardized way for electricity providers and operators to develop technology to communicate across an existing IP-based communications network such as the Internet.
	Administrative burden	Opportunity: Curtailment Service Providers can work with Regional Transmission Organizations/ Independent System Operators and states to streamline demand response participation requirements. Example: EnerNOC, a CSP, offers a demand response program that provides participants with recurring payments in return for agreeing to reduce electricity consumption.

Table 3. Opportunities and Successful Examples for Combined Heat and Power

Type of Barrier	Description of Barrier	Opportunities and/or Successful Examples
Economic and Financial	Internal competition for capital	Example: Sikorsky Aircraft had competing alternatives for capital expenditures but elected to fund the CHP project, which had an estimated payback of 3.2 years.
	Natural gas outlook	–
	Accounting practices	–
	Financial risk/ Lack of low-cost financing structures	Opportunities: • Consider allowing CHP to qualify for Master Limited Partnership status. • Consider adopting performance-based incentives for CHP if this is consistent with state policy goals.
	Sales of excess power /Lack of access to power markets	Opportunities: • Consider criteria identified by FERC in determining the Public Utility Regulatory Policies Act avoided cost rate. • Consider expanding the ability of industrial customers to sell excess power to third parties in retail markets.
	Lack of tax code support	Opportunities: • Consider extending 5-year capital depreciation to WHP equipment. • Consider allowing Bonus Depreciation for CHP and WHP (50 percent depreciation during the first year). • Consider expanding the existing ITC to include WHP.
Regulatory	Utility business model	Opportunity: Consider, where appropriate, various methods that may align customer and utility incentives to achieve greater savings from CHP.
	Environmental permitting and regulatory barriers	Opportunities: • Consider output-based regulations that recognize thermal energy in federal regulations. • State air agencies can consider output-based regulations that recognize thermal energy. • States can consider offering streamlined air permitting for small-scale CHP systems (15 MW or less).
	Inconsistent interconnection requirements	Opportunity: Consider the use of best practice interconnection standards as a basis for state rulemaking where appropriate. Example: New York modified its interconnection requirements to allow for distributed generation systems up to 2 MW in size to interconnect to both radial and secondary network systems.
	Lack of recognition of environmental benefits	Opportunity: Publish papers on approaches to recognize the non-energy benefits of CHP.
	Failure to recognize the full value of CHP in regulatory evaluations	–
	Utility standby rates	Opportunity: Evaluate standby charges to ensure they accurately reflect the costs and benefits of distributed generation and that they are designed to closely maintain the balance between charges and the cost of service.
	Exclusion from clean energy standards	Opportunity: Consider including CHP in energy efficiency resources standards, if consistent with state policy goals.
	Capacity and ancillary services markets	Example: In ISO-NE, CHP systems with a capacity of 1 MW or larger can participate in capacity and ancillary service markets.

Type of Barrier	Description of Barrier	Opportunities and/or Successful Examples
Informational	Lack of awareness of available incentives	Opportunity: Consider increasing outreach to industrial end-users on the benefits of CHP. Example: The New York State Energy Research and Development Authority's (NYSERDA's) FlexTech program successfully coordinates information on the availability of incentives and technical assistance resources.
	Technical knowledge and resource availability	Examples: • The Database of State Incentives for Renewables & Efficiency (DSIRE) contains information on federal, state, city, utility and other incentive programs and policies to encourage clean energy projects, including CHP. DSIRE serves as an important resource for project developers, policymakers, and state regulators. • DOE's CHP Deployment Program provides stakeholders with resources necessary to identify CHP market opportunities and supports implementation of CHP systems in industrial, commercial, institutional, and other applications.

There is some overlap between barriers and the related successful examples and opportunities across the three types of industrial energy efficiency. In many cases a single action, or group of actions, can address multiple barriers. **Table 4** shows several of these overlapping barriers. The intent of this table is to illustrate how stakeholders can address multiple barriers with a single action (or subset of actions).

Table 4. Overlapping Barriers and Opportunities

Type of Barrier	Description of Barrier	Cross-cutting Categories	Opportunity
Economic and Financial and Regulatory Barriers	Lack of Recognition of Environmental Benefits	• End-use energy efficiency (**Table 1**, *Failure to recognize all energy and non-energy benefits of efficiency*) • CHP (**Table 3**, *Lack of recognition of environmental benefits*)	• Provide guidance that describes how energy efficiency can qualify for emissions reductions credits in specific regulatory schemes, and publish papers on approaches to recognize the non-energy benefits of end-use efficiency and CHP.
Regulatory Barriers	Utility Business Model	• End-use energy efficiency (**Table 1**, *Utility business model*) • Demand Response (**Table 2**, *Utility cost recovery structure*) • CHP (**Table 3**,*Utility business model*)	• Consider, where appropriate, various methods that may align customer and utility incentives to achieve greater savings from end-use energy efficiency, demand response and CHP.
Regulatory Barriers	Exclusion from Clean Energy Portfolio Standards (CEPS)	• Demand Response (**Table 2**, *Exclusion from state energy efficiency resource standards*) • CHP (**Table 3**, *Exclusion from clean energy standards*)	• For states that have a CEPS, state agencies, including state legislatures, can consider the inclusion of demand response and CHP as eligible resources in the CEPS, if consistent with state policy goals.
Informational Barriers	Lack of awareness and knowledge	• End-use energy efficiency (**Table 1**, *Lack of awareness of incentives*) • Demand Response (**Table 2**, *Lack of knowledge and resource availability*) • CHP (**Table 3**, *Lack of awareness of available incentives*)	• Develop technical and economic potential studies for each industrial energy efficiency type to identify market opportunities and the benefits from these opportunities. Agencies can increase outreach to industrial end-users through existing programs and the development of resources explaining participation requirements.
Informational Barriers	Lack of in-house technical expertise	• End-use energy efficiency (**Table 1**, *Lack of in-house technical expertise*) • CHP (**Table 3**, *Technical knowledge and resource availability*)	• Expand technical assistance to industrial facilities through existing programs, such as state energy efficiency programs.

Appendix A: The Study, 'Barriers to Industrial Energy Efficiency'

This appendix contains the study that supports the report to Congress.

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DOE/EE-1018

SEE Action
STATE & LOCAL ENERGY EFFICIENCY ACTION NETWORK

Industrial Energy Efficiency: Designing Effective State Programs for the Industrial Sector

Industrial Energy Efficiency and Combined Heat and Power Working Group

March 2014

The State and Local Energy Efficiency Action Network is a state and local effort facilitated by the federal government that helps states, utilities, and other local stakeholders take energy efficiency to scale and achieve all cost-effective energy efficiency by 2020.

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Acronyms

BPA	Bonneville Power Administration
Btu	British thermal units
CEE	Consortium for Energy Efficiency
CEPS	clean energy portfolio standard(s)
CFA	Consolidated Funding Application
CHP	combined heat and power
C&I	commercial and industrial
DOE	U.S. Department of Energy
DSM	demand-side management
EERS	energy efficiency resource standard(s)
EPA	U.S. Environmental Protection Agency
EPI	energy performance indicator
EnMS	energy management system
ETO	Energy Trust of Oregon
EWEB	Eugene [Oregon] Water and Electric Board
FTE	full-time equivalent employee
GWh	gigawatt-hour
IEE	Industrial energy efficiency
IOF-WV	Industries of the Future West Virginia
IPE	NYSERDA's Industrial Process Efficiency program
IPMVP	International Performance Measurement and Verification Protocol
IRP	integrated resource planning
HVAC	heating, ventilating, and air conditioning
HPEM	High Performance Energy Management (BPA program)
kW	kilowatt
kWh	kilowatt hour
M&V	measurement and verification
MMBtu	million British thermal units
MW	megawatt
MW_{avg}	average megawatts
MWh	megawatt-hour
NAICS	North American Industry Classification System
NEEA	Northwest Energy Efficiency Alliance
NEB	non-energy benefit
NWFPA	Northwest Food Processors' Association
NYSERDA	New York State Energy Research and Development Authority
O&M	operations and maintenance
PAC	program administrator cost test
PDC	program delivery contractor
RMP	Rocky Mountain Power
SEM	strategic energy management
SEO	state energy office
SEP	U.S. Department of Energy Superior Energy Performance program
SME	small- and medium-sized enterprise
SWEEP	Southwest Energy Efficiency Project
Therm	100,000 Btu
TRC	total resource cost
UMP	Uniform Methods Project
WFE	Wisconsin Focus on Energy

Table of Contents

Acknowledgments ..... **iii**

Acronyms ..... **iv**

List of Figures ..... **vii**

List of Tables ..... **viii**

List of Examples and Case Studies ..... **ix**

Executive Summary **ES-1**
- Why Do States Undertake Industrial Energy Efficiency Programs? ES-1
- The Wide Spectrum of Ongoing and Useful State Programs ES-2
- Experience from Designing and Delivering Programs ES-4
- Self-Direct Programs ES-6
- Emerging Industrial Program Directions ES-6
- The Importance of Cross Exchange ES-7
- Conclusion ES-7

1. Introduction **1**

2. The Importance of Industrial Energy Efficiency Programs **3**
- 2.1. Manufacturing is an Important Sector 3
- 2.2. Industrial Energy Efficiency Resources Are Cost-Effective 5
- 2.3. Industrial Energy Efficiency Creates Value for Companies and Society 6
- 2.4. The Role of Energy Efficiency in an Expanding Manufacturing Base 9
- 2.5. The Current Status of State Industrial Energy Efficiency Programs 9

3. How States Successfully Promote Industrial Energy Efficiency **13**
- 3.1. Technical Assistance and Knowledge Sharing 14
- 3.2. Prescriptive and Custom Efficiency Offerings 15
- 3.3. Market Transformation Programs 17
- 3.4. Strategic Energy Management and Energy Manager/Staffing Programs 18

4. Program Features that Respond to Manufacturers' Needs **23**
- 4.1. Special Needs and Characteristics of Manufacturers as Energy Users 23
- 4.2. Industrial Participation in Energy Efficiency Programs 25
- 4.3. Clearly Demonstrate the Energy Efficiency Project Value Proposition to Companies 26
- 4.4. Develop Long-Term Relationships with Industrial Customers and Continue to Refine Project Offerings 28
- 4.5. Ensure Program Administrators Have Industrial Sector Credibility and Offer High Quality Technical Expertise 30
- 4.6. Offer a Combination of Prescriptive and Custom Offerings to Best Support Diverse Customer Needs 31
- 4.7. Accommodate Industrial Project Scheduling Needs 32
- 4.8. Streamline and Expedite Application Processes 34
- 4.9. Conduct Continual and Targeted Program Outreach 34
- 4.10. Leverage Strategic Partnerships 35
- 4.11. Set Medium- and Long-Term Energy Efficiency Goals as an Investment Signal for Manufacturers 36
- 4.12 Ensure Robust Measurement, Verification, and Evaluation 37

5. Designing Effective Self-Direct Programs **41**
- 5.1. What are Self-Direct Programs? 41
- 5.2. Ensuring Achievement of Public Policy Goals 44

6. Emerging Industrial Program Directions **49**
6.1. Next-Level Energy Management Programs 49
6.2. Whole-Facility Energy Intensity Programs 54
6.3. Enhancing the Value of Industrial Energy Efficiency Projects through Non-Energy Benefits 54
6.4. Natural Gas Industrial Efficiency Programs 55

7. Conclusion **59**

References **63**

Appendix A: Background **A-1**
A.1. How Energy Efficiency Can Be Achieved in Manufacturing A-1
A.2. Cost-Effectiveness of Industrial Programs A-1

Appendix B: Selected Effective Industrial Energy Efficiency Program Profiles **B-1**
B.1. AlabamaSAVES B-1
B.2. Bonneville Power Administration B-3
B.3. Efficiency Vermont B-7
B.4. Energy Trust of Oregon B-9
B.5. New York State Energy Research and Development Authority B-12
B.6. Rocky Mountain Power wattsmart Business (Utah) B-15
B.7. Wisconsin Focus on Energy Industrial Programs B-18
B.8. Xcel Energy (Colorado and Minnesota) B-20

List of Figures

Figure ES-1. Spectrum of IEE state program approaches with program examples ES-3

Figure 1. Energy consumption in the United States (1990, 2002, and 2012) 3

Figure 2. Clusters of end-use energy efficiency potential in the industrial sector 4

Figure 3. Levelized costs of energy resources in Tucson Electric Power's service area..5

Figure 4. Average costs of energy efficiency programs by sector (2012) 6

Figure 5. Efficiency Vermont costs and savings, high-efficiency case 2012–31 (current $) 8

Figure 6. Spectrum of IEE state program approaches with program examples 14

Figure 7. Energy efficiency resource standards and targets...36

Figure 8. The value of non-energy benefits in Massachusetts' energy efficiency programs......................................39

Figure 9. Current snapshot of self-direct programs (subject to review) 43

Figure B-1. BPA's Energy Smart Industrial Partner Program B-3

List of Tables

Table ES-1. Summary of Key Issues and Considerations for Regulators and Program Administrators ES-8

Table 1. Selected Energy Management and Energy Manager/Staffing Programs...20

Table 2. Structure of Self-Direct Programs 42

Table 3. Recent Energy Management Programs, Pilots, and Initiatives 50

Table 4. Energy Cost Savings and Non-Energy Cost Savings from 52 IEE Projects 55

Table 5. Energy and Non-Energy Cost Benefits from 81 IEE Projects 55

Table 6. Summary of Key Issues and Considerations for Regulators...59

Table A-1. Energy Efficiency Action and Investment Examples A-2

Table A-2. Narragansett Electric 2013 Energy Efficiency Program Benefits, Costs, and Participation A-3

Table A-3. Electricity and Gas Savings in Different Customer Classes in ETO Programs (2010–2011) A-3

Table A-4. Benefit-Cost Ratios for Different ETO Program Offerings (2011) A-3

Table A-5. BPA Budgets, Capacity Costs, and Levelized Costs (2010).. A-4

Table B-1. BPA Energy Project Manager Incentives.. B-4

Table B-2. BPA Program Expenditures, Energy Savings, Demand Savings, and Participation Levels B-5

Table B-3. BPA Budgets, Capacity Costs, and Levelized Costs (2010).. B-6

Table B-4. Electric Savings Results in 2012 and Progress Toward 2012–2014 Goals B-8

Table B-5. Heating and Process Fuel Savings Results 2012 and Progress Toward 2012–2014 Goals........................ B-8

Table B-6. ETO Energy Savings From Industrial Customers (2010–2013)... B-11

Table B-7. Electricity and Gas Savings in Different Customer Classes in ETO Programs (2011–2012) B-11

Table B-8. Benefit-Cost Ratios for Different ETO Program Offerings (2012) B-11

Table B-9. Overview of NYSERDA Industrial and Process Efficiency Incentives Available to Manufacturers and Data Centers That Implement Energy Efficiency and Process Improvements B-13

Table B-10. NYSERDA Program Savings Goals, 2012–2015 .... B-14

Table B-11. Rocky Mountain Power Utah Electricity Savings and Program Expenditures B-16

Table B-12. Rocky Mountain Power Utah Benefit-Cost Ratio... B-17

Table B-13. Summary of First-Year Annual Savings by Program (2012) B-19

Table B-14. Total Resource Cost Test Ratios by Sector in 2012... B-19

Table B-15. Program Emissions Benefits B-19

Table B-16. Xcel Energy (Colorado) Electric and Gas Savings and Total Resource Cost Ratios B-21

Table B-17. Xcel Energy (Minnesota) Electric and Gas Savings and Cost-Effectiveness Ratios B-22

List of Examples and Case Studies

Example 1: The Colorado Industrial Energy Challenge 13

Example 2. The Southeast Industrial Energy Efficiency Network 15

Example 3. West Virginia Industries of the Future 16

Example 4. CenterPoint Energy Custom Process Rebate Program 17

Example 5. NEEA's Market Transformation Program 18

Example 6. BPA's Energy Project Manager Program 21

Example 7. NORPAC's Washington Mill Benefits from Custom Efficiency Offering 26

Example 8. Simplot and Cascade Engineering Identify $1,000,000 in Electrical Savings 27

Example 9. Irving Tissue benefits from NYSERDA's Industrial Offerings 28

Example 10. Xcel Energy Incentives and Technical Support 29

Example 11. Energy Trust of Oregon Production Efficiency Program 30

Example 12. Rocky Mountain Power's Energy FinAnswer and FinAnswer Express programs 33

Example 13. Michigan's Self-Direct Energy Optimization Program 46

Example 14. Puget Sound Large Power User Self-Directed Electricity Conservation Program 47

Example 15. Xcel Energy's Colorado Self-Direct Program 48

Example 16. Baselines and Energy Models 53

Example 17. EPA ENERGY STAR Program 54

Case Study 1. Wise Alloys B-2

Case Study 2. NORPAC B-6

Case Study 3. Husky Injection Molding Systems B-9

Case Study 4. Southport FOrest Products B-12

Case Study 5. Irving Tissue B-15

Case Study 6. BD Medical B-17

Case Study 7. American Foods Group B-20

Case Study 8. Arctic Cold Storage B-22

Executive Summary

Industry[1] is a key energy-using sector in the United States and accounted for about one-third of the nation's total primary energy consumption in 2012. In addition, the potential cost-effective energy savings in U.S industry is large—amounting to approximately 6,420 trillion British thermal units of primary energy (including combined heat and power), according to a comprehensive 2009 analysis by McKinsey & Company. In the United States, efforts to capture more of the potential energy savings in industry at the state level have grown in recent years as energy efficiency programs that capture cost-effective savings continue to be created and expand.

This report provides state regulators, utilities, and other program administrators an overview of the spectrum of U.S. industrial energy efficiency (IEE) programs[2] delivered by a variety of entities including utilities and program administrators. The report also assesses some of the key features of programs that have helped lead to success in generating increased energy savings and identifies new emerging directions in programs that might benefit from additional research and cross-discussion to promote adoption.

Why Do States Undertake Industrial Energy Efficiency Programs?

Many states have instituted energy efficiency programs funded by the public or ratepayers to achieve a variety of benefits. A core, compelling reason for this is because energy efficiency represents a least-cost option for supplying energy services compared to other prevailing options, providing both consumers and society with cost savings. Additional benefits can include environmental gains (including carbon or water use reduction), improved security against energy supply disruption or rapid price increases, and enhanced economic competitiveness. Most state governments have determined that it is necessary to include programs that cover all customers as part of their overall energy efficiency efforts, with industrial customers often a critical component. Experience has shown that the industrial sector historically saves more energy per program dollar than other customer classes: at the national level, IEE programs had an average cost of saved energy of $0.030 per kilowatt hour (kWh) in 2012—nearly one cent lower than the aggregate average energy efficiency program cost of $0.038/kWh.[3] Many of the well-established ratepayer-funded IEE programs in North America, such as those of Bonneville Power Authority, BC Hydro, Energy Trust of Oregon, or Wisconsin's Focus on Energy, continue to realize reliable energy savings from industry at or below the average costs they face for their programs overall. To realize these low-cost energy savings, however, requires a concerted effort developed specifically for the industrial sector and long-term, focused efforts addressing specific industrial needs and circumstances.

States have found that a larger amount of energy savings potential in industry can be gained from energy efficiency programs than can likely be achieved if industrial energy users pursue energy efficiency individually, with limited program assistance. Industrial companies are often aware of energy savings projects in their facilities and many companies have a solid record of developing these projects to save money; however, energy efficiency often cannot compete with other capital demands, even with similar or better paybacks. Moreover, industrial staff members often report that it is difficult to effectively navigate corporate project decision-making systems to get management endorsement for even quick payback energy efficiency projects. In addition, small- or medium-sized energy savings projects often do not compete well with other projects in garnering management attention and

[1] As defined by the Energy Information Administration (EIA), industry consists of the following types of activity: manufacturing (NAICS codes 31-33); agriculture, forestry, fishing, and hunting (NAICS code 11); mining, including oil and gas extraction (NAICS code 21); and construction (NAICS code 23). This report principally focuses on the manufacturing subsector.

[2] The best practices information presented in this report is based on a review of publically available literature on state energy efficiency programs and materials and presentations from related workshops and discussions with industrial energy efficiency experts and program administrators, including: the ACEEE Summer Study on Industry (July 2013, Niagara Falls), the ACEEE Resource Acquisition Conference (September 2013, Nashville), the Industrial Energy Efficiency and CHP Regional Dialogue Meetings (held in 2011, 2012 and 2013), the Midwestern Governor's Association Industrial Energy Productivity Meeting (November 2013, Chicago).

[3] Source: Aden et al. 2013 based on EIA 2012 demand-side management, energy efficiency, and load management programs data for more than 1,000 utilities. Note: To ensure consistency and comparability, these values only include the 182 organizations that reported residential, commercial, and industrial savings and expenditure data; transport sector energy efficiency program data are not included except as a component of the aggregate average.

enthusiasm. Finally, limitations on staff resources and knowhow can further hinder implementation of cost-effective energy efficiency measures.[4]

In states where ratepayer-funded energy efficiency programs are in place, industrial programs can make a significant difference, not only by fostering higher implementation of quick payback projects, but also by providing financial incentives that improve the economics of what would have been longer-term payback projects (3–6 years) that are well outside the typical interest scope of industrial managers. Program incentives to help industrial customers capture the potential for large, additional energy savings can strengthen the alignment of company incentives with the broader interests of energy users statewide in developing low-cost resources for energy service supply. In addition, other intensive but highly cost-effective initiatives of key medium-term interest can be fostered through multi-year programming, such as development of new strategic energy management (SEM) systems in industrial companies.

Even relatively simple programs providing technical assistance, fostering peer exchange, and disseminating practical information can make a difference by supporting facility or company energy management staff in their work and drawing company management attention to energy cost saving possibilities. Increasing awareness of the non-energy benefits (NEBs) that often accompany energy saving projects can help tip the scale in favor of project implementation.

The Wide Spectrum of Ongoing and Useful State Programs

There is wide variation in the types of IEE programs pursued by states, utilities, and energy efficiency program administrators. The dynamics of local economies, existing regulatory frameworks, political interest, and characteristics of local industrial sectors help define what different states feel are the most appropriate approaches for IEE programs. Within this wide spectrum of successful—if diverse—experience, all states can certainly launch new programs, or adapt existing programs, providing cost-saving benefits to industry and the state at large. Moreover, because of the diversity of programs and experience, each state can learn from others about new ideas and lessons learned in program design and implementation.

This report defines a state IEE program in broad terms as a program that provides information, services, and/or financial support to interested industrial facilities within the state for energy efficiency activities. Broadly speaking, there are two main types of IEE programs in the United States:

- Ratepayer-funded energy efficiency programs which are funded through electric and gas customer rates
- Non-ratepayer-funded programs, which are funded by other means (e.g., federal resources, state operating budgets) and are often run by out-of-state energy offices and universities.

This report principally focuses on ratepayer-funded programs, although non-ratepayer-funded programs are also touched upon. Many states also mix a variety of different offerings and funding streams. The National Association of State Energy Officials (NASEO) reports that at least 35 state energy offices operate some type of IEE program separate from, or in support of, ratepayer-funded programs. Forty-one states have ratepayer-funded energy efficiency programs, and just over one-half of states operate ratepayer-funded programs with clean energy portfolio standards/energy efficiency resource standards or utility energy efficiency targets. Some states have chosen to include a self-direct or opt-out option to industrial programs. Self-direct programs are defined in this report as programs that allow qualifying industrial customers to "self-direct" fees that would normally be charged for a ratepayer-funded program directly into energy efficiency investments in their own facilities instead of into a broader aggregated pool of funds collected through a public benefits charge for energy efficiency programs. Not to be confused with "opting out," where the industrial company does not have to participate in the program, self-directed industrial customers are still obligated to spend money and deliver energy savings, either on a project-by-project basis, or over a certain amount of time.

[4] These IEE program challenges were identified through SEE Action Industrial Energy Efficiency and Combined Heat and Power Regional Dialogue Meetings held across the country in 2011, 2012, and 2013 (www1.eere.energy.gov/seeaction/ieechp_dialogues.html).

APPROACH	DESCRIPTION	PROGRAM EXAMPLES
KNOWLEDGE SHARING	• Low-cost or no-cost technical assistance • Workshops and other outreach • Peer exchange opportunities between industrial clusters or groups of companies • Success story dissemination	• West Virginia Industries of the Future • Southwest Energy Efficiency Project
PRESCRIPTIVE INCENTIVES	• Explicit incentives or rebates for certain specific eligible technologies (e.g., lighting, motors, drives, compressed air, process heating equipment)	• Rocky Mountain Power • Efficiency Vermont
CUSTOM INCENTIVES	• Specific energy efficiency projects tailored to individual customers or specific industrial facilities • May be a mix of technologies • Incentives or rebates often based on entire electricity or natural gas savings	• Xcel Energy • NYSERDA
MARKET TRANSFORMATION	• Streamlined path for introduction of new energy efficiency products to the market • Address structural barriers to energy efficiency (e.g., outdated building codes or lack of vendors offering an emerging technology)	• Northwest Energy Efficiency Alliance
ENERGY MANAGEMENT	• Operational, organizational, and behavioral changes through strategic energy management • Continuous energy improvement (e.g., embedded energy manager to provide leadership and organizational continuity for implementing change)	• Wisconsin Focus on Energy • Energy Trust of Oregon
SELF-DIRECT	• Customer fees directed into energy efficiency investments in their own facilities instead of a broader aggregated pool of funds • Eligibility for customer participation often based on threshold amount of energy use or energy use capacity • Verified energy savings	• Puget Sound Energy • Michigan Self-Direct Energy Optimization

Source: Categorization adapted from Bradbury et al. (2013)

Figure ES-1. Spectrum of IEE state program approaches with program examples

Financial incentives and technical assistance are often provided to energy users to implement sufficient energy efficiency measures to meet specific statewide energy savings goals or pursue all cost-effective energy efficiency opportunities. The main types of offerings, shown in Figure ES-1, are the following:

- **Technical Assistance and Knowledge-Sharing Programs.** These programs typically offer no-cost or low-cost expertise and advice to industrial companies on new technologies and practices, share analytical tools, disseminate success stories and case studies, and offer networking opportunities.
- **Prescriptive Programs.** Standardized prescriptive program offerings provide explicit incentives for adoption of specified higher-efficiency technologies in applications that are common among a variety of commercial and industrial energy users.
- **Custom Programs.** These program offerings provide financial and technical support, usually for customized, often process-specific, project implementation designed to meet the explicit needs of specific industrial customers. They can unlock substantial energy savings beyond what is possible when targeting only individual pieces of equipment and are usually quite cost-effective.

- **Market Transformation Programs.** These programs aim to streamline the path from market introduction of new energy efficiency products or practices to their promotion and consumer acceptance. Adoption of the new products can be supported through increasingly stringent energy efficiency codes and standards, technical assistance, and/or financial incentives.
- **Strategic Energy Management and Energy Manager Support Programs.** Rather than focusing on technology and equipment, these programs seek to promote operational, organizational, and behavioral changes resulting in energy efficiency gains on a continuing basis. SEM involves the operation of internal cross-organization management systems for companies that need to identify and implement many energy efficiency measures year after year.

Experience from Designing and Delivering Programs

A central finding of this report is that achieving success in IEE programs requires significant upfront investment and steady commitment over a number of years. In practice, the experience of strong IEE programs shows that the dedicated effort required is worth it in terms of generating robust and low-cost energy savings. This is especially true in the industrial sector where energy improvement decisions may be linked to operational or capital cycles.

The industrial sector is heterogeneous; different plants have different needs, all of which takes time and skill to grasp. Industrial plant staff members are generally more sophisticated concerning energy matters compared to residential and many commercial energy users. However, internal decision-making processes in industrial companies concerning energy efficiency investments or energy use behavioral change can be complex. Plant operational cycles must be understood and typically define project scheduling. Often, non-energy benefits, including increased productivity, may provide a key tipping point benefit in favor of pursuing a given line of projects, but such benefits may not be immediately obvious. As detailed further in Chapter 4, the barriers and challenges of the industrial sector must be addressed if IEE programs are to create real value for their customers.

To overcome existing barriers and provide high value to industrial customers, programs require quality market assessments, steady and close interaction with customers, a critical mass of knowledgeable staff and strategically engaged consultants, and operational stability. This requires upfront investment and a multi-year focus.

There are 10 IEE program features highlighted by analysts and practitioners that consistently add value to industrial customers and contribute to program success. These program features are:

1. **Clearly demonstrating the value proposition of IEE projects to companies.**
   There are many direct and indirect benefits from IEE projects. A key point in making the value proposition case to industrial company managers is to lay out in simple and concise terms the operating cost savings and other benefits—including profits—that are being left on the table by not addressing cost-effective energy efficiency improvement opportunities.
2. **Developing long-term relationships with industrial customers that include continual joint efforts to identify IEE projects.** Maintaining relationships with key industrial customers is important in pure technical assistance programs as well as energy efficiency resource acquisition programs. It takes time and a steady relationship for program personnel to understand company circumstances and needs, and for company personnel to understand what a program can offer them. Projects tend to be identified over time, as circumstances change and opportunities arise.

   Maintaining quality long-term relationships is people-dependent. Most programs have found that it is necessary to have a consistent and savvy contact person for industrial customers to interact with, such as an account manager. Satisfaction of industrial customers with program delivery and results often hinges on the level of trust established in relationships with program staff or experts.

   Due to the importance of long-term relationships, substantial program investments in staffing or contracted expert capacity are necessary over a number of years to generate the best results. Contracting for program delivery capacity based on only short-term goals, with frequent changes in contractors, is not likely to succeed. Time and effort is needed to set up effective institutional systems.

3. **Ensuring program administrators have industrial sector credibility and offer quality technical expertise.** Effective IEE programs also develop credibility with the industrial customer by employing staff and/or contracted experts that understand the customer's industrial segment and have the technical expertise to provide quality technical advice and support on energy efficiency options and implementation issues specific to that industry and customer. Addressing industrial companies' core needs requires understanding a plant's production processes, operating issues, and the market context that it operates within. Effective IEE programs will adopt the language, engagement strategies, and metrics that are meaningful to the corporate managers who drive capital investment decisions. Understanding customer needs and their investment decision-making processes allows IEE program administrators to generate trust with their industrial customers, boosting IEE implementation rates while making better use of limited resources.
4. **Offering a combination of prescriptive and custom options to best support diverse customer needs.** A combination of both prescriptive offerings for common cross-cutting technologies and customized project offerings for more unique projects can best meet diverse customer needs and provide flexible choices to industries.
5. **Accommodating scheduling concerns.** Program flexibility to meet industry project scheduling requirements is important to meet industrial customer needs. Typically, scheduling of capital project implementation must consider both operational schedules that dictate when production lines may be taken out of operation and capital investment cycles and decision-making processes. Programs with multi-year operational planning can best accommodate company scheduling requirements and the ebb and flow of company project implementation progress.
6. **Streamlining and expediting application processes.** Industrial customers may perceive the application and implementation procedures for IEE programs to be administratively complex and burdensome. Achieving the right balance between meeting key program administration needs for information and keeping program procedures simple and efficient may often require a continual process of evaluation and improvement.
7. **Conducting continual and targeted program outreach.** Even where industrial programs are well established, various industrial customers may remain unaware of the industrial program offerings that may be most applicable or useful for them due to staff turnover and internal demands. Steady and continual outreach and dissemination of information, such as examples of successful past projects, is important to encourage participation. Effective long-term relationships with industrial customers create better information flow and can assist in program outreach efforts.
8. **Leveraging partnerships.** Successful IEE programs often partner with federal, state, and regional agencies and organizations to leverage their expertise, access to customers, and program implementation support capacities. Partnerships can help programs by providing technical expertise, program design and implementation guidance, and expanding program outreach and implementation channels.
9. **Setting medium- to long-term goals as an investment signal for industrial customers.** Most state IEE programs have found that establishing and reporting on energy savings goals in three-year cycles is effective. Medium- and longer-term goals and coordinated funding cycles set a framework for long-term programming and can signal increased certainty to the market and program administrators.
10. **Undertaking proper project measurement and verification and completing program evaluations.** Effective measurement and verification (M&V) of project energy savings is critical to program administrators and regulators to assess the actual results of program activities and measure the contribution of projects and aggregate programs for achieving their goals. Manufacturers also can obtain clear views of the results of investment. Planning for M&V during the program design phase as well as periodic evaluation and adjustment in M&V approaches is important. If NEBs can be included in project assessments, they can further improve understanding of these often important benefits in conveying the value proposition for future energy efficiency projects. Finally, it is useful for programs to undertake periodic process and/or operational strategy evaluations of their full range of activities to assess where program efficiency and results can be further improved.

Self-Direct Programs

This report's review of self-directed IEE programs found a wide range in program structures. Some programs leave obligations of self-directed industries only vaguely defined, include little reporting, and little or no monitoring of energy-saving actions. Such programs ultimately may be little different in terms of results from provisions allowing industry to opt out of energy efficiency programs entirely. At the other end of the spectrum, some programs require verified self-directed customer investment and energy savings to be achieved in order for payment into the programs to be waived. Clarity in self-directed customer obligations and M&V of results are necessary if the policy goal is to ensure that self-directed industrial customers contribute to overall efforts to ensure least-cost electricity or gas service at a level on par with the contributions of other customers.

Emerging Industrial Program Directions

Most states with active IEE programs continue to devote much effort to expanding and improving their programs. There are four key areas of particular interest for further program evolution.

- **Expanding and strengthening strategic energy management programs in industry.** Efforts to support implementation of SEM systems in industry (and also commercial and institutional) are gaining momentum in state programs and internationally. Successful implementation of SEM in many industries could have a dramatic impact on capturing more unrealized energy efficiency potential. The benefits of supporting internal company platforms for continual identification and implementation of energy savings measures include more comprehensive identification and prioritization of energy savings investments (including across organizations), high-impact and low-cost behavioral changes, and operational and maintenance improvements, all contributing to the company bottom line. For example, use of greater submetering as part of an SEM initiative may allow previously unclear issues and solutions to come to light, or enable a new energy intensity program to be put in place.

  SEM implementation can be effectively supported through technical assistance and recognition programs or through energy efficiency resource acquisition programs. One key common challenge is how to easily convey options for introducing SEM into different corporate environments and the value proposition of these management systems. Experience has shown that company senior management support for SEM initiatives is necessary for success and strategies are needed to garner such support.

- **Providing energy efficiency incentives for whole-facility performance.** Program expansion to assess energy savings from SEM implementation could provide directions for taking energy efficiency programs that encompass process- or plant-wide opportunities (e.g., providing incentives and assessing savings credits for whole industrial facility performance) as opposed to performance of individual investments or measures. Efforts are underway to determine baselines and performance metrics that can provide sufficiently robust measurements of facility savings so that regulators and the public are confident that funds have produced real and new energy efficiency savings.

- **Valuing and expanding quantification and recognition of project NEBs.** Although there is wide variation between projects, several studies have shown that NEBs from IEE projects, such as broader productivity or quality gains, can be as high as or even higher than the energy cost saving benefits achieved by the projects. Awareness of the importance of quantifying or otherwise highlighting key and large co-benefits is growing. Even so, quantification of these benefits tends to occur mainly after project commissioning as part of project evaluation efforts. Some co-benefits, such as water savings, are relatively easy to quantify, while others, such as safety improvements, are more complex to assess. If programs employed systematic ways to assess some of the NEBs for key projects earlier in the project cycle, the clarity added to both the resulting total returns and shorter project payback could tip the scale on a variety of projects from "wait and see" to implementation.

- **Continuing efforts to expand industrial natural gas efficiency programs.** Although natural gas efficiency programs have been implemented in various states for years, effective coverage of the industrial sector is much less common than for electricity efficiency programs, even though industry accounts for about 26%

of total end-use natural gas consumption in the United States. A key challenge is that most large industrial customers purchase their gas through third-party suppliers, rather than their distribution companies. Another challenge is the recent decrease in natural gas prices (even though many gas saving projects are still cost-effective at current prices). Nevertheless, a number of states and Canadian provinces continue to serve as promising examples in delivery of industrial natural gas efficiency programs, which other states may profit from reviewing. In addition, innovative concepts are under consideration to increase the effectiveness and the reach of gas efficiency programs. One such concept proposes to pool gas and electric efficiency funds to allow participating manufacturers to implement larger and more holistic programs with the flexibility to deliver both electricity and gas savings.

The Importance of Cross Exchange

As this report will show, the experience gained by various states in developing and implementing IEE programs is both diverse and rich. Often, however, valuable details of different programs—and the successes, failures, and lessons learned—are not well known or are poorly understood out-of-state, even though other state practitioners could benefit from these experiences. In addition, early ideas on new programs or improvements to existing ones are common among various practitioners. Opportunities for peer exchange on design and operational specifics could further programs' progress. Finally, there are benefits from greater mutual understanding that can be gained from increased cross-state exchange among different types of stakeholders in the IEE program practice, including regulatory agencies, program administrators, and involved industrial energy users in different states, as well as associated experts.

Various formal and informal networking mechanisms exist for further information exchange. In addition, the State and Local Energy Efficiency Action Network (SEE Action) can play a role in organizational and implementation specific activities on program design and implementation topics of greatest interest. Regional IEE organizations also are well-placed to help foster the increased cross-exchange needed to further ramp up the promising results in IEE programs in the states.

Conclusion

Many opportunities remain to incorporate cost-effective, energy-efficient technologies, processes, and practices into U.S. manufacturing. IEE remains a large untapped potential for states and utilities looking to improve energy efficiency, reduce emissions, and promote economic development. Successful IEE programs vary substantially in operational mode, scope, and financial capacity, but also exhibit common threads and challenges.

Gaining industry support for IEE programs is key; one of the best means to gain increased industry support is by demonstrating the high value of efficiency programs to industrial customers. Experience highlighted in this report will show that IEE programs can effectively deliver value to industries in terms of lower costs, reduced environmental impact, and improved competitiveness, and can help alleviate common resistance by industry to pay into ratepayer programs.

The development and operation of a highly valued IEE program requires a close understanding of the special needs of industrial customers, flexibility in program offerings, and sustained engagement. In practical terms, this means helping industry achieve concrete energy cost reduction benefits, improved competitive position, and additional NEBs such as enhanced productivity and product quality well above the costs of paying into the program. Flexibility in addressing project scheduling and investment cycles, provision of high-quality technical expertise, and comprehensive offerings that include both prescriptive and custom incentives are features of successful programs.

In addition to responding to the needs of industrial customers, IEE programs that leverage strategic partnerships, have robust M&V and evaluation methodologies, and seek to introduce more holistic program approaches, such as SEM and pooled gas and electric programs, will ultimately help program administrators operate more effective programs and deliver significant additional energy savings. As this report will show, states' experience in developing and implementing IEE programs is both diverse and rich. There are benefits from greater mutual understanding that can be gained from increased cross-state exchange among regulatory agencies, program administrators, industrial energy users, and associated experts.

Table ES-1 summarizes the key issues and considerations for regulators and program administrators in designing and implementing effective energy efficiency programs for industry, as well as programs that address that issue. They do not cover all decisions or issues that regulators and program administrators may need to consider because there will undoubtedly be jurisdiction- and case-specific topics that are not anticipated here. However, these considerations provide a starting point for addressing many of the issues that typically arise.

Table ES-1. Summary of Key Issues and Considerations for Regulators and Program Administrators

Topic	Issue	Considerations for Regulators and Program Administrators	Program Examples
The value of energy efficiency projects	Energy efficiency projects may compete with core business investments and decision-making is often split across business units.	• Clearly demonstrate the value proposition of energy efficiency projects to companies • Relay the operating cost savings and other benefits—including profits—lost if energy efficiency improvement opportunities are not addressed.	• Bonneville Power Administration • New York State Energy Research and Development Authority • West Virginia Industries of the Future
Relationships with industrial customers	It takes a long-term relationship for programs to understand industrial operation and needs, and for industrial companies to understand what a program can offer them.	• Long-term relationships with industrial companies enable joint identification of energy efficiency opportunities • Stability in program support and personnel over a number of years is critical.	• Energy Trust of Oregon
Industrial sector credibility and technical expertise	Addressing industrial companies' core needs requires understanding a plant's production processes, operating issues, and the market context the plant operates within.	Effective IEE programs develop credibility with industrial companies by employing staff/contractor experts that understand the industrial segment and have the technical expertise to provide quality technical advice and support issues specific to that industry and customer.	• Efficiency Vermont • Wisconsin Focus on Energy • Xcel Energy (Colorado and Minnesota)
Diverse industrial customer needs	Manufacturers use energy differently than the commercial sector, typically having significant process-related consumption. Focusing on simple common technology fixes alone will miss many of the opportunities.	A combination of both prescriptive offerings for common crosscutting technology and customized project offerings for larger, more unique projects can best meet diverse customer needs and provide flexible choices to industries.	• Rocky Mountain Power • CenterPoint Energy • Xcel Energy
Project scheduling	Scheduling of energy efficiency investments can be heavily dependent on a plant's operational and capital cycle, as proposed equipment changes must be guided through rigorous, competitive, and time-consuming approval processes.	Programs with multi-year operational planning can best accommodate company scheduling requirements, as scheduling of capital project implementation must consider both operational schedules that dictate when production lines may be taken out of operation as well as capital investment cycles and decision-making processes.	• NYSERDA

Topic	Issue	Considerations for Regulators and Program Administrators	Program Examples
Application processes	Industrial customers may perceive the application and implementation procedures for IEE programs to be administratively complex and burdensome.	Achieving the right balance between meeting key program administration needs for information and keeping program procedures simple and efficient may often require a continual process of evaluation and improvement.	• BPA • NYSERDA
Program outreach	Various industrial customers may be unaware of the industrial program offerings that may be most applicable or useful for them due to staff turnover and internal demands.	Steady and continual outreach and dissemination of information, such as examples of successful past projects, is important to encourage participation.	• AlabamaSAVES • NYSERDA
Leveraging partnerships	A range of federal, national, regional, and state initiatives and resources are relevant to state IEE programs, including those provided by the U.S. Department of Energy, the U.S. Environmental Protection Agency ENERGY STAR® program, state energy offices, and the Manufacturing Extension Partnership.	Successful IEE programs often partner with federal, state, and regional agencies and organizations to leverage their expertise, access to customers, and program implementation support capacities.	• AlabamaSAVES • Northwest Energy Efficiency Alliance, Northwest Food Processors Association and BPA
Medium- and long-term goals	Industrial companies and program administrators seek market certainty and reduced risk in ramping up the implementation of cost-effective energy efficiency measures.	Regulators and program administrators can set energy savings goals or targets for the medium- to long-term, coordinated with funding cycles (e.g., in three-year cycles).	• Michigan Self-Direct Energy Optimization Program • Southwest Energy Efficiency Project
Measurement, verification, and evaluation	Effective M&V is critical for program administrators to assess results and measure progress, and is also useful for industrial companies to verify results of their investments.	• Guidelines for M&V need to be clearly defined and periodically reviewed and adjusted • Periodic impact and process evaluations help identify where IEE program efficiency and results can be further improved • Non-energy benefits (NEBs) can be a key element of both project M&V and program evaluation.	• DOE's Uniform Methods Project • International Performance Measurement and Verification Protocol • ETO process evaluations • NYSERDA, Massachusetts, and BPA valuation of NEBs
Self-direct programs	There is a wide range in structures of self-direct programs: from those that are only vaguely defined, and include little M&V of energy saving actions, to those that require verified self-directed customer investment and energy savings to be achieved in order for payment into the programs to be waived.	Clarity in self-directed customer obligations and M&V of results are necessary if the policy goal is to ensure that self-directed industrial customers contribute to overall efforts to ensure least-cost electricity or gas service at a level on par with the contributions of other customers.	• Michigan Self-Direct Energy Optimization Program • Puget Sound Energy • Xcel Energy

Emerging Industrial Program Directions			
Topic	**Issue**	**Considerations for Regulators and Program Administrators**	**Program Examples**
Expanding and strengthening strategic energy management programs	Efforts to support implementation of SEM in industry are gaining momentum in state programs.	The challenge of crediting SEM (how to quantify and credit energy savings specifically achieved through SEM), as well as other SEM-related topics, is worthy of further research and cross-exchange.	• AEP Ohio • BPA • BC Hydro • ETO • WFE • Xcel Energy
Program approaches for whole-facility performance	Significant challenges exist in determining baselines and performance metrics that can provide sufficiently robust measurements of facility savings while maintaining practical and easy-to-implement methodologies.	Work on crediting energy savings from SEM could facilitate the provision of incentives and assessing savings credits for whole industrial facility performance, as opposed to performance of individual investments or measures.	• European experience
Capturing non-energy benefits at the project level	Although there is wide variation between projects, several studies have shown that NEBs from IEE projects, such as broader productivity or quality gains, can be as high as or even higher than the energy cost saving benefits achieved by the projects.	If programs employed systematic ways to assess NEBs earlier in the project cycle, the resulting total returns and shorter payback could tip the scale on a variety of projects from “wait and see” to implementation.	• Energy Trust of Oregon
Expanding natural gas programs	• There is less coverage of the industrial sector in natural gas efficiency programs than in electricity efficiency programs. • Most large industrial customers purchase their gas through third-party suppliers rather than their distribution companies. • Most single-fuel utilities administer energy efficiency programs on their own. However, energy efficiency opportunities typically lead to savings in both gas and electric energy use.	• Gas and electric efficiency measures—when delivered together as part of the same project or a combined program—can result in larger, more effective programs that capture more of the technically and economically viable energy efficiency potential. • Innovative concepts are under consideration to increase the effectiveness and the reach of natural gas efficiency programs.	• Efficiency Vermont • ETO • NYSERDA • PG&E • WFE

1. Introduction

The purpose of this report is to inform state regulators, utilities, and other program administrators about the significant benefits that states in the United States have experienced with industrial energy efficiency (IEE) programs, and to assist these stakeholders in successfully developing and implementing IEE programs in their service territories. This report defines a state IEE program in broad terms as a program that provides information, services, and/or financial support to interested industrial facilities within the state for energy efficiency activities.

This report recognizes that states have their own circumstances, industrial market characteristics, and regulatory structures, and therefore will respond with their own IEE program approaches. These approaches range from ratepayer-funded energy programs—often required under mandatory energy efficiency resource standards (EERS)[5] or other clean energy portfolio standard (CEPS)[6] or through demand-side management (DSM) programs—to knowledge sharing and technical assistance outreach programs without a regulatory incentive structure. The report does not attempt to make specific recommendations that could potentially conflict or be incompatible with individual state regulatory environments. Instead, it explores the practical, proven approaches states have taken. This information can be used by state policymakers and program administrators who wish to further develop their existing IEE programs or start new programs to achieve greater energy savings from industrial customers.

The best practices information presented in this report is based on a review of publically available literature on state energy efficiency programs and materials and presentations from related workshops,[7] and discussions with industrial efficiency experts and program administrators.

The report first provides an overview of why states support strong efforts to promote energy efficiency in the industrial sector and summarizes the current status of IEE programs in the United States. It then illustrates the breadth of existing approaches and program offerings and describes how programs have matured as administrators gain knowledge and experience of customer needs and ramp up energy efficiency improvements.

This is followed by a characterization of IEE program design features intended to respond to industrial customer needs, and highlights of proven practices from states with longstanding experience that have overcome challenges to engaging industrial customers and ensuring broad program uptake. The report focuses on the industrial manufacturing sector—as opposed to industry[8] more broadly defined (which typically includes agriculture, mining, and construction)—but recognizes that many state programs target broader industrial subsectors, combine offerings for industrial and commercial customers, or tend to structure offerings based on customers' energy consumption. In exploring how programs respond to manufacturers' needs, the report identifies programs that target specific industrial process improvements, as well as crosscutting support systems such as motor systems.

Finally, the report discusses two additional topics:

- **Self-direct programs** that allow some customers to "self-direct" their program fees directly into energy efficiency investments in their own facilities instead of into a broader aggregated pool of funding. Concepts that can be used to ensure these programs are achieving energy savings are discussed.
- **Next-generation IEE programs** that expand IEE savings options and industrial participation through strategic energy management (SEM) programs, facility-level programs, better integration of non-energy benefits (NEBs) and fuel sources, and other innovative approaches.

[5] EERS policies aim for quantifiable energy savings by recognizing that energy efficiency is a utility system resource and should be considered by the utility at the same time that supply resources are evaluated.

[6] Clean energy portfolio standards include renewable energy portfolio standards (RPS), EERS, and alternative energy portfolio standards (APS).

[7] Including: the ACEEE Summer Study on Industry (July 2013, Niagara Falls), the ACEEE Resource Acquisition Conference (September 2013, Nashville), the Industrial Energy Efficiency and CHP Regional Dialogue Meetings (held in 2011, 2012 and 2013), the Midwestern Governor's Association Industrial Energy Productivity Meeting (November 2013, Chicago).

[8] As defined by the Energy Information Administration, industry consists of the following types of activity: manufacturing (NAICS codes 31-33); agriculture, forestry, fishing, and hunting (NAICS code 11); mining, including oil and gas extraction (NAICS code 21); and construction (NAICS code 23). This report principally focuses on the manufacturing subsector.

The focus of the report is primarily on ratepayer-funded programs (funded by energy utility customers) due to their relative size in spending terms.[9] Programs that are funded from other sources such as state energy offices are also noted. Numerous examples, case studies, and program descriptions are provided throughout the report. The program examples highlighted here have been successful, not only because they have been able to respond to manufacturers' needs and achieve significant energy savings, but also because they demonstrate cost-effectiveness (according to the relevant cost test the state requires), have good rates of participation, or show they have some longevity and a track record of successful projects. Because this report does not attempt to profile all programs, this by no means suggests that other programs have not been successful.

Although not the focus of this report, the policy contexts for establishing IEE programs are important. These topics include[10]:

- Types of policy mechanisms, such as the decision process for setting CEPS and establishing ratepayer-funded energy efficiency programs
- Institutional guidance for including energy efficiency in integrated resource planning (IRP) processes
- Aligning utility and customer interests in increasing energy efficiency
- Funding sustainability and sources
- Standard criteria for evaluating and screening programs for cost-effectiveness (cost-effectiveness tests)
- Types of data and metrics derived by evaluators for use in impact evaluation of IEE programs
- Choice of program administrator.

[9] In a study of electric IEE program spending in 2010, the bulk of the spending (84%) came from ratepayer-funded utility program budgets, with the remainder of the funding coming from state and federal budgets, universities, nonprofit organizations, and other groups (Chittum and Nowak 2012).

[10] Key resources include Chittum 2012, DOE 2007, EPA 2006, Hayes et al. 2011, Nowak et al. 2011, Sedano 2011, SEE Action Network 2011a, 2011b, and 2012c, Taylor et al. 2012, and Woolf et al. 2012.

2. The Importance of Industrial Energy Efficiency Programs

Effectively managing and reducing energy use in the U.S. industrial sector through increased efficiencies is a key federal, state, and local policy priority as well as a good business decision. The industrial sector is a significant consumer of energy, accounting for about one-third of total U.S. energy consumption (EIA 2013). Implementation of cost-effective industrial energy efficiency (IEE) measures can help defer the need to build more power generation, transmission, and distribution capacity while also enhancing energy security and mitigating risk considerations. Beyond the local and national policy benefits of improved energy efficiency, it is also a key tool in helping U.S. manufacturers reduce their costs and increase competitiveness. To help meet state energy efficiency goals, energy efficiency program administrators are looking to tap the large and cost-effective resource potential the manufacturing sector holds.

2.1. Manufacturing is an Important Sector

The industrial sector accounts for around one-third of all end-use energy in the United States and remains the largest energy user in the U.S. economy (Figure 1). Although IEE has increased dramatically and manufacturing energy intensity has fallen since 1990, industry is projected to consume 34.8 quads of primary energy in 2020 (EIA 2013a). Estimates of the potential to reduce industrial energy consumption through efficiency measures by 2020 are as high as 18% (McKinsey 2009).[11] The energy intensity of production in industrial subsectors varies widely, from 52.3 end-use Btu per dollar of value added in cement production, to 0.4 Btu per dollar in computer assembly. Opportunities for subsector-specific processes make up 67% of the IEE potential, while opportunities in crosscutting energy support systems, such as steam systems and motor systems, comprise the remaining 33%. Sixty-one percent of the total opportunity resides in energy-intensive sectors such as iron and steel, cement, and chemicals, with the remaining 39% in non-energy-intensive sectors (McKinsey 2009).

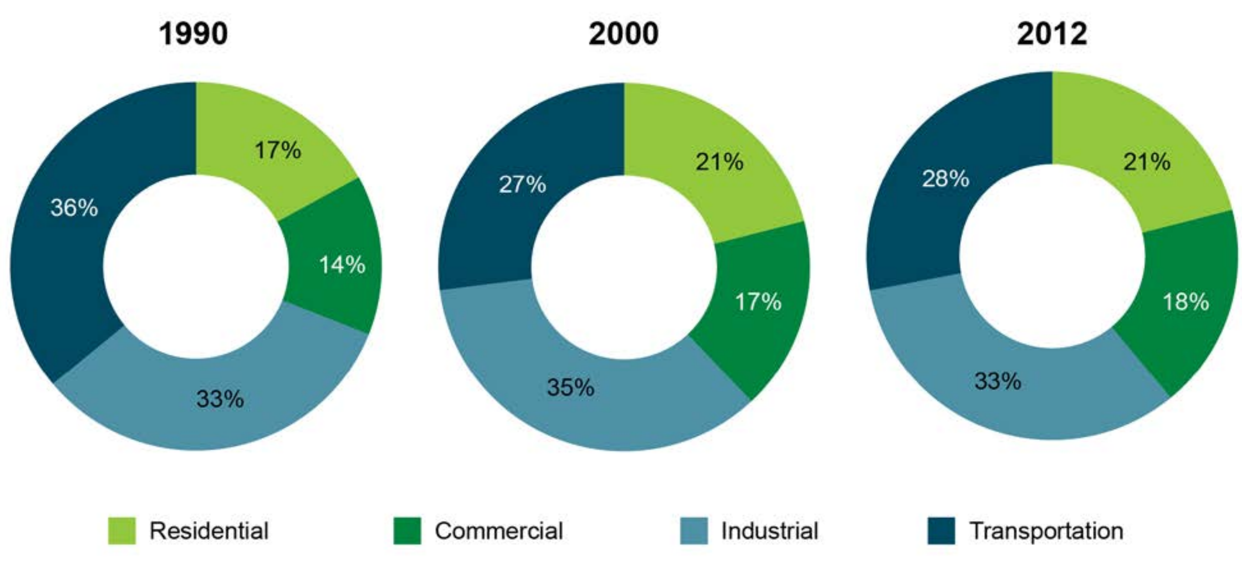


Figure 1. Energy consumption in the United States (1990, 2002, and 2012)

[11] Other estimates are similar; the National Academy of Sciences (NAS) concluded in 2010 in *Real Prospects for Energy Efficiency in the United States* that 14%–22% of industrial energy use could be saved through cost-effective energy efficiency improvements (those with an internal rate of return of at least 10% or that exceed a company's cost of capital by a risk premium). These innovations would save 4.9–7.7 quads annually by 2020.

Figure 2 shows the 2020 IEE potential in various subsectors and cross-sectorial systems, referred to as clusters. The energy savings potential is shown in both direct reductions in end-use energy and in primary energy terms that includes all of the upstream energy consumed in the delivery of energy to the industrial consumer. The potential in primary energy terms reflects the full fuel cycle basis and the avoided electricity losses possible through IEE.

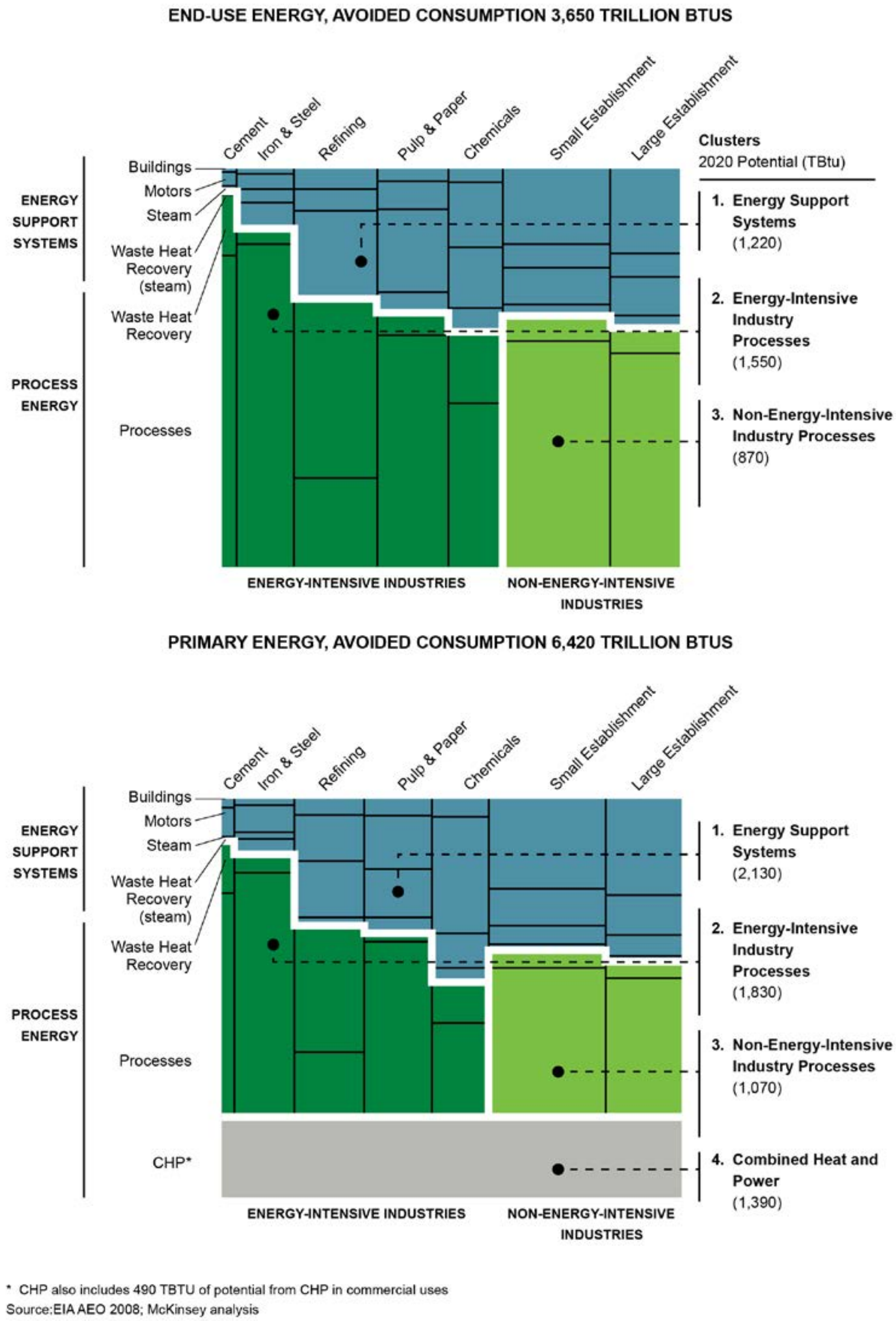
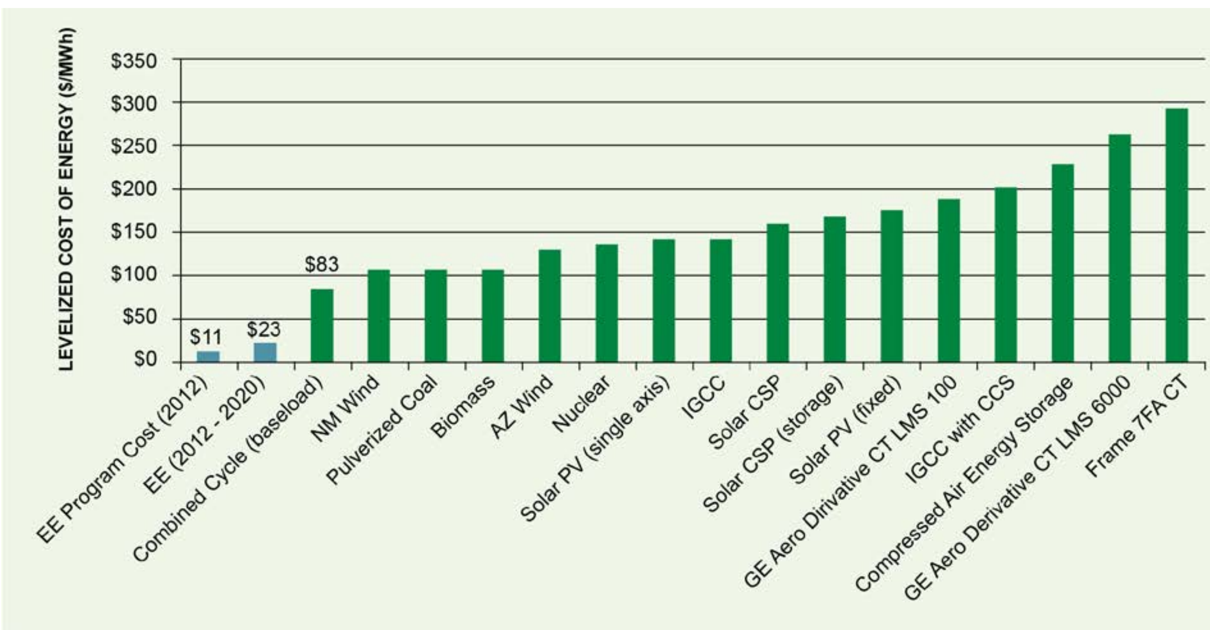


Figure 2. Clusters of end-use energy efficiency potential in the industrial sector

2.2. Industrial Energy Efficiency Resources Are Cost-Effective

Delivery of electricity efficiency resources generally costs much less than delivery of new electricity supply resources in most regions of the country. In most electric power systems, delivery of reliable energy efficiency resources to meet electrical energy consumption (kilowatt-hours [kWh]) costs somewhere between 15%–50% of the cost of power from new central station generation (Lazard 2011). A study examining evaluation results across 14 states found that energy efficiency programs on average cost the sponsoring utility or program administrator about $0.025 per kWh saved and about $3.40 per million Btu of natural gas saved over the life of energy efficiency measures. When costs paid directly by participants are also included, the average cost of efficiency savings is about $0.046 per kWh and $6.80 per million Btu. This is far less than the cost of power from new central station generating plants, which can range from $0.07 to more than $0.30 per kWh (ACEEE 2009, Lazard 2009, SEE Action Network 2011a).

Energy efficiency resources offer cost advantages for meeting new power capacity (kilowatts [kW]) needs as well. Similarly, the costs of improvements in the efficient use of natural gas also are generally substantially lower than acquiring new natural gas supply resources over the medium term, although gas industry structure and economics are different from those of the power sector (Trombley and Taylor 2013).[12] As an example of the economic attractiveness of energy efficiency, Figure 3 highlights the levelized costs[13] of different energy resources in Tucson Electric Power's service area.



Conventional resource costs include fuel, capital, O&M, transmission, and interconnection costs.
Renewable resource costs include generation, delivery, backup capacity, and system integration costs.
Data Source: Tucson Electric Power 2012 IRP, 2012 DSM Report, and 10/31/2012 TEP Rate Case Technical Conference

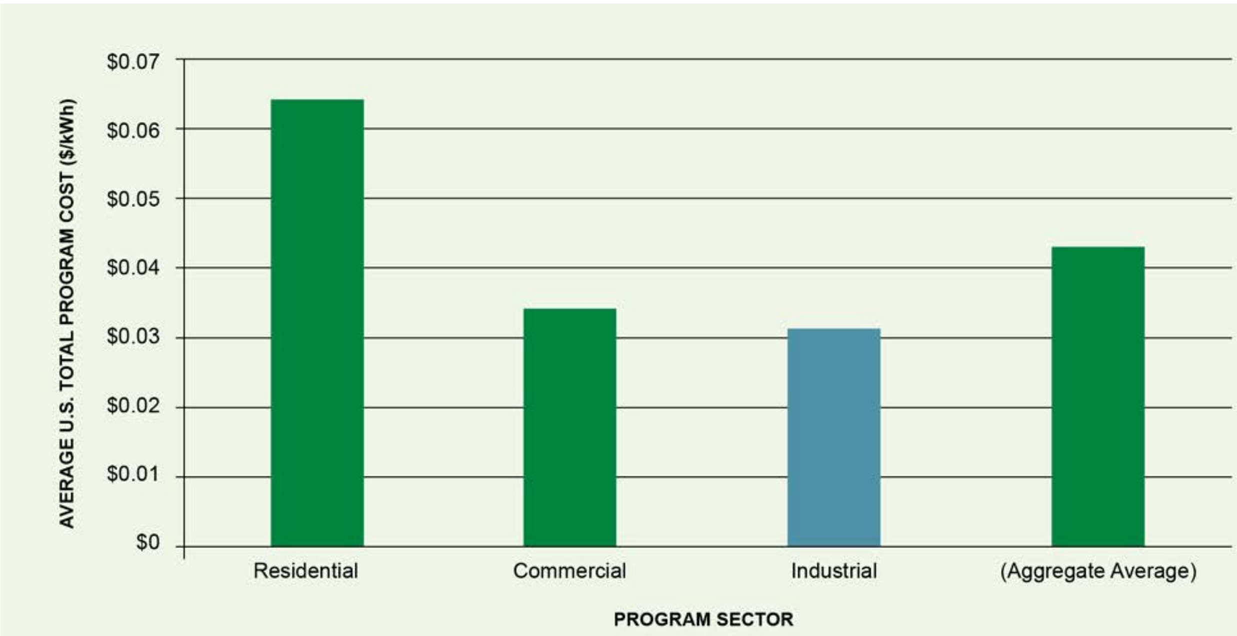
Figure 3. Levelized costs of energy resources in Tucson Electric Power's service area

[12] Although natural gas prices were at an all-time low in 2012, prices have already rebounded to around $4 per MMBtu and current forecasts estimate that prices will remain steady or slightly increase at $4 to $6 per MMBtu for the foreseeable future. Natural gas energy efficiency programs remain cost-effective when gas prices reach around $4 per MMBtu (using the Total Resource Cost test), so under the more likely natural gas price paths, these programs will continue to remain cost-effective. The program design implications of providing incentives for natural gas savings are discussed in Chapter 6.

[13] Levelized cost is often cited as a convenient summary measure of the overall competiveness of different generating technologies. It represents the per-kWh cost (in real dollars) of building and operating a generating plant over an assumed financial life and duty cycle, expressed in terms of real dollars to remove the impact of inflation, and often converted to equal annual payments. Key inputs to calculating levelized costs include overnight capital costs, fuel costs, fixed and variable operations and maintenance (O&M) costs, financing costs, and an assumed utilization rate for each plant type.

Not only is energy efficiency, in general, a more cost-effective option than new supply resources, recent studies suggest that IEE is often among the lower cost, if not the lowest cost, energy efficiency resource (Bradbury et al. 2013, Chittum 2011). Accordingly, many energy efficiency program administrators are not only looking to the industrial sector as a large potential source for energy efficiency resources, but also as a relatively low-cost energy savings acquisition option.

Figure 4 illustrates that the industrial sector has the lowest cost of saved energy on a national level, although it is important to note that cost structures vary by program and sector at the state level (Aden et al. 2013). In British Columbia, for example, the well-established industrial program under the electric utility's Power Smart Program is expected to provide energy savings at a cost to the utility of $0.015 Canadian per kWh during FY 2012–14, compared to utility costs of $0.031 Canadian per kWh for the residential program (Taylor et al. 2012). Additional examples are discussed in Appendix A, including programs in Wisconsin, Rhode Island, Oregon, and the Northwest. These show that industrial programs can often be twice as cost-effective as programs targeting the residential sector.



Source: Aden et al. 2013 based on EIA 2012 DSM, energy efficiency and load management programs data for more than 1,000 utilities www.eia.gov/electricity/data/eia861.

Note: To ensure consistency and comparability, this figure only includes the 182 organizations that reported residential, commercial, and industrial savings and expenditure data; transport sector energy efficiency program data are not included in this figure except as a component of the aggregate average.

Figure 4. Average costs of energy efficiency programs by sector (2012)

2.3. Industrial Energy Efficiency Creates Value for Companies and Society

IEE provides numerous benefits to industrial customers, to utilities, to all ratepayers, and to society as a whole.

Industrial Companies

Energy efficiency reduces costs and increases manufacturers' operational efficiency and productivity. It also often results in a number of co-benefits such as reduced material loss, improved product quality, and lower emissions. In addition, investors increasingly value corporate commitment to energy efficiency and sustainability as an indicator of sound governance and business acumen. Research consistently suggests that NEBs from efficiency measures in the industrial sector are substantial (Hall and Roth 2003, Worrell et al. 2003, Lung et al. 2005, Chittum 2012, Lazar and Colburn 2013). Facilities that take advantage of IEE program offerings provide a valuable hedge against energy supply disruptions or shortages, energy price volatility, and price spikes. For example, Darigold, a dairy and food processing company with 1,400 employees in the Northwest, adopted an energy reduction strategy in 2001. Due to SEM practices and energy-efficient capital improvements implemented since 2001, the company's energy intensity decreased by 21% in 2012. In addition, its productivity grew, the reliability and safety of its equipment increased, the risk of work-related injuries associated with operating machinery decreased, and the company experienced less workforce turnover (IIP 2012a). An analysis of NEBs in Wisconsin found that in calendar year 2010, participants in Focus on Energy business programs enjoyed $8.9 million in NEBs above and beyond the estimated $56 million in annual energy savings for the same year's business customers (Chittum 2012). Productivity and NEBs enjoyed by industrial customers are further discussed in Chapter 6.

System-Wide Benefits

States have found that specific IEE programs can help deliver a larger slice of the energy savings potential in industry than can likely be achieved if industrial energy users pursue energy efficiency on their own with no program assistance of any kind. Company staff are often aware of profitable energy saving opportunities, and many companies have a solid record of developing these projects to save money. However, focus is often on projects that can pay off in one or two years. Other projects that have substantial potential long-term benefits, but that have higher initial costs and longer payback periods, are left on the table. IEE programs can make a key difference, not only by fostering greater adoption of short payback projects, but additionally providing financial incentives that improve the payback of projects outside industrial managers' typical interest scope (less than two years). Program incentives to help industrial customers capture significant additional cost-effective energy savings potential can improve the alignment of company business practices with the broader interest of energy users statewide in developing lowest-cost energy supply resources.

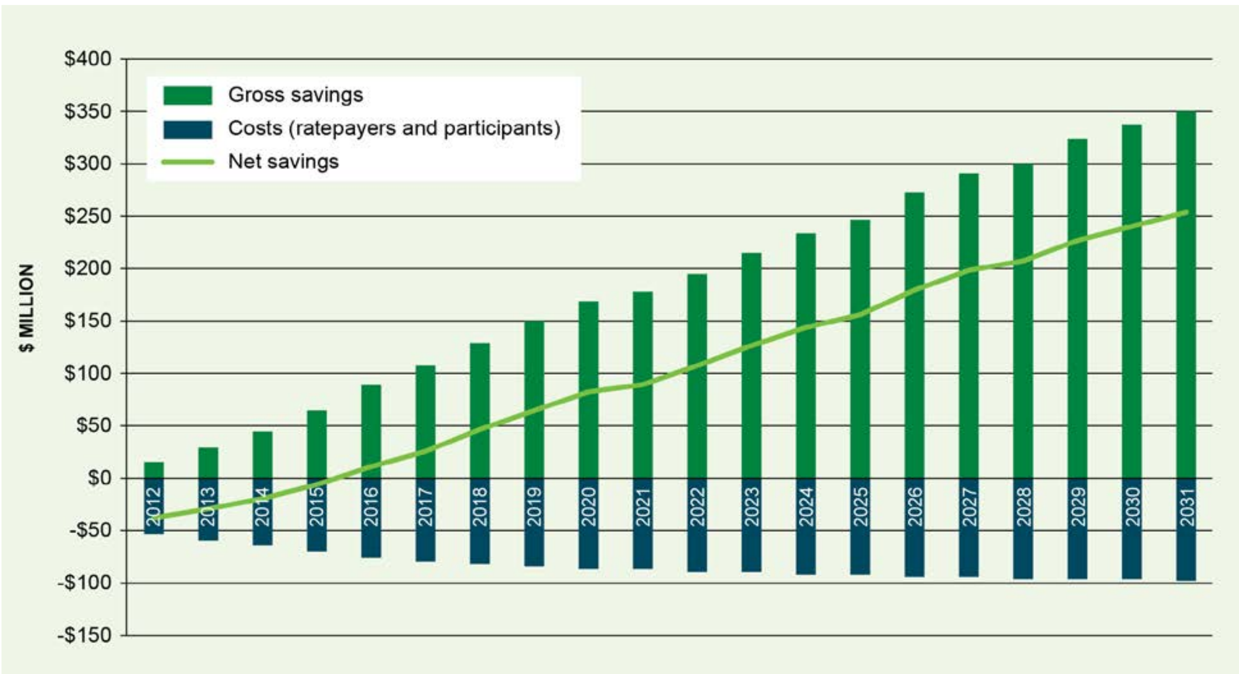
Implementation of cost-effective energy efficiency measures, if made within the context of ratepayer-funded energy efficiency programs, ultimately reduces the energy bills of all consumers. This is because energy efficiency can eliminate or delay the need to build more power generation, transmission, and distribution capacity. As a result, efficiency investments tend to lower electricity prices over the medium-to-long term due to the avoidance of utility rate increases otherwise necessary to develop more expensive new supply and transmission resources. How fast rates may decline relative to the no-energy efficiency base case, and by how much, depends primarily on how fast electricity demand is growing and the differences between the marginal costs for new supply and the marginal costs of energy efficiency resources. Generally speaking, however, a small rate increase in the near term (for energy efficiency program costs) will result in lower level rates in the long term compared to a no-energy efficiency base case (Taylor et al. 2012). This is especially true in regions where energy demand is growing and when other NEBs such as the environmental and public health externalities associated with the extraction of fuels and the extension of power transmission and distribution capacity are accounted for.

However, in order to achieve decreases in rates over time, it will be necessary to provide efficiency services to the vast majority of customers, including industrial customers, which represent a large share of potential savings. If this goal is achieved, then most customers will eventually be program participants and will enjoy the benefits of the efficiency programs, mitigating the issue of differential treatment. Therefore, pursuing the goal of achieving all cost-effective energy efficiency could lead to a reduction, not an increase, in rate impact concerns, as the vast majority of customers experience reduced bills over time. As participation levels increase, thoughtful program designs can ensure that all customers have a fair opportunity to participate (SEE Action Network 2011c).

As an example of the impact of energy efficiency programs on system costs, ACEEE recently modeled the benefits of Ohio's EERS, estimating it could save customers a total of almost $5.6 billion in avoided energy expenditures by 2020 and result in reduced wholesale energy and capacity prices, with wholesale energy price mitigation savings of $880 million (in 2012 dollars) and wholesale capacity price mitigation of $1,320 million (Neubauer et al. 2013).

In another example in the Pacific Northwest, acquisition of efficiency resources to meet additional electricity demand is far cheaper than developing new generation and can help moderate increases in consumer prices. The cost for additional supply of electricity from new sources is substantially higher than current average prices. The Sixth Northwest Conservation and Power Plan, issued in 2010, estimates the long-run averaged levelized cost of new electricity from natural gas-fired combined-cycle power plants to be about $0.092 per kWh, and the cost of Columbia Basin wind power to be about $0.104 per kWh. Compared to this, the average levelized cost of securing the Plan's aggressive portfolio of energy efficiency resources over 2010–2029 is $0.036 per kWh, including consumer costs (Taylor et al. 2012). The Plan also shows that energy efficiency reduced expected electricity loads by approximately 4,000 average MW since 1980 through the end of 2009, helping to level out demand.

Figure 5, from the Vermont Department of Public Service, illustrates how efficiency programs are expected to deliver long-term system savings relative to costs over 20 years.



Source: Vermont Department of Public Service (2011)

Figure 5. Efficiency Vermont costs and savings, high-efficiency case 2012–31 (current $)

Society as a Whole

IEE not only benefits individual companies at which the efficiency improvements are installed as well as all other utility ratepayers, but it also creates broader societal value. In addition to delivering cost-effective energy resources, energy efficiency reduces environmental impacts from energy production and use, and enhances energy supply security. Reductions in energy use, in addition to reducing greenhouse gas emissions, lead to lowering the burden of local air pollution, improving water use and efficiency, minimizing waste, and protecting the health and safety of workers. A recent U.S. Environmental Protection Agency (EPA) report calculated that each ton of reduced emissions from power plants (which might be displaced through IEE) has the following public health cost savings benefits: $130,000 to $290,000 for particle emissions ($PM_{2.5}$), $35,000 to $78,000 for sulfur dioxide (SO_2), and $5,200 to $12,000 for nitrogen oxides (NO_X) (EPA 2013a, Lazar and Colburn 2013).

Large quantities of water are also used in many industrial applications, mostly in process cooling. Energy efficiency measures often reduce water consumption and heat rejection control strategies can impact both process efficiency and water use. For example, significant opportunities exist to upgrade cooling towers to improve thermal capability, increasing energy efficiency and reducing water use. In water-constrained regions with significant industrial activity such as Texas, water- and energy-saving technologies can help to alleviate water scarcity and increase access for other users (Texas IOF 2013).

2.4. The Role of Energy Efficiency in an Expanding Manufacturing Base

Several trends suggest that the United States is beginning a major expansion of manufacturing capacity in a number of sectors (*The Economist* 2013). The U.S. government is tracking billions of dollars in planned manufacturing investments, including in fertilizers, chemicals, steel, cement, and assembly industries. Ample, low-cost natural gas supplies coupled with favorable foreign exchange rates and increasing labor productivity trends are attracting new investment in the U.S. manufacturing sector. For example, nearly 100 chemical industry investments valued at $71.7 billion had been announced through the end of March 2013 (American Chemical Council, May 2013). Companies such as Dow Chemical and Vallourec (steel tube producer) have announced new investments to take advantage of low gas prices and to supply extraction equipment.

The expansion of U.S. manufacturing has brought new awareness of the potential for energy efficiency to support the wider goal of increasing industrial competitiveness, productivity, and innovation. The installation of the most efficient processes and equipment (both in retrofitting existing systems and as new capacity is developed) serves as a hedge to maintain competitiveness for the future when energy supply and price conditions may once again change. Energy efficiency remains a profitable investment opportunity even in a low natural gas price environment and provides the added value of using this valuable domestic resource wisely and efficiently.

Lower American energy prices could result in up to one million additional manufacturing jobs (*The Economist* 2013). Manufacturing is often the key economic engine for local economies, so to the extent that energy efficiency investments help these facilities survive and grow, they support job retention and job growth within the local area. For example, Whirlpool attributes its ability to maintain the majority of its workforce at its Clyde, Ohio, plant, to industrial efficiency and production upgrades made at the facility, in addition to its production of a highly efficient line of front-load washing machines (NRDC 2012, Selko 2013).

2.5. The Current Status of State Industrial Energy Efficiency Programs

This report defines a state IEE program in broad terms as a program that provides information, services, and/or financial support to interested industrial facilities within the state for energy efficiency activities. IEE programs may have multiple goals but almost always have a public interest objective in mind—whether it is least-cost resource development, environmental benefits, consumer benefits, or economic development. State IEE programs can be administered by utilities, program administrators, or state energy offices. The most common are ratepayer-funded energy efficiency programs administrated by utilities and program administrators.[14]

IEE programs in the United States vary widely from state to state, as well as within states in both form and function. Some states have passed legislation mandating that a certain level of energy efficiency resources should be acquired or that all cost-effective energy efficiency opportunities should be pursued. Some programs may focus on electricity only, gas only, both of these energy sources, or all energy sources. State utility regulators, utilities, and energy efficiency program administrators often play pivotal roles in approving and delivering IEE programs. State energy offices are also important drivers of programs. Program funding may come from electric and natural gas ratepayers, funds from the state operating budget, federal and other sources, or a combination of sources. Program offerings are diverse, ranging from prescriptive incentives, custom/process efficiency, market transformation, strategic energy management, and self-direct program types (as described in Chapter 3).

In practice, because many states have chosen to include the manufacturing sector in energy efficiency programs funded by energy utility customers, ratepayer-funded programs are the focus of this report. These programs are predominantly funded by customers of electric and gas utilities. This is done either implicitly or explicitly, as charges added to electric and gas utility bills either as a cost of service and embedded in the total costs customers pay or as a separate line item to bills. These funds are often channeled into a public benefits fund or demand-side management (DSM) fund and programs are administered by utilities and/or energy efficiency program administrators.

[14] In a study of electric IEE program spending in 2010, the bulk of the spending (84%) came from ratepayer-funded utility program budgets; the remainder of the funding came from state federal budgets, universities, nonprofit organizations, and other groups (Chittum and Nowak 2012).

As of January 2014, 28 states have policies in place that establish specific energy savings targets, either through EERS, CEPS, or specific utility goals (ACEEE 2013a and ACEEE 2013b). Many states without energy efficiency targets still have ratepayer-funded programs.[15] In total, 41 states now require utility customers to contribute to supporting energy efficiency programs (Chittum in Uhlenhuth 2013). At least 35 state energy offices (SEOs) administer energy programs for manufacturers and the industrial sector (NASEO 2012). Appendix A provides a more detailed landscape of the scope and breadth of state IEE programs and the policy mechanisms that IEE programs currently operate under, including CEPS, energy savings targets for individual utilities, requirements to pursue all cost-effective energy efficiency opportunities, DSM mandates, or voluntary SEO-run programs.

Under these ratepayer-funded energy efficiency programs, utilities remain primarily responsible for administering and implementing programs with regulatory oversight. However, third-party energy efficiency program administrators also offer energy efficiency programs (ACEEE 2012). Although it is more common for each utility to develop and administer its own program, some states, such as Oregon, through the Energy Trust of Oregon (ETO), have unique programs set up to coordinate activities across the state and retain experts on staff to run the program. Others, like DTE Energy in Michigan, contract the work out to third parties while managing program savings targets (Taylor et al. 2012). Whatever the type of program administrator, each administrator operates under guidance and rules from the state utility regulator.[16]

Industrial Customer Class Coverage

Ratepayer-funded energy efficiency programs are typically designed to include all customer classes—residential, commercial, and industrial. In some states, however, industrial customers have been able to “opt out”[17] from programs altogether, or “self-direct” the funds—that they would have otherwise paid to the fund or utility—to their own direct energy efficiency actions.

Although there are many ratepayer-funded programs that include the industrial sector, there also are many states where development of programs has met with resistance by some manufacturers. In some cases, industrial customers may feel that they can design and implement energy efficiency efforts by themselves and do not want to provide funds through their utility bills for a separate entity to provide design and implementation assistance. In addition, industrial companies often are concerned that they fund a higher share of the program costs and receive less practical benefit compared with other ratepayer classes.

To address these concerns, some states allow industrials to opt out entirely as a “special customer class” from paying energy efficiency system benefit charges and not participate in programs at all. States with legislative opt-out clauses for large customers include Arkansas, Indiana, Kentucky, Maine, Michigan, Texas, and North Carolina (ACEEE 2013, Lewin 2013, Paradis 2013). States that are currently considering opt-out provisions include Oklahoma, Illinois, Louisiana, and Ohio (Ballard 2013, Elliott 2013, Ohio Township Association 2013).

Other states allow manufacturers (usually energy-intensive) to self-direct program funds toward their own energy efficiency activities. Examples include Massachusetts, Minnesota, Ohio, Oregon, Vermont, Washington, and Wisconsin. Note that regulatory oversight, use of program funds, and verification of savings will vary between states and program administrators. Self-direct programs, as opposed to full opt-out provisions, can be an attractive option if properly designed and monitored. Best practices in self-direct program design are further discussed in Chapter 5.

However, opt-out and loosely defined and monitored self-direct programs can be viewed as unfair to other customer classes who are required to pay program costs for energy efficiency resource acquisition that benefits all ratepayers, including manufacturers. Other system resources, such as new generation assets, are generally paid for

[15] Examples of states without EERS/energy efficiency targets but with ratepayer-funded energy efficiency programs include Idaho (Idaho Power), Wyoming (Rocky Mountain Power), and Utah (Rocky Mountain Power).

[16] For a discussion on choice of program administrator, see Sedano (2011).

[17] Opt-out programs allow large customers to fully opt out of paying their energy efficiency charges with no corresponding obligation to make energy efficiency investments on their own (ACEEE 2012b).

by all customers (Chittum 2011). The logic of energy efficiency programs is to procure least-cost energy efficiency resources, as opposed to only energy supply resources, for an entire utility system, ultimately reducing bills for all customers. Capturing cost-effective energy efficiency resources from all customer classes is an important element of an overall least-cost energy strategy for a utility, state, and region.

Many states have focused their energy efficiency program activities on the commercial and residential sectors due to the lower complexity of deploying common solutions throughout these markets. However, as regulators and program managers seek to meet increasing CEPS targets, they have begun to look at the industrial sector for greater energy savings. In addition, federal efficiency appliance standards are raising the baseline efficiency levels for many common residential and commercial measures such as lighting and home appliances, which further reduces the savings potential for these measures.

As a result, energy efficiency program administrators are increasingly turning to the industrial sector to help meet efficiency goals and are rethinking IEE program design and delivery to better meet industrial customers' evolving needs. Custom and tailored approaches are important for engaging industrial customers and responding to their specific needs.

Whatever framework they operate under, IEE programs can provide a variety of offerings and many programs offer a combination of services. For example, financial incentives for investments may be coupled with direct technical assistance. The major types of IEE program offerings generally in use in state IEE programs are discussed in Chapter 3.

3. How States Successfully Promote Industrial Energy Efficiency

Every industrial energy efficiency (IEE) program administrator can learn from its own experience and from the successes of others. This chapter summarizes the lessons and experiences of IEE program administrators, describes ways in which some states have been able to provide attractive offerings to manufacturers in a cost-effective manner, and explores how programs have matured and adapted through time to match evolving manufacturers' needs while simultaneously meeting statewide goals. Many states have effective IEE programs that have active participation from manufacturers and are producing verifiable energy savings.

As shown in Figure 6, these successful IEE programs represent a "spectrum of approaches," ranging from efforts by some states to promote IEE generally through knowledge sharing and technical assistance, to direct financial support of the implementation of strategic energy management and continuous improvement practices. Each offering can be effective in its own way and be an appropriate choice for individual states, depending on their regulatory contexts and circumstances. However, a more comprehensive set of program offerings—including combinations of the approaches on the spectrum (Figure 6)—is likely to deliver greater overall energy savings.

The spectrum highlights the range of program offerings that states can leverage as experience accrues and relationships develop with industrial customers. Effective IEE programs typically evolve over time with program administrators refining the program in cycles to increase its effectiveness.

Many mature IEE programs offer a suite of services to address diverse needs according to manufacturing sector, regional cluster, and each company's knowledge of and experience with IEE. These programs also provide companies with access to different offerings as they progress through an energy management pathway and look to implement more sophisticated improvement measures over time.

EXAMPLE 1: THE COLORADO INDUSTRIAL ENERGY CHALLENGE

The Colorado Industrial Energy Challenge (CIEC) is a voluntary program designed to help industrial facilities improve energy performance. The CIEC program challenges companies to set a five-year energy efficiency goal, and provides assistance in the form of free energy assessments, networking and training opportunities, and public recognition from the governor's office. The program is open to industrial facilities in Colorado with more than $300,000 in annual energy costs. The Southwest Energy Efficiency Project leads and coordinates the program with funding from the Colorado Governor's Energy Office and the U.S. Department of Energy (DOE). To join the program, companies sign a commitment letter agreeing to set a five-year goal for reducing total energy use or energy intensity and report energy information, energy efficiency project implementation, and progress toward the goal. As of 2013, the program has participation from around thirty facilities, and many have undertaken innovative projects to save energy and money. For example, Avago, a manufacturer of semiconductor devices, set a goal as part of CEIC to reduce energy intensity by 40% from 2008 levels by 2013. Avago implemented a project to use waste heat from a chiller condenser that would have otherwise been sent to cooling towers to preheat ultra-pure water needed in the manufacturing process. A heat exchanger now intercepts the rejected heat and pre-heats the cold water needed as feedstock for the process. The project cost $14,000, with a payback of only one month. It generates yearly savings of nearly $200,000, saves 28,000 decatherms of natural gas per year, reduces water use (through evaporation), and reduces CO_2 emissions by 1,600 tons per year.

Source: SWEEP 2013b

The spectrum of program approaches is discussed below and includes examples of successful state programs in each category. Detailed information on successful programs is provided in Appendix B.

APPROACH	DESCRIPTION	PROGRAM EXAMPLES
KNOWLEDGE SHARING	• Low-cost or no-cost technical assistance • Workshops and other outreach • Peer exchange opportunities between industrial clusters or groups of companies • Success story dissemination	• West Virginia Industries of the Future • Southwest Energy Efficiency Project
PRESCRIPTIVE INCENTIVES	• Explicit incentives or rebates for certain specific eligible technologies (e.g., lighting, motors, drives, compressed air, process heating equipment)	• Rocky Mountain Power • Efficiency Vermont
CUSTOM INCENTIVES	• Specific energy efficiency projects tailored to individual customers or specific industrial facilities • May be a mix of technologies • Incentives or rebates often based on entire electricity or natural gas savings	• Xcel Energy • NYSERDA
MARKET TRANSFORMATION	• Streamlined path for introduction of new energy efficiency products to the market • Address structural barriers to energy efficiency (e.g., outdated building codes or lack of vendors offering an emerging technology)	• Northwest Energy Efficiency Alliance
ENERGY MANAGEMENT	• Operational, organizational, and behavioral changes through strategic energy management • Continuous energy improvement (e.g., embedded energy manager to provide leadership and organizational continuity for implementing change)	• Wisconsin Focus on Energy • Energy Trust of Oregon
SELF-DIRECT	• Customer fees directed into energy efficiency investments in their own facilities instead of a broader aggregated pool of funds • Eligibility for customer participation often based on threshold amount of energy use or energy use capacity • Verified energy savings	• Puget Sound Energy • Michigan Self-Direct Energy Optimization

Figure 6. Spectrum of IEE state program approaches with program examples

3.1. Technical Assistance and Knowledge Sharing

Technical assistance and knowledge sharing programs are those that provide low-cost or no-cost expertise on energy-efficient technologies and practices, create networking opportunities between industrial clusters or groups of companies, and capture success stories and disseminate case studies. Some programs may also link companies with energy efficiency equipment and solution providers, leverage federal and other government resources so that industries may take advantage of equipment rebates, or direct customers to low- or no-cost industrial assessments funded through or by other programs.

Technical assistance and knowledge sharing programs are often initiated by program administrators voluntarily (i.e., without regulatory proceedings mandating ratepayer-funded programs and collection of a public benefits charge). Peer learning often provides a powerful driver for companies to implement energy efficiency measures and reap the productivity or competitive advantages their peers have enjoyed from similar investments. In those states that do not currently have ratepayer-funded programs, technical assistance and knowledge sharing programs can still generate significant energy savings to both manufacturers and society.

Examples of effective programs in this category include:

- The Colorado Industrial Energy Challenge (Example 1), which has been effective in its public recognition of IEE performance and providing companies with an opportunity to showcase their energy efficiency achievements
- The Industrial Energy Efficiency Network in the Southeast (Example 2), which hosts an effective peer exchange forum that provides a strong driver to share lessons learned
- The West Virginia Industries of the Future (WV-IOF) (Example 3), which has effectively leveraged partnerships with academic institutions and the U.S. Department of Energy (DOE) to provide training, technical assistance, and energy assessments to industrial staff.

EXAMPLE 2. THE SOUTHEAST INDUSTRIAL ENERGY EFFICIENCY NETWORK

The Industrial Energy Efficiency Network in the Southeast[18] is a regionally focused collaborative effort that unites cross-sector industrials in a peer-to-peer manufacturing network. As a platform for collaboration and education rather than providing technical assistance from a central program administrator to individual companies, the Network elevates energy efficiency best practices and project implementation, links manufacturers to financial and technical resources, and promotes strategic energy management practices.

Elevation of project ideas leads to implementation successes, with companies meeting regularly to share project experiences from initial conception through to measurable savings and other benefits. The exchange of qualified vendor references between peer energy managers is designed to shorten the time to project initiation. The Network offers a venue for activity at individual companies to be validated and celebrated by energy management peers.

The Network received an initial seed grant from DOE and is financed by public benefactors. Attendance at the peer-to-peer meetings continues to grow, with the average attendance around 80; manufacturers in the group have been actively making referrals to other firms in order to deepen the pool for collaboration. Firms are learning new tactics to manage energy at both the corporate and plant levels.

Sources: Marsh 2011, Marsh and Glatt 2011

3.2. Prescriptive and Custom Efficiency Offerings

Prescriptive and customized project offerings provide manufacturers with a financial incentive, often paired with technical assistance, for energy-efficient equipment and projects. Incentives for prescriptive and customized efficiency offerings are usually provided through ratepayer-funded programs. However, some non-ratepayer programs have designed IEE revolving funds in order to provide financial incentives (and technical support) on a self-sustaining basis.[19]

Prescriptive Offerings

Many energy efficiency programs have traditionally engaged the industrial sector through prescriptive incentives for lighting, motors, mechanical drives, compressed air, process heating equipment, and other energy support systems and equipment (Harris 2012). Prescriptive or standardized offerings provide explicit incentive or rebate amounts for certain specific eligible technologies. They can be useful for targeting those crosscutting pieces of equipment that are applicable across diverse commercial and industrial (C&I) sectors, and at both large facilities as well as small and medium enterprises (SME), such as variable speed drives for motor systems.

Prescriptive incentives for cross-cutting technologies can play an important role in helping to deploy high efficiency equipment across a broad base of industrial customers in different sectors and size classes. IEE programs have historically found it challenging to address the needs of SMEs as they have less staff capacity to address energy

[18] The program was previously administered by the Southeast Energy Efficiency Alliance (SEEA).

[19] Non-ratepayer-funded programs include AlabamaSAVES and the Tennessee Energy Efficiency Loan program administered by Pathway Lending. Pathway Lending received seed funding from the Tennessee State Energy Office, Tennessee Valley Authority, and DOE, but financing is leveraged principally through private community development banks. Low interest loans are available for businesses to invest in energy upgrades and the energy savings form a primary component of the principle repayment plan. These programs are profiled in Appendix B.

efficiency and generally have implemented fewer energy efficiency projects than larger companies. Taking advantage of less labor-intensive program offerings, such as prescriptive offerings—as long as eligible technologies are relevant to their situation—is a successful way to engage SMEs that may still have "low hanging" efficiency opportunities involving common technologies.

Prescriptive incentives are widespread throughout many states and are most often included as part of joint C&I rebate programs.[20] Although these measures may apply to manufacturing facilities, they do not address the majority of industrial energy-consuming equipment and processes. Some utilities have prescriptive measures for compressed air equipment, but in general a much larger percentage of energy savings projects specific to key industrial processes are categorized as custom measures (Seryak and Schreier 2013).

Custom Offerings

Instead of focusing on specific equipment upgrades, process or custom efficiency programs emphasize achieving savings from the manufacturing process itself, where the potential for energy savings is greatest (Harris 2012).

EXAMPLE 3. WEST VIRGINIA INDUSTRIES OF THE FUTURE

Industries of the Future West Virginia (IOF-WV), West Virginia's IEE program, was the nation's first state-level program (IOF-WV 2013) and helps manufacturers create financial savings through energy efficiency. IOF-WV teams work with individual companies to assess high priority research needs and develop projects that improve energy efficiency and environmental performance. IOF-WV grew out of a collaboration between West Virginia University, the West Virginia Development Office and DOE. The program provides technical assistance, conducts energy assessments, and runs best practice workshops on system-wide and component-specific topics to teach employees how to operate plants more efficiently. For example, the IOF-WV team conducted a plant-wide energy assessment at the Pechiney (now Alcan) facility in Ravenswood, West Virginia, from March 2002 to November 2003. The team identified $2.5 million in annual energy savings with average payback of less than 8 months. The assessment identified numerous areas for energy savings:

- Turning off comfort heating furnaces in summer months and in places where they are ineffective ($1,014,000 per year)
- Burner tuning and maintenance ($692,000 per year)
- Repair of compressed air leaks ($112,000 per year)
- Turning off idle equipment ($16,000 per year)
- Improving annealing furnace operating practice and modifying nitrogen plant control strategies to prevent waste of nitrogen ($75,000 per year).

The program is funded by a mix of state energy program funds, DOE funds, private sector leveraged funds, and cost-share.

Source: IOF-WV 2013, NASEO 2012

[20] The Database of State Incentives for Renewables and Efficiency (DSIRE) contains comprehensive information on rebates for specific technologies. See www.dsireusa.org.

Custom programs allow individual customers to develop specific energy efficiency projects that may be a mix of technologies and practices and qualify for incentives as long as they meet a required cost/benefit hurdle. Custom efficiency programs usually offer incentives based on a facility's entire electricity (kWh) or natural gas (therm) savings. Custom programs that use a per-unit-of-production calculation method shift the emphasis from traditional equipment upgrades (drives, motors, etc.) to improving a firm's ratio of energy use to physical output (Harris 2012). This allows program administrators to credit savings acquired via the implementation of a wide variety of technologies or plant and process modifications (Bradbury et al. 2013) rather than by choosing specific eligible technologies as in prescriptive rebate programs.

Custom programs generally require specialized resources to administer and support and may require greater program budgets than prescriptive offerings (Chittum et al. 2009). However, because they tend to deliver much larger savings and offer attractive paybacks per project, unit administration cost per kWh is often lower than prescriptive projects. Custom programs can be very cost-effective because they can unlock significant savings not possible through targeting individual pieces of equipment (Bradbury et al. 2013). CenterPoint Energy (see Example 4) has a successful custom program that was designed to address a gap in CenterPoint Energy's program coverage by reaching out to energy-intensive industrial customers who cannot avail themselves of standardized energy savings measures.

EXAMPLE 4. CENTERPOINT ENERGY CUSTOM PROCESS REBATE PROGRAM

CenterPoint Energy is an electric and gas utility based in Minneapolis, Minnesota, and has operated its rebate programs since the late 1990s. CenterPoint Energy provides financial incentives to customers who improve energy efficiency through innovative, customized energy-saving projects.

The Custom Process Rebate Program provides assistance and financial support to energy efficiency projects that do not qualify under prescriptive programs. Rebates primarily go to large-volume and dual-fuel customers that use throughput for process rather than heating purposes. Financial incentives are awarded to customers to assist with the first cost of the energy efficiency upgrade. The program has promoted such projects as bio-methane energy recovery, waste-heat energy recovery, boiler flue-gas condensers, thermal oxidizers, integral quench furnaces, heat-treat ovens, control packages, window replacement, stack economizers, and enthalpy wheels.

Each prospective project is compared to a base case to calculate efficiencies gained by installing the new technology. Once a project passes all requirements, an appropriate financial incentive is awarded to assist with the first cost of the energy efficiency upgrade(s). In some instances, C&I customers reach out to CenterPoint, seeking more effective energy efficiency processes. CenterPoint also works with customers to develop customized systems and solutions, and offers to buy down the new equipment, paying up to 50% of incremental cost.

In 2011, the program processed 148 custom projects that achieved a savings of 374,000 decatherms. The Custom Process Rebate Program addressed a gap in CenterPoint Energy's program coverage by reaching out to energy-intensive industrial customers who cannot avail themselves of standardized energy savings measures.

Source: Heffner et al. 2013

3.3. Market Transformation Programs

Market transformation programs work to streamline the path from the introduction and promotion of new energy efficiency products into the market to the establishment of customer acceptance. Market transformation programs require a long-term focus and are intended to address structural barriers to energy efficiency such as outdated building codes or lack of vendors offering an emerging technology. Their goal is to change marketplace behavior to increase acceptance of energy efficiency technologies and practices, but effecting this change can take time (often 5 to 15 years) (Taylor et al. 2012). Energy savings from these programs typically grow slowly in the early years, but are more likely to be persistent without relying on continued direct policy intervention once market acceptance is achieved (Taylor et al. 2012). An example of a successful market transformation program is the Northwest Energy Efficiency Alliance (NEEA) (Example 5). The initial phases of the process involve significant investments of time and effort to identify promising technologies and ideas and develop and test operational approaches to promote them. This type of effort is difficult for energy efficiency program administrators to justify because the costs are high for initial savings return. However, when an idea takes off, savings can materialize quickly, especially because program administrators in the Northwest (e.g., Energy Trust of Oregon and BPA) provide program support and leverage NEEA's market transformation solutions, pushing up market penetration rates and energy savings (Taylor et al. 2012).

EXAMPLE 5. NEEA'S MARKET TRANSFORMATION PROGRAM

The Northwest Energy Efficiency Alliance is a regional nonprofit alliance of more than 100 Northwest utilities and energy efficiency organizations working on behalf of more than 12 million energy consumers. It operates in Oregon, Washington, Idaho, and Montana. Formed in 1996, NEEA was tasked to undertake energy efficiency market transformation initiatives throughout the region in support of both regional utility energy efficiency programs and the energy efficiency agenda overall. NEEA works across residential, commercial, and industrial sectors; helps accelerate the innovation and adoption of energy-efficient products; and identifies, develops, and advances emerging technologies to fill the energy efficiency pipeline with new products. NEEA's costs are paid by the Bonneville Power Administration, the Energy Trust of Oregon, and distribution utilities.

NEEA's market transformation initiatives involve identifying promising technologies and developing and implementing programs that allow them to be effectively picked up in the marketplace on a sustainable basis. NEEA tracks the energy savings resulting from its various initiatives, which include both savings from ratepayer programs of the utilities or ETO that build directly from NEEA's innovations, as well as savings directly from overall market penetration. Since 1996, the region has cost-effectively delivered, on average, over 900 MW of energy efficiency per year through market transformation.

Sources: Taylor et al. (2012), NEAA (2013).

3.4. Strategic Energy Management and Energy Manager/Staffing Programs

Traditionally, IEE programs have generally focused on promoting energy efficiency technology and supporting the installation of new, more efficient equipment or processes. In contrast, continuous energy improvement,[21] strategic energy management (SEM), or energy manager programs seek to promote operational, organizational, and behavioral changes that result in greater efficiency gains on a continuing basis. Although technology-based programs typically involve energy assessments to identify specific efficiency opportunities, organizational issues often prevent cost-effective measures from being implemented. SEM and energy manager programs focus on establishing the framework and internal processes for managing energy use, as well as on implementing capital projects.

Strategic Energy Management Programs

SEM programs help support the deployment of holistic energy management strategies and seek to encourage energy savings generated from changes in corporate culture, behavior, and operations and maintenance (O&M) practices. SEM programs, which in this report also include the adoption of energy management systems (EnMS), usually involve establishing a team representing personnel from across the organization (rather than just one energy manager) and require corporate management support to raise energy efficiency as a priority within the firm. SEM programs support the development of baselines, energy performance indicators, and metering capabilities. Although implementation of capital projects is still guided by energy management processes to identify and prioritize energy efficiency opportunities, SEM programs also encourage best practices in O&M independent of new investments.

SEM programs can be an effective tool for companies that want to extend their efforts to systematically identify and prioritize capital projects beyond the isolated technical improvements they may have already made at their facilities. At the same time, SEM can also provide a framework for saving energy at little or no cost through changes in operational efficiency. For example, J.R. Simplot's corporate energy manager noted that by simply

[21] While the term "continuous energy improvement" was common in the past, the term "strategic energy management" has gained currency in today's programs.

applying behavioral changes, one plant was able to realize a 3% reduction in energy consumption in one year alone, with no capital expenditures (Sturtevant 2013). Energy management practices can be an especially attractive option for companies that do not have the capacity at that time to make significant investments, or are in the middle of operational cycles that limit plant modifications.

Examples of SEM programs include the BPA, the Energy Trust of Oregon (ETO), Wisconsin Focus on Energy (WFE), Xcel Energy Process Efficiency Program, BC Hydro, and AEP Ohio. An overview of the programs is provided in Table 1. Note that these programs' SEM offerings are often integrated into prescriptive or custom/process incentive programs but incentives for SEM can be different from custom or prescriptive incentives. Federal programs such as ENERGY STAR® offer resources that can be used and incorporated into an SEM offering.

BPA and ETO's SEM programs involve training "cohorts," or groups of non-competing companies, on SEM approaches. Companies typically meet monthly, with homework and coaching provided between meetings. These programs measure total energy savings achieved through the SEM training process, including savings from O&M changes, and provide incentives per unit of energy savings. BPA also offers a "track and tune" program to help companies find and implement low- and no-cost energy saving opportunities, and provides assistance with developing more sophisticated systems for monitoring energy consumption and measuring savings (Kolwey 2013).

Energy Manager Programs

A knowledgeable and dedicated energy manager is often the key to successfully implementing SEM within a company. An energy manager who works within and for the company for a period of time can provide leadership and organizational continuity for implementing change. Energy managers help guide energy efficiency capital expenditures through the company's approval process and provide the leadership and communication skills needed to inspire collaboration and minimize resistance to change within the organization. However, given the competitive pressures imposed on manufacturers today, many organizations are not able to obtain or reassign staff with the skill set to be a fulltime energy manager. Many organizations may lack awareness of the costs and benefits of hiring a fulltime staff member relative to other business investment opportunities and may also not anticipate the scope of the responsibilities. BPA's Energy Project Manager program (Example 6) has been successful in promoting the value of energy managers, as indicated by the fact that several facilities have gone on to hire their own energy managers after receiving BPA support.

To overcome these challenges, some IEE programs specifically support the placement of on-site energy managers in industrial facilities or with the corporate office. The energy manager can either be sourced as an existing staff member from within the company or brought in as an external expert (Russell 2013b). In some cases, programs provide support for on-site energy managers for a period of one year or longer. Program-sponsored energy manager initiatives promote the development of a cadre of experts needed to support SEM and achieve continuous energy efficiency gains over time (Russell 2013b).

For example, WFE provides a staffing grant to facilities that have already documented their major energy improvement needs. Reimbursements are paid upon implementation of energy efficiency projects. Twenty-eight facilities have been served to date. In 2010, 35 projects facilitated by the staffing grant in seven facilities generated energy savings of 278,872 MMBtu, or an average of 54,823 MMBtu per recipient). Staffing grant savings averaged $0.91 per MMBtu. Note that the energy savings totals include some projects that were not eligible for additional investment incentives (Russell 2013b).

BPA and Puget Sound Energy also have energy manager co-funding programs. Puget Sound Energy, BPA, and WFE programs provide partial financial support for the energy manager position assigned from existing personnel within the facility. The advantage of assigning an existing employee is that the person has already garnered trust of his/her colleagues and is familiar with the operational and technical processes of the workplace.

Roving energy project managers that assist multiple companies (as opposed to embedded energy managers for a single facility as described above) can also be an effective option, particularly for SMEs. SMEs often lack technical expertise and can thus benefit from external personnel who can share their technical and implementation experience from working with companies in similar applications. A roving energy manager can assist five to six companies at once by providing energy project management support and implementing energy efficiency opportunities identified through an energy audit (Weir 2013). For example, from 2010 to 2012, the Minnesota Energy Resources Corporation provided an energy management team coordinator to help the internal energy management teams of five industrial customers identify and implement energy conservation improvements (i.e., the coordinator dedicated 20% of total work time to each customer).

Table 1. Selected Energy Management and Energy Manager/Staffing Programs

Energy Management Offering	SEM Incentives	Customer Size
BONNEVILLE POWER ADMINISTRATION—ENERGY SMART INDUSTRIAL PROGRAM		
- **High Performance Energy Management (HPEM):** Provides training and individual assistance to 8–15 companies for one year. Measurement and incentive funding is available for 3–5 years. - **Track and Tune**: Low/no-cost operations O&M with incentive funding over 3–5 years and tools for interval data acquisition and performance tracking. - **Energy Project Manager (EPM) Program**: Funding of energy efficiency staff to support project identification and implementation (see Example 6).	$0.025/kWh for 3 or 5 years, for O&M savings	18,000 MWh/yr (guideline)
ENERGY TRUST OF OREGON—PRODUCTION EFFICIENCY PROGRAM		
- **Industrial Energy Improvement (IEI)**: Year-long engagement provides cohorts of manufacturing companies trainings on SEM principles, tools, and practices designed to help companies manage their energy strategically. - **Corporate SEM (CSEM):** Focuses on corporate sites, instead of the cohort model, CSEM provides training and on-site activities on SEM principles and practices (9–12 months). - **SEM-Maintenance:** Helps former SEM participants maintain, deepen, and continue the integration of SEM into their business' operations. - **CORE Improvement**: Offering similar to IEI in focus and structure but services and instructions are tailored to small to medium manufacturers. - **ISO 5001 pilot implementation** (see Chapter 6).	$0.02/kWh, $0.20/therm for 1 year of savings. SEM-Maintenance: $0.01/kWh, $0.10/therm	IEI/CSEM: More than 8,000,000 kWh/yr, or if eligible for gas, 500,000 therms/yr usage. CORE: Spending $50,000–$500,000 on total energy costs (electricity and gas combined)
WISCONSIN FOCUS ON ENERGY—INDUSTRIAL PROGRAM		
- **Practical Energy Management**: Provides best practice training events and applies its industry-specific Energy Best Practice Guidebooks to key cluster industries. - **Staffing grants:** Allow companies to hire an FTE.	Grants for energy staff	Customers with more than $60,000 in monthly bills
XCEL ENERGY—PROCESS EFFICIENCY PROGRAM (CO & MN)		
Provides individual assistance in developing a 3–5 year energy management plan using the Envinta One-2-Five Energy Methodology that evaluates energy intensive processes, benchmarks energy management practices, and provides an assessment prioritizing opportunities.	For capital projects only	> 2,000 MWh/yr of savings potential
BC HYDRO—POWER SMART		
- **Industrial Energy Manager:** Offers funding for large customers to hire an on-site energy manager and a structured support group of local companies that share best practices. - **Energy Management Assessment:** Free assessment of opportunities, customized SEM action plan, and rating against the Energy Management Scorecard. - **Various free energy management tools and training**, employee awareness kits, and customer recognition through public media.	Co-funding of energy manager	> 20 GWh annually
AEP OHIO—CONTINUOUS ENERGY IMPROVEMENT PROGRAM		
- **Coaching assistance, tools, and templates** to help meet plant and corporate cost saving targets. - **Custom statistical models** to help measure and manage energy intensity. - An **Energy Coach** to help identify and implement opportunities.	$0.06 /kWh (or $0.02/kWh over 3 years)	> 10 GWh annually

Sources: Batmale and Gilless 2013, IIP 2013, Kolwey 2013, Russell 2013, Nowak et al. 2012, BC Hydro 2013, AEP Ohio 2013, Xcel Energy 2010

EXAMPLE 6. BPA'S ENERGY PROJECT MANAGER PROGRAM

BPA has introduced an Energy Project Manager (EPM) program that funds a position for an engineer at an industrial facility. This individual can be an existing staff engineer or someone specifically hired for the position. One of the primary requirements is that the facility has the potential for, and commits to, annual energy savings of 1 million kWh through efficiency projects.

Initially, BPA and the customer estimate achievable energy savings. The energy manager is then required to develop a plan with updates every three to six months. The savings are tabulated according to the upfront feasibility studies for specific projects and revised according to final measurement and verification of achieved savings. Once the EPM is assigned and the estimated savings have been agreed, an initial $25,000 funding payment is made to the facility. The program also reimburses a fixed rate per kWh saved ($0.025 per KWh saved) subject to a funding cap of $250,000 maximum annual amount. Additional incentives are available for capital and O&M projects.

From 2009 through March 2013, 28 energy managers had been placed in a variety of industries and capacity savings averaging 16.6 MW had been implemented. More than half of program participants apply for term renewals. Some facilities are currently in years 2–3 of their participation. BPA has found that several facilities have gone on to hire their own energy managers after receiving this type of funding support for several years.

Sources: BPA 2012a, DOE 2010, Kolwey 2013, Russell 2013b

4. Program Features that Respond to Manufacturers' Needs

The spectrum of program approaches discussed in Chapter 3 demonstrates that there are a range of program offerings designed to help manufacturers improve their energy efficiency. These can range from providing technical assistance to offering financial incentives for common technologies to sponsoring an energy manager to guide a facility toward behavioral changes that result in more energy-efficient operations and maintenance. These approaches can be customized to meet a variety of conditions, and fundamental success factors can be worked into a wide variety of program designs and policy environments.

Effective industrial energy efficiency (IEE) programs will adopt the language, engagement strategies, and metrics that are meaningful to the corporate managers who drive capital investment decisions. Understanding customer needs and the investment decision-making processes allows state IEE program administrators to boost implementation rates while making better use of limited resources.

This chapter first discusses the special needs and characteristics of industrial companies as energy users and provides basic information that may help program administrators recognize and navigate prevailing capital investment practices and corporate culture perspectives on energy. The reader should keep in mind these are generalizations, and may not be applicable to any specific industrial customer. It then discusses reasons why manufacturers may resist participating in state IEE programs. Finally, building on approaches that are currently operating in a variety of state contexts, it explores specific features that can respond to manufacturers' needs.

For the most part, these features are engagement strategies that have been proven to provide value to industrial customers. With greater industrial engagement and participation, state goals such as providing utility customers with low-cost energy resources and environmental benefits can be met more quickly and cost-effectively. The program examples highlighted here have been successful, not only because they have been able to respond to manufacturers' needs and achieve significant energy savings, but also because they often demonstrate cost-effectiveness (according to whatever cost tests a state may require for the program), have had good rates of participation, or show they have some longevity and a track record of successful projects.

4.1. Special Needs and Characteristics of Manufacturers as Energy Users

Manufacturing is Complex and Sophisticated

Understanding energy use patterns in manufacturing plants can be far more complex than in other end-user sectors. Manufacturing uses energy in various common technologies such as boilers, air compressors, or motors, as well as in processes that are specific to each industry.

Although the technical choices and energy use characteristics for various common technologies may at times be straightforward, the economics of adopting energy savings measures in these cases can still be complicated, as they are heavily related to production patterns that typically change with the ups and downs of market demands. Energy use tied to specific manufacturing processes, then, is highly plant-specific and typically requires a level of specialized knowledge that often is found only among subsector technical experts.

Industrial companies are also generally more knowledgeable about energy issues than other customer categories, especially in factories where the cost of energy is a substantial proportion of overall costs. For example, in the steel industry, energy accounts for about 15% of total manufacturing costs, and in the glass industry, energy costs are 8%–12% of production cost (DOE 2013a). Even in applications where energy is not a large proportion of costs, some industrial managers view energy as a cost that can be controlled more easily than labor or feedstock inputs—at least in the near term.

Manufacturing is Heterogeneous

The industrial sector is very diverse, comprising a wide variety of different industry subsectors with different production processes and energy use characteristics. Even within subsector processes, product mix output and energy use patterns vary substantially. In the chemical industry, for example, it is typical for individual plants to continually adjust their product outputs as market conditions change and new opportunities arise. Such changes often require adjustments in process flows and the equipment and energy use patterns of different parts of a facility.

The industrial sector includes a broad spectrum of company size and technical sophistication ranging from very large companies with internal engineering staff to small and medium enterprises (SMEs) with limited technical capabilities.

The heterogeneity of the manufacturing sector can make it difficult for IEE programs to meet the specific needs of individual companies. To some extent, fairly simple programs designed to assist companies to save energy in common technology applications can be designed to be relevant to a wide range of manufacturing plants, providing some value. However, focus on simple common technology fixes alone will tend to put programs on only the periphery of manufacturing energy use and savings concerns. Manufacturers use energy differently than the commercial sector, typically having significant process-related consumption in addition to heating, ventilating, and air conditioning (HVAC) and lighting loads. Although it varies depending on manufacturing subsector, HVAC and lighting typically make up around 20% of total energy consumption (Kolwey 2012).

Although manufacturing as a sector is usually heterogeneous, industries may cluster in certain service areas for a variety of reasons. This creates opportunities for program administrators to concentrate energy efficiency process expertise in such places. Wisconsin's cluster approach is discussed in Section 4.7.

Energy Efficiency is Often Not Integrated into a Company's Decision-Making Process

Because energy can be a significant percentage of total manufacturing costs, lowering energy costs through increased efficiency can improve a company's bottom line and overall competitiveness. However, the decision-making processes of industrial companies involve a variety of participants, concerns, and procedures. There is a range of reasons why internal decision-making processes may not result in implementation of highly cost-effective energy efficiency opportunities, including:

- Energy efficiency projects may compete with core business investments that dominate attention, as well as investments for safety, environmental, and other regulatory requirements
- Decision-making is often split across business units
- The skills required to identify and pursue energy efficiency opportunities are not always present.

Projects focusing on operating cost savings may not compete well internally with projects focusing on expansion or new market development, despite very attractive financial returns. The profit benefits of investments leading to operating cost reductions may be difficult to clearly identify or communicate. Sometimes, other major investments may be seen as more core to the business, attracting higher priority. At other times, access to financing for operating cost saving projects also may be a barrier. Projects may be difficult to finance with outside loan capital if they are relatively small, due to lukewarm interest among financiers and high transaction costs.

Large companies often split responsibility for plant operations, energy bills, and investment decisions across different organizational units. A plant manager may be interested in energy efficiency, but does not see the actual energy bills or get credit for reducing them. A procurement manager may be motivated to minimize first costs instead of life-cycle costs, even if efficient choices save operating costs at the plant level. These "principal-agent" or "split-incentive" barriers can keep cost-effective improvements from happening.

In addition, in some cases manufacturers concerned about controlling energy costs may focus on efforts to gain more favorable energy pricing and contractual arrangements with energy suppliers and not necessarily on improving the efficiency of energy use in operations.

Finally, the skills required to identify and implement IEE opportunities are not always present in existing staff or staff are tasked with addressing other priorities. Companies often lack in-house staff capacity and specialized expertise in energy management and technology skill sets. This prevents cost-effective measures from being identified, and also prevents known options from being advanced to the implementation stage.

Operational Cycles Influence When Energy Efficiency Investments Can Be Made

Energy efficiency investments are heavily dependent on the industrial customer's operational cycle, which can span four to seven years on average (Chittum 2009). Maintaining stable production is critical in industry. Project implementation can require temporary downtime for equipment installation and testing, impacting plant operations and production. Flexible scheduling to best match production requirements—for example, delaying implementation to times when many projects can be done at once or to planned shutdowns—will minimize plant interruptions and reduce management concerns.

In addition, IEE projects can often be significantly larger than projects in other sectors, requiring completion of comprehensive project approval processes and careful consideration by various personnel across a number of corporate divisions. Time horizons for project approval may be long. Moreover, implementation scheduling may require linkages to a variety of other project implementation measures at the same time.

Co-Benefits Are Often Not Included in the Cost-Benefit Analysis for Energy Efficiency Projects

Although additional co-benefits or non-energy benefits (NEBs) from energy efficiency projects may be substantial for the industrial customer, they are generally not included in the cost-benefit analysis for energy efficiency projects. This is despite extensive evidence that NEBs can be a key part of project benefits and can reduce payback times for new investments. Co-benefits may even exceed the value of energy savings. A 2003 study of commercial and IEE programs in Wisconsin valued these benefits at approximately 2.5 times the projected energy savings of the installed technologies (Hall and Roth 2003). In a recent survey of 30 energy managers, engineers, sustainability managers, plant managers, presidents, and vice presidents from a diverse pool of companies nationwide, 90% of energy projects were found to also have a broader productivity impact (Russell 2013a). For one company surveyed, energy improvements provided a fourfold return in the form of production improvements and some companies claimed that NEBs "dominated" the returns from energy projects. NEBs are further discussed in Chapter 6.

4.2. Industrial Participation in Energy Efficiency Programs

Historically, energy efficiency program administrators have struggled to create programs that overcome concerns from manufacturers about perceived or real costs, potential risk for production disruptions, or lack of flexibility in prescriptive incentive programs. When new ratepayer energy efficiency programs are being contemplated, large industries may resist paying systems benefits charges. In cases where some types of industrial programs have already been put in place as part of resource acquisition efforts, some industries remain lukewarm about participating. Several common reasons for this include:

- Saving energy is already claimed to be a business imperative and many industrial customers feel they can best manage their own energy needs, so they may think there is no added value in participating in IEE programs.
- Manufacturers are not aware of the IEE program offerings that may be most useful for their operations.
- IEE program offerings may not be flexible enough to meet the most pressing energy efficiency investment priorities of manufacturers and may be considered administratively complex and burdensome.
- Available IEE programs are perceived as being unresponsive to core energy issues in plants that are subsector- and site-specific.
- IEE program administrators may be perceived to have insufficient expertise in manufacturing and/or are not knowledgeable about key customer concerns and needs.
- There is a mismatch between industrial planning and project cycles and IEE program terms. Equipment replacement or refurbishment or plant retrofits can often only occur at the end of appointed times in operational cycles.

- Industrial firms can be sensitive about releasing confidential information and may be concerned that programs end up sharing information on what they consider to be their competitive advantage.

All of these observations help explain why manufacturers may not always respond quickly or positively to IEE program offerings. Program designers who are aware of the issues and concerns that can limit industrial participation can be better equipped to design programs that address these concerns and better meet the specific needs of their industrial market (Section 4.7 discusses how program administrators have been able to provide significant value to their industrial customers).

As described in further detail below, successful IEE programs that provide value both to individual industrial energy users and to society at large:

- Clearly demonstrate the value proposition of energy efficiency projects and IEE programs
- Develop long-term relationships with industrial customers, with continual efforts to identify effective projects
- Accommodate project scheduling issues
- Provide both common technology and customized project development options
- Ensure that program administrators have industrial sector credibility and can offer high quality technical expertise targeted to specific subsectors
- Streamline and accelerate application processes
- Leverage strategic partnerships
- Conduct active and continuing program outreach
- Set medium- and long-term energy efficiency goals as an investment signal for industrial customers
- Ensure robust evaluation, monitoring, and verification.

EXAMPLE 7. NORPAC'S WASHINGTON MILL BENEFITS FROM CUSTOM EFFICIENCY OFFERING

NORPAC, a large paper mill in Washington State, is the largest newsprint and specialty paper mill in North America. The 33-year-old mill produces 750,000 tons of paper a year and is the largest industrial consumer of electricity in the state, requiring about 200 MW_{avg} of power. It takes a lot of energy, water, and wood to make paper and the process begins with wood chips. Refining wood chips is a mechanical process that requires large amounts of energy.

Bonneville Power Administration (BPA) and the Cowlitz County Public Utility District (PUD) funded the installation of new screening equipment between refiners that reduces the electricity and chemicals used to refine wood chips and reduces the amount of pulp needed for the process. The equipment is estimated to save NORPAC 100 million kilowatt-hours of electricity per year, equivalent to cutting its power requirements by about 12%, and is enough energy to power 8,000 Northwest homes.

The improved refining processes have also allowed NORPAC to expand its product line. The mill can now produce a brighter and whiter paper that is made from fewer wood chips than a similar grade from its competitors.

NORPAC employs 415 full-time employees and about 30 contractors and the construction phase of the project created 64 full-time family-wage jobs.

BPA has funded about $21 million for three custom projects at NORPAC, and Cowlitz PUD will contribute up to an additional $3.9 million. NORPAC is funding the remaining $35 million of the $60 million project.

Source: Taylor et al. (2012); BPA (2012b)

4.3. Clearly Demonstrate the Energy Efficiency Project Value Proposition to Companies

Energy efficiency measures, which generally lower the cost of production or increase output per input costs, have repeatedly demonstrated their effectiveness in improving a facility's bottom line and in increasing company competitiveness and productivity. Benefits can include strong life-cycle cost savings with sometimes minimal capital investment, a variety of non-energy co-benefits, and even reputational advantages. It is not uncommon for manufacturing facilities to realize energy efficiency improvements as high as 10%, with corresponding cost savings and financial paybacks of two years or less when they implement basic operational and maintenance improvements. For example, as part of the U.S. Department of Energy's (DOE's) Superior Energy Performance (SEP) program, 14 pilot plants have implemented the global energy management standard, ISO 50001, and achieved SEP certification. Nine of these plants have shown an average energy performance improvement of 10% in the first 18 months of SEP implementation, with an average payback of 1.7 years (DOE 2013c). Energy Trust of Oregon (ETO) and AEP Ohio also estimate that their industrial customers can typically achieve 5%–15% savings through energy management with little or no capital investment (ETO 2013, AEP Ohio 2013). And Efficiency Vermont estimates its Continuous Energy Improvement program can help companies cut energy consumption by 10%–15% within the first three years and 25%–35% within six years (Efficiency Vermont 2013).

Many companies that have participated in IEE programs have experienced strong cost savings benefits, and successful IEE programs document how program offerings have helped their industrial customers' bottom lines. For example, the Bonneville Power Administration (BPA) extensively documents results from its Energy Smart Industrial Program. Success stories include:

- The NORPAC pulp and paper mill in Washington State, which cut its power requirements by 12% per year through upgrades financed by BPA (Example 7)
- J.R. Simplot, which identified energy savings of $715,000 per year with a three-year payback (Example 8)
- Irving Tissue, which, through participation in the New York State Energy Research and Development Authority's (NYSERDA's) industrial FlexTech and Industrial Process Efficiency (IPE) programs, was able to save 14,800,000 kWh per year (Example 9).

EXAMPLE 8. SIMPLOT AND CASCADE ENGINEERING IDENTIFY $1,000,000 IN ELECTRICAL SAVINGS

J.R. Simplot Company is one of the largest privately-held corporations in the United States, consisting of AgriBusiness, Land and Livestock, and Food Group divisions. The company was successful in developing and integrating a company-wide energy management program and worked with Cascade Energy within local utility energy programs to obtain energy study co-funding and implementation incentives. Simplot is also a U.S. Department of Energy Better Plants Challenge Partner and a U.S. Environmental Protection Agency (EPA) ENERGY STAR® partner.

Simplot and Cascade Energy have joined forces on 14 detailed energy studies at nine facilities over the past 10 years. Cascade provided facility scoping, energy analysis, project costing, design assistance, commissioning, and final inspection services on these projects. Cascade evaluated refrigeration, compressed air, hydraulics, pumping systems, processes, and controls at both existing and new facilities. Simplot implemented seven of the largest projects to date, capturing well over half the identified energy savings.

Energy Savings: $715,000 per year or 21,000,000 kWh per year ($1,000,000 or 36,000,000 kWh per year identified)

Investment: $950,000 to date ($2,000,000 identified)

Financial Return: Three-year simple payback on implemented projects

Source: EPA 2013b

PacifiCorp, an investor-owned utility operating in five northwestern states, offers extensive ratepayer-funded energy efficiency programs throughout their territory. For those customers participating in IEE programs, PacifiCorp has found that a one-dollar investment can yield $4.10 to $5.60 in long-term savings. The utility has documented that these energy savings are predictable over time, measurable, and long-lasting (WGA 2013).

A key point in making the value proposition case to industrial company managers is to lay out in simple and concise terms the operating cost savings and other benefits—including profits—that are being left on the table by not addressing cost-effective energy efficiency improvement opportunities. The case can then move on to the simple steps required to capture the most prominent savings opportunities. Cost-saving examples and success stories from similar companies in similar situations can also greatly help to further buttress the case. Discussion and exchange with peers can also be a strong driver for energy efficiency with individuals and companies. Many successful programs offer a venue for peer exchange.

SUCCESSFUL DESIGN AND IMPLEMENTATION APPROACHES

- Document results from successful IEE projects.
- Include non-energy benefits of energy efficiency measures in the value proposition.
- Develop case studies and examples for different industrial sectors.

4.4. Develop Long-Term Relationships with Industrial Customers and Continue to Refine Project Offerings

Maintaining multi-year and steady relationships with individual industrial customers is a key factor for achieving success in state IEE programs. All the energy efficiency programs that have been successful with industry have this element in common.

The reasons why long-term, steady relationships with individual customers are so important stem in large part from the particular characteristics and needs of the industrial sector described previously. Key reasons include:

- Strong understanding of industrial customer circumstances and needs. To add real value to existing energy efficiency efforts at a customer facility, program staff need to understand the specific circumstances of the plant as well as their plans and issues.
- Develop projects on a flexible timeframe. IEE projects tend to be identified over time, as plant circumstances change and opportunities arise. In addition, project implementation scheduling must accommodate a host of industrial client concerns (see Section 4.5). Successful program staff consistently report that the best results are maintained through steady dialogue and contact, responding to the opportunities when they arise.
- Build synergies between program offerings. Proven results with industrial customers often involve a variety of program offerings and services. Typically, these are delivered at different times, as opportunities and customer needs develop, but they are also often interrelated and build on each other. For example, assistance in completing an audit may often lead to identification of a project for program support or an energy management improvement opportunity. Joint work on completion of a customized project may lead to identification of a number of simple prescriptive project options that a company was not aware of. Advice on how to access a key process expert may lead to a new project.

EXAMPLE 9. IRVING TISSUE BENEFITS FROM NYSERDA'S INDUSTRIAL OFFERINGS

The New York State Energy Research and Development Authority's (NYSERDA's) longstanding technical assistance program—known as FlexTech—and its Industrial Process Efficiency grant programs have assisted Irving Tissue, a tissue, paper towel, and napkin manufacturer located in Fort Edward, New York, with increasing its new plants' efficiency. The company was considering a major plant expansion to improve productivity and competitiveness. To ensure that the new operation was cost competitive, Irving Tissue worked with manufacturers, suppliers, and NYSERDA to build energy efficiency into the new paper-making systems. A proposed upgrade for a more efficient vacuum system would create significant energy and cost savings while delivering a higher quality product. However, the cost of the system was too great for the company to self-finance. The Industrial Process Efficiency program was not only able to provide grant funding for the vacuum, but also was able to recommend the installation of premium efficiency motors and variable-speed drives. NYSERDA was able to finance $1.8 million of the full incremental cost of $4.3 million for the efficiency upgrades. The new papermaking machine is saving 14,800,000 kWh per year compared with a standard paper machine.

Source: NASEO 2012

The importance of building long-term relationships is bolstered by a stable and skilled IEE program contact for industrial customer interaction. Satisfaction of industrial customers with program delivery and results often hinge on the degree of success achieved in establishing a strong relationship with program staff. Within IEE programs, the industrial program account management system provides a structure for steady engagement with industrial customers. Individual account managers may be staff, long-term contractors, or a blend of these (see Section 4.7). Successful programs have a cadre of skilled staff and experts to develop, build, and maintain the long-term relationships with individual customers needed for industrial program success.

Many programs become steadily stronger because of long-lasting industrial customer relationships. IEE program administrators that have developed long-term relationships with industrial customers can track the status of the firm's energy efficiency efforts and investments made over time. This enables them to provide continued relevant solutions to the company.

In their efforts to maintain steady, regular dialogue with industrial customers, successful IEE programs engage at the customer's corporate level as well as the plant level. Note that this can be a challenging task for a regional program, especially when corporate headquarters is located outside the region. Identifying an internal energy champion within the industrial company and connecting with several additional staff so relationships can continue despite staff changes also helps foster long-lasting relationships.

In ETO's Production Efficiency program (see Example 11), additional customer support has encouraged more cost-effective savings. The ETO program focuses on long-term relationships using a business-like approach to customer relations to help customers achieve significant ongoing savings. Increased program delivery expenditures have delivered higher savings and lower resource acquisition costs than increased incentive levels. Customers recognize the value of program assistance in customer satisfaction surveys (Nowak et al. 2012).

EXAMPLE 10. XCEL ENERGY INCENTIVES AND TECHNICAL SUPPORT

Xcel Energy operates in eight states. Their incentives portfolio has been lauded by industrial customers for offering simple incentive applications for providing a full suite of programs—custom, self-direct, and process energy efficiency incentives. Xcel representatives noted that they see the most manufacturing participation where there is flexibility and incentive stability.

Xcel's Process Efficiency (PE) program in Colorado integrates its technical assistance, energy management support, and incentive programs. The PE program is available to industrial customers with energy conservation potential of at least 2 GWh, which usually translates to total annual electricity consumption of at least 20 GWh. The program offers a free scoping assessment and provides support for strategic energy management. A second more detailed assessment is then undertaken, for which the customers pays 25% of the cost, up to $7,500. After the detailed assessment is completed, Xcel Energy and the customer sign an agreement that specifies which projects will be implemented, the timeframe for implementation, and the incentive amount based on the rate of $400 per kilowatt of peak demand reduction. Xcel Energy encourages the customer to agree to complete projects within a year, but allows longer timeframes if needed.

Source: Kolwey 2012, WGA 2012

SUCCESSFUL DESIGN AND IMPLEMENTATION APPROACHES

- Understand the industrial customer's circumstances, needs, and operational cycles.
- Build synergies between program offerings.
- Develop stable, long-lasting relationships for maximum results.

EXAMPLE 11. ENERGY TRUST OF OREGON PRODUCTION EFFICIENCY PROGRAM

Recognizing that large manufacturers can realize deep energy savings with low-cost changes, the Energy Trust of Oregon (ETO) offers the Industrial and Agricultural Production Efficiency program, a custom and prescriptive rebate program, to help achieve these savings. Portland General Electric, Pacific Power, NW Natural, and Cascade Natural Gas customers, who pay into the state public benefit fund, qualify.

The program promotes innovative IEE technological and behavioral approaches and provides technical expertise, training, and project funding to help companies plan, manage, and improve their energy efficiency. All industrial size classes are eligible, but the program focuses on measures that will yield more significant energy savings: custom projects for industrial process improvements, strategies for large energy users, and projects with certain low-cost changes that can yield significant energy savings. The program also offers prescriptive incentives available for projects such as lighting and heat pumps.

ETO provides free technical services, typically valued at $20,000 to $50,000, to complete a study of energy efficiency opportunities. Custom incentives are calculated on a case-by-case basis. Incentives of $0.08 per kWh and $0.04 per therm are also available for operations and maintenance improvements (up to 50% of eligible project costs or up to 90% if completed within 90 days), energy management practices ($0.02 per kWh saved or $0.20 per therm saved), and custom process or production equipment projects (up to 50% of project costs).

ETO contracts with energy efficiency account managers throughout Oregon, termed program delivery contractors, and with energy efficiency process engineers termed allied technical assistance contractors, who provide detailed technical and scoping studies to determine the most cost-effective energy upgrades.

ETO's 2013 energy savings from industrial customers reached 16.9 MW_{avg} of electricity and 2.2 million therms of natural gas. The Production Efficiency program completes nearly a thousand projects per year.

Sources: ETO 2012, ETO 2013b, Nowak et al. 2013

4.5. Ensure Program Administrators Have Industrial Sector Credibility and Offer High Quality Technical Expertise

As discussed in the previous section, development of long-term relationships between industrial customers, program administrators, and experts is important for IEE program success. Effective IEE programs also develop credibility with the industrial customer by employing staff and/or contracted experts that understand the customer's industrial segment, and have the technical expertise to provide quality technical advice and support on energy efficiency options and implementation issues specific to that industry and that customer.

Addressing industrial companies' core needs requires understanding a plant's production processes, operating issues, and the market context that the plant operates within. Effective IEE programs will adopt the language, engagement strategies, and metrics that are meaningful to the corporate managers who drive capital investment decisions. Understanding customer needs and their investment decision-making processes allows IEE program administrators to generate trust with their industrial customers, boosting IEE implementation rates while making better use of limited resources.

Access to specific subsector technical expertise for specific short-term assignment is almost always necessary. Engagement of technical experts can address customers' specific technical needs such as completing diagnostics, developing new internal metering programs, assessing technology options for new projects, and developing project-specific measurement and verification (M&V) plans.

There are different approaches to ensure that this key program contact function is effective. Some program administrators rely heavily on in-house staff for this function. For example, Efficiency Vermont maintains six account managers in charge of all day-to-day relations with industrial customers. On the other side of the spectrum, some program administrators rely heavily on contractors to undertake day-to-day account-manager type functions for their industry programs. One example includes Wisconsin's long-standing Focus on Energy program, which one contractor has operated successfully for almost 14 years, providing steady service to large industrial customers under the Focus on Energy brand (Taylor et al. 2012). Others rely heavily on contractors to undertake day-to-day account-manager type functions.

A mixed approach can also be adopted, using both in-house and contractor staff to maintain day-to-day dialogue. In Oregon, for example, nine of ETO's 80–85 internal staff are responsible for delivery of the industry and agriculture Production Efficiency program. These staff work together with six outsourced Program Delivery Contractor (PDC) teams. The PDC teams include six to seven people each, working on day-to-day delivery of the program. There are currently 30–35 PDC full-time equivalent employees (FTEs), and approximately 10–20 FTEs that provide technical assistance and energy management advice that, in 2012, served 800 discrete facilities with 1,000 projects covering a mix of types and sizes of industrial and agricultural customers (Crossman 2013).[22] ETO places emphasis on maintenance of close individual client contact by its in-house staff as well as by its PDCs (Taylor et al. 2012).

Wisconsin's Focus on Energy program has used a "cluster" approach to organize program delivery with greater subsector and industrial process expertise for specific industrial groups, such as food processors, pulp and paper manufacturers, or plastics companies. Including workshops with cluster members and relevant trade associations, this approach also has fostered cross-peer exchange and learning (Taylor et al. 2012, Chittum 2009). In 2012, its program for large energy users generated savings of 61,344,005 kWh and 3,119,919 therms (see Appendix B-7).

Xcel found that one of the biggest challenges in implementing IEE projects is that technical needs vary from industry to industry and company to company with no standard template for implementation. To address this, Xcel's team of account managers works closely with industrial customers to understand their production processes and operational needs, and provides both initial energy audits and continued support throughout project construction (WGA 2013). Similar to many other programs, Xcel's efforts to provide project development support expertise extends beyond basic diagnostic service to help move projects through the implementation stage, helping decision makers to make a go/no go decision based on accurate, complete, and customized project information. In Colorado, Xcel's custom and process efficiency programs generated average savings of 10,838,108 kWh per year from 2010–2012 (see Appendix B-8).

SUCCESSFUL DESIGN AND IMPLEMENTATION APPROACHES

- Invest in knowledgeable, skilled technical staff.
- Use high quality technical assistance to enhance prescriptive and custom program success.
- Recognize that technical needs vary from industry to industry and company to company.

4.6. Offer a Combination of Prescriptive and Custom Offerings to Best Support Diverse Customer Needs

A combination of both prescriptive offerings for common cross-cutting technology and customized project offerings for larger, complex projects in IEE programs can best meet diverse customer needs and provide flexible choices to industries. Prescriptive offerings—typically involving rebates for a portion of the cost of common technology equipment upgrades or certain other clearly defined actions—can be relatively simple for both customers and administrators. However, their value to large customers may not be significant. Custom approaches are needed for the larger, complex, or process-specific projects. If both types of offerings are included, IEE incentive program offerings can be tailored to accommodate both large manufacturers and SMEs, depending on the state's industrial base.

[22] For ETO's Production Efficiency program, incentives are budgeted at 63%, delivery at 26%, and internal costs are 11% (Crossman 2013).

Xcel's programs (Example 10) have been lauded by industrial customers for offering simple incentive applications for providing a full suite of programs—custom, self-direct, and process energy efficiency incentives. ETO (Example 11) has been successful in its ability to help its Oregon industrial customers realize deep energy savings through low-cost changes as well as complex custom approaches. Rocky Mountain Power (Example 12) couples its custom Energy FinAnswer program with the complementary Energy FinAnswer Express program offering prescriptive rebates to target deep savings as well as quick wins. Efficiency Vermont, NYSERDA, and PG&E, among others, also provide both prescriptive technology and customized project development options.

Including customized project offerings requires administrator investment in program capacity and development of mechanisms to access specific technical expertise (see Section 4.7). However, the energy savings can be well worth the investment. In Vermont, six industrial account managers are actively engaged full-time in Efficiency Vermont industrial programs, centering primarily on customized project identification, development, delivery, and savings measurement and verification. Their work yields nearly 90% of Efficiency Vermont's annual industrial program energy savings delivery (Taylor et al. 2012).

SUCCESSFUL DESIGN AND IMPLEMENTATION APPROACHES

- Prescriptive offerings support common cross-cutting technologies or practices.
- Custom offerings support larger, complex, or process-specific energy efficiency measures.
- Offering prescriptive and custom offerings allows programs to accommodate large industrials and SMEs.

4.7. Accommodate Industrial Project Scheduling Needs

Scheduling energy efficiency investments can be heavily dependent on a plant's operational cycle. Equipment is normally renewed or refurbished at the end of an operational cycle. The timing of a major investment window can be difficult to predict, particularly by someone not engaged in the plant's day-to-day activities (Chittum et al. 2009).

Operational cycles and investment windows can be few and far between, and proposed equipment changes must be guided through rigorous, competitive, and time-consuming capital expenditure approval processes. Firms often have long timeframes between identifying an opportunity and project implementation, especially when large companies consider large dollar proposals.

IEE program cycles may not match industrial company timing for allocating capital for projects. Manufacturers, particularly large organizations, need time to secure capital and plan for potential plant shutdown to accommodate energy efficiency assessments and project implementation. This often leads to a "phased approach" to energy efficiency implementation.

Programs with flexible timelines that can accommodate an industrial client's investment cycle will help to maximize energy efficiency implementation. Programs that are not limited to one-year timeframes but instead accommodate multi-year projects and application periods—or have multi-year planning and operation as their standard operating procedure—allow companies the flexibility to consider and implement program offerings on a schedule that matches their decision and investment cycle. This, in turn, can promote higher program participation levels. To the extent possible, program managers should also be mindful of industrial operational and investment cycles and time recruitment and outreach accordingly (Russell 2013b). In addition, by examining current and projected economic trends in the industrial sector, an efficiency program can anticipate when the next large cycle of construction, infrastructure, and capital investment is likely to occur (Harris 2012) and therefore help to encourage energy efficiency, either from new production equipment or a new facility (Seryak and Schreier 2013).

For example, evaluations of NYSERDA's IPE program suggested that program managers should target specific industrial subsectors based on an understanding of a firm's hours of operation, capital plans, level of interest in energy efficiency and sustainability initiatives, and capacity utilization.[23] The IPE Program is positioned to take advantage of potential capacity investments by developing lists that classify industrial customers using North American Industry Classification System (NAICS) codes to include evidence of plant capacity constraints, using capacity utilization data published by the U.S. Federal Reserve System. Companies with a high capacity utilization rate relative to their historical averages are prioritized for targeted outreach concerning large infrastructure investments. Firms reporting mid- or low-capacity utilization rates are targeted to increase the productive capacity of existing facilities, implement and/or adopt a strategic approach to energy management, and/or implement low- and no-cost operational improvements (Harris 2012). NYSERDA estimates that its IPE program will save 200,000 megawatt-hours per year and 735,000 million Btu (MMBtu) per year from 2012 through 2015 (see Appendix B-5).

SUCCESSFUL DESIGN AND IMPLEMENTATION APPROACHES

- Accommodate multi-year projects and application periods or have multi-year planning and operation as their standard operating procedure.
- Understand the operational cycle and capital approval process cycle of individual industrials.
- Monitor economic and investment trends of industries in your region to plan for expansion and new plant opportunities industrials and SMEs.

EXAMPLE 12. ROCKY MOUNTAIN POWER'S ENERGY FINANSWER AND FINANSWER EXPRESS PROGRAMS

Rocky Mountain Power's (RMP's) Energy FinAnswer program in Idaho offers engineering services, technical expertise, and cash incentives to help industrial and commercial customers upgrade to the most energy-efficient systems, tailored to the needs of retrofit or new construction projects. The Energy FinAnswer program is a long-standing program that has been in place in some form since the 1990s. It has continued to evolve to accommodate changing market and company resource positions.

RMP is involved from the very beginning of projects and starts by reviewing facility plans and identifying possible efficiency opportunities. The next step involves the utility preparing a free energy analysis report to provide specific recommendations and estimates of what each efficiency measure will cost and how much the customer will save. RMP also includes an incentive offer and any commissioning requirements. The incentive amount available is typically $0.12 per kWh of annual energy savings plus an additional $50 per kW for average monthly on-peak demand savings. Prior to July 2013, incentives were capped at 50% of the project cost and at least one-year payback (if the payback is less than one year, the incentive is reduced so that the payback equals one year). Program revisions in July 2013 increased the incentive cap to 70% of project cost. The two parties sign an incentive agreement form before the company proceeds with any purchase orders for the equipment. RMP allows two years for customers to implement the projects.

The program provides a number of resources, including case studies of past projects, to help those interested in the program determine their own project plans, and provides a list of engineering firms under contract to provide program services. Energy FinAnswer has a complementary program, Energy FinAnswer Express, which offers simple, prescriptive incentives for lighting, HVAC, and other common efficiency upgrades. Customers typically receive the incentive payment within 45 days of completing a post-installation report. These two programs complement each other in the market, providing a broad platform of services and incentives for a wide variety of energy efficiency projects.

In 2012, RMP generated electrical gross savings of 4,473,114 kWh per year across 81 measures under its FinAnswer Express program and 318,915 kWh per year across seven measures under its Energy FinAnswer program.

Source: Rocky Mountain Power 2013a, Rocky Mountain Power 2013b, Kolwey 2012

[23] The capacity utilization rate describes the extent to which the industrial sector's production capabilities are actually being used to produce the current level of output. In general, a high rate of capacity utilization is a positive indicator of economic health.

4.8. Streamline and Expedite Application Processes

Industrial customers may perceive the application and implementation procedures for IEE programs to be administratively complex and burdensome. Achieving the right balance between meeting key program administration needs for information and streamlining the application process is helpful.

As an example, BPA began using a third party to evaluate and then help streamline procedures to address industrial concerns about the application process. A third party also helps individual companies navigate application procedures.

NYSERDA also provides upfront assistance to help companies navigate the application process, and uses a Consolidated Funding Application (CFA) developed as part of a statewide plan to streamline and expedite the grant application process. Because the CFA is commonly used across a range of programs, this simplifies the application process and applicants may already have experience with this documentation.

SUCCESSFUL DESIGN AND IMPLEMENTATION APPROACHES

- Streamlined application procedures encourage participation.
- Assistance in navigating the application process is helpful to industrials.
- Balancing program administrative needs for information with keeping procedures simple and efficient may require continual evaluation and improvement.

4.9. Conduct Continual and Targeted Program Outreach

Manufacturers are sometimes unaware of the industrial program offerings that may be most applicable or useful for them. Significant outreach and development of information, such as examples of successful past projects, is often necessary to encourage participation. As an example, Wisconsin's Focus on Energy program provides program engineers who reach out to industrial firms via numerous training classes, webinar series, and outreach to industrial associations. The AlabamaSAVES loan program formed partnerships with Bank of America, Philips Lighting, Metrus Energy, and Efficiency Finance, not only to provide private sector leveraging of funds, but also to conduct marketing and outreach for the program itself. Using their existing sales and marketing channels and networks with Alabama industries and contractors, these private partners are driving program uptake and demand in the market (NASEO 2012). As of April 2013, more than 20 loans have closed and nearly $17 million in funding has been put toward the installation of energy efficiency projects. The initial $60 million in funding will continue to cycle through loans and has the potential to finance up to $121 million in projects over the next 20 years (see Appendix B-1).

NYSERDA's IPE program demonstrates an awareness of industrial customers' decision-making processes when it markets its offerings to potential program participants. When marketing IPE incentives for non-process equipment upgrades (motors, lighting, etc.), NYSERDA targets facility directors and executives. In contrast, when working to secure process-efficiency projects, NYSERDA conducts targeted outreach to industrial staff in charge of production lines and revenue-generating projects, as well as members of continuous improvement teams and executives, who consider the costs and benefits of energy efficiency projects that affect production capability. This approach reflects research findings that show facility maintenance and process engineers play a critical role in the decision-making processes within their companies (Harris and Gonzales 2013).

SUCCESSFUL DESIGN AND IMPLEMENTATION APPROACHES

- Continual and targeted outreach is needed to make sure industrials are aware of applicable program offerings.

4.10. Leverage Strategic Partnerships

Successful IEE programs often partner with a variety of federal, state, and regional organizations to share technical expertise, program design, and implementation guidance, and leverage access to customers for outreach and implementation. For example, the collection of assessment and recommendation data in DOE's Industrial Assessment Center Database is commonly used by program staff and support contractors to inform thousands of investments in state and utility IEE programs.[24] The database includes information on the type of facility assessed (size, industry, energy usage, etc.) and details of resulting recommendations (type, energy and cost savings, etc.). In addition, DOE's Combined Heat and Power (CHP) Technical Assistance Partnerships (formerly called the Clean Energy Application Centers) promote and assist in transforming the market for CHP, waste heat to power, and district energy technologies and concepts throughout the United States. And the EPA ENERGY STAR for Industry program provides guidance, tools, and recognition to help industrial companies improve their energy performance.

Efforts by SEOs complement and support ratepayer-funded programs. States can provide resources or programs, such as tax incentives, that utilities often cannot. States are not constrained by regulatory cost-effectiveness tests that may limit what programs are offered. Therefore, states can often support IEE activities such as training, certification, and recognition awards. SEOs use their established partnerships with other relevant stakeholders and program administrators, such as utilities, regional energy efficiency groups, and the National Institute of Standards and Technology's Manufacturing Extension Partnership (MEP), to coordinate and expand programs with existing resources available to manufacturers. SEO energy assessment and audit programs typically include utility cost-share. Training workshops organized or supported by SEOs are often offered in conjunction with universities and MEP, and typically leverage DOE efforts (NASEO 2012). For example, Washington State has an IEE award program that is hosted by the governor, who recognizes leaders in IEE.

In another example, the Alabama SEO brought together key state partners including the Alabama Industrial Assessment Center, University of Alabama in Huntsville, and the Alabama Technology Network to implement AlabamaSAVES, a revolving fund loan program, and Alabama E3.[25] Over time, the SEO will coordinate both programs so they can grow together and companies who take advantage of E3 assessments can finance energy efficiency upgrades through AlabamaSAVES (NASEO 2012) (profiled in Appendix B).

BPA partnered with the Northwest Energy Efficiency Alliance (NEEA) to consolidate costs and expand program resources in an effort to reach more customers and initiate more projects. As a regional organization, NEEA was able to support replication of the BPA approach across a variety of local distribution utilities in the BPA service area. Similar regional energy efficiency organizations exist in most regions of the United States, and can be engaged in similar ways.

In 2008, NEEA partnered with the Northwest Food Processors' Association (NWFPA), the largest industrial trade organization in the region, representing more than 100 food processing enterprises, to convene food processing industry leadership around common energy reduction goals and strategic energy management practices. Aggregating energy saving efforts through NWFPA allows the industry to apply resources toward a unified energy reduction goal—sharing the risk, efficiency, and energy savings potential. The partnership was able to secure buy-in and establish trust when reaching out to potential customers and leveraged funding from the State Technologies Advancement Collaborative and DOE's technical assistance resources to establish a customized program dedicated to the unique needs of the northwest region's food processing industry (IIP 2012, Chittum et al. 2009).

SUCCESSFUL DESIGN AND IMPLEMENTATION APPROACHES

- Partner with federal, state, and regional organizations to leverage their expertise, access to customers, and program implementation support capacities.
- Partnerships can help programs by providing technical expertise, program design, and implementation guidance as well as expanding program outreach and implementation channels.

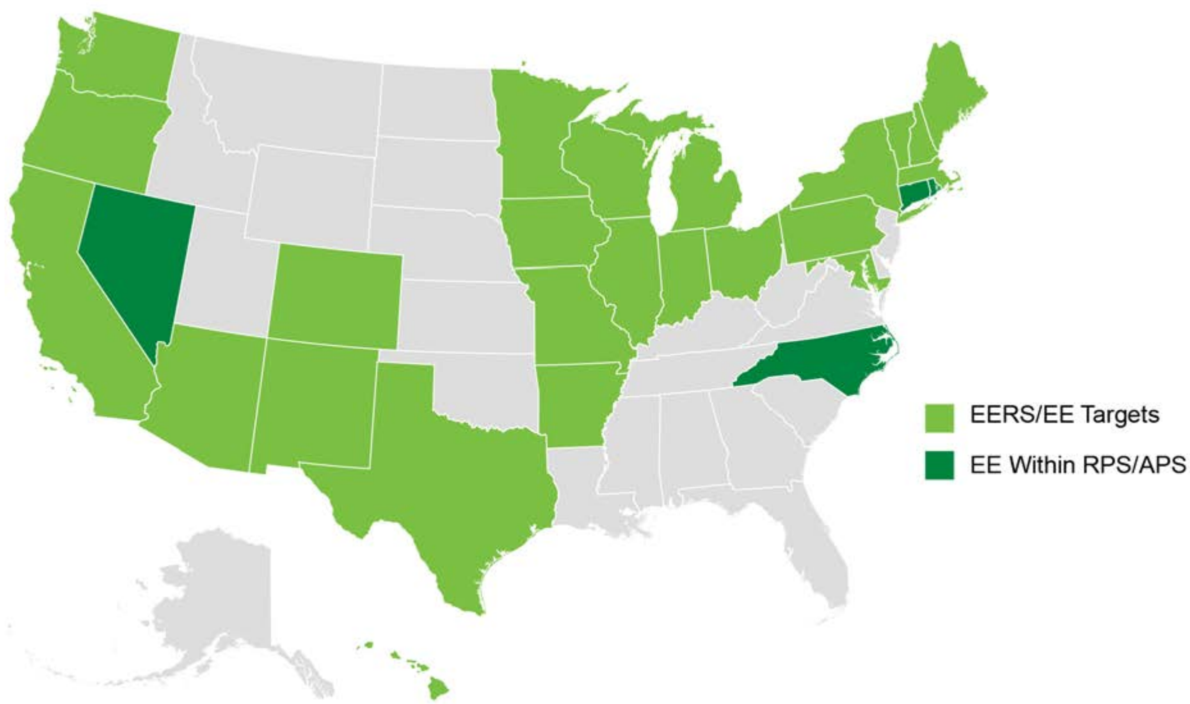
[24] http://iac.rutgers.edu/database

[25] E3—Economy, Energy, and Environment—is a coordinated federal and local technical assistance initiative that helps communities work with their manufacturing base to adapt and thrive in a new business era focused on sustainability for SME manufacturing companies.

4.11. Set Medium- and Long-Term Energy Efficiency Goals as an Investment Signal for Manufacturers

To provide signals of certainty to the market, regulators and program administrators can set energy savings goals or targets for the medium- to long-term to reduce risk in ramping energy efficiency measures implementation. Specific targets and extended program lengths (minimum three years) can give both program administrators and manufacturers the confidence to invest over sufficiently long program timeframes.

CEPS are an important tool states use to set goals and targets. A CEPS sets electricity and/or natural gas energy savings targets, usually expressed in energy savings delivered per year (including cumulative delivery over a period) or a percentage of utility sales. CEPS have gained popularity in the United States, and 28 states now have some sort of high-level energy savings target (see Figure 7). The longer-term goals associated with CEPS send a clear signal to market players about the importance of energy efficiency in utility planning and create a level of certainty to encourage large-scale investment in energy efficiency technology and services. Longer-term goals also help build customer engagement and develop an energy efficiency workforce and market infrastructure (ACEEE 2012, SEE Action Network 2011a).



Sources: ACEEE 2013a and 2013b

Figure 7. Energy efficiency resource standards and targets

CEPS are often designed and integrated into the integrated resource planning (IRP) processes to ensure that acquired energy efficiency resources are cost-effective compared with supply resources. An IRP can be a powerful impetus for promoting energy efficiency and other demand management alternatives to new supply. Although the amount of available cost-effective energy efficiency will vary based on local circumstances, some quantity will likely always be available at a lower levelized cost per megawatt-hour than supply side alternatives. Thus, any planning process that requires utilities to consider demand-side resources as part of an integrated strategy to meet customer demand is likely to promote energy efficiency. This is especially true where IRP processes are mandatory and overseen by a utility regulatory commission, because the IRP requirement may require utilities to consider demand-side programs that benefit ratepayers even if the programs do not benefit shareholders. In some circumstances, cost-effective energy efficiency measures may even be available in sufficient quantities to satisfy all of the projected load growth within the planning timeframe (SEE Action Network 2011b).

SUCCESSFUL DESIGN AND IMPLEMENTATION APPROACHES

- Longer-term goals provide increased certainty to the market and to program administrators.
- Higher annual savings targets require a more comprehensive set of program offerings and will drive programs to IEE.

4.12 Ensure Robust Measurement, Verification, and Evaluation

M&V of project energy savings is critical to program administrators and regulators to assess the actual results of program activities and to measure the contribution of projects and aggregate programs for achieving their goals. Robust M&V programs also allow customers to obtain clear views of the results of their efficiency investments. In addition, effective M&V enables program administrators to undertake periodic process and operational strategy evaluations to assess where program efficiency and results can be further improved.

Require Robust Measurement and Verification

Measurement and verification requirements

Planning for M&V during the design phase of a program is key to ensuring that energy savings can be tracked and program success can be systematically assessed. M&V is required at some level in all programs, and M&V plans and requirements are a condition of funding in most programs. For example, NYSERDA has stringent technical analysis and M&V requirements for its programs, and performance-based incentive payments are only provided on a verified kWh or MMBtu energy-saved basis (Taylor et al. 2012).

Clear, concise guidelines for M&V requirements benefit both project and program evaluations. Planning for M&V during the program design phase and periodic evaluation and adjustment in M&V guidelines are both important. In most custom projects, M&V plans are an integrated part of the process. Some program administrators will help design project M&V plans and may assist in arranging financing of meter installation to execute the plan.

Submetering can further strengthen M&V programs, because measuring energy use at the project or equipment level provides the discrete data needed to demonstrate the savings from a specific project or plant improvement (which is typically not the case when this type of data is not collected). Submetering can be a necessity for proper M&V of many projects, and is best applied both before and after project implementation.

Broadening the scope of project M&V to include benefits beyond energy savings can be used in the cost-effectiveness analysis of projects and programs, further quantifying the full economic and societal benefits of energy efficiency investments, and improving overall cost-effectiveness of energy efficiency measures. If these are to be included, M&V plans need to extend requirements and guidelines to non-energy benefits.

Consistent methodologies in measurement and verification protocols

Current M&V practices in the United States use multiple methods for calculating verifiable energy savings. These methods were initially developed to meet the needs of individual energy efficiency program administrators and regulators. Although the methods serve their original objectives well, they have resulted in differing and incomparable savings results—even for identical measures. These differences can be significant, and inconsistent results have limited the acceptance of reported energy savings beyond specific program applications.

Increasing the consistency and transparency of how energy savings are determined through consistent and clear M&V protocols strengthens the credibility of energy efficiency programs. Examples of existing protocols include the International Performance Measurement and Verification (IPMVP) protocol, which is used in Xcel's self-direct programs, and the Superior Energy Performance (SEP) M&V protocol, which will play an important role in DOE's Industrial Strategic Energy Management Accelerator[26] initiative.

Another opportunity for common methodologies is DOE's Uniform Methods Project (UMP). Through UMP, DOE aims to establish easy-to-follow protocols based on commonly accepted engineering and statistical methods for determining gross savings for a core set of commonly deployed energy efficiency measures. The protocols provide guidance on energy savings determinations, which will be available as a reference to improve M&V practices. The addition of industrial measures in UMP provides a potential opportunity to create consistent protocols for IEE programs that would make it easier and less costly for efficiency programs to quickly establish good M&V practices because they no longer have to develop protocols from scratch (DOE 2013b).

Use Evaluations to Support Continual Program Improvement

Periodic process evaluations identify ways to improve program design and delivery

Robust M&V plans enable program administrators to conduct periodic process evaluations that identify successes and weaknesses in program implementation and point to ways to improve program design and delivery. Process evaluations can be initiated during the first year of operation to identify lessons learned from implementation as soon as possible and to apply them to subsequent program cycles. They can also be helpful in adjusting programs to match manufacturers' needs on a continuing basis. ETO regularly commissions process and impact evaluations, which have identified specific areas for improvement in its Industrial Production Efficiency program. These areas include:

- To maximize the effectiveness of program marketing, program staff can improve their understanding and augment the marketing skills of contractors to increase uptake of programs.
- To add credibility to program reporting and enhance marketing efforts, staff improved specific and consistent definitions of data entry categories and date variables to report program activity by year, thereby improving data collection, tracking, and processing.
- To simplify the program review and oversight function, and to enhance quality control of technical studies, program staff promulgated and implemented uniform procedures and standards or guidelines for both the technical studies and the review of those studies (ETO 2006).

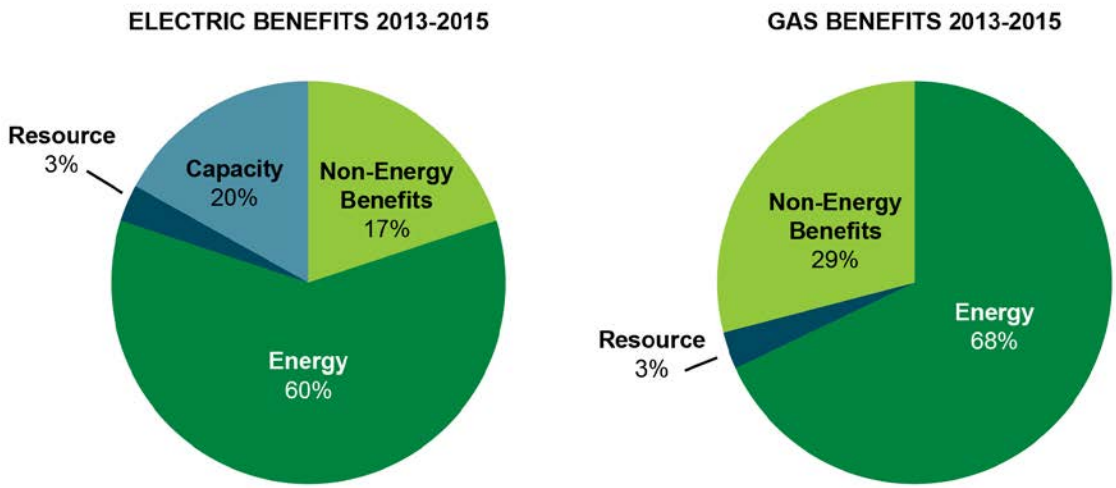
Include non-energy benefits in program evaluations

In addition to M&V methods, NEBs can be included in program evaluation to prove the improved cost-effectiveness resulting from NEBs additional to energy saving benefits in both projects and programs (for a discussion of NEBs at the industrial customer level, see Chapter 6). Many studies suggest that the NEBs of IEE measures can be quite large, often far greater than any energy savings (Chittum 2012). Including NEB elements in program cost-effectiveness evaluations could significantly increase the benefit-to-cost ratios of IEE programs.

Because valuing NEBs can be difficult and has sometimes proven controversial, most states that currently account for NEBs typically do so only for benefits that are readily quantifiable, mostly confined to water and other fuel savings (Kushler et al. 2012). Some regulators and stakeholders resist including benefits such as improved participant/public health, comfort, and property values because they are "externalities" outside the usual realm of utility regulation, and if benefits occur outside the system, it could create an implication that other stakeholders might be expected to contribute to energy efficiency funding to the extent that they receive benefits. Estimating the value of some NEBs can also be complicated, leading many administrators to resist attempts at monetizing all of them (Lazar and Colburn 2013). Thus, it may be most practical to focus on only the key NEBs most amenable to quantification. Examples of programs that incorporate a relatively large range of NEBs include NYSERDA, Massachusetts, and BPA.

[26] The Industrial Strategic Energy Management Accelerator is designed to demonstrate SEP as a practical and cost-effective energy efficiency program offering. Signatories to this Accelerator are utilities and energy efficiency program administrators that agree to deploy SEP to a set of industrial customers across their service territories. This Accelerator was launched in December 2013.

Over the last decade, Massachusetts has integrated NEBs when estimating the value of its energy efficiency program offerings to the whole utility system (using the Total Resource Cost Test). Figure 8 shows that NEBs represent approximately a quarter of total benefits that accrue to the system. Note that many benefits, such as productivity gains or environmental benefits are not included, meaning that if these positive environmental and social externalities were included, NEBs would in fact be much greater.[27]



Source: Halfpenny 2013

Figure 8. The value of non-energy benefits in Massachusetts' energy efficiency programs

Acknowledge free ridership and positive spillover effects

Free ridership is a situation in which a program incentivizes a company to implement an energy project that they would have conducted on their own without the program's financial and/or technical assistance. Program administrators want to get the most from the incentives they offer by encouraging projects that would not have otherwise been implemented. However, identifying and preventing free ridership is complicated, and estimating the impact can be costly. Based on surveys that ask people to relate why they made energy conservation investments, it is difficult to make accurate estimates.

Although the number of "free riders" can be high for certain programs, other end users may see substantial energy cost-saving advantages from some of the investments or concepts being promoted in an energy efficiency program and decide to undertake measures themselves without receiving any program incentives or being otherwise involved with the program. This "spillover effect" can work to mitigate or neutralize the level of free ridership. For example, NYSERDA has found that for most (though not all) IEE delivery programs, "spillover" equals or exceeds "free riders" (Taylor et al. 2012).

Programs in Vermont, British Columbia, New York, and Oregon attempt to estimate free riders and report net savings against targets for at least some of their specific IEE programs (Taylor et al. 2012). Regulators and program administrators can expect some level of free ridership, and may wish to accept moderate levels, as long as the programs remain cost-effective overall.

As with other key elements of project M&V, it is important that any needs to consider free ridership or spillover effects in assessing how energy savings from specific project and programs will be credited to users and administrators be clearly stated and agreed to by all parties prior to project and program implementation efforts.

[27] **Approved NEBs**: 1) C&I new construction and retrofit: operations and maintenance costs, administrative costs, material handling; 2) Low income: utility savings, rate discounts, bad debt write off, terminations and reconnections, collections and notices; 3) Residential new construction and retrofit: customer perceived savings, thermal comfort health benefits, noise reduction rental marketability, property value increase, reduced tenant complaints, lighting quality, home durability, equipment maintenance. **Not approved**: national security, economic development, reduced waste.

This includes clarification of both what specific types of projects must consider free ridership and spillover, and details on the quantification methodologies to be used. Ambiguity about how reported savings may be discounted in after-the-fact evaluations may lead to contentious arguments or inhibit project implementation.

SUCCESSFUL DESIGN AND IMPLEMENTATION APPROACHES

- Effective M&V is critical for program administrators to assess results and measure progress, and useful for industrials to verify results of their investments.
- Guidelines for M&V need to be clearly defined and periodically reviewed and adjusted.
- Periodic impact and process evaluations help identity where IEE program efficiency and results can be further improved.
- NEBs can be a key element of both project M&V and program evaluation.
- Any needs to make allowances for free ridership and spillover effects should be clearly stated and agreed by all parties prior to project or program implementation.

5. Designing Effective Self-Direct Programs

Effectively capturing energy efficiency opportunities within the industrial sector adds substantially to total state program energy savings and often helps lower total unit costs of saved energy. As discussed in Chapter 3, maximizing industrial energy efficiency (IEE) typically brings down overall system costs over the medium term, which is in the interest of all utility customers.

There is a strong public policy case for including the industrial sector in ratepayer-funded energy efficiency programs. A large portion of the overall available energy efficiency potential resides in this sector, and the unit costs of energy savings in industrial projects is typically lower than in most other sectors targeted for resource acquisition (see Chapter 3). In addition, many advocates point out an issue of fairness—why are certain customers exempted from paying into ratepayer-funded programs even though they ultimately benefit from lower total system costs?

However, industrial customers often raise legitimate concerns about the extent to which ratepayer-funded energy efficiency programs will be able to meet their specific needs. Especially when programs are first being contemplated, industries may be skeptical about whether the programs will be administered with enough flexibility to meet their priorities. They may be skeptical about the IEE capability of program administrators compared with their own capabilities, and they may have concerns about administratively complex and burdensome participation requirements. In essence, many industries—especially larger ones—may raise concerns that the benefits that they might receive from a ratepayer energy efficiency program will not be commensurate with the costs of paying into the program and dealing with administrative requirements.

As of January 2014, 16 states offer “self-direct” programs. To achieve energy savings, these programs must be designed and implemented to meet both the public policy objective of the programs and the industrial customers’ desire for greater flexibility and control of energy efficiency efforts in their own companies. Self-direct programs should not be confused with “opt-out” program clauses. “Opt out” means that a class of consumers is allowed to not participate in a ratepayer-funded energy efficiency program—these customers do not pay into the system, do not have an obligation to deliver energy savings, and do not directly benefit from participation in the programs. Under self-direct programs, qualifying consumers implement their own energy savings programs, often without design and implementation assistance from a program administrator. However, they are still obligated to spend money and deliver energy savings, either on a project-by-project basis or over a certain amount of time. A self-direct option keeps large customers in the energy savings portfolio but allows them the flexibility to take advantage of cost-effective energy efficiency opportunities. There is wide variability in terms of the industrial savings requirements and measurement and verification (M&V) rigor across existing self-direct programs. As such, those that employ high levels of M&V rigor and achieve robust industrial savings can serve as the best examples for delivering successful self-direct programs.

Some self-direct programs have proven to be effective tools to both deliver low-cost energy savings for system-wide benefits and to help industrial customers achieve substantial cost savings and bottom-line benefits through energy efficiency improvements. This chapter describes the types of self-direct programs common among the states, outlines program features that help achieve both public policy goals and increased flexibility for industrial customers, and provides examples of successful self-direct programs currently in operation. Readers should note that the program design features discussed in Chapter 4, such as demonstrating the value proposition of energy efficiency to customers, also apply to self-direct programs.

5.1. What are Self-Direct Programs?

In this report, self-direct programs are defined as programs that allow some customers, usually large industrial ones, to “self-direct” fees directly into energy efficiency investments in their own facilities instead of into a broader aggregated pool of funds collected through a public benefits charge for energy efficiency programs. This is in contrast to opt-out provisions, which allow large customers to fully opt out of paying their energy efficiency charge with no corresponding obligation to make energy efficiency investments on their own (ACEEE 2012b).[28]

Self-direct programs usually define eligibility for customer participation in terms of a threshold amount of energy use or energy use capacity (e.g., megawatt-hour [MWh] or megawatt [MW]), with the view that, generally speaking, only larger customers are likely to have the capacity to undertake serious energy efficiency programs themselves and attempting self-direction among small consumers is inefficient.

Self-direct programs may be administered by a utility, state regulatory authority, or state agency. In Oregon, for example, the state's self-direct program is overseen by the state energy office (although the customized administrator-managed industrial offering—the Production Efficiency program—is implemented by the Energy Trust of Oregon). In Vermont, self-direct customers report their programs to the state utility regulator, although there is currently only one customer that uses the large self-direct program and two customers that use the smaller self-direct program.[29] In Michigan and Washington, self-direct customers report their plans to their utilities, and validation of plans falls to the state utility regulatory commission.

Table 2 illustrates the continuum of self-direct programs existing in the states, showing differences in the rigor with which the programs are structured to ensure achievement of public policy energy savings delivery goals. As programs move down the continuum from the least to the most structured programs, they vary in two key ways: 1) accounting with respect to energy efficiency payments that would be required without self-direction and with respect to use of funds, and 2) extent of M&V of energy savings and follow-up by utility regulatory commissions or program administrators.

Table 2. Structure of Self-Direct Programs

Public Benefit Maximization

Program Type	Energy Efficiency Payment	Measurement and Verification of Savings	Use of Funds	Follow-Up	Examples
Less structured self-direct	None	Minimal; self-reported	Company uses retained cash for energy efficiency	None to minimal	MN, OH
More structured, lower oversight self-direct	Fully or partially paid on bill	Minimal; self-reported	Rate credit or project rebate	Minimal	MT, OR
More structured, higher oversight self-direct	Fully or partially paid on bill	Robust; similar to ratepayer-funded programs	Personal escrow, rate credit, or project rebate	Minimal to substantial	WA, CO

Source: Adapted from Chittum in Elliott 2013

In the less structured cases, programs may exempt a customer entirely from paying energy efficiency charges, and require them to simply channel the funds directly into their own energy efficiency projects. To be considered self-direct programs as defined above, however, there should be some level of formal reporting on funds spent and the projects implemented. In more structured cases, there are reporting mechanisms that aim to ensure that self-

[28] It should be noted that some states have "self-direct" terminology in legislation that provides energy-intensive customers to be fully exempted from energy efficiency charges to direct towards energy efficiency measures, but there is minimal to no oversight or requirements to report on implementation of measures. This is in reality equivalent to opt-out provisions (Chittum 2011).

[29] See http://aceee.org/sector/state-policy/vermont for more information that distinguishes both programs.

direct customers spend at least as much on energy efficiency projects as they would have on energy efficiency charges. Customers may be exempted from paying energy efficiency charges for a certain time if they undertake a reported project or set of projects as planned. More commonly, customers are required to pay most or all energy efficiency charges and then receive project rebates or rate credits against their qualified expenditures on self-direct projects. Ongoing accounts of energy efficiency payment requirements against qualified energy efficiency project expenditures also may be used.

Programs also vary substantially as to the extent of program follow-up on project execution and on energy savings M&V. Some less-structured programs require some documentation stating the customer has invested in energy efficiency in the past or plans to do so in the future, but the customer is not required to provide detailed information on its investment. More structured programs require that purchase receipts or other evidence of investments be submitted, but energy savings reporting may be minimal or the reported savings may not be verified. Finally, the most structured programs with high levels of administrative oversight are subject to M&V protocols in the same way as administrator-managed IEE programs. In some cases, a small portion of energy efficiency charges may be retained by program administrators rather than fully rebated to customers to help cover oversight costs (Chittum 2011).

Figure 9 provides a snapshot of the prevalence of self-direct programs among the states as of January 2014. At least 16 states have some type of self-direct program, and six states have opt-out provisions. Figure 9 also provides a sense of the prevalence of less structured and more structured programs by state. However, it should be noted that definition into these categories is not a perfect science and characterization of individual state programs requires customized review.

Source: Elliott (2013)

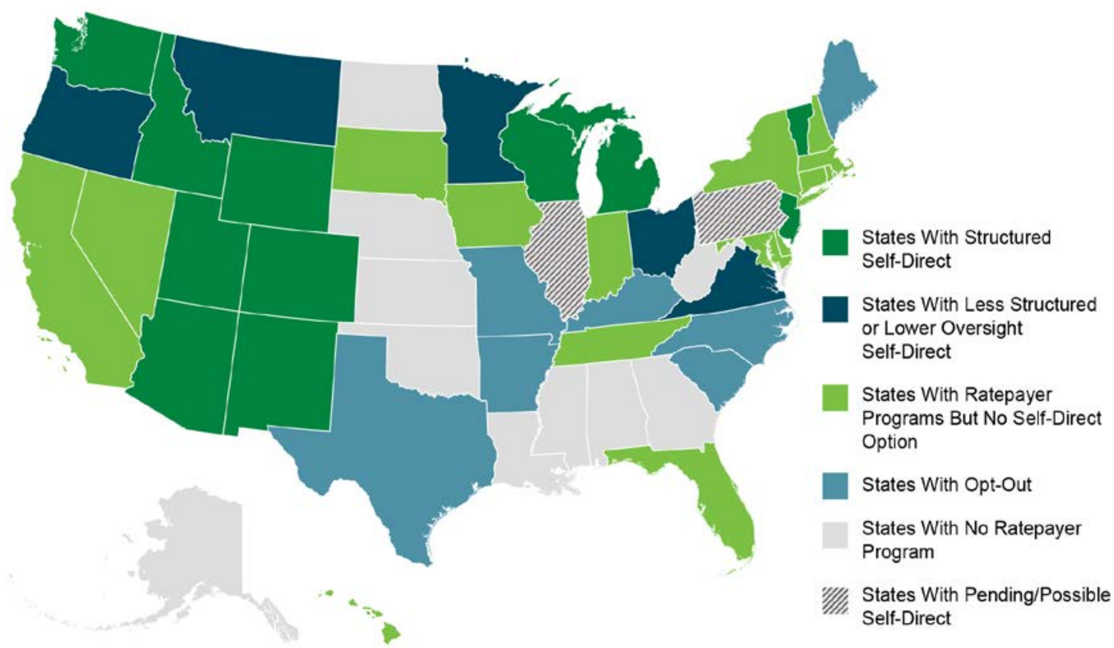


Figure 9. Current snapshot of self-direct programs (subject to review)

5.2. Ensuring Achievement of Public Policy Goals

To meet basic energy efficiency public policy goals, it is necessary to ensure that self-direct programs are producing cost-effective energy savings equal to or greater than what would have been realized in a traditional, administrator-directed program. Based on the experience of the most successful programs, one path to achieving this is to operate self-direct programs as one option within the overall energy efficiency program. Rather than designing a self-direct program as a means of avoiding participating in the state's resource acquisition effort altogether, the program can be designed as a program choice for industry's participation in the state's overall resource acquisition effort. Industries can choose to direct their own efforts or to have staff and consulting experts from the program administrator work with them as part of an administrator-directed program. Minimum expenditures (e.g., energy efficiency charges or equivalent amounts) are expected to be the same for either choice.

From the public policy perspective, it is important to ensure that self-direct customers meet their energy savings requirement with the funds they would otherwise pay into the ratepayer-funded program for the benefit of all.

There are competing viewpoints about whether one type of program can achieve greater savings or leverage greater benefits for the industrial customers as well as all system users, and states have had differing experience with the value of self-direct programs compared with core programs managed by a utility or program administrator. This report does not compare the effectiveness of these two types of programs. Instead, for states that are choosing to introduce or allow self-direct programs as an option, it highlights how self-direct programs in some states have been able to provide an attractive alternative to large customers while meeting public policy goals.

Set Goals to Achieve at Least Equivalent Performance

Where self-direct programs are offered as part of overall energy efficiency programs, large consumers are asked to report on their actual programmed energy efficiency investments. If the investments are assessed by program administrators as meeting program criteria, the customers receive rebates or credits against ongoing energy efficiency payments or they receive energy efficiency payment exceptions related to the size of the investment. The assumption is that customers participating in the self-direct program must pay the energy efficiency contributions, similar to all other customers, unless they are excused from payment based on evidence of comparable investments they have programmed themselves.

Some self-direct programs simply ask that customers spend a certain amount of money on energy efficiency. However, solely focusing on spending fails to take account of the quantity of energy savings delivered. Developing concrete savings goals can help improve the working relationship between the customer and the self-direct program administration. Instead of focusing on dollars, these goals keep the conversation focused on energy. When customers buy into the idea of energy savings goals, they may squeeze more energy savings out of every dollar spent (Chittum 2011).

For example, in Michigan's self-direct program, large customers must develop energy optimization plans that set annual energy savings targets based on the previous year's energy consumption, factoring out changes in business activity, energy required for pollution control equipment, or, if relevant, weather normalization (see Example 13).

Another example is the Eugene [Oregon] Water and Electric Board (EWEB) self-direct program. EWEB's individual self-directing customers develop energy savings goals in collaboration with utility staff. Goals are based primarily on the percent of load a customer represents. EWEB notes that they are acquiring more efficiency from their two self-directing customers than they had in the past when the customers were using EWEB's standard program offerings (Chittum 2011).

Energy Savings Measurement and Verification

Some form of energy savings M&V is needed to ensure that self-direct programs are achieving expected energy savings. Data collection to track the amount of funds directed toward energy efficiency projects—and the savings achieved from those projects—is necessary to determine whether a self-direct program is performing as effectively as a traditional program might (Chittum 2011).

Most self-direct programs do not penalize customers for failure to demonstrate verified energy savings or meet goals. Although such structures may not be always necessary, some self-direct program administrators have found that requiring companies to pay back energy efficiency charges if no or insufficient action is taken can encourage customers to meet energy savings goals or use up all of their allotted energy efficiency funds. If a company earns rate credits or rebates in advance of project implementation, customers may have to pay back a portion of the rate credit or rebate if a planned project does not come to fruition. Michigan's self-direct program (see Example 13) asks customers to meet set energy savings targets. If a customer fails to meet its targets, it must repay energy efficiency charges in proportion to the shortfall. Puget Sound Energy's self-direct customers simply lose their allotted energy efficiency fund credits if they do not dedicate all resources toward implementation of energy efficiency measures (Example 14).

Self-Direct Options as Complementary to Core Industrial Offerings

In states that may be starting out and do not have mature industrial offerings that provide quality technical assistance or if manufacturers may be seeking opt-out provisions, self-direct programs can be viewed as attractive options to ensure the industrial sector remains in the program portfolio. If IEE potential is substantial and capacities can be developed, the most complete service package can include both strong administrator-directed industrial programs and strong self-direct programs. Ultimately, both administrator and self-direct programs have their comparative advantages.

As experience accumulates, states may wish to offer self-direct options as complementary to, rather than instead of, core program offerings for companies interested in going beyond those offerings (Elliott 2013). For instance, Xcel Energy (Example 15) in Colorado provides a self-direct program alongside a range of other prescriptive and custom program offerings. With the potential for wide variability in participation, not all industrial customers can be expected to self-direct funds effectively toward all cost-effective opportunities. They also may be interested in the specialized technical support that a statewide program can potentially provide. Comprehensive and mature industrial offerings as part of administrator-directed core programs have many times demonstrated added value to manufacturers. At least three self-direct programs—in Oregon, Michigan, and Wisconsin—reported that customers who had been self-directing or had considered self-directing chose to return to paying the energy efficiency charge and using core ratepayer programs because these programs yielded substantial benefits. The ratepayer-funded industrial offerings in these states are robust and have evolved to meet customer needs over time (Chittum 2011).

It is interesting to note that Rocky Mountain Power allowed industrial customers above a certain size threshold to opt out of paying 50% of the ratepayer surcharge if they could show—through third-party audit—that there are no more energy efficiency opportunities below a certain payback period. During the 10-year period that the credit was in place, no companies took up the credit, which implies that participants either could not prove that all energy efficiency opportunities had been implemented or valued the energy efficiency program offerings more than the exemption.

SUCCESSFUL DESIGN AND IMPLEMENTATION APPROACHES

- Structure self-direct programs as part of a larger portfolio of robust IEE programs that are responsive to industrial and other large customers' needs.
- Develop self-direct programs with active engagement with industrial customers to ensure the programs meet user needs.
- Allow flexibility in eligible technologies and timelines.
- Require verified energy savings equivalent to what would be achieved with core program offerings, with routine progress reporting and robust approaches for measurement and verification.
- Consider escrow-like accounts to structure a "use it-or-lose-it" fund base that encourages greater participation.

EXAMPLE 13. MICHIGAN'S SELF-DIRECT ENERGY OPTIMIZATION PROGRAM

Under Michigan's 2008 Public Act 295 (PA 295), certain customers may create and implement—or self-direct—a customized energy optimization (i.e., energy efficiency) plan and thus be exempt from paying the full energy optimization (EO) surcharge to its utility provider. The EO plan is consistent with the energy savings goals required of electric utilities as part of the state's energy efficiency resource standards. The plan identifies targets, planned projects, and verification process for approval by their utility, and the utility approves the plan and reports aggregated program data to the Public Service Commission.

Self-direct customers do not pay fully into the energy efficiency fund in exchange for the execution of their energy savings plan. They do pay a portion of their assigned charges to cover administration of the self-direct program and a portion of the public benefit charge that funds programs for low-income consumers.

In the first years of PA 295 implementation (2009 and 2010), the self-direct option was made available only to large customers with at least 2 MW of peak demand (or 10 MW peak demand for aggregate sites). For 2011 and 2012, PA 295 allows customers with at least 1 MW annual peak demand in the preceding year or 5 MW aggregate at all of the customer's sites within a service provider's territory to participate. The number of customers enrolled to self-direct their own EO program has dropped from 79 in 2010 to 47 in 2011 to 32 in 2012. This reflects the perceived value of the flexibility and comprehensive program options that are being offered under utility programs. Electric reductions from self-direct programs reached 53,593 MWh across customers from all providers (DTE Electric, Consumers Energy, Efficiency United, and cooperative and municipal utilities).

PA 295 specifies that all but the largest self-direct customers must hire an energy efficiency service company to develop an EO plan, which sets annual energy savings targets based on the previous year's energy consumption, factoring out changes in business activity, energy required for pollution control equipment, and weather normalization. As an alternation to normalizing for weather, the self-directing company can choose to base savings off of a three-year average annual demand for all retail customers in the state. Very large customers (more than 2 MW per site or 10 MW in aggregate) are not required to hire an energy efficiency services company.

Every year, the self-direct customer must submit a report detailing the energy savings projects and estimated energy savings. The third-party energy efficiency service company hired by the company is responsible for notifying the utility if the targets are not being met. If the targets are not met, the self-direct customer must pay the utility a portion of the avoided public benefit charge proportional to the percentage by which it missed the target. If the company exceeds their goal, excess savings may be applied to the following year's goal.

For 2009 and 2010, 26 customers of DTE Energy took advantage of the self-direct option, although DTE has reported that several customers may opt back in to DTE Energy's efficiency program due to the low surcharge.

Source: Taylor et al. 2012, Chittum 2011, Michigan Public Service Commission 2013

EXAMPLE 14. PUGET SOUND LARGE POWER USER SELF-DIRECTED ELECTRICITY CONSERVATION PROGRAM

Program Overview

One of Puget Sound Energy's (PSE) four commercial and industrial programs is the Large Power User Self-Directed Electricity Conservation Program, which started in its current form in 2006 (a pilot program was initiated in 1999). The self-direct program provides funding for customers that contribute to a conservation fund. Self-direct customers have access to 82.5% of the fund. Although participants in other PSE commercial and industrial programs are limited to maximum incentives of 70% of the measure cost, self-direct customers may fund up to 100% of measure cost. PSE keeps 7.5% of the conservation fund for program administration and 10% for Northwest Energy Efficiency Alliance market transformation programs activities. Customers are eligible under the self-direct program when they take three-phase service at greater than 50,000 volts.

PSE requests customers to calculate electric energy savings using standard engineering practices and to document data, assumptions, and calculations for PSE review. PSE reviews savings calculations and reserves the right to modify energy savings estimates. After receipt of project final cost documentation, a PSE Energy Management Engineer conducts a post-installation site inspection to review installed equipment and confirm implementation of the M&V plan. Actual savings may be trued-up based on post-installation energy use monitoring.

PSE works with self-direct customers to track energy efficiency contributions for future use and allows them to earn an incentive against their tracked contributions whenever an approved project is completed. The program focuses on large customers that often have in-house engineering resources, which can help reduce overall program costs and guarantee successful implementation of efficiency measures funded. PSE relies on trade allies such as energy service companies to help self-direct customers identify and implement projects.

Participation Process

PSE's program is creatively structured in that it combines grants with a competitive bid process. The program begins with a non-competitive phase during which customers are guaranteed access to their portion of energy efficiency fees and are responsible for proposing cost-effective projects to use their allocation. At the end of the non-competitive phase, customers not proposing projects to fully use their allocation forfeit their remaining balance to a competitive bid phase. Funds are aggregated together and disbursed via a competitive bid process among all self-direct customers, encouraging highly cost-effective projects. The projects funded as a result of this competitive bid process are generally more cost-effective than those funded during the first two years, as customers compete against each other to make a case for their projects. The program saw a very large volume of competitive projects proposed during the competitive bid process. For example, in 2009, self-direct customers proposed cost-effective energy efficiency investments of more than four times the amount of funding actually available in the aggregated fund.

All projects must meet PSE's avoided cost requirements. Although the customer submits its own proposal and M&V plan, PSE reviews the proposal and plan. Upon approval, PSE enters into a funding allocation agreement with the company and conducts a post-installation inspection after the measure is implemented.

Program Performance

PSE reports its self-direct program is acquiring energy efficiency at a cost equal to its other programs and that the program is acquiring more efficiency resources than would have otherwise been the case. Participation rates are also higher in the self-direct program among eligible customer classes than in other programs.

Each year, more customers qualify for the self-direct program; for the 2010–2013 program period, 54 customers were eligible. PSE has awarded more than $12 million in project incentives and projects 42,000 MWh per year in annual savings. As the program matures, PSE is seeing a shift toward longer payback projects, in part because more commercial customers have begun to participate in the self-direct program.

Sources: Puget Sound Energy 2012, Chittum 2011

EXAMPLE 15. XCEL ENERGY'S COLORADO SELF-DIRECT PROGRAM

Program Overview

Xcel Energy launched the Colorado Self-Directed Custom Efficiency Product in 2009. The program provides rebates to large commercial and industrial electricity customers who engineer, implement, and commission qualifying projects at their facilities. Self-direct customers perform the design, engineering, measurement, verification, and reporting of energy efficiency projects approved by Xcel Energy. The intent of the offering is to allow customers with the internal expertise, or access to expertise (through a third party), to drive their own energy efficiency projects while providing utility incentives to help them overcome financial barriers to implementation. Customers must have access to appropriate resources to properly identify, quantify, scope, and implement a project—without the assistance of Xcel Energy.

Due to this increased reporting and validation burden placed on the customer, Xcel Energy is able to provide a larger rebate than those offered through other incentive programs in exchange for the in-house engineering analysis required of a self-direct customer. Self-direct customers continue to pay their assigned energy efficiency charge, and self-direct projects are reimbursed through a rebate. Customers may earn rebates of up to 50% of the incremental project costs, either $525 per kilowatt (kW) or $0.10 per kilowatt-hour (kWh). Eligible business customers must have aggregate peak demand at all meters of at least 2 megawatts (MW) in any single month and have an aggregate annual usage of at least 10,000,000 kWh.

Participation Process

Participation is a multi-step process:

- Customers receive a rebate application from their Xcel Energy account manager, who ensures that all eligibility requirements are met. Pre-qualified customers then identify energy efficiency opportunities in their building and submit a detailed energy efficiency improvement plan to Xcel Energy.
- Xcel Energy reviews the project and provides a total resource cost (TRC) calculator for the customer to analyze the cost/benefit relationship of the project. To qualify for a rebate, the TRC must be greater than 1.0 and payback periods must be greater than one year and less than the lifetime of the equipment.
- Upon review and pre-approval of the improvement plan, customers are notified of project approval and potential rebate amount. At this stage, a monitoring plan is finalized to verify the project's results.
- Upon project completion, the customer submits a completion report including measurement and verification of the energy savings if savings are anticipated to be greater than 250,000 kWh. Once Xcel Energy approves the completion report, the rebate, based on measurement and verification savings, is issued to the customer.

Program Performance

Since its inception, the program has seen considerable customer interest and has achieved early success. Participating customers report high satisfaction with the program and vendors are optimistic about the future of performance contracting due to increasing customer prioritization in addressing energy costs.

- Since the 2009 launch, the self-direct program has achieved more than 26 gigawatt-hours (GWh) and 3,531 kW of savings and paid rebates in excess of $3.4 million (average savings per participant is 1.7 GWh with TRCs of more than 2.0).
- 2010 had 10 projects and achieved savings of 8.97 GWh against a goal of 4.4.
- 2011 had two participants and achieved 7.67 GWh against a goal of 5.6 GWh.
- 2013 has a pipeline of more than 8 GWh.

In 2012, TRC was 1.79, Utility Cost Test was 4.67; and lifetime cost of conserved energy was $0.01 per kWh.

Source: Nowak et al. 2013

6. Emerging Industrial Program Directions

Well-designed self-direct programs such as those discussed in the previous chapter are likely to play an important role in states that have clean energy portfolio standards (CEPS) but do not have mature industrial program offerings, or where manufacturers may be seeking opt-out provisions. However, in other circumstances, other types of programs may be more relevant. For example, states with long-standing industrial programs may want to ramp up efforts or, at the other end of the spectrum, there may be no regulatory driver to acquire energy efficiency resources. This chapter discusses promising opportunities for the next level programs that can further address some of the traditional barriers to industrial participation and expand the development of energy efficiency potential present in manufacturing facilities.

This chapter focuses on new program opportunities rather than providing detailed pathways for immediate implementation because further research, regulatory guidance, and implementation experience is needed. Some approaches, such as next-level strategic energy management (SEM) programs, are based on proven practices that states have implemented for years, while others are in the development stage and may not be market-ready.

The approaches discussed below could result in increased industry participation, develop deeper or harder-to-find savings, enhance the value of certain energy efficiency projects to manufacturers, and expand the fuel options for IEE programs. Initial discussions on these innovative or emerging approaches include:

- Further expanding the use of SEM programs and overcoming current challenges with crediting savings from SEM improvements
- Compensating customers beyond individual energy management or equipment installation and for performance at the whole-facility level
- Integrating non-energy benefits (NEBs) more effectively at the industrial customer level
- Developing new mechanisms that allow natural gas saving projects to receive incentives.

6.1. Next-Level Energy Management Programs

As discussed in Section 3.4, SEM and energy manager/staffing programs seek to promote operational, organizational, and behavioral changes that result in greater efficiency gains on a continuing basis. SEM programs seek to move beyond incentives for equipment and technologies toward a systems focus that rewards operational efficiency, maintenance improvements, "lean" techniques, and ongoing implementation strategies. SEM programs, although diverse in nature, usually offer incentives for operations and maintenance (O&M) improvements, provide energy management training and workshops, and offer support to establish energy tracking systems. Energy manager/energy staffing placement programs provide financing for an energy manager or dedicated personnel to provide leadership and technical expertise beyond discrete projects to identify opportunities and bring them through to implementation on a continuous basis. In practice, several program administrators have tended to offer both SEM and energy manager/energy staffing programs. Incentives are often provided for operational efficiency measures, energy tracking systems, and staff time (see Chapter 3).

The success of these programs has been noted by long-standing administrators, such as Wisconsin Focus on Energy, which has been offering SEM for 1 years, and there is growing interest in applying this approach in new service territories. Administrators that have traditionally offered prescriptive and custom programs are now piloting energy management programs. Recent programs have been introduced by DTE Energy, the Energy Trust of Oregon (ETO), Southern California Edison, Vectren (Indiana), Rocky Mountain Power (PacifiCorp) in Utah and Wyoming (the latter as an energy manager pilot), and Minnesota Energy Resources Corporation (see Table 3).

Table 3. Recent Energy Management Programs, Pilots, and Initiatives

<table>
<tr><th>Activities</th><th>Incentives (Where Applicable)</th></tr>
<tr><td colspan="2">Energy Trust of Oregon CORE Improvement</td></tr>
<tr><td>The CORE Improvement offering is designed to implement strategic energy management (SEM) for highly motivated small and medium industrial cohorts. Through a 12–15 month engagement, plants participate in four peer-to-peer cohort workshops, and SEM coaches meet with participants individually. These meetings leverage tools and resources to ensure that assignments are applicable to the site and effective for each facility.</td><td>Technical services in the form of the SEM coaches, which cost around $25,000–$40,000 per facility over the 15 month engagement.</td></tr>
<tr><td colspan="2">Energy Trust of Oregon ISO 50001 Pilot</td></tr>
<tr><td>In 2012, the Energy Trust of Oregon (ETO) initiated a pilot offering under the Production Efficiency program to deploy energy management practices to the ISO 50001 level to establish a system that could be externally certified.</td><td>Financial incentives for achieving certification within six months of completing the statistical energy savings model (as well as incentives already available from existing ETO programs)</td></tr>
<tr><td colspan="2">Minnesota Energy Resources Corporation Energy Management Team Coordinator Pilot</td></tr>
<tr><td colspan="2">Minnesota Energy Resources Corporation (MERC) undertook a pilot program from August 2010 to June 2012 to help industrial customers identify and implement energy conservation improvements. The pilot provided an Energy Management Team Coordinator to assist the internal Energy Management Teams of five MERC customers (i.e., the coordinator dedicated 20% of work time to each customer). Customers were recruited as part of MERC's Commercial & Industrial Turn-Key Efficiency program, requiring minimum annual gas usage of 500,000 therms. During the two-year pilot, the coordinator worked with each participating customer to implement an energy management system similar to ISO 50001 and based on U.S. Environmental Protection Agency's ENERGY STAR program publication, Teaming Up to Save Energy. The results of the pilot were positive. Participants outperformed the comparison group by implementing an average of nearly twice the number of energy savings projects, achieving higher annual energy savings, and attaining a conversion ratio of three times the achieved therms savings compared with identified potential therms savings.</td></tr>
<tr><td colspan="2">Northwest SEM Collaborative</td></tr>
<tr><td colspan="2">The Northwest Energy Efficiency Alliance (NEEA), Bonneville Power Authority (BPA), Energy Trust of Oregon (ETO), BC Hydro, and a number of Northwest utilities are taking a collaborative approach to industrial SEM to share best practices in SEM research, design, implementation, and evaluation. The Collaborative aims to help energy efficiency program administrators accelerate the adoption of SEM in the industrial sector by focusing on:
Strategic planning: Provide long-term direction for the Northwest SEM community
Solution improvement: Enhance the efficiency and effectiveness of Northwest SEM offerings
Program innovation: Increase the reach of industrial Northwest SEM programs
Knowledge transfer: Broaden and deepen the extended SEM community's capabilities and skill sets.</td></tr>
<tr><td colspan="2">NEEA SEM Cohorts (Montana)</td></tr>
<tr><td colspan="2">NEEA and Northwestern Energy are partnering to work with SEM cohorts, groups of Montana companies that share both their experiences launching energy-saving programs and their vision of a more competitive Montana business community. Representatives from each organization champion energy management goals and regularly share results. Northwestern Energy and NEEA provide training and support on developing SEM plans, and participating companies meet regularly and share their experiences and progress throughout the nine-month program (NEEA 2013b).</td></tr>
<tr><td colspan="2">Rocky Mountain Power (PacifiCorp) Schedule 24 Revisions (Utah)</td></tr>
<tr><td>Effective July 2013, Rocky Mountain Power (PacifiCorp) revised its programs through Schedule 140, which introduces incentives for operations and maintenance (O&M) savings and copayment for an internal energy project manager over 12–18 months.</td><td>$0.02/kWh for annual O&M savings; and $0.025/kWh annual savings for energy project manager co-funding with minimum savings of 1,000,000 kWh for 12–18 months</td></tr>
</table>

Source: Carl 2012, Batmale and Gilless 2013, ETO 2013a, Franklin Energy 2013, Rocky Mountain Power 2013

Despite the interest in expanding SEM programs in other service territories, these efforts are challenging to implement because of the following issues, which include the lack of common policy guidance and regulatory rules:

- Crediting savings from improvements from SEM
- Determining appropriate baselines
- Justifying incentives for energy management hardware such as submetering and for support of energy managers, which do not directly save energy
- Evaluating SEM typically requires both quantitative information (demonstrated energy savings) as well as qualitative information (energy management practices).

An initial discussion of design considerations that would support more and better energy management programs—i.e., "next generation energy management programs"—is provided below. It is important to note that early adopters have been leading the way in overcoming these challenges and some of their experience is touched on here. For example, the Northwest SEM Collaborative is leading a work program that would drive greater understanding and consensus on SEM research, design, implementation, and evaluation. In-depth coverage of these issues, however, is not provided in this chapter.

Incentives for Submetering

Attention to improving facility metering can generate more accurate knowledge of where energy is being used. This is often the first step to create a continuous energy savings program. Constant monitoring allows the facility to gauge the ongoing effectiveness of its portfolio of energy savings investments and measures. Utility incentives that include submeters and other energy monitoring equipment would allow companies to fine tune operational performance, identify new opportunities for projects, and inform where to focus resources, and track progress.

However, many program administrators face challenges in providing incentives for submetering or other energy management hardware. Although meters do not directly save energy, accurate metering is a critical element of effective benchmarking and verifiable measurement and verification (M&V). Effective strategies that could be used by energy efficiency program administrators include rolling meter costs into the overall measure cost or treating submetering as a persistence strategy for certain energy efficiency measure types, especially O&M measures.

Energy Management Maturity

Energy management approaches are diverse and can range from a set of principles with top-level commitment based on the "Plan Do Check Act" framework, focused O&M improvements, implementing energy management system (EnMS) standards (ISO 50001), lean manufacturing techniques, or use of energy management software tools such as energy management information systems. In addition, the energy management approach employed by an individual company will mature as experience accrues—implementing new technologies, replacing outdated technology with newer, more energy-efficient systems, and investing in energy management assets throughout the organization. The SEM approach itself becomes more sophisticated and energy savings persist.

As well as focusing on the quantitative aspects of M&V from SEM (i.e., energy savings—see next section), program administrators and industrial customers need to be able to assess industrial customer energy management practices and maturity. Energy management assessments are used as a diagnostic tool to determine baseline practices at the beginning of a customer's participation in SEM and are also useful to assess progress and evaluate programs. In addition, maturity models can help to integrate SEM within other business improvement and productivity models (IIP and MSS 2013).

Several successful programs that already assess energy management maturity include:

- The Northwest Energy Efficiency Alliance (NEEA) and the Northwest Food Processors' Association's (NWFPA's) Industrial Energy Roadmap outlines an "Energy Efficiency Self-Assessment" to help enterprises gauge their current level of energy efficiency efforts and understand how energy is viewed within the organization. The self-assessment helps both enterprise and evaluator establish a level of energy management sophistication, creating a roadmap on SEM implementation improvement.

- BC Hydro's Energy Management Scorecard serves to rate companies' energy management in multiple areas, identifying critical areas for improvement and outlining ways to excel in those areas.
- Xcel Energy helps companies benchmark their energy management practices.
- The U.S. Department of Energy's (DOE's) Superior Energy Performance (SEP) program has developed an industrial facility Best Practice Scorecard, which enables companies with mature EnMS to earn credits by implementing energy management best practices as well as improving energy performance. The best practices are activities, processes, or procedures that are above and beyond what is required by ISO 50001 and encourage "best in class" companies to continually improve their EnMS, which will lead to improved performance and sustained energy savings (SEP 2012).
- EPA's ENERGY STAR® program has several assessment matrices that gauge the amount of energy management implementation presently in place for an industrial company or facility. Matrices address energy management programs, plant programs, and small or medium sized plants.

Baselines, Energy Models, and Measurement and Verification

Traditionally, prescriptive approaches use deemed savings for common equipment or verify the savings from replacing a piece of equipment, where estimating the before and after energy consumption is relatively straightforward. With industrial custom projects, M&V analysis is done for each project at the measure level because of the high specificity of the industrial process and application. Using either method, utilities can be relatively confident in the amount of energy savings resulting from replacing existing equipment with more efficient equipment.

SEM programs move away from the equipment focus to continuous improvement across all factors that affect energy use—equipment, systems optimization, O&M, and behavior. In this way, SEM programs unlock the potential of persistent O&M and behavioral savings, which have rarely been included as eligible measures in traditional programs. However, SEM programs that focus on "how,"—for example using a piece of equipment less or using it more optimally—often suffer from an inability to confidently quantify savings or demonstrate persistence over time (Milward et al. 2013).

Attributing savings to projects identified through SEM programs is challenging, but tracking success will be increasingly important as SEM programs become more widespread and their effectiveness is put under regulatory scrutiny. SEM M&V can also be a valuable tool for industrial managers, by making energy performance visible, meaningful, and actionable. SEM M&V requires the development of a robust baseline (typically for a period of one year or more) and an energy model against which actual performance is measured. The general approach is described in Example 16.

Although SEM is broader than just O&M or operational efficiency, the approach as described in Example 16 that subtracts out the savings from capital projects is currently the most common M&V approach to credit financial incentives for SEM. Current programs deploying this approach apply traditional incentives for custom retrofit measures, where retrofit measure savings are subtracted from facility-wide savings, and then a lower incentive is paid on the difference (Gilless 2013). Programs that estimate and incentivize SEM program savings in this way include NEEA, ETO, the Bonneville Power Administration (BPA), and Rocky Mountain Power (PacifiCorp).

In contrast, in addition to crediting operational efficiency, BPA also tracks the increased number of equipment retrofits due to SEM and includes this information in its program results. Companies participating in BPA's High Performance Energy Manager Program (HPEM) show that companies tend to significantly increase the number of capital projects after enrolling in the program: new capital projects submitted after HPEM adoption rose to 23 projects compared with 10 projects beforehand (Wallner 2011). Energy management programs that estimate program results solely in terms of increased numbers of equipment retrofit projects (i.e., they do not count operational, behavioral, or non-equipment savings) include BC Hydro and Xcel Energy (Wallner 2012).

Experience from energy management programs in Europe also supports this observation. Participants in Ireland's Energy Agreements Programme were surveyed to understand how the Irish energy management standard, primarily driven by impending carbon limits, had contributed to their energy efficiency efforts. Surveys report that 67% of the projects to save energy were derived or driven by the EnMS process, and since the introduction of EnMS in Ireland in 2005, the pace of energy savings has increased (Reinaud et al. 2012).

Engaging Supply Chains

Utility or third-party energy management programs may wish to encourage these leading companies with mature SEM experience to collaborate with their supply chains to improve supplier energy management performance. For example, the NEEA-NWFPA Energy Efficiency Assessment recognizes "Industry Collaborators" as companies that actively work outside their own facilities to collaborate with suppliers, utilities, organizations, competitors, consortiums, and associations. Similar program initiatives also exist abroad. In the Netherlands' Long Term Agreements, companies meet one third of their reduction target outside the plant boundaries by engaging their value chains. In Japan's benchmarking policy, companies that demonstrate that they are already at global best practice can collaborate with other companies in their supply chain instead of searching for additional savings within their own operations (Goldberg et al. 2012).

EXAMPLE 16. BASELINES AND ENERGY MODELS

To isolate the effect of strategic energy management (SEM) versus capital projects and other variables, program administrators and customers typically develop an energy use baseline and an energy (regression) model for the entire facility. Payments are made based on actual savings once equipment changes and other variables have been subtracted. Robust models require reliable sources of facility and production data to establish the facility baseline and any savings. For example, the Energy Trust of Oregon and the Bonneville Power Administration model a facility's energy consumption as a function of production and other variables such as weather to determine a baseline level. Using meter-level analysis, they then track actual performance against projected usage—the difference is the potential savings. Actions and measures taken to reduce energy use and the dates of those actions are also tracked in order to be able to tie changes in energy use in the model to actual energy efficiency actions taken. To calculate the annual SEM incentive for the customer, savings from all capital projects are subtracted out (because capital projects receive their own incentives) so that only operations and maintenance savings are included in the cost-effectiveness evaluations of SEM programs (Kolwey 2013, Crossman 2013).

The Consortium for Energy Efficiency and the Northwest SEM Collaborative are actively working to develop a greater common understanding of these issues and to provide guidance to regulators and program administrators to promote more widespread deployment of SEM programs.

At the implementation level, new developments in intelligent technology are emerging as promising tools to ease the burden of determining baselines and using energy models. Companies with longstanding experience with SEM approaches perhaps started out looking at their energy use once a week or month and might have updated their energy models once a year. However, recent developments in information technology systems such as for submeters, energy management information systems, and Intelligent Efficiency, are paving the way toward giving manufacturers the ability to track and measure their energy use and savings performance data in real time across their entire operation. Self-diagnostic, comparative, and anticipatory analytical capabilities of smart devices are enabling a new level of process energy management and systems optimization within companies and can help prevent the degradation of energy savings. With this information, companies can prioritize different operations, tune up systems and integrate demand response, and support less costly measurement and verification.

6.2. Whole-Facility Energy Intensity Programs

The building up of energy baseline and consumption models that were developed to allow customers to receive incentives for SEM implementation provides possible new directions: customers could be compensated beyond individual energy management or operational efficiency and be paid for performance at the whole-facility level—i.e., incentives are not separated by project or equipment installation.

Under this new program model, utilities or program administrators could work with customers to agree on an energy baseline for a certain period (e.g., a year) and provide incentives based on improvements in energy intensity below the baseline. These types of pay-for-performance programs resemble power-purchasing agreements for renewables or white certificates schemes in Europe. They could also be closely integrated into national initiatives and provide greater applicability for a single company with industrial facilities in multiple service territories.

However, the outlook for these programs is likely longer-term because of a range of technical and policy questions such as:

- Accepted methods for setting baselines. There already are existing methods, such as the International Performance Measurement and Verification Protocol (IPMVP) Option D and those used by the New York State Energy Research and Development Authority (NYSERDA), Connecticut Light & Power, and outlined in BPA's Energy Efficiency Implementation Manual (2013) (Seryak and Schreier 2013). The Consortium for Energy Efficiency (CEE) and the Northwest SEM Collaborative are working to gain a common understanding of these issues.
- Whether incentives for improvements in energy intensity can become a commonly accepted policy approach for regulators and legislators across different states—there can be regulatory concerns and restrictions to base analysis of savings on intensity reduction (Crossman 2013).
- The inability of many industrial customers to quickly and effectively analyze their energy consumption information provided by utilities.

EXAMPLE 17. EPA ENERGY STAR PROGRAM

EPA's ENERGY STAR program for industry has developed a number of whole-plant energy benchmarks known as ENERGY STAR plant energy performance indicators (EPIs). These tools provide an energy performance score for plants based on the energy performance of the plant type nationally. To learn more about which industrial sectors have an EPI, visit www.energystar.gov/epis.

6.3. Enhancing the Value of Industrial Energy Efficiency Projects through Non-Energy Benefits

Energy efficiency measures often result in a number of non-energy benefits (NEBs) such as increased productivity, reduced material loss, improved product quality, and lower emissions. In addition, investors increasingly value corporate commitment to energy efficiency and sustainability as an indicator of sound governance and business acumen. Several studies have shown that NEBs from IEE projects, such as broader productivity or quality gains, can be as high as or even higher than the energy cost saving benefits achieved by the projects (Kushler et al. 2012, Chittum 2012, Lazar and Colburn 2013). Full quantification of NEBs for use by implementers and industrial customers at the project or measure level is not commonplace.

NEBs can play an important role in persuading industrial customers to participate in programs. A 2003 study of commercial and industrial (C&I) energy efficiency programs in Wisconsin valued these benefits at approximately 2.5 times the projected energy savings of the installed technologies (Hall and Roth 2003). Worrell et al. (2003) analyzed the NEBs that accrued to industrial customers from 52 energy efficiency projects, where 55% of the cost savings came from productivity improvements as summarized in Table 4. Lung et al. (2005) undertook a similar study with 81 projects (Table 5), showing that 31% of the savings were attributable to NEBs.

Table 4. Energy Cost Savings and Non-Energy Cost Savings from 52 IEE Projects

Total project investment	$54.2 million
Total annual energy savings	$12.9 million (45% of total savings)
Total annual productivity savings	$15.7 million (55% of total savings)
Combined total savings	$28.6 million
Average energy payback	4.2 years
Average payback including energy and non-energy benefits	1.9 years

Source: Worrell et al. 2003

Table 5. Energy and Non-Energy Cost Benefits from 81 IEE Projects

Total project costs	$68.2 million
Total annual energy savings	$47.7 million (69% of total savings)
Total annual non-energy savings	$21.1 million (31% of total savings)
Total annual savings	$68.7 million
Simple payback of energy savings	1.43 years
Simple payback of non-energy benefits	0.99 years

Source: Lung et al. 2005

In a recent survey of 30 energy managers, engineers, sustainability managers, plant managers, presidents, and vice presidents from a diverse pool of companies nationwide, 90% of energy projects were found to also have a broader productivity impact (Russell 2013a). For one company surveyed, energy improvements provided a four-fold return in the form of production improvements and some companies claimed that NEBs "dominated" the returns from energy projects.

However, at the industrial customer level, NEBs are often not quantified prior to making an investment. Some assessment of NEBs may be undertaken post-implementation for evaluation or recognition purposes, but this is for measures that already pass the cost-effectiveness test on energy cost considerations alone. ETO tries to address NEBs upfront and will help industrial customers to quantify NEBs to support the investment decision for projects that are of interest to the industrial customer but do not quite satisfy the cost-effectiveness test. For ETO, water savings is a common NEB to be quantified and is relatively straightforward to quantify relative to other NEBs, such as improved safety and employee morale (Crossman 2013).

Valuing NEBs at the project level prior to an investment could significantly broaden the number and types of projects eligible for program support and incentivize additional efforts for the industrial customer. Although this may require additional engineering resources, collaborative opportunities with water utilities could be pursued to bring additional incentives for water and energy efficiency measures (e.g., steam leaks, steam traps).

As well as focusing on water benefits, using lean approaches can provide benefits in the "non-energy wastes." For example, an hour shaved off of a two-hour line start-up saves energy, scrap material (from sub-optimal line speed), and an hour of staff labor (Gilless 2013).

6.4. Natural Gas Industrial Efficiency Programs

Energy efficiency programs designed to help natural gas customers reduce energy use and costs have existed for more than 30 years in a number of states (ACEEE 2012c). The first customer energy efficiency programs were primarily targeted at residential customers and typically focused on increasing home insulation, reducing air leaks, and installing high-efficiency furnaces. Also, many of these early programs targeted the needs of low-income customers who had difficulty keeping up with rising winter heating costs at a time when natural gas prices were increasing rapidly. Making energy affordable was a primary objective of many of these early gas programs and still is one of the goals of most programs today.

Although the roots of natural gas efficiency programs lie within residential markets, there are a growing number of programs that now serve a broad range of gas customers, from homeowners to, increasingly, large industries. However, although opportunities for natural gas savings in the industrial sector are significant, most of the current IEE program activity at the state level focuses on electricity. In 2011, $6.8 billion was budgeted for overall electric programs (residential, commercial, and industrial); C&I program budgets were approximately $2.6 billion. In contrast, $1.2 billion was budgeted for overall gas programs in 2011, with approximately $350 million for natural gas C&I programs (CEE 2012). Total C&I natural gas program expenditures were approximately $225 million in 2011, with $50 million specific to industrial programs (AGA 2013).[30] Further, estimates show that C&I customers accounted for more than 50% of gas efficiency program savings in 2011 (approximately 71.8 trillion Btu out of a total savings of 125.2 trillion Btu), with industrial programs accounting for 30 trillion Btu on their own (AGA 2013).

Natural gas utilities recover energy efficiency costs in a number of ways, one of which is to apply a surcharge to the delivery charge (other methods include special energy efficiency tariffs or riders or cost recovery via base rates). Nearly 40% of U.S. industrial customers have separate purchasing agreements with wholesale gas suppliers or third-party marketers for the commodity. However, 88% of the natural gas volumes delivered by U.S. utilities to industrial customers were purchased from a third party, which implies that large industrials predominantly acquire their natural gas supply from a source other than the utility. Thus gas utilities serve those large industrial customers mainly with transportation services, so typically they would not include large-volume industrial customers in their gas efficiency programs. With the industrial sector being the second largest end-use consumer of natural gas (after electric generators)—accounting for 26% of total U.S. end-use gas consumption (EIA 2013)[31]—this represents an enormous opportunity in gas savings by targeting industrial customers.

In addition to this challenge, recent low gas prices have made energy efficiency challenging from a cost-effectiveness perspective. Gas utilities are continuing to deliver energy efficiency programs in this low price environment and most gas efficiency programs still continue to pass cost-effectiveness tests. Where engaged, industrial customers tend to be one of the most cost-effective options in the portfolio of efficiency program offerings. Although natural gas prices were at an all-time low in 2012, prices have already rebounded to around $4 per million Btu (MMBtu) and current forecasts estimate that prices will remain in the range of $4 to $6 per MMBtu for the foreseeable future (EIA 2013).[32] In addition, the attractive price outlook for natural gas has created an opportunity for industrial customers to invest in new technologies, processes, and systems. Industrial gas efficiency programs can help ensure that these investments are based on the latest, most efficient practices and technologies, ensuring continued benefits for customers and the state. A particular efficiency opportunity driven by the positive long-term outlook for natural gas supply and price in the United States is combined heat and power (CHP). CHP can play a unique role in IEE programs because it is not only a highly efficient use of the natural gas resource, but reduces load requirements on electric utilities similarly to straight electric efficiency measures. By providing both electricity and useful thermal energy at the industrial facility in one energy-efficient step, CHP delivers overall energy savings both from its own high efficiency and from avoiding transmission and distribution line losses that normally occur in delivering power from the central station generator to the customer.

The organization of utility service provision often impacts the way in which energy efficiency program services are delivered and their cost-effectiveness evaluated. Most single-fuel utilities administer energy efficiency programs on their own. However, energy efficiency opportunities typically lead to savings from end uses that reduce both gas and electric energy use. Delivered together as part of the same project or program, gas and electric efficiency measures may very well pass cost-effectiveness tests even if the gas measures on their own do not. Delivering gas and electric efficiency programs together has the benefit of avoiding the loss of technically and economically viable energy efficiency potential. Energy efficiency technical potential comes from individual end uses and the interaction of those measures with one another and the facility itself in which they are implemented. Ignoring the benefits of energy savings from "other fuels" may lead regulators and administrators of gas efficiency programs to

[30] Overall gas efficiency program budgets for 2012 were $1.4 billion (AGA 2013).

[31] The power generation sector is the largest consumer of natural gas, using an estimated 32.5% of total gas consumption in 2013 (EIA Annual Energy Outlook 2013).

[32] Natural gas energy efficiency programs remain cost-effective when gas prices reach around $4 per MMBtu (using the total resource cost test).

undervalue investment in packages of measures that deliver savings across fuels. The resulting customer under-investment may foreclose on energy efficiency savings opportunities because long-lived equipment is installed that is oversized or because certain improvements can only be technically or economically installed in conjunction with a broader package of measures (Hoffman et al. 2013).

Some states have been able to overcome the cost-effectiveness challenges and can serve as promising examples for other states that wish to further increase gas savings and meet CEPS targets through industrial gas efficiency programs and/or combined electric and gas efficiency programs. For example, PG&E's gas efficiency program in California achieves 60% of its savings through industrial customers, in contrast to 20% of its electricity savings from industrial programs (Sethuraman 2013).

Programs that offer incentives for industrial gas savings as well as electric savings include NYSERDA, ETO, Wisconsin Focus on Energy, Efficiency Vermont, NSTAR, and CenterPoint Energy (Example 4). Another example of a holistic approach to energy savings is an innovative mechanism being proposed by the Utah Association of Energy Users. The proposal suggests that gas utilities offer large industrial customers the opportunity to voluntarily "opt in" to a demand-side management fund, through a self-assessed contribution of 1%–3% of their gas expenses, and to pool these funds with contributions already made to electric public benefits funds. Participating manufacturers could then self-direct these funds to cover both electric and gas energy efficiency opportunities, thereby implementing larger and more effective programs with the flexibility to deliver both electricity and gas savings (Weir 2013).

In summary, industrial customers provide a large savings potential for natural gas utilities and regulators that aim to reduce energy consumption and costs, infrastructure costs, and greenhouse gas emissions through efficiency programs. To achieve this, it is important to align policy goals with implementation rules and evaluation methodologies. Clear and streamlined guidance can help utilities to work with their industrial customers to implement building and process efficiency measures and optimize energy use, while being able to track and credit energy savings to the efficiency program, rather than to new, more stringent energy codes.

7. Conclusion

Building on the improvements in energy efficiency in the U.S. industrial sector that have occurred over the past decades in response to volatile energy prices, fuel shortages, and technological advances is essential to maintaining U.S. industry's viability in an increasingly competitive world. The fact is that many opportunities remain to incorporate cost-effective, energy-efficient technologies, processes, and practices into U.S. manufacturing. Industrial energy efficiency (IEE) remains a large untapped potential for states and utilities that want to improve energy efficiency, reduce emissions, and promote economic development. Successful IEE programs vary substantially in operational mode, scope, and financial capacity, but also exhibit common threads and challenges.

As this report shows, the states' experience gained in developing and implementing IEE programs is both diverse and rich. In Table 6, specific issues discussed in each of the preceding chapters are summarized for regulators and program administrators to consider when designing and implementing effective energy efficiency programs for industry. They do not cover all decisions or issues that regulators and program administrators may need to consider because there will undoubtedly be jurisdiction- and case-specific topics that are not anticipated here. However, these considerations provide a starting point for addressing many of the issues that typically arise.

Table 6. Summary of Key Issues and Considerations for Regulators

Topic	Issue	Considerations for Regulators and Program Administrators	Program Examples
The value of energy efficiency projects	Energy efficiency projects may compete with core business investments and decision-making is often split across business units.	• Clearly demonstrate the value proposition of energy efficiency projects to companies • Relay the operating cost savings and other benefits—including profits—lost if energy efficiency improvement opportunities are not addressed.	• Bonneville Power Administration • New York State Energy Research and Development Authority • West Virginia Industries of the Future
Relationships with industrial customers	It takes a long-term relationship for programs to understand industrial operation and needs, and for industrial companies to understand what a program can offer them.	• Long-term relationships with industrial companies enable joint identification of energy efficiency opportunities • Stability in program support and personnel over a number of years is critical.	• Energy Trust of Oregon
Industrial sector credibility and technical expertise	Addressing industrial companies' core needs requires understanding a plant's production processes, operating issues, and the market context the plant operates within.	Effective IEE programs develop credibility with industrials by employing staff/contractor experts that understand the industrial segment and have the technical expertise to provide quality technical advice and support issues specific to that industry and customer.	• Efficiency Vermont • Wisconsin Focus on Energy • Xcel Energy (Colorado and Minnesota)
Diverse industrial customer needs	Manufacturers use energy differently than the commercial sector, typically having significant process-related consumption. Focusing on simple common technology fixes alone will miss many of the opportunities.	A combination of both prescriptive offerings for common crosscutting technology and customized project offerings for larger, more unique projects can best meet diverse customer needs and provide flexible choices to industries.	• Rocky Mountain Power • CenterPoint Energy • Xcel Energy

Topic	Issue	Considerations for Regulators and Program Administrators	Program Examples
Project scheduling	Scheduling of energy efficiency investments can be heavily dependent on a plant's operational and capital cycle, as proposed equipment changes must be guided through rigorous, competitive, and time-consuming approval processes.	Programs with multi-year operational planning can best accommodate company scheduling requirements, as scheduling of capital project implementation must consider both operational schedules that dictate when production lines may be taken out of operation as well as capital investment cycles and decision-making processes.	• NYSERDA
Application processes	Industrial customers may perceive the application and implementation procedures for IEE programs to be administratively complex and burdensome.	Achieving the right balance between meeting key program administration needs for information and keeping program procedures simple and efficient may often require a continual process of evaluation and improvement.	• BPA • NYSERDA
Program outreach	Various industrial customers may be unaware of the industrial program offerings that may be most applicable or useful for them due to staff turnover and internal demands.	Steady and continual outreach and dissemination of information, such as examples of successful past projects, is important to encourage participation.	• AlabamaSAVES • NYSERDA
Leveraging partnerships	A range of federal, national, regional, and state initiatives and resources are relevant to state IEE programs, including those provided by the U.S. Department of Energy, the U.S. Environmental Protection Agency ENERGY STAR® program, state energy offices, and the Manufacturing Extension Partnership.	Successful IEE programs often partner with federal, state, and regional agencies and organizations to leverage their expertise, access to customers, and program implementation support capacities.	• AlabamaSAVES • Northwest Energy Efficiency Alliance, Northwest Food Processors Association and BPA
Medium- and long-term goals	Industrial companies and program administrators seek market certainty and reduced risk in ramping up the implementation of cost-effective energy efficiency measures.	Regulators and program administrators can set energy savings goals or targets for the medium- to long-term, coordinated with funding cycles (e.g., in three-year cycles).	• Michigan Self-Direct Energy Optimization Program • Southwest Energy Efficiency Project
Measurement, verification, and evaluation	Effective M&V is critical for program administrators to assess results and measure progress, and is also useful for industrial to verify results of their investments.	• Guidelines for M&V need to be clearly defined and periodically reviewed and adjusted • Periodic impact and process evaluations help identify where IEE program efficiency and results can be further improved • Non-energy benefits (NEBs) can be a key element of both project M&V and program evaluation.	• DOE's Uniform Methods Project • International Performance Measurement and Verification Protocol • ETO process evaluations • NYSERDA, Mass-achusetts, and BPA valuation of NEBs

Topic	Issue	Considerations for Regulators and Program Administrators	Program Examples
Self-direct programs	There is a wide range in structures of self-direct programs: from those that are only vaguely defined, and include little M&V of energy saving actions, to those that require verified self-directed customer investment and energy savings to be achieved in order for payment into the programs to be waived.	Clarity in self-directed customer obligations and M&V of results are necessary if the policy goal is to ensure that self-directed industrial customers contribute to overall efforts to ensure least-cost electricity or gas service at a level on par with the contributions of other customers.	• Michigan Self-Direct Energy Optimization Program • Puget Sound Energy • Xcel Energy
Emerging Industrial Program Directions			
Expanding and strengthening strategic energy management programs	Efforts to support implementation of SEM in industry are gaining momentum in state programs.	The challenge of crediting SEM (how to quantify and credit energy savings specifically achieved through SEM), as well as other SEM-related topics, is worthy of further research and cross-exchange.	• AEP Ohio • BPA • BC Hydro • ETO • WFE • Xcel Energy
Program approaches for whole-facility performance	Significant challenges exist in determining baselines and performance metrics that can provide sufficiently robust measurements of facility savings while maintaining practical and easy-to-implement methodologies.	Work on crediting energy savings from SEM could facilitate the provision of incentives and assessing savings credits for whole industrial facility performance, as opposed to performance of individual investments or measures.	• European experience
Capturing non-energy benefits at the project level	Although there is wide variation between projects, several studies have shown that NEBs from IEE projects, such as broader productivity or quality gains, can be as high as or even higher than the energy cost saving benefits achieved by the projects.	If programs employed systematic ways to assess NEBs earlier in the project cycle, the resulting total returns and shorter payback could tip the scale on a variety of projects from "wait and see" to implementation.	• Energy Trust of Oregon
Expanding natural gas programs	• There is less coverage of the industrial sector in natural gas efficiency programs than in electricity efficiency programs. • Most large industrial customers purchase their gas through third-party suppliers rather than their distribution companies. • Most single-fuel utilities administer energy efficiency programs on their own. However, energy efficiency opportunities typically lead to savings in both gas and electric energy use.	• Gas and electric efficiency measures—when delivered together as part of the same project or a combined program—can result in larger, more effective programs that capture more of the technically and economically viable energy efficiency potential. • Innovative concepts are under consideration to increase the effectiveness and the reach of natural gas efficiency programs.	• Efficiency Vermont • ETO • NYSERDA • PG&E • WFE

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Appendix A: Background

A.1. How Energy Efficiency Can Be Achieved in Manufacturing

There are numerous opportunities for industrial enterprises to be more efficient, both at existing facilities and in new production. Opportunities range from simple technology retrofits to corporate behavioral changes supported by strategic energy management systems that result in continuous energy improvement. Measures involve:

- **Adopting more efficient equipment and technology**. Replacing inefficient compressors, which often lose up to 80% of input energy as heat (IEA 2012), is just one example of energy efficiency gains from upgrading individual equipment. Some pieces of new equipment can even produce energy from facilities' own industrial processes. For example, retrofitting industrial boilers with combined heat and power (CHP) systems generates electricity on-site and captures the waste energy usually lost in the power generation process and uses it to provide heating and cooling to factories and businesses.
- **Managing energy and optimizing operations**. Adopting an energy management system (EnMS) can help facilities make a range of operational improvements and could lead to savings of 10%–30% of their annual energy use. Systems optimization means going beyond component replacement toward integrated system design and operation. Although energy-efficient components can provide efficiency gains of 2%–5%, optimizing energy use at the systems level can deliver average efficiency gains of 20%–30% within a payback period of two years or less (UNIDO 2012).
- **Transforming production systems.** More radical reductions in industrial energy use can be achieved through resource and waste management over the whole industrial process and consumption chain. For example, using municipal solid waste as an alternative fuel and raw material in cement manufacturing can substantially improve energy efficiency, reduce greenhouse gas emissions, and divert waste from the landfill.

Energy efficiency can make money for enterprises, improving their bottom lines. Energy efficiency can also increase manufacturers' operational efficiency and productivity, improve risk management, and generate a host of co-benefits.

Some investments will have a very short payback period, which is useful for demonstrating to senior management the benefits of energy efficiency improvements. Other investments will have higher costs, possibly leading to a change in production technology and process, resulting in additional gains in reducing labor costs and improving product quality (Reinaud and Goldberg 2011). The different types of energy efficiency actions investment decisions are illustrated in Table A-1.

A.2. Cost-Effectiveness of Industrial Programs

Measuring the Cost-Effectiveness of Ratepayer-Funded Programs

The use of public and ratepayer funds for acquiring energy efficiency resources means that projects need to demonstrate the cost-effectiveness of demand-side resources. Cost-effectiveness tests help to decide what programs will be invested in and some states specify that public purpose funds may be invested only in cost-effective energy efficiency measures. That is, efficiency measures must cost less than acquiring the energy from conventional sources (cost-effective programs therefore have a cost-benefit ratio greater than 1.0).

Standard criteria are often determined by utility regulatory commissions and used by program administrators to evaluate and screen programs for cost-effectiveness. There are five major types of tests: for society as a whole (societal cost test), for all utility customers (total resource cost), for the program administrator (program administrator test—also known as the utility cost test), for participants in the program (participant test), and for the price impact on non-participant ratepayers (rate impact measurement) (Woolf et al. 2012).

Table A-1. Energy Efficiency Action and Investment Examples

Level of Investment	Action/Investment
No- to low-cost	• Turning off lights and other equipment when not in use • Behavioral/operational change (e.g., switching to low-rate overnight power) • Strategic energy management (SEM)*
Lower cost	• Replacement lights with high bay fixtures • Variable-frequency drive motors, new pumps • SEM*
Medium cost	• Heating, ventilating, and air conditioning replacement • New boilers, refrigerators • Back-up generator replacement • SEM*
Higher cost	• Process equipment upgrades and selective equipment replacement • Combined heat and power • SEM*
High cost	• Replacement of complete production lines • New power generation units, if off-grid; on-site energy generation
Highest cost	• New plant, new facility

Source: adapted from Mason in Reinaud and Goldberg 2011
* SEM is a broad approach and can incur varying levels of cost depending on how it is implemented by the company.

Each test includes different costs and benefits according to different stakeholder perspectives. For example, the program administrator cost test includes energy costs and benefits that are experienced by the program administrator. The costs include all expenditures by the program administrator to design, plan, administer, deliver, monitor, and evaluate efficiency programs offset by any revenue from the sale of freed up energy supply. The benefits include all the avoided utility costs, including avoided energy costs, avoided capacity costs, avoided transmission and distribution costs, and any other costs incurred by the utility to provide electric services (or gas services in the case of gas energy efficiency programs). The societal cost test includes avoided utility costs, any other program impacts experienced by the participating customers, such as avoided water costs, other fuel savings, reduced operations and maintenance costs, improved productivity, improved sales for businesses with improved aesthetics, improved comfort levels, and health and safety benefits. It also includes externalities, such as environmental costs and reduced costs for government services (Woolf et al. 2012).

Cost-Effectiveness Examples of Industrial Programs

Wisconsin Focus on Energy's non-residential program consists mostly of energy efficiency projects with industrial customers, and had a benefit-cost ratio almost double that of the residential program in 2011, 2.7 compared to 1.5. This is despite the fact that the non-residential program expenditures ($81 million) were almost double the residential program expenditures ($42 million) (Wisconsin Focus on Energy 2011).

Another example is the Narragansett Electric program in Rhode Island, where the benefit-cost ratios for its 2013 electric offerings are estimated to be almost twice as high for commercial and industrial (C&I) customers as for residential customers. The lifetime cost (from a total resource perspective) of energy savings from the C&I sectors is less than half the cost for the residential sector (as shown in Table A-2).

The Energy Trust of Oregon (ETO) has also found its industrial offerings to generate low-cost electricity and natural gas savings. Table A-3 highlights that industrial electricity savings cost 20%–40% less than savings in the residential sector. Similarly, gas savings in the industrial sector cost less than half those generated from ETO's residential programs. In 2010, industrial sector costs from electric savings were almost 40% lower than residential costs.

Similarly, Table A-4 shows that ETO's industrial "Production Efficiency" program was one of its most cost-effective programs in terms of utility and societal benefit-cost ratios.

Table A-2. Narragansett Electric 2013 Energy Efficiency Program Benefits, Costs, and Participation

Electric Program by Sector	Total Resource Cost Benefit-Cost Ratio	Total Resource Cost ¢/lifetime kWh	Participants
Non-income eligible residential	1.5	12.9	466,834
Income-eligible residential	1.6	7.7	5,601
Commercial and industrial	2.9	3.7	3,910
Total	2.3	4.7	476,345

Source: Narragansett Electric 2012, Woolf 2013

Table A-3. Electricity and Gas Savings in Different Customer Classes in ETO Programs (2010–2011)

Sector	Electric Savings: Levelized Cost (¢/kWh)		Gas Savings: Levelized Cost/Therm (¢/kWh)	
	2011	2012	2011	2012
Industrial	2.5	2.6	19	25
Commercial	2.9	2.6	32	34
Residential	3.2	3.0	44	44

Source: Energy Trust of Oregon Annual Reports to the Oregon Public Utility Commission 2011, 2012

Table A-4. Benefit-Cost Ratios for Different ETO Program Offerings (2011)

Program	Combined Utility System Benefit-Cost Ratio	Combined Societal Benefit-Cost Ratio
New Homes and Products	1.8	2.0
Existing Homes	2.3	1.8
Existing Buildings	2.4	1.7
New Buildings	3.5	2.5
Production Efficiency (ETO's Industrial Offering)	3.0	2.0
NW Energy Efficiency Alliance	3.7	1.2

Source: Energy Trust of Oregon Annual Report to the Oregon Public Utility Commission 2012

Average levelized costs estimated for the Bonneville Power Administration's (BPA) 2010–2014 industrial sector plan are $0.029 per kWh, far below the $0.05 per kWh for the residential sector plan, but higher than the $0.018 per kWh estimated for the commercial sector (see Table A-5). It is worth noting, however, that the energy savings capacity costs (cents per kWh per year) for the industrial sector are assessed as the highest of all three sectors. Yet although the industrial sector projects in BPA's program persist over more years, their levelized costs[33] become more attractive over time.

[33] Levelized cost is often cited as a convenient summary measure of the overall competiveness of different generating technologies. It represents the per-kilowatt-hour cost (in real dollars) of building and operating a generating plant over an assumed financial life and duty cycle, expressed in terms of real dollars to remove the impact of inflation, and often converted to equal annual payments. Key inputs to calculating levelized costs include overnight capital costs, fuel costs, fixed and variable operations and maintenance costs, financing costs, and an assumed utilization rate for each plant type (EIA 2013b).

Table A-5. BPA Budgets, Capacity Costs, and Levelized Costs (2010)

Sector	2010 Actual (Million $)	2011 Estimated (Million $)	2010–2014 Total Target (Million $)	2010–2014 Capacity Cost (¢/kWh/yr)	2010–2014 Levelized Cost (¢/kWh)
Industrial	30.4	35.1	115	24	2.9
Commercial	43.5	34.6	157	20	1.8
Residential	47.8	76.4	314.6	21	5
Other	15.7	17.4	74.8		
TOTAL	**137.4**	**163.5**	**661.4**	**21**	**3.7**

Source: Action Plan Update BPA 2012a

Appendix B: Selected Effective Industrial Energy Efficiency Program Profiles

B.1. AlabamaSAVES

Launched in 2010 by the Alabama State Energy Office, AlabamaSAVES is a revolving loan program funded through the American Recovery and Reinvestment Act providing credit enhancement to Alabama businesses, enabling them to secure fixed rate financing specifically for energy efficiency upgrades. Originally conceived for industrial businesses and manufacturers, AlabamaSAVES now includes commercial and institutional facilities, enabling loans for efficiency upgrades and retrofits in lighting, heating, ventilating, and air conditioning (HVAC), controls, envelope, process improvement upgrades, solar photovoltaic systems, and compressed natural gas or propane fleet conversions. Program funding excludes new construction of buildings and factories, and installed fixtures are required to have a 10-year simple payback or better.

Program Description

Qualifying Alabama businesses can secure fixed-rate financing for projects with interest rates between 1%–2% through credit enhancements in the form of loan loss reserves, interest rate buydowns, or a combination of the two. These are direct monetary subsidies applied by the U.S. Department of Energy (DOE), the State Energy Program, and the Energy Division of the Alabama Department of Economic and Community Affairs (ADECA) and funded by the American Recovery and Reinvestment Act of 2010.

Eligible Businesses

Program subsidies are available to all private companies with a place of business in Alabama that are duly organized and/or qualified to do business in the state and that operate one or more existing commercial, industrial, or institutional facilities in the state.

Eligible Projects/Improvements

Subsidized loan funds may be used to purchase and install equipment for renewable energy systems and energy-efficient fixtures and for retrofits installed on property owned and/or operated by an eligible business. Eligible renewable energy systems may employ solar, biomass, biofuels, geothermal, micro-hydroelectric, methane capture and use, or fuel cell technologies. Eligible energy-efficient fixtures and retrofits may include mechanical systems and components including HVAC and hot water, electrical systems and components including lighting and energy management systems, doors and windows, insulation, refrigeration, and combined heat and power. Subsidized funding from the program is for retrofits of existing properties and not for new construction of buildings and factories.

Application Process

Companies wishing to apply must first complete an "expression of interest" allowing for the collection of basic project information. After this, a financial discussion takes place in which the company is consulted on financing and following steps. The loan application formalizes the request for a subsidy or direct loan. A fee of $500 is collected for projects less than $250,000 and a fee of $1,000 for projects $250,000 or larger. All applications are reviewed for conformance with program policies on a timely basis by the Loan Review and Governance Committee, which consists of representatives from ADECA Energy Division, Abundant Power (administrator), and other parties appointed by ADECA Energy Division. Before funding is awarded, an energy assessment defining the project and estimated energy savings impact is submitted and reviewed to ensure a simple payback of 10 years or better.

Loan/Subsidy Terms

Program subsidies are offered in the form of a loan loss reserve and interest rate buydown for accepted applicants. The available subsidies can support approximately $60 million in loans throughout the state of Alabama. Project financing is available to cover up to 100% of project costs. Financing criteria include the following:

- Minimum loan size: $50,000
- Maximum loan size: $4,000,000
- Interest rate: as low as 1%, fixed, per annum (maximum buydown of 5%)
- Closing costs: 2% program origination fee and reasonable and customary costs from a participating lender partner
- Other program requirements, as applicable.

A limited amount of funding exists for direct loans from AlabamaSAVES LLC. Direct loans are available under different terms.

Eligible Service Providers

Installing contractors, energy service providers, product vendors, consultants, engineers, and auditors all could serve a potential role in energy savings projects, dependent on the project's specific needs. A list of eligible service providers is available from AlabamaSAVES. Providers not already on the list are encouraged to review requirements for participation and contact AlabamaSAVES.

Program Results

As of April 2013, more than 20 loans have closed and nearly $17 million in funding has been put toward the installation of energy efficiency projects. The initial $60 million in funding will continue to cycle through loans and has the potential to finance up to $121 million in projects over the next 20 years. Partnerships with Bank of America, Philips Lighting, Metrus Energy, and Efficiency Finance have provided private sector leveraging, valuable marketing and outreach capabilities and been instrumental in driving demand and market uptake.

Program Information and References

AlabamaSAVES: www.alabamasaves.com/Overview.aspx

CASE STUDY 1. WISE ALLOYS

Company: Wise Alloys, Muscle Shoals, Alabama

Wise Alloys, LLC is the third leading U.S. producer of aluminum can stock for the beverage and food industries with a 15% domestic market share of the beverage can stock market. Wise Alloys partnered with Poplar Hill, Blake & Pendleton, and iZ Systems for the project implementation. As well as a loan from AlabamaSAVES, Wise Alloys also leveraged program incentives from the Tennessee Valley Authority (TVA).

Efficiency Measures: Lighting and compressed air energy conservation measures

Project Cost: not available

Loan Amount: $3.75 million

Incentive from TVA: $2.46 million

Energy Savings: 30.6M kWh per year

Cost Savings: $1.5 million per year

Payback Period: not available

Non-Energy Benefits: not available

B.2. Bonneville Power Administration

Overview

The Bonneville Power Administration (BPA) is a federally owned interstate wholesale electric power utility, which sells power (mostly hydro) to 135 retail electricity utilities in the Northwest. BPA has energy efficiency resource acquisition requirements mandated through the federal government and purchases electric efficiency resources from the region's retail utilities.

Public utilities in the Pacific Northwest serve more than 2,200 megawatts (MW) of industrial load, making industrial sector users a vitally important factor in BPA's energy efficiency programs. The Energy Smart Industrial (ESI) program encompasses all BPA-offered industrial sector programs and is designed to bring regional consistency to BPA utility customers and their end users.

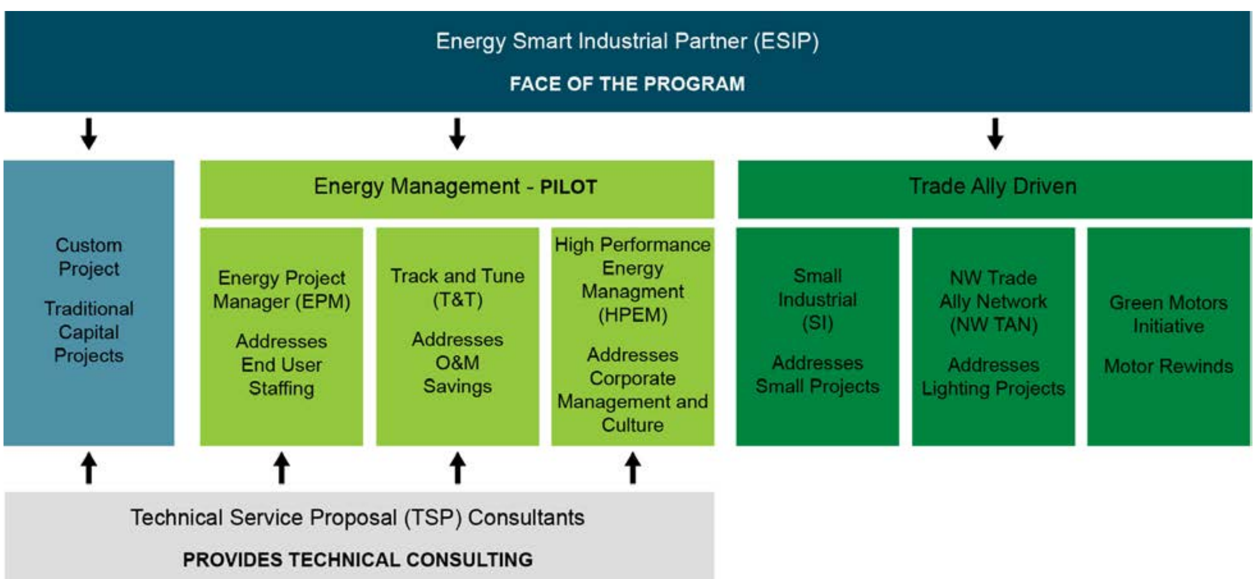
BPA industrial sector staff and dedicated engineers provide overall ESI program management as well as project technical review and approval. The BPA program partner Cascade Energy, Inc. and its subcontractors, Evergreen Consulting and Triple Point Energy, Inc., work with BPA and utilities to provide a variety of services to regional utilities and their industrial end users. These services include project development, marketing, technical service proposal consultant contracting, and implementation of industrial sector energy efficiency acquisition.

ESI technical experts work with facilities to build customized solutions that protect privacy and minimize impact to production process. ESI offers technical expertise in industries including pulp and paper, wood products, food processing, high tech, data centers, water/wastewater, mining, and more.

Energy Smart Industrial Program Components

There are a wide variety of program options for all industry sizes and budget levels (see Figure B-1).

Energy Smart Industrial Partner (ESIP): The ESIP is a dedicated IEE expert assigned by the ESI program to serve as a single point of contact for utilities, coordinating the program and its resources. ESIPs help utilities achieve the goals and needs of their conservation program, provide technical expertise and other assistance to utility staff, and can also market, upon request, the ESI program to industries and facilitate the development and implementation of industrial projects.



Source: BPA 2012

Figure B-1. BPA's Energy Smart Industrial Partner Program

Energy Management: Energy Management is a pilot component of the ESI program that addresses the opportunities to acquire energy savings through improved operations and maintenance (O&M) and overall energy management practices. There are three core features of the pilot.

1. **Energy Project Manager (EPM) Co-Funding:** The purpose of EPM co-funding is to increase end user management and engineering manpower devoted to electrical energy projects/activities and increase the number of industrial projects submitted. This EPM will identify energy saving opportunities and help manage projects from beginning to end. Participating industries set an annual (verifiable) energy savings goal (at least 1,000,000 kilowatt-hours [kWh]) and receive co-funding proportionate to that goal (subject to minimum and maximum co-funding levels). If the end user meets these verified energy savings goals on schedule, co-funding continues. If, however, milestones are missed, co-funding could be suspended and/or ultimately ended. The process and incentives include:
    - Sign a one-year EPM agreement with your utility.
    - An EPM is assigned (either an existing employee, a new hire, or subcontracted employee to the facility) and the utility funding is secured, an initial $25,000 funding payment is made to the facility (See Table B-1 for details).
    - Develop an EPM comprehensive plan to implement energy efficiency projects with milestones to reach the energy savings goal.
    - Annual EPM co-funding of $0.025 per kWh of energy savings, not to exceed the total base EPM salary, benefits, and other associated costs. ($250,000 annual maximum).
    - Additional incentives available for capital projects and/or O&M projects.

Table B-1. BPA Energy Project Manager Incentives

Annual EPM Installment	Timeline	EPM Payment Amount	Annual EPM Co-Funding To Date	EPM Payment Methodology
1a	EPM assigned	$25,000	$25,000	$0.025 per kWh at the 1,000,000 kWh per year minimum savings goal requirement
1b	Comprehensive plan approved	$8,333	$33,333	1/3 of the energy savings goal less payment 1a
2	6 months after EPM assigned	$33,333	$66,666	2/3 of the energy savings goal less payments 1a and 1b
3	12 month after EPM assigned	$38,334	$105,000	100% of the energy savings achieved less payments 1a, 1b, and 2

Source: BPA (2013)

2. **Track and Tune Projects:** Track and Tune is designed to provide financial and technical help to the end user to implement no-cost/low-cost improvements, and install a tracking system that allows for monitoring of energy performance and savings over multiple years. Track and Tune centers on realizing O&M savings instead of implementing large capital projects. To achieve savings on industrial projects, Track and Tune continuously tracks the performance of the area of focus (e.g., whole facility, system, or process). This tracking establishes the baseline, shows the effect of the initial tune-up effort, and tracks the performance over the long term. This methodology transforms industrial O&M improvements into a reliable, verifiable source of savings.
3. **High-Performance Energy Management (HPEM):** HPEM provides training and support that allows industrial facilities to integrate energy management and the principles and practices of continuous improvement into their core business practices.

Small Industrial Measures: Small Industrial Measures provide a cost-effective mechanism to handle specific efficiency measures when the energy savings for a project are small in relation to typical industrial projects. This allows the ESI program to target small-scale industrial facilities and/or small systems that are historically underserved by traditional industrial efficiency programs. Currently, small compressed air (<75 hp) measures fall under the Small Industrial Measures component. Additional technologies (e.g., refrigeration, variable frequency drives, etc.) may be added in the future.

Enhanced Lighting: Enhanced Lighting is considered an extension to the existing Northwest Trade Ally Network, with the focus of driving more industrial lighting projects. Industrial lighting specialists are assigned to participating utilities to assist with these efforts.

Enhanced Technical Service Providers (TSP): This includes expansion and enhancement of traditional TSP services, including quick-response time and materials work, and BPA funding of scoping assessments, detailed assessments, and measurement and verification (M&V) activities where appropriate.

Results

Since 2009, the ESI program has saved 66 MW_{avg} and has helped more than 500 Northwest industrial customers in such market segments as pulp and paper, wood products, food processing, high tech, water/wastewater, and mining.

Program expenditures, energy savings, demand savings, and participation levels are provided in Table B-2.

Table B-2. BPA Program Expenditures, Energy Savings, Demand Savings, and Participation Levels

	2010	2011	2012	2013
Program expenditures ($ million)	$30.4	$36.7	$15.2	$21.9
Energy savings (kWh)*	115,632,000	253,514,400	91,980,000	970,059,936
Demand savings (MW_{avg})*	13.20	28.94	10.50	11.08
Participation				
Enrolled utilities	99	104	105	108
Engaged utilities	63	80	86	86
Participating end users	219	378	478	516

*net savings
Source: Nowak et al. 2013, BPA 2013

Average levelized costs estimated for BPA's 2010–2014 industrial sector plan are $0.029 per kWh, far below the $0.05 per kWh for the residential sector plan, but higher than the $0.018 per kWh estimated for the commercial sector (see Table B-3). It is worth noting, however, that the energy savings capacity costs (cents per kWh per year) for the industrial sector are assessed as the highest of all three sectors. Yet, as the industrial sector projects in BPA's program continue over more years, their levelized costs[34] become more attractive over time.

[34] Levelized cost is often cited as a convenient summary measure of the overall competitiveness of different generating technologies. It represents the per-kilowatt-hour cost (in real dollars) of building and operating a generating plant over an assumed financial life and duty cycle, expressed in terms of real dollars to remove the impact of inflation, and often converted to equal annual payments. Key inputs to calculating levelized costs include overnight capital costs, fuel costs, fixed and variable operations and maintenance costs, financing costs, and an assumed utilization rate for each plant type (EIA 2013b).

Table B-3. BPA Budgets, Capacity Costs, and Levelized Costs (2010)

	2010 Actual (million $)	2011 Estimated (million $)	2010–2014 Total Target (million $)	2010–2014 Capacity Cost (¢/kWh/yr)	2010–2014 Levelized cost (¢/kWh)
Industrial	30.4	35.1	115	24	2.9
Commercial	43.5	34.6	157	20	1.8
Residential	47.8	76.4	314.6	21	5
Other	15.7	17.4	74.8		
TOTAL*	137.4	163.5	661.4	21	3.7

* Industrial includes capitalized program costs. Expense budgets were not included. All other sectors are primarily expense budgets. The difference is about $0.02/kWh
Source: Action Plan Update BPA 2012a

Cost-Effectiveness

BPA's ESI program had a benefit-cost ratio of 7.3 in 2011 (Aden 2013).

Program Information and References

Aden, N. (2013). "One Goal, Many Paths: Comparative Assessment of Ratepayer-Funded Industrial Energy Efficiency Programs." Presentation to the Midwest Governors Association Industrial Energy Productivity Working Group Meeting. Chicago, November 20, 2013.

BPA (2013). Unpublished inputs.

BPA (2012). ESI Program Overview. https://www.bpa.gov/energy/n/industrial/program_overview.cfm.

Nowak, S.; Kushler, M.; Witte, P.; York, D. (2013). *Leaders of the Pack: ACEEE's Third National Review of Exemplary Energy Efficiency Programs*. Report Number U132. ACEEE.

CASE STUDY 2. NORPAC

Company: NORPAC, Longview, Washington

A large paper mill in Washington State. The 33-year-old mill produces 750,000 tons of paper per year. The largest electricity consumer in the state, it requires 200 MW per year on average.

Efficiency Measures: New wood chip pretreatment and screening process

Offering/Incentive: $21 million for three custom projects (BPA), plus an additional $3.9 million (Cowlitz County Public Utility District)

Project Cost: $60 million project (NORPAC funded the remaining $35 million)

Energy Savings: 100 million kWh per year (12% saving)

Energy Cost Savings: not available

Payback Period: not available

Non-Energy Benefits: Reduced chemical, wood chip, and pulp inputs, improved refining process and product quality.

B.3. Efficiency Vermont

Program Summary

In 1999, Vermont´s Public Service Board consolidated the efficiency acquisition programs of all of Vermont utilities into a single, statewide energy efficiency utility—Efficiency Vermont—and a smaller energy efficiency utility, covering Burlington, Vermont's largest city. The Public Service Board is responsible for the overall oversight of Efficiency Vermont. Efficiency Vermont has been operated since its inception by the Vermont Energy Investment Corporation (VEIC), an independent nonprofit entity. Vermont's Public Service Department is responsible for monitoring and evaluating service offerings. Performance against targets determines VEIC´s compensation.

Efficiency Vermont provides a full suite of program offerings for businesses and industrial customers. Efficiency Vermont maintains six account managers in charge of all day-to-day relations with industrial customers.

Program Offerings

Efficiency Vermont's programs for industrial customers include prescriptive and custom incentives, technical assistance in the form of auditing, project development, training on energy management and lean techniques, and employee energy efficiency awareness.

Prescriptive Incentives: Financial assistance is provided for the purchase and installation of efficient common technologies such as lighting, motors, and variable speed drives on a prescriptive ($/unit) basis.

Custom Incentives: More complex projects are eligible for custom incentives that are negotiated with program staff and linked to annual energy savings. Customized projects are by far the dominant source of efficiency acquisition, accounting for perhaps 90% of the industrial project total. Six account managers currently cover large industrial customers, developing multi-year assistance relationships with their clients, and providing skills in areas such as finance and business as well as technical expertise for addressing complex projects and challenges. Account managers are at liberty to negotiate financial incentive and cost-sharing levels. A key emphasis is to partner with customers to create a portfolio of opportunities that can be incorporated into industry planning processes. Account managers may also engage consultants for specific technical tasks, for which costs may be shared with customers.

Continuous Energy Improvement (CEI): The CEI program provides comprehensive assistance on capital upgrades, process improvements, employee engagement, and energy efficiency maintenance protocols. Efficiency Vermont estimates CEI can help cut energy consumption by 10%–15% within the first three years and 25%–35% within six years.

Energy Leadership Challenge: Efficiency Vermont launched a new Energy Leadership Challenge in July 2011. Under this challenge, 69 large energy consumers are asked to commit to saving 7.5% of their energy use over a two-year period. Efficiency Vermont provides special technical assistance to these customers in addition to other offerings.

Results

Tables B-4 and B-5 provide Efficiency Vermont's electric and gas resource acquisition results in 2012 and progress toward its three-year goals.

Table B-4. Electric Savings Results in 2012 and Progress Toward 2012–2014 Goals

Electric Savings 2012 (MWh)	2012 Results	3-Year Goal	% of 3-Year Goal Achieved
All programs—TOTAL	110,179	274,000	40%
Business Energy Services—TOTAL	67,687	193,200	35%
Business—New Construction—SUBTOTAL	15,310	26,400	58%
Business—Existing Facilities—SUBTOTAL	52,377	166,800	31%
Residential Energy Services—TOTAL	42,492	80,800	53%

Source: Adapted from Efficiency Vermont 2013, Table 3.7

Table B-5. Heating and Process Fuel Savings Results 2012 and Progress Toward 2012–2014 Goals

Heat and Process Fuel Savings in 2012 (MMBtu)	2012 Results	3-Year Goal	% of 3-Year Goal Achieved
All programs—TOTAL	78,361	126,000	62%
Business Energy Services—TOTAL	51,876	29,690	175%
Business – New Construction—SUBTOTAL	18,834	1,850	1,018%
Business – Existing Facilities—SUBTOTAL	33,042	27,840	119%
Residential Energy Services—TOTAL	26,485	96,310	27%

*The three-year goal and percentage of three-year goal for savings in MMBtu reflect target changes proposed by Efficiency Vermont and approved by the Vermont Public Service Board in 2013.

Source: Adapted from Efficiency Vermont 2013, Table 3.18

Cost-Effectiveness

The key cost-effectiveness metric is total resource benefits, which includes the present value of lifetime economic benefits resulting from resource saving measures, including avoided costs of electricity, fossil fuels, and water:

- The ratio of gross electric benefits to spending was 3.3.
- The total resource benefits in 2012 from electric and thermal investments was $173,800,000.
- Net lifetime economic value of electric and thermal energy efficiency investments in 2012 was $102,300,300.
- The total resource benefits in 2012 for Efficiency Vermont's reporting categories were:
    - Business New Construction: $38.8 million
    - Existing Businesses: $58.7 million
    - Retail Efficient Products: $26.6 million
    - Residential New Construction: $10.4 million
    - Existing Homes: $14.7 million.

Efficiency Vermont delivered significant value compared to the costs of other sources of energy:[35]

- Efficiency Vermont supplied electric efficiency in 2012 at $0.035 per kWh. Taking into account participating customers' additional costs and savings, the levelized net resource cost of saved electric

[35] Numbers in the two ensuing bulleted items do not include customer credit. The "levelized net resource cost of saved electric energy" comprises: 1) Efficiency Vermont costs of delivery, plus customer and third-party contributions to measure costs, all adjusted to reflect the comparative risk adjustment of 10% adopted by the Vermont Public Service Board in Docket 5270; and 2) costs or savings associated with fuel, water, and building operation and maintenance.

energy in 2012 was less than $0.001 per kWh. By contrast, the cost of comparable electric supply in 2012 was $0.086 per kWh.

- Efficiency Vermont's heating and process fuels efforts supplied fossil fuel efficiency in 2012 at $0.005 per million British thermal units (MMBtu). Taking into account participating customers' additional costs and savings, the levelized net resource cost of fossil fuel saved through efficiency in 2012 was $0.014 per MMBtu, whereas the avoided cost for that fuel was $0.029 per MMBtu.

Program Information and References

Efficiency Vermont (2013). *2012 Annual Report*. Submitted Vermont Public Service Board and to the Vermont Department of Public Service, October 18, 2013.

Efficiency Vermont (2013). www.efficiencyvermont.com/For-My-Business/.

Taylor et al. (2012).

CASE STUDY 3. HUSKY INJECTION MOLDING SYSTEMS

Company: Husky Injection Molding Systems, Milton, Vermont

Husky Injection Molding Systems is a manufacturer of injection molding equipment. Having recently joined the Energy Leadership Challenge, Husky was committed to reducing its electricity use by 7.5%, and Efficiency Vermont partnered with them to help them achieve their target.

Efficiency Measures: installation of submeters, optimization of pressure and volume of metal working fluid, operational changes in equipment

Offering/Incentive: not available

Project Cost: not available

Energy Savings: 4,500,000 kWh per year

Energy Cost Savings: $340,000 total saved per year, including $160,000 per year in 2012 through systems optimization and $120,000 per year through shutting off equipment during downtime

Payback Period: not available

Non-Energy Benefits: not available.

B.4. Energy Trust of Oregon

Program Summary

The Energy Trust of Oregon (ETO) Production Efficiency (PE) program offers industrial and agricultural businesses of all types and sizes technical services and cash incentives to help them identify and implement electric and natural gas energy efficiency projects and practices. ETO promotes innovative technological and behavioral approaches to IEE and provides technical expertise, training, and project funding to help companies plan, manage, and improve their energy efficiency.

In 2008, PE began an intentional strategy to diversify the program's offerings with new O&M and SEM offerings delivering a substantial increase in savings in 2010, which has been maintained for the past three years. The diversification of offerings has helped the program round out its portfolio as the contribution of savings fluctuates between offerings.

The program works closely and consultatively with industries over the long term, helping these businesses employ best practices and continuously improve their energy performance. The program has been designed and managed in-house since 2008 and is delivered with the support of a large number of contractors:

- Program delivery contractors (PDCs) with deep technical and program expertise bring the program to market and make it easy for customers and trade allies to participate.
- Allied technical assistance contractors (ATACs) provide high quality technical studies to enable customers to make investment decisions on custom energy efficiency projects.
- Industrial technical service providers (ITSPs) support the development of customer capacity to manage their own energy use and reduce energy waste in their operations with SEM.
- Trade allies and other vendors act as an additional sales force program, speeding the implementation of more standard measures such as lighting and irrigation and streamlining the customer experience of project development and working with the program.

Program Offerings

Production Efficiency is organized around and achieves savings through two primary pathways—custom and streamlined. Each is targeted to specific industry needs and/or market segments with differing complexity, delivery channels, and development timelines.

Custom Track: The Custom Track is delivered by PDCs acting as energy efficiency account managers. It includes custom capital and O&M projects as well as SEM offerings. By performing custom analysis and verification of savings for each project, the program has the flexibility to work with large industrial retrofits, unique process improvement projects, and emerging technologies and practices. The Custom Track works with medium to large industries, which are provided with energy efficiency services and incentives to drive deep and persistent process efficiencies. Custom capital and O&M projects are supported by assigned PDCs and ATACs, who provide detailed technical studies. SEM opportunities are identified by PDCs and delivered by a separate pool of ITSPs. All in all, approximately 30 Oregon firms participate as contractors in some role in the custom track.

Custom incentives are project-based. ETO offers cash incentives, calculated on an individual case-by-case basis, for almost any type of energy efficiency project with savings that can be quantified through a study and verified. PE provides free custom technical analysis studies through qualified ATACs.

- Custom Track incentives are $0.25 per annual kWh saved and $2.00 per annual therm saved, capped at 50% of eligible project costs.
- The 90 x 90 industrial O&M incentive is for standalone custom O&M measures and provides 90% of implementation costs to sites that implement recommended O&M measures and required persistence strategies within 90 days, capped at $0.08 per kWh and $0.40 per therm. Sites that complete after the 90 day implementation period revert to the standard O&M incentive for 50% of project costs.
- SEM initiatives receive valuable free training, technical support, and coaching to establish or develop a comprehensive SEM program at their plant. Incentives for achieving behavioral/O&M energy savings during implementation of SEM offering are $0.02 per annual kWh saved, or $0.20 per annual therm saved.

Streamlined Track: The Streamlined Track includes Industrial Lighting and the Small Industrial and Agricultural Initiative. Streamlined projects are delivered through trade ally networks, developed and organized by a different set of PDCs. Trade allies are recruited and provided with calculated savings tools and a simplified incentive process. This is effective for standard measures where savings are easily calculated by common formulas with a small number of inputs. It streamlines program participation and reduces the cost of delivery, enabling a cost-effective approach to smaller projects.

Results

A summary of energy savings from industrial customers is provided in Table B-6.

- Program volume for the PE program has more than quadrupled over the past 5 years as ETO has expanded tracks and created new initiatives. The trade ally tracks in lighting and small industrial have been the major contributors to this growth. Currently, PE completes close to a thousand projects a year and expects this to be about the same or higher in 2013.
- The savings from SEM engagements increased by nearly 50% in 2012.
- In 2012, 73% of electric savings in 2012 came from the Custom Track (capital, O&M, SEM) while 27% of savings came from Streamlined Tracks (lighting & small industrial).

Table B-6. ETO Energy Savings From Industrial Customers (2010–2013)

	2010	2011	2012	2013
Electric savings (MW_{avg})	15.2	14.8	14.7	16.9
Gas savings (million annual therms)	0.6	1.0	0.9	2.2

Cost-Effectiveness

ETO has also found its industrial offerings to generate low-cost electricity and natural gas savings. Table B-7 highlights that industrial electricity savings cost 20%–40% less than savings in the residential sector. Gas savings in the industrial sector cost less than half those generated from ETO's residential programs. In 2010, industrial sector costs from electric savings were almost 40% lower than residential costs.

Table B-7. Electricity and Gas Savings in Different Customer Classes in ETO Programs (2011–2012)

	Electric Savings: Levelized Cost (¢/kWh)		Gas Savings: Levelized Cost/Therm (¢/therm)	
	2011	2012	2011	2012
Industrial	2.5	2.6	19	25
Commercial	2.9	2.6	32	34
Residential	3.2	3.0	44	44

Source: Energy Trust of Oregon Annual Reports to the Oregon Public Utility Commission 2011, 2012

Similarly, Table B-8 shows that ETO's industrial PE program was one of its most cost-effective programs in terms of utility and societal benefits to cost ratios.

Table B-8. Benefit-Cost Ratios for Different ETO Program Offerings (2012)

Program	Combined Utility System Benefit-Cost Ratio	Combined Societal Benefit-Cost Ratio
New Homes and Products	1.8	2.0
Existing Homes	2.3	1.8
Existing Buildings	2.4	1.7
New Buildings	3.5	2.5
Production Efficiency (ETO's industrial offering)	3.0	2.0
NW Energy Efficiency Alliance	3.7	1.2

Source: Energy Trust of Oregon Annual Report to the Oregon Public Utility Commission 2012

Program Information and References

Nowak, S., Kushler, M.; Witte, P.; York, D. (2013). *Leaders of the Pack: ACEEE's Third National Review of Exemplary Energy Efficiency Programs*. Report Number U132. ACEEE.

ETO (2013). *2012 ETO Annual Report.*

ETO (2013). *Brief: Energy Trust of Oregon Energy Efficiency Programs*. June 7, 2013. http://energytrust.org/library/reports/Brief-Energy_Efficiency_Programs.pdf.

ETO (2013). "Oregon Sawmill Cuts Energy Waste In Product Expansion." http://energytrust.org/library/case-studies/IND_CS_SouthportForest.pdf.

CASE STUDY 4. SOUTHPORT FOREST PRODUCTS

Company: Southport Forest Products, North Bend, Oregon

Small log sawmill and whole log chipping facility

Efficiency Measures: new efficient gas-fired boiler, dry kiln improvements: heat exchange vents; dry kiln improvements—fan variable-frequency drive control

Offering/Incentive: $240,600

Project Cost: $568,419 total

Energy Savings: 226,421 therms; 181,073 kWh per year

Energy Cost Savings: $131,321 per year

Payback Period: not available

Non-Energy Benefits: lower operating and energy costs, improved controls, facilitated diverse product line.

B.5. New York State Energy Research and Development Authority

Program Summary

New York State has one of the largest and longest running state-run energy efficiency programs in North America. The New York State Energy Research and Development Authority (NYSERDA) is a public benefit corporation created in 1975 to help New York meet its energy goals. NYSERDA offers objective information and analysis, innovative programs, technical expertise, and funding to help New York increase energy efficiency, save money, use renewable energy, and reduce reliance on fossil fuels. NYSERDA industrial programs are funded from a number of sources, of which ratepayer system benefits charge funding is the primary source. Process and energy efficiency, combined heat and power (CHP), and research and development programs help manufacturers and data centers compete and succeed in the global economy.

Program Offerings

NYSERDA offers several programs for its large commercial and industrial customers, with an overview provided in Table B-9.

Industrial and Process Efficiency Program (IPE): NYSERDA's IPE Program provides financial incentives to manufacturers and data centers in New York State that enhance productivity and energy efficiency. Eligible projects include improvements to industrial processes, information technology efficiency, and support systems. Incentives are available to both new and existing facilities.

Table B-9. Overview of NYSERDA Industrial and Process Efficiency Incentives Available to Manufacturers and Data Centers That Implement Energy Efficiency and Process Improvements

Incentive Type	Utility	Upstate	Downstate
Process and Energy Efficiency Incentives	Electric	$0.12/kWh	$0.16/kWh
	Natural Gas	$15/MMBtu	$20/MMBtu
Operations and Maintenance Incentives	Electric	$0.05/kWh	$0.05/kWh
	Natural Gas	$6/MMBtu	$6/MMBtu
Maximum Incentive	All Projects	50% Project Cost	
	Electric	$5 million/facility/year	
	Natural Gas	$1 million/facility/year	

Note: The incentive rates shown in Table B-9 are based on annual energy savings. Incentives are determined by multiplying the annual energy savings by the rates shown.

Flexible Technical Assistance Program (FlexTech): NYSERDA's FlexTech Program offers a wide range of flexible, cost-shared technical services to help businesses operating in New York State make intelligent energy decisions. A dedicated team of engineers, technology experts, and energy consultants works with customers to create a customized assessment to identify specific opportunities for reduced energy consumption and cost. FlexTech's goal is to increase the productivity and economic competitiveness of participating facilities by identifying and encouraging the implementation of process and energy improvements. Technical evaluations, process improvement analysis, energy master plans, retro-commissioning, and CHP are eligible for cost-sharing incentives.

Manufacturing Technology Development Program: NYSERDA's Manufacturing Technology Development Program activities advance the application of new energy-efficient technologies in New York State's manufacturing base with strategic focus on strengthening competitive advantage, increasing productivity, and reducing the state's energy and environmental footprint. Activities support the identification and validation of new manufacturing processes and industrial products through demonstration and other methods designed to help defray risk to industrial innovators and the supporting engineering community.

The research and development programs are typically run as periodic competitive solicitations, and consider not only the amount of energy to be saved at a factory where a project is implemented, but also the energy to be saved by the retail consumers of the clean energy product that the factory produces. A prime objective of these research and development projects is to facilitate the growth and expansion of the clean energy economy in New York State by overcoming technical hurdles to enable the efficient mass production of newly-invented clean energy products.

Combined Heat and Power: NYSERDA also offers incentives to promote the installation of clean and efficient CHP systems.

- **CHP Acceleration Program (CHP < 1.3 MW):** NYSERDA provides incentives to promote installation of pre-qualified (or conditionally qualified), pre-engineered CHP systems by approved CHP system vendors at customer sites. The maximum incentive per project, including bonuses, is $1.5 million.
- **CHP Performance Program (CHP > 1.3 MW):** NYSERDA offers incentives to promote the installation of commercially available CHP systems. Incentives are performance-based and correspond to the summer-peak demand reduction, energy generation, and fuel conversion efficiency achieved by the CHP system on an annual basis over a two-year M&V period. The maximum incentive per project, including bonuses, is $2.6 million.

Program Support

In order to fully support the complex needs of large industrial and data center customers, NYSERDA implemented a key account manager strategy in which a dedicated project manager is assigned to be the main point of contact and develop a long-term relationship with the customer. In addition to this staff, a network of industrial outreach consultants, competitively selected for their proven expertise, provides customer assistance with the application process and the determination of the best productivity and efficiency opportunities to pursue.

Program Application

Applications for the IPE and FlexTech Programs are accepted through the Consolidated Funding Application (CFA), which was developed as part of a statewide effort to streamline and expedite the grant application process across a range of New York State grant programs.

Results

Table B-10 shows energy savings goals based on NYSERDA’s commercial and industrial electric and natural gas resource acquisition programs through 2015.

Table B-10. NYSERDA Program Savings Goals, 2012–2015

Program Energy Savings	2012	2013	2014	2015	2012–2015
Industrial and Process Efficiency—Electric (MWh)	200,000	200,000	200,000	200,000	800,000
FlexTech—Electric (MWh)	111,250	111,250	111,250	111,250	445,000
Industrial and Process Efficiency—Gas (MMBtu)	1,470,000	735,000	735,000	–	2,940,000
FlexTech-Gas (MMBtu)	100,000	100,000	100,000	100,000	400,000

Cost-Effectiveness

Information not available.

Program Information and References

NYSERDA (2013). www.nyserda.ny.gov/Energy-Efficiency-and-Renewable-Programs/Commercial-and-Industrial/CI-Programs.aspx.

Energy Efficiency Case Study: Irving Tissue. www.nyserda.ny.gov/Publications/Case-Studies/IPE-Case-Studies/Irving-Tissue.aspx.

Taylor, R.P.; Trombley, D.; Reinaud, J. (2012). “Energy Efficiency Resource Acquisition Program Models in North America.” Institute for Industrial Productivity. www.iipnetwork.org/IIP_resource_acquisition.

IIP (2013). Industrial Energy Efficiency Programs Database. www.iipnetwork.org/databases/programs/

NYSERDA (2013). *Energy Efficiency Portfolio Standard: Supplemental Revision to the Systems Benefit Charge (SBC) Operating Plan (2012–2015)*. February 15, 2013

CASE STUDY 5. IRVING TISSUE

Company: Irving Tissue, Fort Edward, New York

Construction of new pulp processing, paper machine, production support systems, boiler plant, and associated buildings

Offering/Incentive: NYSERDA incentive is $1,775,000

Project Cost: incremental cost for these energy-saving improvements was $4.3 million

Efficiency Measures: built energy efficiency into the new manufacturing processes and systems, vacuum systems, motor systems, and process-specific improvements

Energy Savings: 14,800,000 kWh per year (compared with a standard paper machine installation)

Energy Cost Savings: not available

Payback Period: not available

Non-Energy Benefits: not available.

B.6. Rocky Mountain Power wattsmart Business (Utah)

Program Summary

Rocky Mountain Power (RMP) offers energy efficiency programs, technical expertise, and incentives for new construction and retrofit projects to qualifying commercial, industrial, and agricultural customers. RMP is an electric utility in Utah, serving approximately 800,000 customers in Utah and responsible for 44% of total energy sales in the state.

Effective July 1, 2013, RMP's Utah program consolidated its energy efficiency programs for businesses and increased its incentives. To make the program easier for customers to understand and participate in, and to streamline program administration, RMP combined Energy FinAnswer (the main industrial program), FinAnswer Express, Recommissioning, and Self-Direction Credit into a single program, known as "wattsmart Business." This request was approved under Schedule 140 by the Utah Public Service Commission.

Program Offerings

RMP Utah's revised offerings for C&I customers include the following.

Typical upgrades/incentive lists: Incentive lists provide pre-calculated cash incentives for improvements to lighting, HVAC, compressed air, motor systems, and other equipment. It was previously known as the FinAnswer Express program.

Custom analysis: Offers energy analysis studies and services for more comprehensive projects. RMP is increasing incentives from $0.12 to $0.15 per kWh for non-lighting custom measures, and project incentives will now be capped at 70% of project cost, an increase from the previous cap of 50%. It was formerly known as the Energy FinAnswer program. The custom lighting incentive remains unchanged at $0.10 per kWh.

For the bill credit option previously known as "Self-Direct Program": Eligible customers continue to receive a credit of 80% of qualifying project cost. This credit offsets the monthly customer efficiency service charge until all available credits have been used. An eligible customer has an annual energy use of 5 million kWh per year or 1,000 kW demand per month, and customers may aggregate their sites to qualify. Qualifying projects have a simple payback of between one and eight years; projects with more than an eight-year payback may qualify pending a secondary review of cost-effectiveness. Participating customers have the option of taking the available lump sum cash incentive or the bill credit option. Verification requirements are the same as under typical equipment and custom projects, where a pre-inspection and/or post-inspection may be undertaken to verify savings.

Energy management: Offer provides expert analysis to help lower energy costs by optimizing facility's energy use. Facilities receive $0.02 per kWh for verified savings implemented through energy management strategies under the wattsmart Business program.

Under the energy management program, there are different opportunities, each requiring an increasing level of engagement from the participant:

1. **Recommissioning**: A 3–6 month engagement targeting single systems, e.g., "chilled water loop" or "primary air handlers"—a "find the problem and fix the problem" approach.
2. **Industrial recommissioning**: A 3–9 month engagement targeting process systems, e.g., compressed air or refrigeration—track baseline and tune-up system operations.
3. **Persistent commissioning**: A 6–12 month engagement that is data driven, focusing on the whole building/facility and targeting more comprehensive improvements over time.
4. **Strategic energy management**: An 18–24 month commitment requiring an internal energy manager and focusing comprehensively on the whole building and/or industrial processes. There are two participation options—the cooperative option pairs business and organizations with similar operations, such as school districts, water treatment, etc. The one-to-one option offers engagement with a single customer, requires executive sponsorship, and includes monthly in-person meetings.
5. **Energy project manager co-funding:** Available to customers who commit to an annual goal of completing energy projects resulting in 1,000,000 kWh per year in energy savings. The available co-funding is based on $0.025 per delivered kWh per year up to the full salary of the customer-selected energy project manager.
6. **Peak management:** Offers incentives to businesses to reduce their energy use during peak demand.

RMP also offers businesses the Energy Profiler Online program, which monitors facility electricity consumption and converts it into easy to understand charts and graphs. Once enrolled, daily meter reads will be posted to a secure website to help facilities track energy usage versus budget, find energy issues that may be wasting money, manage monthly demand charges, and measure effectiveness of energy efficiency projects.

Results

Sector level and industrial program results for 2012 are provided in Table B-11.

Table B-11. Rocky Mountain Power Utah Electricity Savings and Program Expenditures

Energy Efficiency Programs	kWh/Yr Savings (at site)	kWh/Yr Savings (at gen)	Program Expenditures
Total Industrial:	28,795,470	30,478,565	$4,781,027
Energy FinAnswer (125)	15,272,168	16,164,826	$3,003,454
FinAnswer Express (115)	5,492,904	5,813,964	$1,312,532
Recommissioning (126)			$6,664
Self-Direct (192)	8,030,398	8,499,775	$458,378
Total Residential	94,627,738	103,445,150	$15,423,913
Total Commercial	93,878,382	102,057,067	$13,816,366
Total Agricultural	244,794	267,406	21,027
Total Energy Efficiency	217,546,384	236,248,188	$35,880,194

Source: Rocky Mountain Power 2013c

Cost-Effectiveness

The latest results available for RMP Utah's previous programs under the industrial and commercial portfolio are summarized in Table B-12.

Table B-12. Rocky Mountain Power Utah Benefit-Cost Ratio

	Total Resource Cost Test	Utility Cost Test	Participant Cost Test	Ratepayer Impact
Commercial and Industrial Portfolio	1.99	3.84	2.32	0.91
FinAnswer Express	1.51	3.42	1.79	0.9
Energy FinAnswer	2.31	4.77	2.62	0.94
Re-Commissioning	1.54	1.66	11.35	0.77
Self-Direct	2.43	2.63	2.98	0.86
Residential Portfolio	2.26	2.51	4.33	0.74
Total Energy Efficiency	2	3.14	2.82	0.84

Source: Rocky Mountain Power 2013c

Program Information and References

Pacificorp (2013). Pacificorp Facts. www.rockymountainpower.net/content/dam/rocky_mountain_power/doc/About_Us/Company_Facts/6709-30_RMP_FACTSHEET_2013_Fweb.pdf.

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Rocky Mountain Power (2013e). Energy Efficiency Case Study: BD Medical. www.rockymountainpower.net/content/dam/rocky_mountain_power/doc/Business/Save_Energy_Money/Energy_FinAnswer_13.pdf.

CASE STUDY 6. BD MEDICAL

Company: BD Medical, Sandy, Utah

Efficiency Measures: 62 energy efficiency projects since 2001 including 29 lighting projects, compressed air upgrade/replacement. (BD ran five compressors and four dryers prior to upgrade. After the upgrade the company runs three compressors and three dryers.)

Offering/Incentives: $712,900 incentive payments, with a total project cost of $1,880,500

Project Cost: not available

Energy Savings: 10.4 million kWh per year

Energy Cost Savings: $580,000 per year

Payback Period: not available

Non-Energy Benefits: operational process improvements, facilitates maintenance of ISO certifications, lower environmental impact, improved employee comfort

B.7. Wisconsin Focus on Energy Industrial Programs

Program Summary

Wisconsin has more than 100 separate electric and natural gas utilities, including investor-owned, municipal, and rural cooperative utilities. Systems benefits charges from these utilities' ratepayers fund Wisconsin Focus on Energy (WFE). WFE consolidates all of the state's utility-managed energy efficiency programs into one statewide program, representing 98% of the state's electric and natural gas load. WFE's industrial programs offer assistance to all eligible industrial customers, consisting of approximately 12,000 customers ranging in size from small light manufacturing to heavy industrial processes.

Although WFE began by offering prescriptive and custom incentives, other types of offerings, including feasibility studies, performance-based assessments, staffing grants, and competitive RFPs, developed over the years and have helped generate more participation in the programs. Practical Energy Management™ (PEM) is now a main feature of the programs for large energy users, geared toward teaching and providing individual customers with a customizable template that enables them to gain control of their energy costs.

In 2012, WFE restructured the program to target customers stratified by energy usage: the large energy users program, a general business incentive program, a chains and franchise program, and a small business program.

Program Offerings

There are five types of incentives offered to large energy users:

- **Prescriptive Incentives**: Hundreds of prescriptive incentive offerings for technologies such as lighting, compressed air, variable-frequency drives, and boiler tune-ups.
- **Custom Incentives**: Offered for verified electric and natural gas projects at $0.04 per kWh, $125 per kW, and $0.40 per therm.
- **Feasibility Studies**: Up to 50% of the cost of a study, not to exceed $7,500, paid to studies that show good potential for energy saving projects.
- **Staffing Grants**: For customers who demonstrate a need for human resources to complete projects.
- **Special Offers**: Include compressed air leak study and repair, compressed air retro-commissioning, process energy bounties, and performance-based assessments used to engage trade allies and leverage new projects.

For larger customers with more than $60,000 in monthly bills, WFE offers PEM, a systematic energy management approach to profile energy use, identify and prioritize energy-saving projects, capitalize and implement projects, communicate results to management, and continually improve overall process. The PEM process is customized to meet the user's specific needs. The tools provided by PEM include project-tracking software and energy best-practice calculations. It provides a tool for large energy users to identify energy savings after WFE has left the facility. Staffing grants are available to pay for staff time to implement energy projects.

By working closely with each industry, WFE is able to offer process-specific expertise and build a relationship with the consumer. The program applied its *Energy Best Practice Guidebooks*, training events, and webinars to bring best practices to key cluster industries including pulp and paper, food processing, metal casting, plastics, ethanol, and water/wastewater. The program also developed and supported training in the key industrial systems such as steam, heat processing, compressed air, and refrigeration, relying heavily on the DOE's suite of energy efficiency decision tools. Program staff work with facilities to identify projects and negotiate the amount of incentive needed to initiate a project. Expert field energy advisors provide direct service delivery through communication channels with customers, trade allies, and utility key account managers. The program has partnered with one contractor successfully for almost 14 years, providing steady service to large industrial customers under the WFE brand.

Results

The WFE industrial program has consistently exceeded its goals for both natural gas and electric savings. Over the years, spanning from 2001 into 2012, the program reached almost 4,000 customers—more than one-third of the market—including all of the top 200 eligible industrial energy users in the state. There were 952 individual companies participating in 2011 alone. Verified net savings values since the industrial programs were restructured in 2012 are summarized in Table B-13.

Table B-13. Summary of First-Year Annual Savings by Program (2012)

Program	kWh	Therms
Business Incentive	91,681,793	2,152,273
Chain Stores and Franchises	37,036,344	433,661
Large Energy Users	61,344,005	3,119,919
Small Business Program	13,642,762	21,904
Nonresidential Legacy	130,712,439	7,475,589
Nonresidential Programs Total	334,417,343	13,203,348

Savings include carryover from previous year(s)
Source: Public Service Commission of Wisconsin 2013

Cost-Effectiveness

The benefit-cost test approved for WFE use is based upon the total resource cost (TRC) test. A recent evaluation of the residential and nonresidential (commercial and industrial) is provided in Table B-14.

Table B-14. Total Resource Cost Test Ratios by Sector in 2012

	Residential	Non-residential	Total
TRC with renewables	2.41	3.07	2.89
TRC without renewables	2.69	3.83	2.69

Source: Public Service Commission of Wisconsin 2013

Emissions Benefits

The program evaluation also quantified the benefits of reduced nitrogen oxides, sulfur dioxides, and carbon dioxide emissions in 2012 (see Table B-15).

Table B-15. Program Emissions Benefits

	Nonresidential	Residential	Total
2012 Emissions Benefits	$110,122,130	$30,961,768	$141,083,899
2011 Emissions Benefits	$84,075,436	$19,667,147	$103,742,582

Source: Public Service Commission of Wisconsin 2013

Program Information and References

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Nowak, S.; Kushler, M.; Witte, P.; York, D. (2013). *Leaders of the Pack: ACEEE's Third National Review of Exemplary Energy Efficiency Programs.* Report Number U132. ACEEE.

Public Service Commission of Wisconsin (2013) *Focus on Energy: Calendar Year 2012 Evaluation Report.* Volume I. April 30, 2013. Cadmus Group.

CASE STUDY 7. AMERICAN FOODS GROUP

Company: American Foods Group, Green Bay, Wisconsin (beef processing facility)

Offering/Incentive: training on Practical Energy Management™

Project Cost: not available

Efficiency Measures: a wide range of energy management projects

Energy Savings: six energy management projects implemented in 2006

Energy Cost Savings: $143,000 in energy cost savings from six projects. An additional 11 projects were underway to save an additional $0.9 million

Payback Period: average 6 months

Non-Energy Benefits: not available.

B.8. Xcel Energy (Colorado and Minnesota)

Program Summary

Xcel Energy in Colorado and Minnesota provides simple incentive applications for a full suite of programs—prescriptive, self-direct, and custom process energy efficiency incentives—to provide flexibility for their industrial customers. Xcel's Process Efficiency program integrates its technical assistance, energy management support, and incentive programs. The program is available to industrial customers with energy conservation potential of at least 2 GWh, which usually translates to total annual electricity consumption of at least 20 GWh.

Program Offerings

Process Efficiency is the major industrial program. The program helps industrial customers evaluate both business practices and technical projects, and supports companies to practice energy management as a tool to strengthen existing and ongoing energy efficiency activities. The program operates in three phases:

Phase 1—Identify Opportunities: Xcel offers a no-cost, one-day energy management session (based on the EnVinta One-2-Five energy management model) to evaluate energy-intensive processes and benchmark energy management practices; Identify energy-saving technical opportunities during a high-level, walk-through audit; and review follow-up assessment report that outlines industrial customers' energy management practices and high-priority action items

Phase 2—Scope Energy Efficiency Potential: Facilities then develop an energy action plan based on the assessment report. Xcel prepares a customized proposal to help support additional project scoping and provide engineering and technical studies to develop energy-saving opportunities. Xcel funds 75% of the cost of the study. Facility contributions are limited to 25% with a cap of $7,500. If the study costs more than $30,000, Xcel will cover the balance.

Phase 3—Implement Energy Efficiency Improvements and Qualify for Rebates: After the detailed assessment is completed, Xcel Energy and the customer sign an agreement that outlines improvements to implement, set a timeline for their installation, and detail customized rebates, bonuses, and support. Xcel Energy encourages the customer to agree to complete projects within a year, but allows longer timeframes if needed.

Prescriptive and custom measures are available within the program. The guidelines and rebate levels of the other products are mirrored with enhancements to drive customers to approach conservation on a system level versus a component level.

Delivery of this product is resource intensive both internally and externally. The magnitude and complexity of the projects require significant resources from Xcel's technical staff to support the project and the M&V requirements. The more developed relationship with the customer requires significant account management resources, and the customization of the offering to match customer needs requires significant marketing resources. External resources are used to deliver both the identification and scoping phases of the product. Third-party providers deliver the Phase 1 session. The product emphasizes building on what the customer has in place, so, when possible, Xcel includes vendors that the customer is already working with who are familiar with the operations. This has included various engineering firms and equipment vendors.

Xcel Energy has a range of other commercial and industrial offerings, including:

- **Prescriptive offerings** for equipment and systems (compressed air, cooling, heating, lighting, motors)
- **Custom efficiency** for a wide variety of equipment and process improvements that do not fall within predetermined rebates under prescriptive products
- **Data center efficiency**, which provides rebates for data centers and large-scale information technology operations
- **New construction**, which provides energy expertise and design assistance supporting an integrated design process for new construction or a major renovation project
- **Recommissioning**, which reviews existing equipment and systems within a building to ensure that they are working as efficiently as possible and operating as intended. The program is designed to assist electric and/or natural gas business customers to improve identification of existing functional systems that can be "tuned-up" to run as efficiently as possible through low- or no-cost improvements.
- **Self-direct program** provides large commercial and industrial electricity customers in Colorado the opportunity to self-fund electric energy saving projects at their facilities (see Chapter 5).

Results and Cost-Effectiveness

Tables B-16 and B-17 show Xcel's electric and gas savings and cost-effectiveness ratios for the commercial/industrial programs in both states.

Table B-16. Xcel Energy (Colorado) Electric and Gas Savings and Total Resource Cost Ratios

	Electric and Gas Savings		Total Resource Cost Tests	
	2010–2012 average (electric kWh)	2010–2012 average (decatherm gas)	2010–2012 average (electric programs)	2010–2012 average (gas programs)
Commercial and Industrial Programs	**188,661,742**	**76,327**	**2.70**	**1.37**
Compressed Air Efficiency	2,723,733	-	2.08	-
Custom Efficiency	5,530,809	8,419	1.85	1.38
Motor and Drive Efficiency	26,329,811	-	3.67	-
New Construction	18,657,939	24,570	2.17	1.60
Process Efficiency	5,307,299	-	2.27	-
Recommissioning	5,602,323	12,667	1.95	2.39
Self-Direct Custom Efficiency	8,784,932	-	2.34	-
Standard Offer	2,748,717	2,421	1.14	0.88
Residential Programs	**113,285,966**	**270,841**	**4.04**	**1.28**

Table B-17. Xcel Energy (Minnesota) Electric and Gas Savings and Cost-Effectiveness Ratios

	Electric and Gas Savings		Cost Tests	
	2012 (electric kWh)	**2012** (decatherm gas)	**2012 Total Resource Cost** (electric programs)	**Triennial Societal Test** (gas programs)
Commercial and Industrial programs	**307,749,043**	**468,710**	**2.77**	**4.72**
Compressed Air Efficiency	13,582,375	0	2.79	-
Cooling Efficiency	12,751,893	0	2.82	-
Custom Efficiency	18,902,718	37,232	2.12	5.27
Motor & Drive Efficiency	29,144,249	0	3.35	-
New Construction	34,926,304	64,312	2.98	7.11
Process Efficiency	49,473,722	217,344	3.54	10.99
Recommissioning	10,960,929	18,946	1.51	2.49
Self-Direct Custom Efficiency	0	0	-	-
Turn Key Services	1,423,070	0	1.57	-
Residential programs	**156,667,754**	**245,219**	**3.15**	**2.29**

Program Information and References

Xcel Energy (2010). *Process Efficiency Information Sheet—Colorado and Minnesota*.

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Xcel Energy (2013b). Status Report & Associated Compliance Filings Minnesota Electric and Natural Gas Conservation Improvement Program Docket No. E,G002/CIP-09-198 2012. Issued April 1, 2013.

CASE STUDY 8. ARCTIC COLD STORAGE

Company: Arctic Cold Storage, St Cloud, Minnesota

Arctic Cold Storage stores meat, poultry, packaged foods, and raw materials for food processing. With more than 5.5 million cubic feet of temperature-controlled warehouse space, energy consumption plays a significant role in day-to-day business.

Efficiency Measures: high-speed roll door with operating speeds of more than eight feet per second

Offering/Incentive: $8,300

Project Cost: $16,965

Energy Savings: 110,000 kWh (estimated)

Energy Cost Savings: $8,130 (estimated)

Payback Period: 1.1 years

Non-Energy Benefits: not available.

SEE Action
STATE & LOCAL ENERGY EFFICIENCY ACTION NETWORK

Synapse
Energy Economics, Inc.

Commercial & Industrial Customer Perspectives on Massachusetts Energy Efficiency Programs

Prepared for the Massachusetts Energy Efficiency Advisory Council

April 3, 2012

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Table of Contents

EXECUTIVE SUMMARY **1**

1. INTRODUCTION **10**

2. ECONOMIC FORECASTS **12**

2.1 METHODOLOGY 12

2.2 ECONOMIC FORECAST RESULTS 15

3. PARTICIPATION BARRIERS IDENTIFIED FROM OTHER SOURCES **25**

3.1 MEASUREMENT AND VERIFICATION STUDIES 25

3.2 COMMENTS AT JANUARY 2012 EEAC MEETING 26

4. CUSTOMER SURVEY **29**

4.1 CUSTOMER SURVEY METHODOLOGY 29

4.2 CUSTOMER SURVEY RESULTS 33

5. IMPLICATIONS FOR ENERGY EFFICIENCY PROGRAMS **51**

APPENDIX A – MASSACHUSETTS M&V STUDIES **53**

APPENDIX B – SURVEY TOOLS **66**

APPENDIX C – SURVEY RESPONSES **75**

Executive Summary

This report includes a forecast of economic conditions in Massachusetts for 2013 through 2015, as well as a survey of commercial and industrial (C&I) customer perspectives on the Massachusetts energy efficiency programs. The Massachusetts Energy Efficiency Advisory Council (EEAC) asked Synapse Energy Economics, Inc. (Synapse) to conduct this assessment in order to inform the development of the Three-Year Statewide Energy Efficiency Plans for 2013 through 2015.

The primary purpose of this report is to assess the extent to which C&I customers are likely to participate in the Massachusetts energy efficiency programs over the next few years. The economic forecast is intended to provide an indication of the extent to which economic conditions might create barriers to C&I customer participation in the energy efficiency programs. The survey is intended to assess the variety of barriers that C&I customers face with regard to energy efficiency program participation.

Economic Forecast

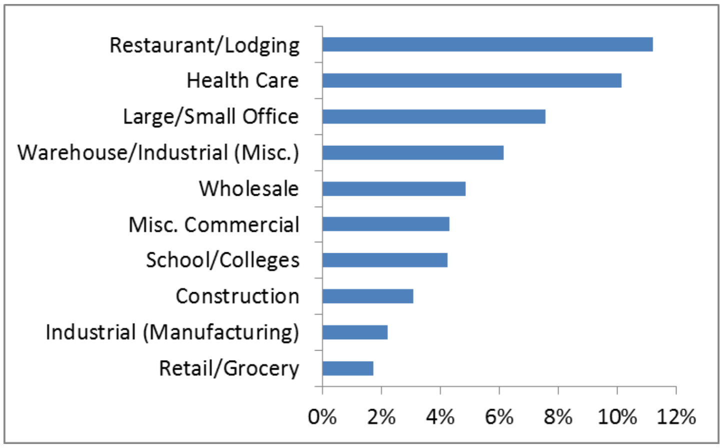
Our economic forecast relies upon historic and forecast data from Moody's Analytics, a source that is fequently used by planning agencies for economic forecasts. We present forecasts for the five regions of the state, based on county borders: (1) Bristol County, (2) Greater Boston, (3) Central Massachusetts, (4) Cape Cod and the Islands, and (5) Western Massachusetts. We also present economic forecasts for several industry types including: construction, healthcare, industrial, large/small office, miscellaneous commercial, restaurant/lodging, retail/grocery, schools/colleges, warehouse industrial, and wholesale.

The economic forecast suggests that, in general, the state's economy will see improved performance over the next several years. At the statewide level, gross state product, construction activity, residential construction permits, and retail sales are expected to grow, while unemployment rates, business bankruptcies, and commercial rental vacancy rates are expected to decline. The same overall trend of improvement can be seen within each region, as well. One exception to this trend is gross state product and retail sales in the Cape Cod/Islands region, which are expected to stay essentially flat between now and 2015.

On a statewide basis, most industries are projected to grow in Massachusetts over the next few years. Figure ES-1 below presents the forecast of employment growth, in percentage terms over 2011 through 2015, by the different industry types. Note that the growth rates by industry are different in the different regions of the state, and in some regions there are several industries that are expected to see reduced employment levels over this period. This regional information is presented in Section 2.2.

Healthcare and office industries are projected to grow strongly in every region of the state, and both are large components of every region's employment. Restaurant/lodging is projected to grow significantly in every region except the Cape/Islands. Construction is projected to have robust growth in Bristol, but less growth in other regions. Bristol County, the region hit hardset by the economic downturn in Massachusetts, is expected to see a large fall in unemployment over the 2011 through 2015 period, in part due to the construction growth expected there.

Figure ES-1. Employment Growth in Massachusetts, Percentage Increase 2011 – 2015



Survey Methodology

We began our survey by identifying a set of targets for customer types to interview. We planned to interview a total of 40 customers across the state. We identified a target set of customers to interview by first spreading the 40 interviews across the five state regions based on economic activity in those regions; and second by spreading the interviews in each region across the different industry types according to the level of economic activity within each industry type. We limited our target set of interviews to medium and large C&I customers, and we excluded governmental agencies from the target set. Furthermore, we attempted to focus our interviews on customers that have not participated in the Massachusetts energy efficiency programs for at least the past five years.

We then collected customer contact information from the Massachusetts energy efficiency program administrators and a few other stakeholders. We sent invitations to all of the 137 customers provided to us that were eligible and included contact information. Many of these customers did not respond to, or declined, our invitation. We conducted a total of 36 interviews.

The interviews that we conducted are presented by region and industry type in Table ES-1. Since a large number of customers did not respond to the survey invitations, the distribution of interviews by region and industry were determined more by customer interest and availability than by the information and priorities that we used to determine the target region and industry distribution. Nonetheless, the set of interviews that we were able to conduct is close enough to the target region and industry distribution that we believe it will provide the geographic and industry diversity that we set out to survey.

The one exception is that the vast majority of our interviews were with customers that have participated in the Massachusetts energy efficiency programs. We did not receive as many non-participant contacts from the stakeholders, and those that we did contact were much less likely to participate in our survey than the program participants. It is important to note that our survey results are likely to be influenced by the fact that so many of the respondents are program participants.

Table ES-1. Interviews Completed, by Industry Type and Region

Industry Type	Boston	Central Mass	Cape Cod	Western Mass	Bristol County	**Total**
Heavy industry	2	1	0	5	1	**9**
Warehouses & Distribution	0	0	0	1	0	**1**
Retail	1	1	0	1	2	**5**
Office	5	1	0	3	0	**9**
Schools & Colleges	4	0	0	0	0	**4**
Healthcare	3	1	1	0	0	**5**
Restaurants & Lodging	1	1	0	0	0	**2**
Miscellaneous	0	0	0	0	1	**1**
Total	**16**	**5**	**1**	**10**	**4**	**36**

It is also important to note that a sample size this small will not provide results that can be considered statistically significant. Nonetheless, we believe the results from these interviews provide useful insights for the EEAC and other stakeholders, consistent with the purpose of this study.

Survey Results

Overview of Common Themes

Most customers that we interviewed were program participants at some level and stated that they either will participate or are considering participating in programs in the next few years. In general, the customers we interviewed consider energy efficient equipment regularly when they make purchasing decisions.

Another theme we heard from most of our interviews was that payback period was the main criteria for evaluating energy efficiency investments and that energy efficiency investment payback periods compete with the payback periods for other capital investment projects.

A third theme we heard from many customers we interviewed was that capital constraints are a key barrier to moving forward with energy efficiency projects. Many customers have access to capital, but energy efficiency projects have to compete with other projects for that capital.

A fourth theme is that the general process for vetting and approving energy efficiency investments is similar across many customers. Projects are scoped, analyzed, and proposed on an annual basis and submitted to a higher level team for review and approval. Energy efficiency investments are frequently categorized as discretionary expenditures.

A fifth theme is that financing mechanisms, such as loans, are seldom, if ever, used. Instead, customers use existing capital to pay for the efficiency projects up-front, despite the widely recognized fact that the efficiency cost savings are experienced over many years.

It is clear from even our small sample that there are many different types of customers with different needs and barriers to participating in energy efficiency programs. This diversity of customers creates a significant challenge for program administrators, because reaching additional customers and achieving deeper levels of savings per customer will likely require offering program technical and financial support that is more tailored to the unique needs of the many different types of electric and gas customers.

Positive Feedback

Many of the customers provided positive feedback on the programs. Some of the highlights include the following points.

- Many customers were grateful for the sustained incentives and technical assistance provided by energy efficiency program administrators over the years, and indicated that energy efficiency investments could not compete with other capital investments without the incentives and technical assistance received.
- Several customers mentioned that they appreciate the level of outreach that they receive from energy efficiency program administrators and have had a long-standing, trusting relationship with their account executives.
- Some customers recognized and appreciated the variety of efforts and approaches (such as the upstream lighting program and the Memorandum of Understanding approach) that the energy efficiency program administrators are leveraging.
- Several customers recognized the positive impacts of the program administrators' efforts over time, such as the ability to accelerate energy efficient product development and manufacturing and make energy efficient solutions affordable.

Summary of Barriers Identified by Customers

The barriers to participation that have emerged from the interviews can be organized in two categories: customer barriers and program barriers. Customer barriers are barriers that stem from a customer's internal decision-making processes. Program barriers are barriers that stem from the way the programs are designed or administered. The customer barriers were subdivided into the following categories: customer's capital constraints, economic climate, unsupportive corporate review and approval process, the customer is convinced it has done all the efficiency measures it can within its facilities, or distrust of new technology.

The program barriers were subdivided into the following categories: insufficient marketing and outreach, high transaction costs, inadequate responsiveness and timing, limited measures offered through the programs, insufficient incentives, the desire to opt out of the energy efficiency charge, the programs are not tailored to the unique needs of customers, and other barriers.

Figures ES-2 and ES-3 present a summary of the number of times each of these barriers was mentioned by customers in our interviews.[1] In general, program barriers were mentioned more frequently than customer barriers. Insufficient marketing and outreach as well as customer's capital constraints were mentioned most often, with transaction costs the next most frequently mentioned barrier.

[1] Note that each customer mentioned more than one barrier, and not all customers identified the same number of barriers. We present these figures simply to provide a summary of the frequency with which the different barriers were identified.

Figure ES-2. Customer Barriers Mentioned in the Interviews

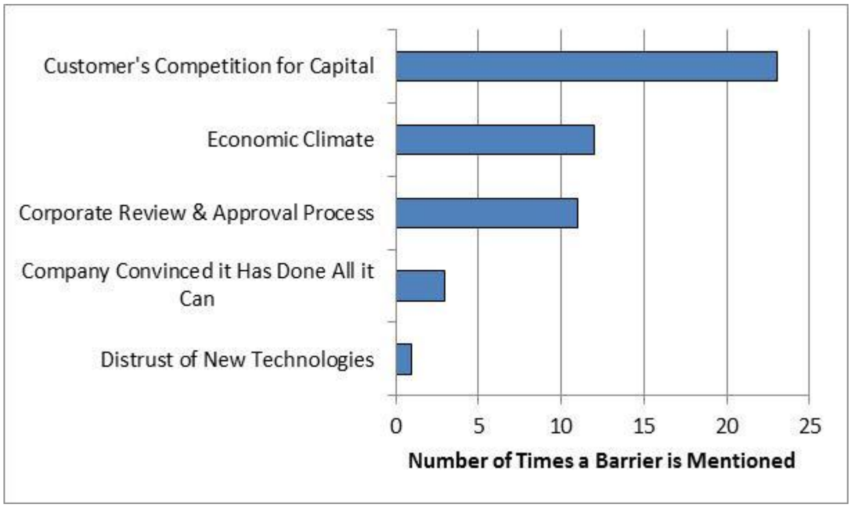
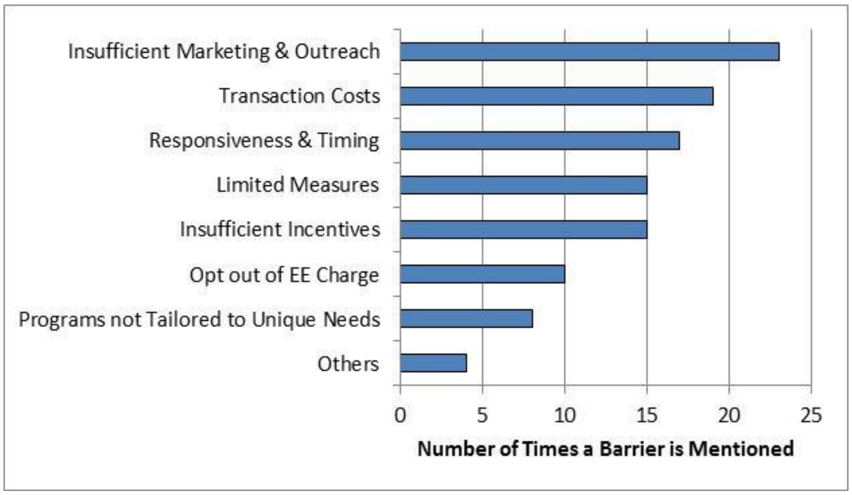


Figure ES-3. Program Barriers Mentioned in the Interviews



Customer Barriers

Customer's capital constraints. This is one of the most frequently cited and important barriers that customers face in energy efficiency program participation. Many customers, although not all, do not have a problem accessing capital. Their chief problem is with the competition for capital between energy efficiency investments and other investments, especially those investments that are more germane to the core business of the customer. Some customers have global operations, and face competition for capital in Massachusetts, in the United States, and elsewhere in the world. This competition for capital is so important to customers that it results in greater adherence to payback period constraints, as that is often the criteria that is used to determine which project deserves the constrained capital. Further, some customers mentioned that the significant upfront cost of efficiency measures, especially larger projects beyond lighting upgrades, created a barrier to participation.

Economic climate. The economy appears to have a relatively indirect impact on a customer's ability to participate in efficiency program, as many customers were not clear on the connection between economic conditions and efficiency program participation. When asked, customers held several views on the extent to which the economy affects their participation:

- Some customers do not see the economy as a barrier to participation.
- Other customers were quick to mention that the economy has affected their employee base, profit, or capital availability, making it more difficult to undertake nonessential projects.
- Some customers see efficiency as even more important in tight economic conditions, as a means to better manage budgets and reduce costs with minimal capital outlay.
- For other customers, the downturn in the economy exacerbates the competition for capital problems discussed above, in that capital might be harder to access or payback periods may need to be shorter.
- Still other customers noted that in a tight economic context they are more likely to let existing equipment run through its useful life, rather than retrofit it early. This creates a barrier to implementing efficiency measures as there is often insufficient time and resources to identify and procure the most efficient option at the time of equipment failure.

Unsupportive corporate review and approval process. Many customers noted that they have no problem getting support from corporate executives to implement energy efficiency projects. However, corporate decision-making practice often requires efficiency projects to compete for capital with investments that are more germane to a customer's business (see above), and sometimes corporate practices place very tight payback periods constraints on all investments, limiting the energy efficiency measures that can obtain corporate approval.

Customer convinced it has done all it can. This was not a commonly identified barrier, as only three customers identified this barrier. When mentioned, it was seen as a transient barrier that would disappear over time. Customers mentioned that they had done several efficiency projects, and that, while additional savings opportunities likely exist within their buildings, the savings are not likely to outweigh the transaction costs. One customer indicated that savings opportunities from the next generation of efficient equipment would likely propel them to participate in the future.

Distrust of new technology. Only one of the customers interviewed indicated that they were reluctant to implement energy efficiency measures because they did not trust or fully understand the efficiency technology. This customer was concerned that reducing energy consumption could reduce its production capability.

Other barriers. A few customers mentioned barriers or topics that did not fit into the categories above. These include: people have been lulled into a sense of security with prices of electricity and natural gas being relatively low, and participants are distracted by other energy projects like solar or geothermal.

Program Barriers

Insufficient marketing and outreach. Many of the customers feel that the program administrators could be more proactive in reaching out to and educating customers about efficiency opportunities. Some customers felt program administrators were inconsistent in their outreach, or had limited contact with their representative. Others thought that, while the program administrators do reach out to them, the customer was driving the process and had previously researched the opportunities. Several customers noted that their gas program administrator has not reached out to them with energy efficiency opportunities, or provided any technical or financial support. This is particularly troubling to several customers who are very active in the electric efficiency programs and who believe they have significant gas efficiency opportunities. Some customers have regular, annual cycles of budgeting and investing in energy efficiency equipment, and they would prefer that the program administrators coordinate their program services with the customer's annual cycle.

<u>High transaction costs</u>. Many customers indicated that the paperwork and legwork involved in participation is too great, and that the overall process needs to be simplified. Some customers claimed that, for long lead-time projects, the time required to receive a financial incentive, as well as the uncertainty about obtaining a financial incentive, especially across program years, create a barrier to their participation.

<u>Inadequate responsiveness and timing</u>. Several customers thought their program administrator was unresponsive to their needs, and a few customers attributed it to the program administrators being overworked. Others thought it was difficult to time their participation, such as when major equipment fails and needs to be replaced immediately, or during new construction when projects need to go forward and cannot be held up by program participation.

<u>Limited measures offered through the programs</u>. Many customers expressed a desire for the programs to be more flexible and to allow the customers to recommend efficiency projects to undertake. Other customers suggested that specific equipment, such as more efficient elevators, should be offered incentives through the programs.

<u>Insufficient financial incentives</u>. Many customers noted that they would implement additional efficiency measures if they were provided with greater financial incentives. Additional financial incentives would help overcome the competition for capital that many customers face, as well as reduce the payback periods needed to meet corporate requirements. Many companies indicated that there is not enough coverage of technical support costs or availability of technical support in general. Some customers wished the programs offered different incentive structures and better addressed upfront costs as well as costs over the life of the measure.

<u>Desire to opt out of the energy efficiency charge</u>. Many customers claimed that they would be able to achieve much greater energy efficiency saving if they were able to keep all of the funds that they contribute to the Massachusetts energy efficiency programs and dedicate those funds to efficiency projects at their own facilities. This was especially true among the large customers, including those in the industrial, healthcare and schools/colleges industry types.

<u>Programs not tailored to unique needs</u>. Some customers thought that the program administrators did not make an effort to understand the unique needs of their industry. This was especially true for customers in the healthcare industry.

<u>Other barriers</u>. A few customers mentioned barriers or topics that did not fit into the categories above. These include: (a) the lack of transparency with regard to the amount that the customer is providing to efficiency program funding is a barrier when employees try to convince management to take advantage of efficiency programs offered by the

program administrators; and (b) customers appear to be confused by the number of energy efficiency providers in the market (i.e., ESCOs vs. renewable installers vs. lighting manufacturers/distributors vs. utilities/municipal aggregators/municipals).

Implications for Energy Efficiency Programs

The results of our economic forecast and customer survey lead us to draw the following conclusions with regard to energy efficiency program planning.

1. The Three-Year Energy Efficiency Plans should include savings goals that recognize that (1) the Massachusetts economy is forecasted to improve steadily over the next few years, (2) many customers do not see the state of the economy as a barrier to participation in the energy efficiency programs, (3) many customers have additional efficiency opportunities in their facilities and (4) many customers have an interest in participating in the programs again. In fact, several customers noted that in a tight economy they might be more likely to participate in energy efficiency programs as one of the few options they have to cut costs (as long as the payback periods are short enough).
2. The Three-Year Energy Efficiency Plans should recognize the potential savings available from the C&I New Construction programs, given that the economic forecast indicates that business construction activity is expected to steadily increase over the next few years.
3. Encouraging customers to adopt a deeper level of efficiency measures will likely require additional efforts to overcome some of the key barriers identified above, particularly customer budget limits and competition for capital, burdensome transaction costs of participating in the efficiency programs, and limited efficiency measures available by the efficiency programs.
4. Encouraging customers to adopt a deeper level of efficiency measures will also likely require increased engagement from the program administrators' account executives and efficiency support staff. This will be important both to reduce the transaction costs associated with the energy efficiency programs and to better serve the unique needs of the different customers.
5. The Three-Year Energy Efficiency Plans should recognize that many customers have apparently not received much outreach regarding gas efficiency opportunities, and that additional outreach and support from gas program administrators might lead to increased gas efficiency savings.
6. Program administrators should be required to collect and report more comprehensive data regarding the customers who participate in their energy efficiency programs. A better understanding of customer participation would provide the program administrators with very useful information about where the untapped efficiency opportunities lie and how to pursue them. It would also be very useful to identify and track the different types of participation, including: active participants (i.e., recent participants), inactive participants (i.e., past participants), non-participants, and proactive participants (where the customer prefers to take the lead with assistance from the program administrator) versus reactive participants (where the customer prefers the program administrator to take the lead).

Recommendations for Further Research

Our survey indicates that there are several areas where additional research might help to increase the participation of C&I customers over the next few years.

1. Most importantly, it would be helpful to continue efforts to better assess the perspectives of the C&I customers who have not participated in the Massachusetts energy efficiency programs to date.
2. It may be helpful to conduct statewide research into opportunities for reducing the transaction costs (including timing concerns) associated with participation in the energy efficiency programs. This could include a statewide effort to identify best practices within the state and from other parts of the country.
3. It may be helpful to conduct statewide research into training the program administrators' account representatives and support staff so that they have a better understanding of the needs of different customer types and different industries. This could include a statewide effort to train account executives and support staff and to share knowledge and experience across the program administrators.
4. It may be helpful to conduct statewide research into ways to expand the types of efficiency measures eligible for financial support, reduce the time required to accept measures for eligibility, and streamline the process that is used in deciding measure eligibility.
5. It may be helpful to conduct statewide research into opportunities for the gas program administrators to better coordinate their outreach and support services with electric program administrators.
6. It may be helpful to conduct statewide research into practices for spending the efficiency budgets more evenly over the course of a year, in order to avoid the year-end blitz that sometimes occurs in order to meet annual targets.

1. Introduction

Background

The 2010-2012 Massachusetts Joint Three-Year Electric and Gas Energy Efficiency Plans were the first statewide three-year plans that put the Massachusetts electric and gas energy efficiency program administrators on a path to meeting the 2008 Green Communities Act mandate that "electric and natural gas resource needs shall first be met through all available energy efficiency and demand reduction resources that are cost effective or less expensive than supply." Given that this first three-year plan was a ramp up to more aggressive levels of energy savings than had ever been achieved in the state, each year of the three-year plan had budget and savings targets that were higher than the previous year.

The 2010 electric C&I savings goals were nearly met (i.e., 98 percent of the goal was achieved), using 85 percent of the planned budget. The 2010 gas C&I savings goals were also nearly met (i.e., 95 percent of the goal was achieved), using 75 percent of the budget. However, the program administrators were not as successful in meeting their 2011 C&I program savings goals. Preliminary year-end statewide results for 2011 indicate that the electric and gas program administrators were short of their C&I savings goals and were not able to spend all of their remaining C&I budget to close the gap.[2]

Concerned that this trend might continue in 2012 and into the next three-year plan, the Massachusetts Energy Efficiency Advisory Council contracted Synapse Energy Economics to investigate the barriers that C&I customers face in participating in energy efficiency programs. The EEAC is specifically interested in determining whether the economic recession is a key factor preventing or delaying C&I customers' participation in the energy efficiency programs. The primary purpose of understanding these barriers to C&I customers is to determine whether they can be addressed in planning and designing the programs for the 2013-2015 Energy Efficiency Plans.

Organization of the Report

In order to investigate the barriers, real and perceived, to commercial and industrial participation in energy efficiency programs, we first present a forecast of the state's economic activity. This near-term forecast is intended to provide context for targeting C&I customers in Massachusetts over the period coinciding with the 2013 – 2015 Three-Year Energy Efficiency Investment Plan.

Next, as background to Synapse's investigation, we summarize the results of measurement and verification (M&V) studies conducted on the Massachusetts C&I programs over the past two years. This summary presents some of the barriers to C&I participation identified in recent research, and provides a foundation for our customer survey.

We then present the results of surveys of several C&I customers, in order to develop a better picture of the barriers they face in participating in the Massachusetts energy efficiency programs, as well as an indication of their expected participation in these

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[2] Preliminary year-end results for 2011, presented by the Massachusetts program administrators to the EEAC, February 2012.

programs over the next few years. The survey covers medium and large C&I customers across a variety of industry types, and across several regions of the state.

Finally, we evaluate the findings of the economic forecast and surveys, and discuss the implications of these findings for the 2013 – 2015 Massachusetts energy efficiency programs.

Appendix A of this report presents a more detailed discussion of the M&V study results. Appendix B provides the survey questionnaire and interview questions used by Synapse in this study, while important questionnaire responses and the complete interview notes for each customer are provided in Appendix C.

2. Economic Forecasts

2.1 Methodology

Data Source

Our economic forecast relies upon historic and forecast data from Moody's Analytics (formerly Economy.com). Moody's is a common source for economic projections, one that is used by utilities in Massachusetts and other planning agencies.[3] Table 2.1 presents the data that are available for this study from Moody's. As indicated, some of the data are available for each county and for the state as a whole, while some of the data are available only for the state as a whole.

Table 1.1 Moody's Data by Source and Geography

Moody's Data	Geography	Primary Historical Source
Business Bankruptcies	State	Office of US District Courts
Construction Put-in-Place (non-residential)	State	US Census
Industry Employment (23 industries)	County, State	Bureau of Labor Statistics (BLS)
Gross State Product	County, State	Bureau of Economic Analysis (BEA)
Labor Force	County, State	Bureau of Labor Statistics (BLS)
Residential Permits (single and multi-family)	County, State	US Census
Rental Vacancy Rate	State	US Census
Retail Sales	County, State	US Census
Unemployment[4]	County, State	Bureau of Labor Statistics (BLS)

In our results below, we present the actaul data for these metrics for the years of 2006 through 2011, in order to provide some historical context. We then present Moody's forcast of this data for the years 2012 through 2015, in order to coincide with the planning horizon for the 2013 – 2015 Three-Year Energy Efficiency Plans.

Regional Definitions

In order to capture the regional differences in economic activity, we analyzed data for five different regions of the state. These regions are defined on the basis of county borders, in order to allow us to apply the Moody's county data to our five regions. We present economic forecast for the following regions: (1) Bristol County, (2) Greater Boston, (3) Central Massachusetts, (4) Cape Cod and the Islands, and (5) Western

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3 It is important to note that forecasts of any kind are fallible, because unforeseen circumstances can always arise. While the Moody's forecasts are well respected and frequently used, they should be seen as estimates to be used for identifying trends but not to be used for providing precise predictions.

4 The unemployment rate is the percentage of individuals in the "labor force" (i.e. those who are working or actively looking for work) who have not found employment, as collected by the Bureau of Labor Statistics. Therefore, it does not include those who have stopped looking for work. Also, part-time employees are all considered "employed" even if they are looking for full-time work (BLS refers to this as "part time for economic reasons"). Monthly unemployment rates are typically "seasonally adjusted" to account for month-to-month variations from seasonal industries; however, annual unemployment is usually not adjusted in this manner.

Massachusetts. Table 2.2 indicates the five regions that we analyze and the counties that are within each region.

Table 2.2 Massachusetts Regions by County

Region	County
Bristol County	Bristol County
Greater Boston	Suffolk County Middlesex County Plymouth County Norfolk County Essex County
Central Massachusetts	Worcester County
Cape Cod/Islands	Barnstable County Dukes County Nantucket County
Western Massachusetts	Hampden County Hampshire County Berkshire County Franklin County

Industry Types

Moody's presents its economic forecasts by industry type, using the North American Industry Classification System (NAICS). We made two minor modifications to the indsutry types for our study. First, we aggregated the NAICS data into a slightly smaller list of industries, for presentation and simplicity purposes.

Second, we aligned the new Synapse aggregations with the industry types used in the Point380 study, which used slightly different labels and categories for its industry types.[5] We have, to the best of our ability, mimicked the aggregations used in Moody's and Point380 studies. However, due to limited granularity in the Moody's data, we have had to combine categories (e.g., Warehouse/Industrial and Miscellaneous). Also, construction and wholesale trade were not presented in the Point380 studies, but are included in Moody's data. Lastly, Moody's categorizes government as large/small office, whereas the Point380 study spread this over many industry types.

Table 2.3 presents the industry types presented in the Moody's forecasts, as well as our version of the industry types.

[5] The Point380 study is described in more detail below.

Table 2.3 Industry Aggregation Scheme

Moody's Industry Types	Synapse Industry Types
Construction	Construction
Healthcare	Healthcare
Manufacturing	Industrial (manufacturing)
Admin/Waste Management Finance/Insurance Government Information Management of Companies Professional/Scientific Real Estate	Large/Small Office
Arts/Entertainment/Recreation Farms Other Services	Misc. Commercial
Food/Accommodation	Restaurant/Lodging
Retail Trade	Retail/Grocery
Education Services	School/College
Mining, Quarrying, etc. Utilities Warehouse and Transportation	Warehouse/Industrial (misc.)
Wholesale Trade	Wholesale

Figure 2.1 below shows the percent of total employment that each industry type represents, for each of the five regions in Massachusetts. As indicated, large and small offices dominate the employment in all regions, especially in the Boston region. Healthcare is a significant employer in all regions of the state, as is retail/grocery. Manufacturing is a dominant employer in Bristol County, Cental Massachusetts and Western Massachusetts, and with fewer employees on Cape Cod and the Islands.

Figure 2.1 Massachusetts 2011 Industry Employment by Region

Other Sources of Economic Forecasts

We considered using other sources for economic forecasts, if only to provide a comparison or a check against the Moody's forecast. After a brief review of the other economic forecasts that are readily available, we decided not to use any of them, because they either relied upon the same Moody's forecast that we use, or they do not provide data and forecasts at the county level and therefore could not be used for our forecast of the five different regions of Massachusetts.

We asked several of the electric and gas program administrators for access to the economic forecasts that they use for their own purposes. One program administrator provided us its forecast, but noted that it is based on the Moody's forecast. Another program administrator declined to provide us with their economic forecast, because it is also based upon the Moody's forecast and would only be redundant. A third program administrator noted that they do use a different source for their economic forecasts, but they declined to provide us with their forecasts because they are proprietary.

The New England Economic Partnership (NEEP) is a member-supported, non-profit organization dedicated to providing objective economic analyses and forecasts. Twice a year the NEEP publishes macroeconomic forecasts of the New England region and its six individual states. Their most recent forecasts were published in November 2011 and are available to members. Upon investigation we learned that the NEEP forecasts also rely upon the Moody's forecasts, and do not provide forecasts at the county level.[6] Therefore, we did not pursue this source any further.

2.2 Economic Forecast Results

As a whole, the Massachusetts economy has faired slightly better than the US economy throughout the recent economic downturn. In terms of unemployment, the state has tracked at one percent or more below the national unemployment rate. As of the close of 2011, the state was showing a 6.8 percent unemployment rate, compared to 8.5 percent for the U.S.[7]

The latest Business Confidence Index from the Associated Industries of Massachusetts (AIM) shows that business optimism in the state has been rising in recent months. This index takes a monthly survey of businesses' economic outlook for the current year compared to the prior year. As seen in Figure 1.2 below, the recently released index of 52.8 for January 2012 is the highest it has been since May 2011. An index level of 50 is deemed a neutral outlook.

While optimism among the group has been rising since October 2011, expectations for a fast economic recovery have been mitigated somewhat by the crisis in Europe, especially since Massachusetts is reliant on export business with Europe.[8]

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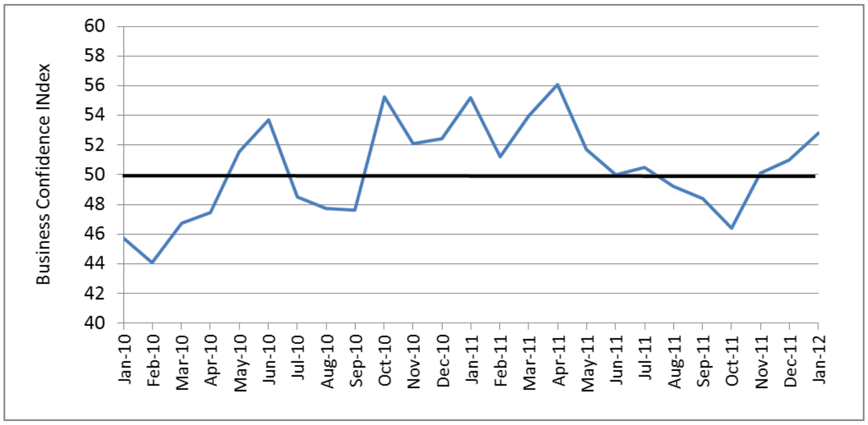
[6] We contacted Mike Goodman (of UMass-Dartmouth) and Alan Clayton-Matthews (of Northeastern University) both of whom are part of New England Economic Partnership. They could only provide state-level forecasts and these were only available to NEEP members.

[7] Based on December 2011 data from the Bureau of Labor Statistics.

[8] Comment from Andre Mayer at AIM, see: http://www.aimnet.org/AM/Template.cfm?Section=Business_Confidence_Index

Figure 1.2 Business Confidence Index (Decemeber 2010 – January 2012)



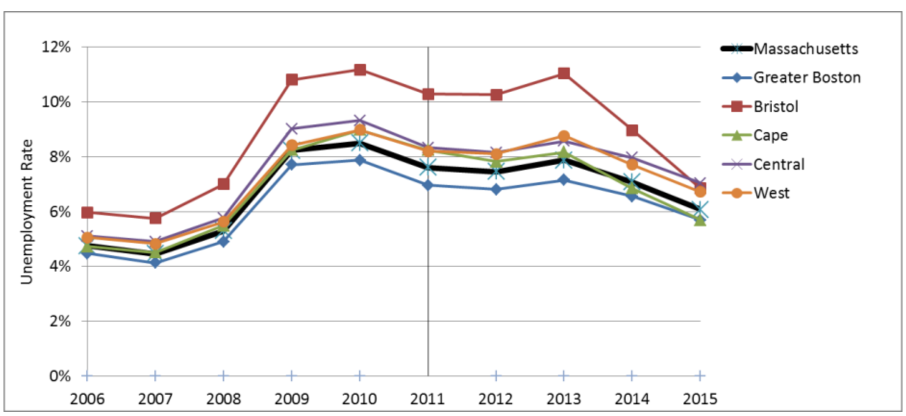
Source: Associated Industries of Massachusetts

<u>Unemployment Rates</u>

The Massachusetts economy is highly diverse by region. This means that parts of the state have been more insulated from the downturn than others. Bristol County has been hit the hardest of any region in recent years, in part due to its reliance on heavy industries (such as manufacturing) which has seen production downturns.

According to the economic forecast that we used, the unemployment picture is projected to improve in the state and its regions over the next few years. Typically, employment lags behind the economic performance, since some industries are only willing to hire once their business picks up significantly. This explains why, according to the Moody's forecasts, unemployment in Massachusetts is expected to increase slightly through 2013, then fall back below seven percent for the following two years.[9] The unemployment rate is projected to fall precipitously for Bristol County (from 11 percent in 2013 to around seven percent in 2015), with the rate for all other regions (including the state as a whole) falling to between 5.5 percent and seven percent by 2015.

Figure 2.3 Current and Projected Unemployment Rate by Region (2011 – 2015)

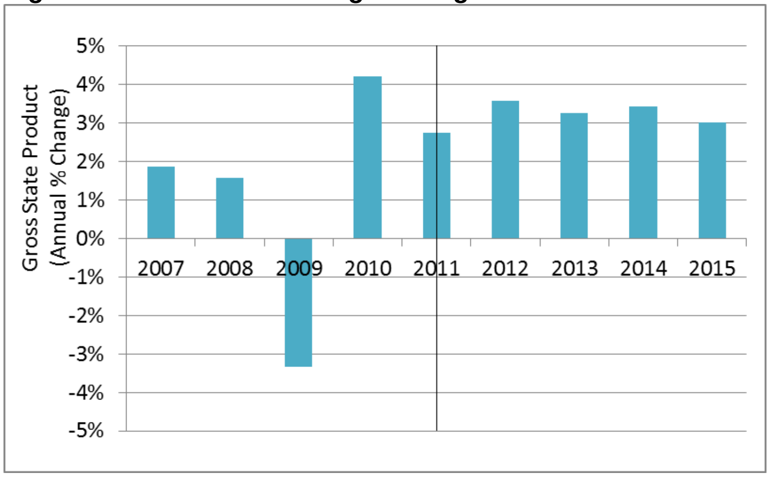


[9] The Moody's forecast data lag behind the most recent data available on unemployment by two months. This explains the recent decreases in unemployment, which were more than expected but not accounted for in Figure 2.3.

Gross State Product

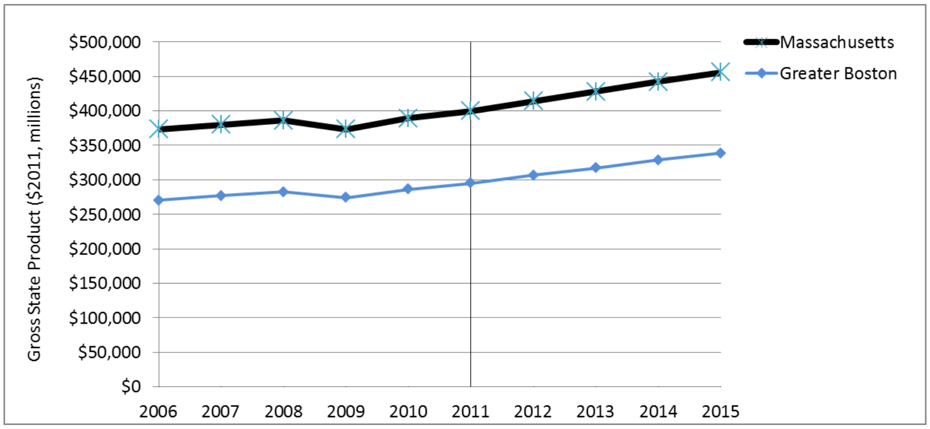
Figure 2.4 presents the annual percentage change in real (i.e., adjusted for inflation) gross state product for the historic years of 2007 – 2011, and forecasts for 2012 – 2015. This forecast suggests that gross state product will increase to annual growth rates higher than those that existed prior to the downturn in 2009.

Figure 2.4 Annual Percentage Change in Real Gross State Product: Massachusetts



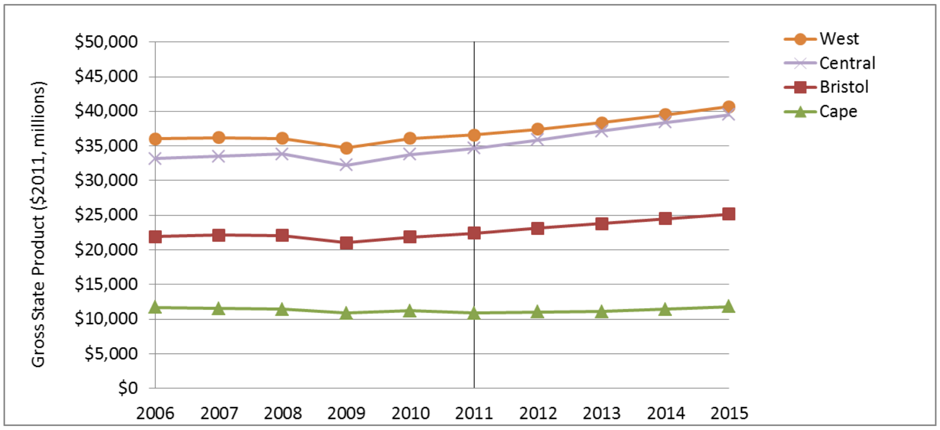
Figures 2.5a and 2.5b (below) show the gross state product forecasts by region (in 2011 dollars).[10] As indicated, steady growth in gross state product is expected over the next few years, except for the Cape and Islands region where gross state product remains essentially flat.

Figure 2.5a Gross State Product: Massachusetts and Greater Boston (million$)



10 We use two charts to present the gross state product because the results for Boston and the state require a different scale than the results for the other regions.

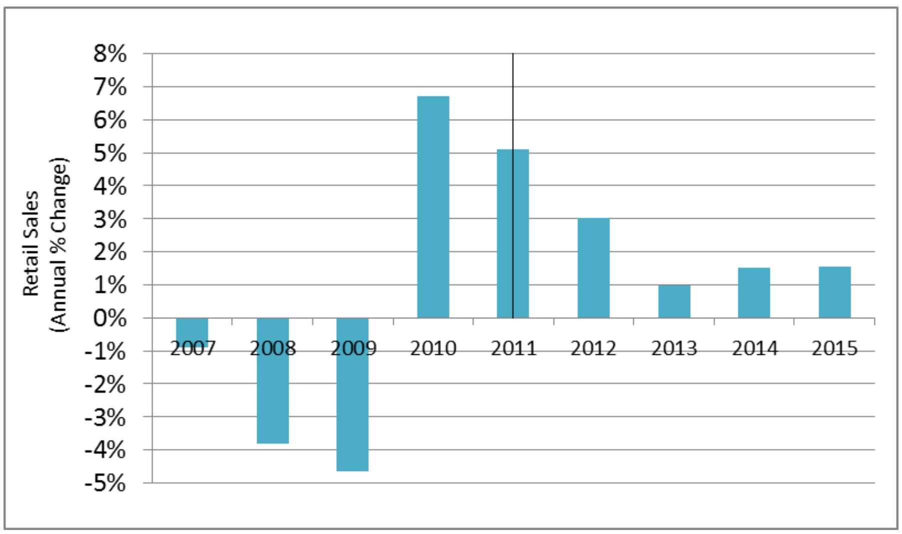
Figure 2.5b Gross State Product: Cape, West, Bristol, and Central Regions (million$)



Retail Sales

Retail sales is a large component of gross state product—accounting for more than 26 percent of gross state product in Massachusetts. After a significant drop in 2007 through 2009, retail sales rose sharply in 2010 and 2011, and are predicted to rise modestly in the coming years. 2.6 presents the annual percentage change of real (i.e., adjusted for inflation) retail sales by year for the state.

Figure 2.6 Annual Percentage Change in Real Retail Sales: Massachusetts



Figures 2.7a and 2.7b show the retail sales forecasts by region (in 2011 dollars).).[11] As indicated, steady growth in retail sales is expected over the next few years, except for the Cape and Islands region where retail sales remain essentially flat.

[11] We use two charts to present the retail sales because the results for Boston and the state require a different scale than the results for the other regions.

Figure 2.7a Retail Sales: Massachusetts and Greater Boston (millions$)

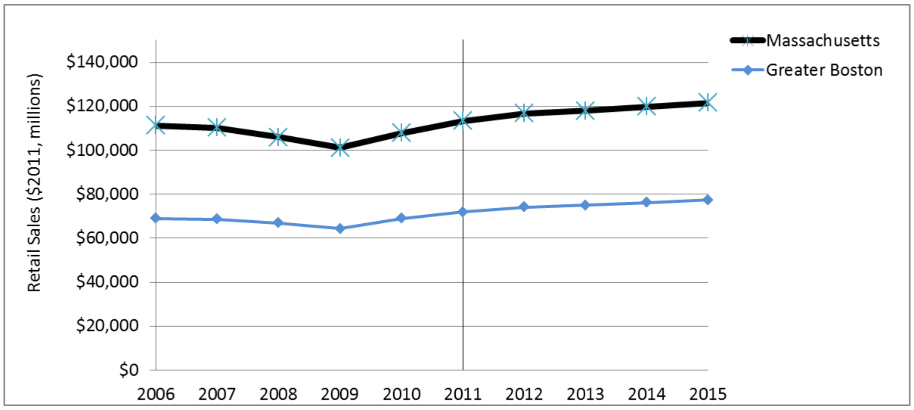
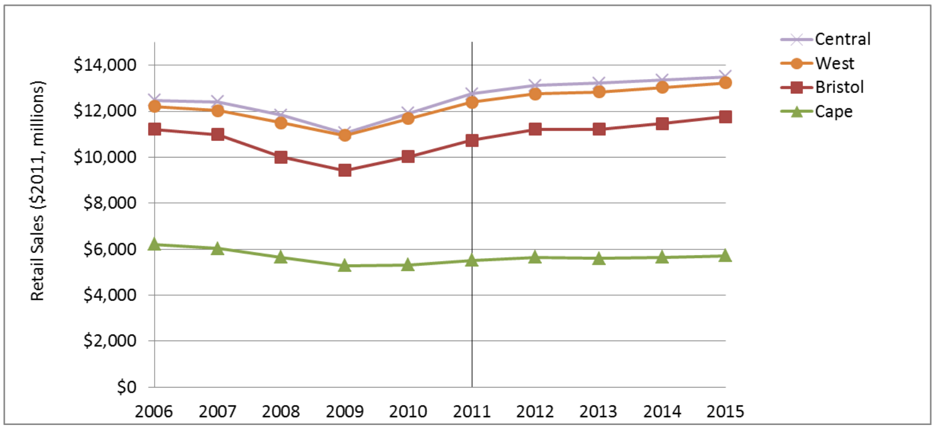


Figure 2.7b Retail Sales: Cape, West, Bristol, and Central Regions (millions$)



Construction Activity

Construction activity has declined in recent years (during the economic downturn), but is expected to pick up in the coming years in Massachusetts. Figures 2.8 and 2.9 show the increases in business construction investments and residential permits, respectively. These indicators are important for the state's economic outlook, and also offer a glimpse of the opportunities for residents and businesses to implement new efficiency measures—whether in a new building, an addition, or renovation of an old space.

Figure 2.8 Business Construction Activity in Massachusetts (2011 – 2015)

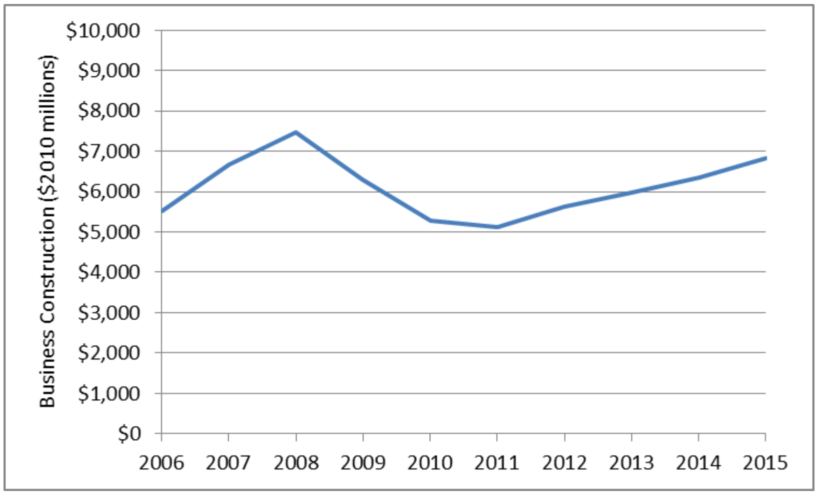
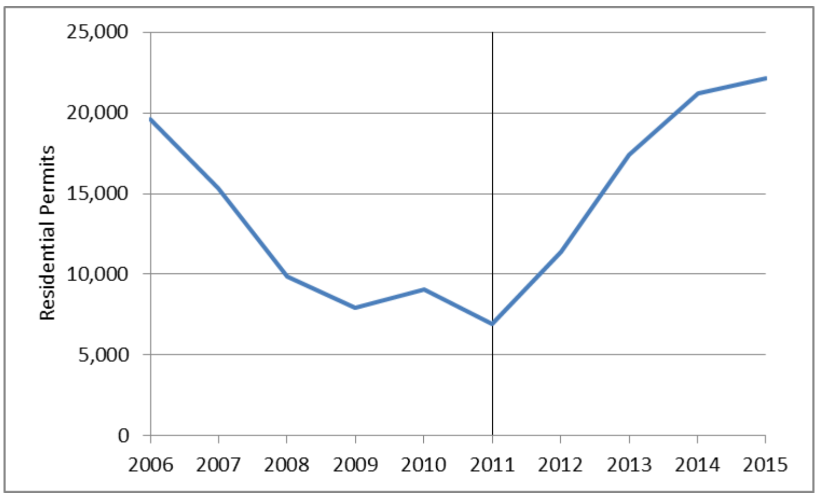


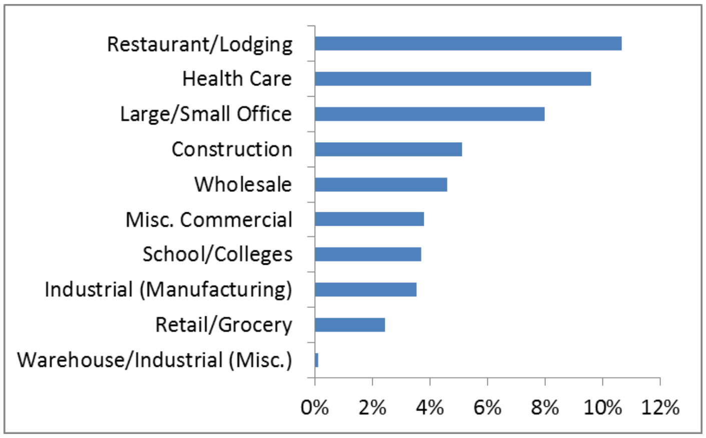
Figure 2.9 Residential Permits in Massachusetts (2011 – 2015)



Employment Growth by Industry

Most industries are projected to experience employment growth in Massachusetts in the period between 2011 and 2015, including manufacturing. Figure 2.10 shows the percentage increase in employment for each business type from 2011 to 2015. Restaurant/lodging, office, and healthcare industries are projected to experience employment growth of the most, with each industry projected to grow more than eight percent over the period. Industries such as industrial (manufacturing) and warehouse/industrial are expected to experience less employment growth.

Figure 2.10 Percentage Employment Growth in Massachusetts by Industry (2011 – 2015)



These results are presented below in Figures 2.11a-e, separately by region. Interestingly, healthcare and office industries are projected to grow strongly in every region of the state (and both are large components of every region's employment); restaurant and lodging are projected to grow significantly in every region except the Cape/Islands; and construction is projected to have robust growth in Bristol, but little growth in other regions. This feeds into the large projected fall in unemployment in Bristol presented earlier; five industries in this region are expected to grow 9% or more in terms of employment.

Figure 2.11a Percentage Employment Growth in Greater Boston by Industry (2011 – 2015)

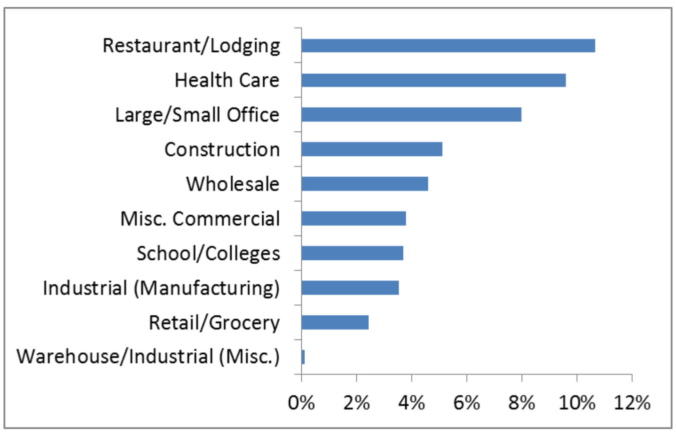


Figure 2.11b Percentage Employment Growth in Bristol County by Industry (2011 – 2015)

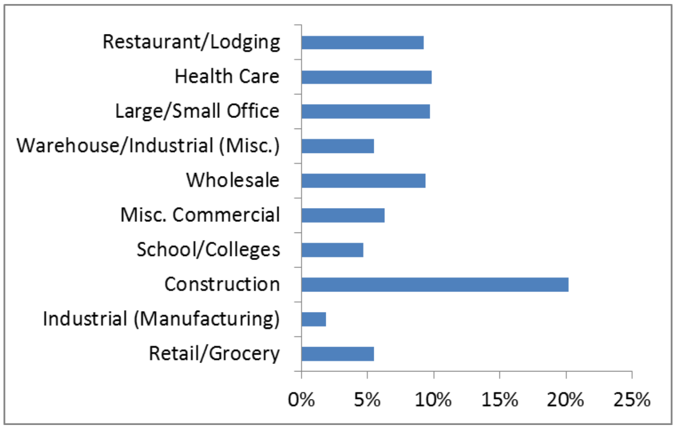


Figure 2.11c Percentage Employment Growth in Cape/Islands (2011 – 2015)

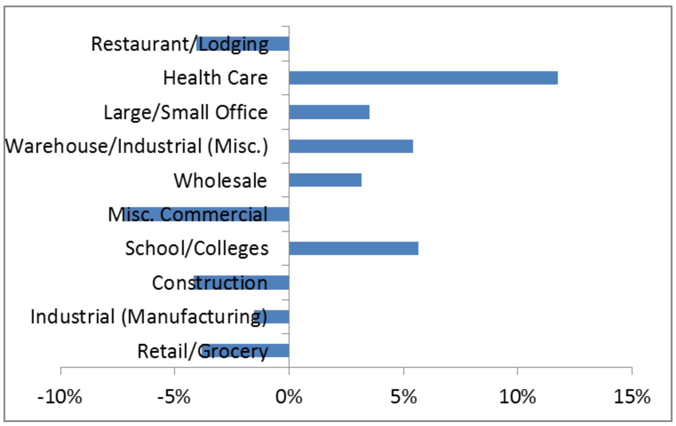


Figure 2.11d Percentage Employment Growth in Central Massachusetts (2011 – 2015)

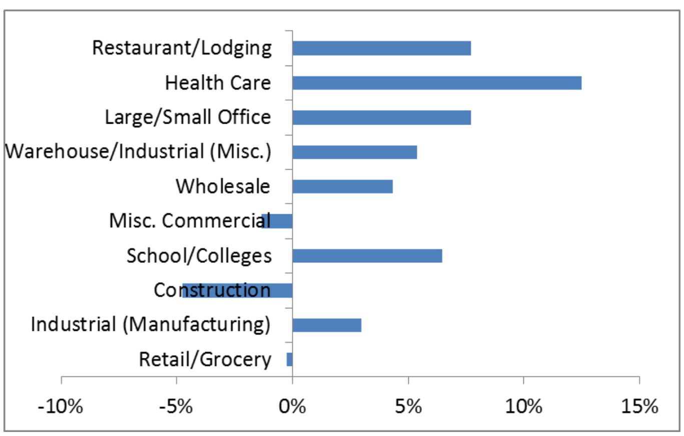
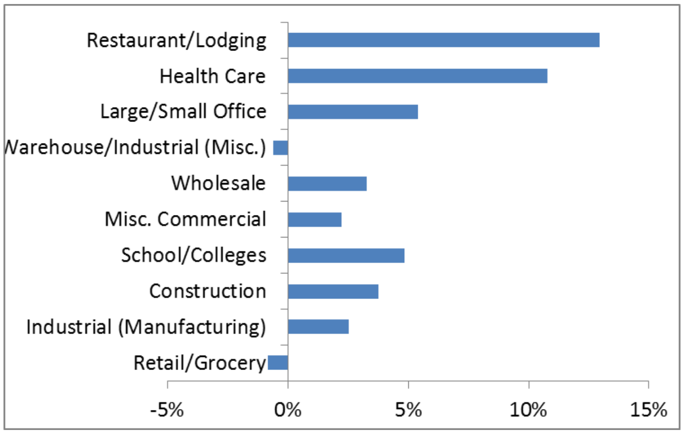


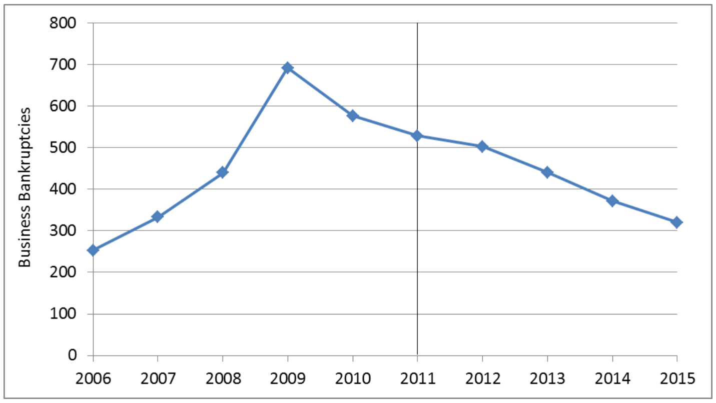
Figure 2.11e Percentage Employment Growth in Western Massachusetts (2011 – 2015)



Business Bankruptcies

Figure 2.12 presents historic and forecasted business bankruptcies in Massachusetts. Consistent with the positive trend in other economic indicators, bankruptcies are expected to decline over the next several years.

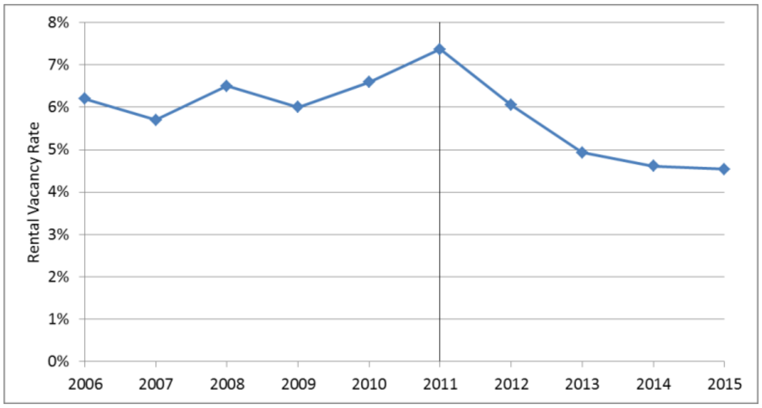
Figure 2.12 Business Bankruptcies: Massachusetts



Commercial Retail Vacancy Rate

Figure 2.13 presents the historic and forecasted commercial rental vacancy rate for Massachusetts. As indicated, the vacancy rates are expected to decline over the next few years.

Figure 2.13 Commercial Rental Vacancy Rate: Massachusetts



Summary

The economic forecast suggests that, in general, the state's economy will improve over the next several years. At the statewide level, gross state product, construction activity, residential construction permits, and retail sales are expected to grow, while unemployment rates, business bankruptcies, and commercial rental vacancy rates are expected to decline. The same overall trend of improvement can be seen within each region, as well. One exception to this trend is gross state product and retail sales in the Cape Cod/Islands region, which are expected to stay essentially flat between now and 2015.

Healthcare and office industries are projected to grow strongly in every region of the state, and both are large components of every region's employment. Restaurant/lodging is projected to grow significantly in every region except the Cape/Islands. Construction is projected to have robust growth in Bristol, but less growth in other regions. Bristol County, the region hit hardset by the economic downturn in Massachusetts , is expected to see a large fall in unemployment over the 2011 – 2015 period, in part due to construction growth.

3. Participation Barriers Identified From Other Sources

3.1 Measurement and Verification Studies

Massachusetts energy efficiency program administrators routinely conduct measurement and verification (M&V) studies of the commercial and industrial (C&I) energy efficiency programs. Among other things, these studies investigate customer perspectives regarding energy efficiency.

To inform our survey, we reviewed the results of recent M&V research, focusing on the C&I process evaluation and market characterization studies performed in the past two years. Based on our review, these studies suggest the following key barriers and, in some cases, potential solutions, to C&I participation in energy efficiency programs:

- Financial barriers. These include cost of efficiency investments, incentives and financing availability, capital availability, and payback periods associated with installing efficient equipment. Even with large financial incentives available, there are still instances when participants face significant upfront costs for the time and resources required to conduct technical assessments or lifecycle cost analyses. Additionally, companies often have a limited amount of capital available to spend on efficiency projects. Increased incentives related to technical assistance and increased availability of financing are often recommended as methods to overcome cost barriers, and are generally seen as an attractive and important component to participation.
- The recent economic downturn. This most notably impacts the new construction market, including lack of available capital, customers' apprehension toward capital investments, and efficiency investments competing against other capital projects within a company. For customers who participate in efficiency programs during an economic downturn, the amount of the incentive plays an increasingly important role in the decision to participate. Recommended methods to address the economic mindset of customers include increasing financial incentives, focusing on more cost-effective technologies and/or customers with stable financial conditions, and developing creative marketing programs.
- Customer awareness and program marketing barriers. This includes lack of customer awareness about efficiency programs, the advantages and drawbacks of different types of customer outreach methods (e.g., direct contact compared to marketing materials), and difficulty in reaching key decision makers and/or target markets. A key challenge for efficiency programs is reaching eligible customers with information about program offerings and the process for participation. Program Administrators typically market efficiency programs to C&I customers through account executives who serve as the main point of contact between customers and program administrators, and are therefore responsible for informing their customers of relevant energy efficiency opportunities. For this customer sector, personal relationships are particularly important in recruiting participants and the direct outreach conducted by program staff and vendors is central in reaching customers who ultimately chose to participate in programs. Furthermore, who the account executives or program managers contact influences program participation greatly. Recommendations include improving

marketing materials, hosting "lunch and learns," and educating customers as well as Program Administrator staff.

- Program design and administration barriers. This includes burdensome and time-consuming processes for participation, Program Administrator staffs' lack of available time and technical knowledge, customers' lack of understanding regarding efficiency strategies and measures, availability of certain technologies, and lack of technical assistance. A number of studies suggested that participating in efficiency programs could be streamlined, especially the application process required for participation. Despite the relatively large incentives offered, program staff reported that some customers are reluctant to assume the additional time and cost required by participation. Additionally, account executives mentioned being too busy or lack of staff as an issue. Some studies suggested that program administrator's skill sets could be more diverse, and that program administrators often lack technical knowledge. One recurring issue relates to the types of measures offered through the program administrators programs. One recommendation was that there should be something in between a straight forward prescriptive approach and full building modeling.
- Timing of participation as a barrier. This includes lack of early involvement by the program administrators in efficiency projects. For example, some projects require early involvement of the program administrators to ensure that all relevant energy efficiency improvements are incorporated into the customer's building design.

Additional barriers to participation include: (a) the need to obtain corporate approval to participate; (b) customers' hesitation to adopt new technology; and (c) customers already as efficient as is feasible, and (d) rapidly changing building codes. For some clients, who may operate their facilities on a 24/7 basis, the need for equipment reliability and ease of maintenance is paramount.

A more detailed discussion of the key barriers to efficiency program participation identified in the Massachusetts M&V studies is presented in Appendix A of this report.

As might be expected, our survey results discuss many of these same issues.

3.2 Comments at January 2012 EEAC Meeting

The majority of the EEAC's January 10, 2012 monthly meeting was devoted to hearing comments from the public regarding the development of the 2013 through 2015 three-year energy efficiency plans. Summarized below are the written comments filed in follow up to the January 10, 2012 meeting, related to participation barriers.

Measures and Incentives Structures

A Better City (ABC) recommends increased flexibility in program offerings, as it finds that the current programs are too limited, with significant incentives for low-savings measures such as lighting, but comparatively little support for the major building infrastructure improvements that can substantially reduce energy consumption (ABC, 5). ABC states that many building owners feel that they have reached the limit of what can be accomplished under the current utility programs, but are certain that much deeper savings can be found in their properties (ABC, 5). More specifically, ABC argues that incentives to replace aging HVAC systems are inadequate to drive early retirement, and suggests that paybacks approach five years to incent owners to make the large-scale capital investments that drive deep energy savings (ABC, 6).

Medical Academic and Scientific Community Organization, Inc. (MASCO) and Health Care Without Harm note that once healthcare facilities move beyond installing "low-hanging fruit," sophisticated energy conservation systems will need to be addressed in order to reap additional savings (MASCO, 1; Health Care Without Harm, 1-2). Such sophisticated systems do not function properly without certain synergistic sequences and/or behaviors, which the current incentive programs do not address (MASCO, 1). MASCO urges that prescriptive specifications and sequences be linked to operational and maintenance best practices (MASCO, 1).

MASCO also explains that as healthcare reimbursement rates decline, some hospitals lacking financial resources and/or depth in their facility departments may need a larger cost share from utilities to meet project costs (MASCO, 1; Health Care Without Harm, 1-2). Such support can be tied to conditions such as utility/client MOUs, institutional energy master plans, finances, and adjusted lifecycle savings, perhaps with utility payback coming from later energy savings (MASCO, 1-2).

Northeast Energy Efficiency Partnerships (NEEP) understands that an ongoing challenge and area of focus by the program administrators has been moving customers from initial assessment of energy saving opportunities to actually installing measures (NEEP, 5). NEEP recommends exploring the possibility of adapting for mid-size businesses the Memoranda of Understanding (MOUs) that have helped large C&I customers take a multi-year approach to efficiency investment (NEEP, 5). MASCO and Health Care Without Harm recommend that efficiency programs consider development of a joint strategic MOU as standard practice between all relevant utilities and large accounts (MASCO, 2; Health Care Without Harm, 1-2). MASCO suggests that such an approach would widen and deepen hospital participation, optimize projects, enable projects with longer returns on investment, and reduce barriers by minimizing the time needed to develop multiple MOUs (MASCO, 2). ABC also recommends negotiating a single, consolidated MOU, as it may have significant advantages and would allow building owners to effectively leverage time and personnel (ABC, 4).

Medium Sized Customers

ABC highlights that larger customers with dedicated utility account representatives are more satisfied with their program administrator program experience, while small and medium sized customers have a more challenging time navigating the programs (ABC, 3). ABC suggests that such a barrier could be addressed by having utility representatives offer a package of incentives and a single point of contact to assist during program participation (ABC, 3). ABC notes the gap in program offerings for customers between 300 kW and 700 kW, which could be removed by increasing the ceiling for the direct install program from 300 kW up to 500 kW and lowering the level for facilities to be appointed an Account Executive from 700 kW down to 500 kW (ABC, 3-4). Further, ABC recommends that the program administrators provide increased guidance on developing custom measure retrofits to small and medium sized customers (ABC, 4). ABC also notes that program application forms and marketing materials can be confusing, creating a barrier for smaller companies that do not have dedicated staff to manage energy projects (ABC, 4). ABC also notes that landlord-tenant split incentive issues are a well-known barrier in the commercial real estate market that could be overcome with focused utility efforts to bring both parties into the retrofit process in support of mutually beneficial building improvements (ABC, 5).

Better Data for Customers and About Customers

ABC suggests that the lack of easily accessible and transparent energy consumption data is a barrier to reducing energy use for office tenants, building owners, and other utility customers (ABC, 2). ABC recommends the development of a utility sub-metering program to help defray costs of metering equipment installations (ABC, 2). ABC also recommends that efficiency programs encourage widespread adoption of EPA's Energy Star Portfolio Manager, as such an approach could improve building energy use monitoring and significantly aid building owners in their efforts to evaluate energy savings investments (ABC, 2-3). Finally, ABC recommends allowing for better access to real-time or interval meter energy consumption data by providing commercial customers with web-based tools that better organize and present real-time data (ABC, 3).

MASCO and Health Care Without Harm argue that customers need data at a more granular level than currently is available so as to integrate energy management and clinical operations to target efforts, detect and correct aberrational usage, monitor and maintain conservation measures, and incent and track behavior change (MASCO, 1; Health Care Without Harm, 1-2). MASCO contends that standardized sub-metering, water and steam monitoring specifications, and protocols could be developed to push vendors for lower costs, and to widely deploy accurate systems (MASCO, 1).

Mass Energy Consumers Alliance (Mass Energy) recommends that the program administrators be required to collect and report data about who is served and how in ways that would provide for meaningful planning, monitoring and evaluation (Mass Energy, 3). Mass Energy argues that better data will lead to better, more cost-effective programing (Mass Energy, 3).

4. Customer Survey

4.1 Customer Survey Methodology

The purpose of the survey component of Synapse's investigation was to gather additional information about the perceived current and future barriers to C&I participation in Massachusetts's energy efficiency programs, with specific attention to the role of the economy. We use the language "perceived current and future barriers" because this information has been self-reported by C&I customers and, as such, represents their opinions about the barriers to participation that they face.

Survey Development

To determine the content and design of its surveys, Synapse worked with the EEAC, conducted interviews with EEAC members and consultants, reviewed recent studies related to C&I participation, and attended the January EEAC meeting, which was devoted to receiving input from residential and C&I customers to inform the upcoming three-year plans. Questions were developed both to compare directly with the results of existing research, and to delve deeper into areas of particular interest to the EEAC.

Each survey consisted of two parts: a questionnaire, followed by a one-on-one interview. The questionnaire collected information that could be easily provided in written format, including both quantitative and qualitative information. The same questionnaire was used for both participants and non-participants.

Interview questions (all qualitative) were developed to provide a framework for the one-on-one interviews; however, interviewers were given the freedom to "go off-script," in order to ask follow-up or clarifying questions, to allow for open dialogue with the customer, and to address specific issues brought up in the customer's responses to the questionnaire.

Two versions of the interview questions were prepared; one for participants and one for non-participants. Non-participants were defined as customers who had not participated in C&I energy efficiency programs within the past five years, or had never participated.

The questionnaires and interview questions, for participants and non-participants, are provided in Appendix B of this report.

Selection of the Targeted Survey Pool

We then identified a set of targets for customer types to interview. We planned to interview a total of 40 customers across the state. We identified a target set of customers to interview by first spreading the 40 interviews across the five state regions based on economic activity in those regions; and second by spreading the interviews in each region across the different industry types according to the level of economic activity by industry type. In addition, the EEAC Executive Committee asked Synapse to focus our interviews on:

- Non-participants, as this segment of the population may have more significant savings opportunities. Non-participants were defined as customers who had not participated in C&I energy efficiency programs within the past five years, or had never participated.

- Medium-to-large C&I customers, as these customers often have significant savings opportunities. Medium-to-large C&I customers were defined by electric Program Administrators (PAs) as customers with a demand of greater than 300 kW. Medium-to-large C&I customers are defined differently among gas PAs. However, one gas PA suggested that medium-to-large C&I customers can be characterized by a usage of 10,000 therms or more annually.
- Non-governmental customers, as the reasons for governmental customer non-participation are better understood, and a number of initiatives are ongoing to address barriers to participation by governmental customers.

The resulting targets by region and industry type are presented in Table 4.1, below.

Table 4.1 Survey Targets by Region and Industry Type

Region and Industry Type Targets						
Industry Type	Boston	Central Mass	Cape Cod	Western Mass	Bristol County	Total
Heavy industry	1	1	1	1	1	5
Warehouses & Distribution	0	1	0	1	1	3
Retail	1	1	1	1	1	5
Office	6	2	1	2	1	12
Schools & Colleges	1	1	0	1	0	3
Healthcare	3	1	1	1	1	7
Restaurants & Lodging	2	1	1	1	1	6
Miscellaneous	0	0	0	0	0	0
Total	13	8	5	8	6	40

Point380 Energy Efficiency Market Opportunity Study

National Grid and NSTAR recently hired Point380 to conduct an energy efficiency market opportunity assessment of their service territories. Synapse was provided a copy of the Point380 study, to help inform our survey design.[12]

The purpose of the Point380 study is to provide National Grid and NSTAR with a general framework for understanding where the greatest remaining energy efficiency program opportunities exist. The study provides a high-level projection of energy efficiency opportunities by end-use, customer type, building type, and energy use (electric and natural gas).

We used the Point380 study to inform which industries to focus on in our survey. We reviewed the results of the Point380 study to identify those industries that offer the greatest potential for energy efficiency savings.

The two figures below, taken directly from the Point380 study, illustrate how we used the study. The first chart indicates the opportunity for commercial electric efficiency savings,

[12] Point380, *Energy Efficiency Market Opportunity Model*, Final Deliverables/Report Deck, prepared for National Grid and NSTAR, January 17, 2012, The results were provided to Synapse in four slide decks: Overview, Slide Deck 1a, Slide Deck 1b, and Slide Deck 2.

according to the different industries and end-uses. It indicates that six industries—small office, large office, health, retail, college, and grocery—offer the majority of electric efficiency savings.

The second chart indicates the opportunity for commercial electric efficiency savings available per account, i.e., savings available for any one customer. From the perspective of an energy efficiency program administrator, it is much easier to achieve efficiency savings from those industries that have a high level of savings per account. This chart indicates that the largest amount of efficiency savings per account is available from four industries: large office, health, college, and grocery.

We reviewed this information to help us focus on those industries that offer the greatest opportunity for efficiency savings. In this case, for commercial electric opportunities, we concluded that we should attempt to give priority to the six industries that show the greatest potential in the two charts below: small office, large office, health, retail, college, and grocery.

Figure 4.1 Sample Result from Point380 Study: Commercial Electric Opportunity.

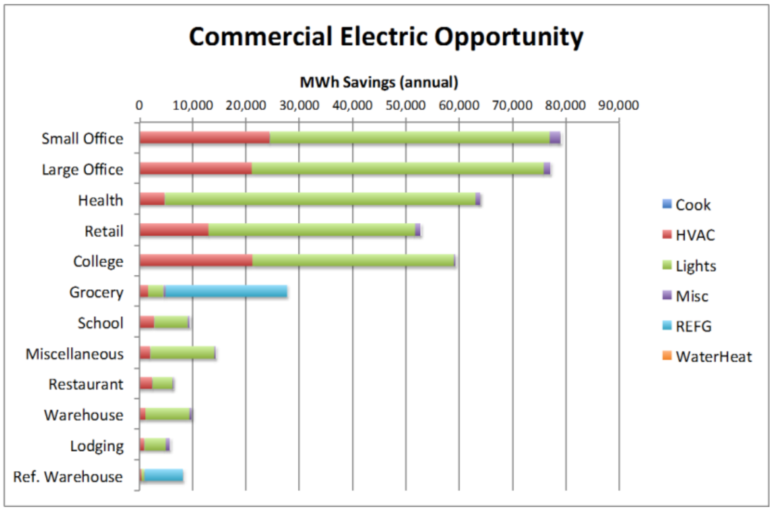
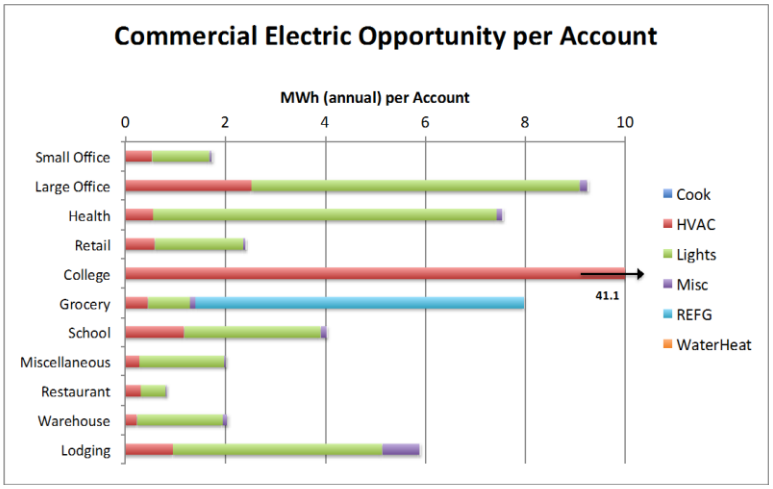


Figure 4.2 Sample Result from Point380 Study: Commercial Electric Opportunity/Account.



We also looked at the results for the industrial sector and for the gas end-uses. The following bullets summarize how we used the results of the Point380 study:

- As mentioned above, for the commercial electric customers we gave priority to interviewing customers from the following industries: small office, large office, health, retail, college, and grocery. This is based on the charts above, from slides 25 and 26 of the Point380 slide deck 1a.
- For the commercial gas customers, we gave priority to interviewing customers from the following industries: office, health, college, restaurant, and hotel. This is based on slides 32 and 33 of the Point380 slide deck 1a.
- For the industrial electric customers, we gave priority to interviewing customers from the following industries: industrial machinery, electronics, rubber/plastics, and chemicals. This is based on slides 13 and 14 of the Point380 slide deck 1b.
- For industrial gas customers, we gave priority to interviewing the following industries: food, chemicals, rubber / plastics, and paper. This is based on slides 20 and 21 of the Point380 slide deck 1b.

It is important to note that the Point380 results were used by Synapse simply for prioritizing which industries to invite for interviews. It was not intended to exclude industries, or limit survey participation by specific industries.

The Final Survey Pool

We then collected customer contact information from the Massachusetts energy efficiency program administrators and a few other stakeholders. We sent invitations to all 137 of the customer contacts that we received that were eligible and included contact information. Many of these customers did not respond to, or declined, our invitation. We conducted a total of 36 interviews. An additional four customers returned the questionnaire, but could not be reached to schedule an interview.[13]

The interviews that we conducted are presented by region and industry type in Table 4.2. Since a large number of customers did not respond to the survey invitations, the actual region and industry distribution was determined more by customer interest and availability than by the information and priorities that we used to determine the target region and industry distribution. Nonetheless, the set of interviews that we were able to conduct is close enough to the target region and industry distribution that we believe it will provide the geographic and industry diversity that we set out to survey.

The one example of where our customer set does not align with the intended target is that the vast majority of our interviews were with customers that have participated in the Massachusetts energy efficiency programs. We did not receive as many non-participant contacts from the stakeholders, and those that we did contact were much less likely to participate in our survey than the program participants.[14] Additionally, some non-participant contacts that the stakeholders provided were actually program participants.

[13] These four customers are not included in our discussion of the survey results. However, their responses to the questionnaire are included at the end of Appendix C.

[14] The participation levels of the 137 customers to whom we sent invitations was approximately 31% participants and 41% non-participants, while 28% were not identified as either a participant or non-participant. The customers who responded to our invitation and participated in the survey were throught to comprise a roughly similar percentage of participation levels. In interviewing customers, 8 customers who were provided to us as

Table 4.2 Actual Surveys Completed, by Industry Type and Region

Industry Type	Boston	Central Mass	Cape Cod	Western Mass	Bristol County	**Total**
Heavy industry	2	1	0	5	1	**9**
Warehouses & Distribution	0	0	0	1	0	**1**
Retail	1	1	0	1	2	**5**
Office	5	1	0	3	0	**9**
Schools & Colleges	4	0	0	0	0	**4**
Healthcare	3	1	1	0	0	**5**
Restaurants & Lodging	1	1	0	0	0	**2**
Miscellaneous	0	0	0	0	1	**1**
Total	**16**	**5**	**1**	**10**	**4**	**36**

It is important to note that sample sizes this small will not provide results that can be considered statistically significant. In addition, because these customers were not chosen at random it is quite possible that the survey results suffer from "selection bias." Nonetheless, we believe the results from these interviews provide useful anecdotes and insights for the EEAC and other stakeholders, consistent with the purpose of this study.

Survey Implementation

Using the contact information provided by the program administrators and EEAC members, Synapse sent invitations to the potential survey pool of 137 contacts via email.

The first part of the survey, the questionnaire, was attached to the email invitation. Once a customer completed the questionnaire, a one-on-one interview (approximately 30 – 40 minutes in length) was scheduled to delve deeper into specific interest areas, including any that were raised in the customer's responses to the questionnaire. Most interviews were conducted over the phone; however, customers were given the option to be interviewed in person, and some did choose that option.

In order to encourage customers to be more forthright with Synapse, the survey was conducted confidentially. As such, while selected questionnaire responses and interview notes for each surveyed customer have been provided in Appendix C of this report, all customer- and interviewee-identifying information have been removed.[15]

4.2 Customer Survey Results

Overview of Common Themes

We noticed many common themes among the customers that we interviewed. For example, most customers that we interviewed were past program participants at some

non-participants revealed that they were actually program participants, and 14 customer that were originally unidentified revealed that they were program participants. Therefore, the participation levels of the final 36 customers surveyed is as follows: 6 customers were non-participants (17%) and 30 customers (83%) were participants.

15 The characterization of barriers evolved as we surveyed customers. Because of this, the "Barriers to Participation" section in the interview notes in Appendix C varies depending on when the customer was interviewed.

level and stated that they either will participate or are considering participating in programs in the next few years.[16] In general, the customers we interviewed consider energy efficient equipment regularly when they make purchasing decisions.

Another theme we heard from most of our interviews was that payback period is the main criteria for evaluating energy efficiency investments and that energy efficiency investment payback periods compete with the payback periods for other capital investment projects. The payback threshold for moving forward with energy efficiency investments was remarkably consistent across industries and regions. Most customers require projects to have payback periods of four years or less. However, projects with payback periods of three to four years are rarely approved. Projects with payback periods of two to three years are sometimes considered, but approval is uncertain and depends largely on the economics of the other projects that are competing for capital in a given year. A project with a payback of two years or less is typically considered to be worthwhile and is approved.

A third theme we heard from many customers we interviewed was that capital constraints are a key barrier to moving forward with energy efficiency projects. All projects that are submitted (whether they are related to energy efficiency and energy consuming equipment replacement or not) compete for capital investment dollars using payback as the key criteria and taking into the account the nature of the need for the project. Energy efficiency investments are frequently categorized as discretionary, not required, expenditures.

A fourth theme is that the general process for vetting and approving energy efficiency investments is similar across many customers. Projects are scoped, analyzed, and proposed on an annual basis and submitted to a higher level team for review and approval.

A fifth theme is that financing mechanisms, such as loans, are seldom, if ever, used. Instead, customers primarily use available capital to pay for their energy efficiency investments, supplemented by the contributions from the energy efficiency programs. A sixth theme is that many customers were generally confused by the number of different energy efficiency program administrators in the market and what each provider could provide. Some customers had facilities served by both municipals and utilities. Also, some customers mentioned that they were also working directly with ESCOs, renewable installers, and manufacturers/distributors of lighting products, among other third parties.

It is clear from even our small sample that there are many different types of customers with different needs and barriers to participating in energy efficiency programs. For example, some customers are proactively looking for energy efficiency opportunities, prefer to scope an energy efficiency project using their own internal resources, and prefer to obtain program administrator resources with little technical support from the program administrators. Other customers do not have the resources to be proactive and scope projects, and prefer regular contact from program administrators on program offerings and savings opportunities. This diversity of customers creates a significant challenge for program administrators, because reaching additional customers and achieving deeper levels of savings per customer will likely require offering program technical and financial

[16] Specifically, when asked whether a customer plans to participate in the efficiency programs within the next three years, 27 customers said “yes,” 2 said “no,” and 7 said “maybe.” The four additional customers that completed the questionnaire but not the interview all indicated “maybe.”

support that is more tailored to the unique needs of the many different types of electric and gas customers.

Positive Feedback

Many of the customers interviewed provided positive feedback on the programs. Some of the highlights include the following points, which are amplified with a few anecdotes.

Many customers were grateful for the sustained incentives and technical assistance provided by energy efficiency program administrators over the years and indicated that energy efficiency investments could not compete with other capital investments without the incentives and technical assistance received.

- One customer is a regular participant and is totally committed to energy efficiency, but cannot do efficiency projects without the program administrator's rebates. The efficiency savings from equipment installations does not allow the customer to reach its required payback on its own. The combination of energy savings, maintenance savings, and rebates allows the customer to meet its two years or less payback objective.
- Another customer has mostly focused on lighting opportunities and has been transitioning to new lighting over the past 10-13 years. The customer stated that every step the customer takes improves long run expenses and, even though they must do this in a phased approach to maximize incentives and manage the capital investment, they aim to eventually reach all of the lighting retrofit opportunities in the building.
- A third customer indicated that it has mostly tapped out its gas opportunities using incentives that the customer has accessed 2 or 3 times. The incentives have helped the customer achieve the payback criteria and helped energy efficiency projects compete with other capital investment projects that were on the table, resulting in project prioritization, approval, and implementation.

Several companies mentioned that they appreciate the level of outreach that they receive from energy efficiency program administrators and have had a long-standing, trusting relationship with their account executives.

- One customer stated that it has a true partnership with his energy efficiency program administrator and feels strongly that the energy efficiency program administrator is representing the customer's interests and needs. The customer appreciates the support provided by the energy efficiency program administrator to help the customer complete efficiency projects. The partnership is a win-win for both parties. The customer has national operations and acknowledges that Massachusetts energy efficiency programs are way ahead of most energy efficiency programs across the country and that Massachusetts has been very proactive in its approach to efficiency. The customer especially appreciates the ability to work with the energy efficiency program administrator to meet the customer's needs.
- Another customer stated that they appreciate and trust the energy efficiency program administrator's guidance on energy efficiency products and services.

Some companies recognized the variety of efforts and approaches that the energy efficiency program administrators are leveraging as well as the positive impacts of these efforts over time.

- One customer likes the concept of the upstream lighting program. The customer stated that this program shows that the energy efficiency program administrators are trying to help their customers get incentive dollars without having to submit a lot of paperwork.
- One customer has worked closely with its energy efficiency program administrator to design a custom three-year efficiency plan for its property through a Memorandum of Understanding (MOU). Through the MOU, the customer set aggressive goals and has been successful in meeting those goals. The energy efficiency program administrator has been able to provide greater amounts of funding than in previous years of participation, which allowed the customer to design a significant efficiency investment plan.
- Another customer felt strongly that the biggest benefit of these programs over time has been to accelerate energy efficient product development and manufacturing and make energy efficient solutions affordable options for companies.

Summary of Barriers Identified by Customers

The barriers to participation that have emerged from the interviews can be organized into two categories: customer barriers and program barriers. Customer barriers are barriers that stem from a customer's internal decision-making processes.[17] Program barriers are barriers that stem from the way the programs are designed or administered.

Customer Barriers

The customer barriers consist of the following:

- Customer's capital constraints: this category addresses a customer's tight capital investment budgets, and efficiency projects competing against other investment projects that are more germane to a customer's core business.
- Economic climate: this category addresses economic issues that might influence a customer's decision to participate in programs, such as reduced capital availability because business is slow or there is not enough time to devote to efficiency because the customer has had layoffs, and responsibilities are divided among fewer employees.
- Unsupportive corporate review and approval process: this category addresses the difficulty in receiving corporate or management approval to spend on efficiency measures.
- Company is convinced it has done all it can : this category addresses the customer perception that it doesn't have any more efficiency measures it can implement within its facilities..
- Distrust of new technology: this category addresses whether a customer distrusts efficiency measures, including perceiving efficiency measures as requiring more maintenance and upkeep.

[17] It is important to note that the efficiency programs, by their very nature, are designed to remove barriers to participation in efficiency projects. However, customers identified aspects of the programs that they perceive as barriers.

Program Barriers

The program barriers consist of the following:

- Insufficient marketing and outreach: this category addresses how aware customers are about efficiency programs and opportunities, and how regularly they hear from program administrators.
- High transaction costs: this category addresses the process required for program participation, including paperwork and time devoted to program participation.
- Inadequate responsiveness and timing: this category addresses how quickly the program administrators respond to a customer's needs (i.e., when equipment fails and needs immediate replacing), as well as the timeliness of program administrators outreach to customers about participation in programs, .
- Limited measures offered through the programs: this category addresses the appropriateness and adequateness of measures offered through the efficiency programs.
- Insufficient incentives: this category addresses the appropriateness and adequateness of incentive levels and rebates offered through the efficiency programs.
- Desire to opt out of the energy efficiency charge: this category tracks customer's mention of the energy efficiency charge or the system benefits charge as a barrier to greater efficiency savings. Some large customers would prefer to opt out of the charge and use the funds they would normally contribute to the charge within their business, with the stipulation that such funds can only be used for efficiency projects. While this is not necessarily a participation barrier created by the design or implementation of the efficiency programs, some customers argued that such a change would allow them to spend more on efficiency projects and achieve greater savings.
- Programs not tailored to unique needs: this category tracks customer's mention that the programs are not designed to meet their needs.

Figures 4.3 and 4.4 present a summary of the number of times each of the barriers was mentioned by customers in our interviews.[18] In general, program barriers were mentioned about twice as frequently as customer barriers. Of the program barriers mentioned, insufficient marketing and outreach and transaction costs were the most frequently mentioned barrier.

[18] Note that each customer mentioned more than one barrier, and not all customers identified the same number of barriers. We present these figures simply to provide a summary of the frequency with which the different barriers were identified.

Figure 4.3 Customer Barriers Mentioned in the Interviews

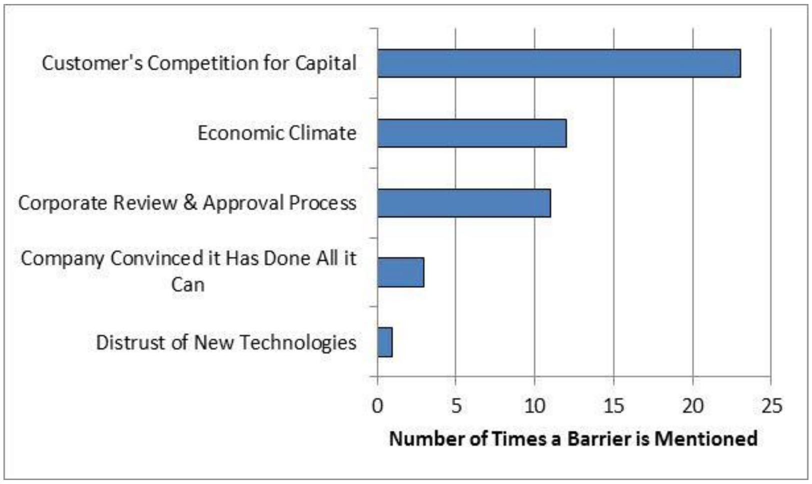
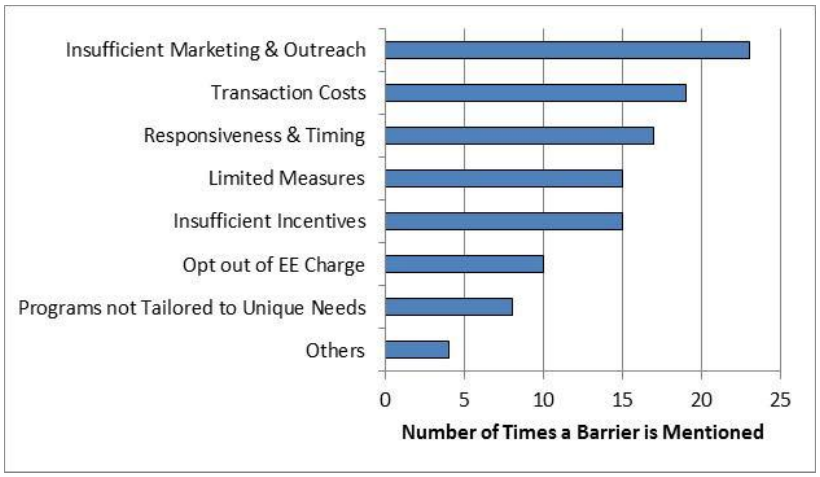


Figure 4.4 Program Barriers Mentioned in the Interviews



Tables 4.3 and 4.4 present a summary of the barriers identified by each customer during its individual interview.[19] Each customer is identified by its region and industry. A "yes" in the table indicates that the barrier affects the customer, while a "maybe" indicates that the barrier could affect the customer depending on certain circumstances. For example, a "maybe" within the "corporate review and approval process" category could be because the customer is under new ownership and is uncertain how responsive the new ownership will be to energy efficiency projects.

[19] Note that the number given to each surveyed customer in Tables 4.3 and 4.4 corresponds to the interview number identified in each customer's interview notes included in Appendix C.

Table 4.3 Barriers Identified in Customer Interviews - Customer Barriers

Company Information				Expect to Participate in Next 3 Years?					
#	Region	Industry	Participant		Customer's Capital Constraints	Economic Climate	Corporate review & approval process	Company distrust of new technologies	Company convinced it has done all it can
1	Bristol County	Heavy Industry	Yes	Maybe	Yes				
2	Bristol County	Retail	Yes	Yes	Yes				
3	Bristol County	Miscellaneous	Yes	Yes	Yes	Yes	Yes		
4	Boston	Schools & Colleges	Yes	Yes			Yes		
5	Western Mass	Retail	Yes	Yes	Yes	Yes			
6	Boston	Healthcare	Yes	Yes	Yes				
7	Boston	Office	Yes	Yes		Yes	Yes		
8	Boston	Restaurants & Lodging	Yes	Yes					
9	Boston	Office	Yes	Yes	Yes				
10	Central Mass	Heavy Industry	Yes	Yes	Yes				Yes
11	Western Mass	Office	Yes	Maybe	Yes	Yes			
12	Boston	Office	Yes	Yes	Yes	Yes			
13	Central Mass	Healthcare	Yes	Yes	Yes	Yes	Yes		
14	Boston	Schools & Colleges	Yes	Yes	Yes				
15	Boston	Schools & Colleges	Yes	Yes					
16	Boston	Healthcare	Yes	Yes	Yes				
17	Boston	Schools & Colleges	Yes	Yes		Yes			
18	Western Mass	Heavy Industry	No	Yes	Yes		Maybe		
19	Central Mass	Retail	Yes	Yes					
20	Central Mass	Office	Yes	Yes	Maybe	Maybe			
21	Boston	Healthcare	Yes	Maybe	Yes	Yes			
22	Western Mass	Heavy Industry	Yes	Yes	Yes				
23	Western Mass	Heavy Industry	Yes	Yes	Yes				
24	Western Mass	Heavy Industry	Yes	Yes	Yes				
25	Western Mass	Heavy Industry	Yes	Yes	Yes				
26	Bristol County	Retail							
27	Central Mass	Restaurants & Lodging	Yes	Yes			Maybe		
28	Boston	Office	no	No			Yes		
29	Boston	Office	Yes	Yes			Maybe		
30	Boston	Heavy Industry	No	Maybe	Yes	Yes			
31	Western Mass	Heavy Industry	No	Yes			Yes		
32	Boston	Heavy Industry	Yes						Maybe
33	Western Mass	Office	no	Yes			Maybe		
34	Western Mass	Warehouses & Distribution	no	Maybe	Yes			Yes	Maybe
35	Cape Cod	Healthcare	Yes	No	Yes	Yes			
36	Boston	Retail	Yes	Yes	Maybe	Yes	Yes		

Table 4.4 Barriers Identified in Customer Interviews - Program Barriers

Company Information			Program Design & Administration Barriers							
#	Region	Industry	Insufficient Incentives	Insufficient Marketing & Outreach	Transaction Costs	Responsiveness & Timing	Limited Measures	Programs not Tailored to Unique Needs	Opt out of SBC	Others
1	Bristol County	Heavy Industry	Yes	Yes					Yes	Yes
2	Bristol County	Retail	Yes	Yes	Yes					
3	Bristol County	Miscellaneous		Yes	Yes	Maybe	Yes			
4	Boston	Schools & Colleges					Yes	Yes		Yes
5	Western Mass	Retail		Yes	Yes		Yes			
6	Boston	Healthcare				Yes	Yes			
7	Boston	Office	Yes	Yes	Yes					Yes
8	Boston	Restaurants & Lodging		Yes	Yes	Yes		Yes		
9	Boston	Office		Yes		Yes	Yes			
10	Central Mass	Heavy Industry					Yes		Yes	
11	Western Mass	Office		Yes						
12	Boston	Office	Yes	Yes		Yes				
13	Central Mass	Healthcare			Yes					
14	Boston	Schools & Colleges	Yes				Yes	Yes	Yes	
15	Boston	Schools & Colleges	Yes	Yes		Yes	Yes		Yes	Yes
16	Boston	Healthcare	Yes				Yes	Yes	Yes	
17	Boston	Schools & Colleges			Yes	Yes	Yes	Yes	Yes	
18	Western Mass	Heavy Industry		Yes						
19	Central Mass	Retail	Yes	Yes	Yes	Yes	Yes	Yes		
20	Central Mass	Office		Yes		Yes				
21	Boston	Healthcare	Yes	Yes			Yes	Yes		
22	Western Mass	Heavy Industry	Yes	Yes	Yes	Yes			Yes	
23	Western Mass	Heavy Industry	Yes	Yes	Yes	Yes			Yes	
24	Western Mass	Heavy Industry	Yes	Yes	Yes	Yes			Yes	
25	Western Mass	Heavy Industry	Yes	Yes	Yes	Yes			Yes	
26	Bristol County	Retail	Yes							
27	Central Mass	Restaurants & Lodging			Maybe		yes			
28	Boston	Office		Maybe				Yes		
29	Boston	Office			Maybe					
30	Boston	Heavy Industry		Yes	Yes					
31	Western Mass	Heavy Industry		Maybe	Yes		Maybe			
32	Boston	Heavy Industry		Maybe		Yes				
33	Western Mass	Office			Yes	Yes				
34	Western Mass	Warehouses & Distribution			Yes		Yes			
35	Cape Cod	Healthcare	Maybe			Yes				
36	Boston	Retail		Yes	Yes	Yes				

Customer Barriers

Each of the customer barriers summarized above is discussed in more detail below. It is worth noting that many of the customer barriers are not mutually exclusive, leading to the appearance of overlaps. For example, when asked whether the economy affected a customer's business, the person interviewed may have discussed reduced capital or reduced payback periods, which are addressed in both the customer's capital constraints and corporate review and approval barrier categories. When quantifying whether a customer considers a situation to pose a participation barrier, we adhered to the barrier definitions discussed above and only considered the situation a barrier when the customer explicitly identified it as such.

Customer's capital constraints. This is one of the most frequently cited and important barriers that customers face in energy efficiency program participation. Many customers, although not all, do not have a problem accessing capital.[20] Their chief problem is with the competition for capital between energy efficiency investments and other investments, especially those investments that are more germane to the core business of the customer. Some companies have global operations, and face competition for capital in Massachusetts, in the United States, and elsewhere in the world. This competition for capital is so important to customers that it results in greater adherence to payback period constraints, as that is often the criteria that is used to determine which project deserves the constrained capital. Further, some customers mentioned that the significant upfront cost of efficiency measures, especially larger projects beyond lighting upgrades, created a barrier to deeper participation.

Economic climate. The economy appears to have a relatively indirect impact on a customer's ability to participate in efficiency program, as many customers were not clear on the connection between economic conditions and efficiency program participation. When asked, customers held several views on the extent to which the economy affects their participation:

- Some customers do not see the economy as a barrier to participation.[21]
- Other customers were quick to mention that the economy has affected their employee base, profit, or capital availability, making it more difficult to undertake nonessential projects.
- Some customers see efficiency as even more important in tight economic conditions, as a means to better manage budgets and reduce costs with minimal capital outlay.
- For other customers, the downturn in the economy exacerbates the competition for capital problems discussed above, in that capital might be harder to access or payback periods may need to be shorter.
- Still other customers noted that in a tight economic context they are more likely to let existing equipment run through its useful life, rather than retrofit it early. This creates a barrier to implementing efficiency measures as there is often insufficient

[20] This may be partly a result of the fact that our survey was limited to medium and large C&I customers.

[21] This may be partly a result of the fact that our survey primarily included those customers that have participated in the energy efficiency programs in recent years.

time and resources to identify and procure the most efficient option at the time of equipment failure.

Economic climate. The economy was a relatively intangible impact on customer's ability to participate in efficiency program, as many customers were not clear on the connection between economic conditions and efficiency program participation. Some customers were quick to mention that, over the past few years, the economy had impacted their employee base, profit, or capital availability. Many of these customers indicated that their business recently experienced improvements, consistent with upturn observed in the larger economy. However, the ways in which the ebbs and flows in the economy influence the customer's ability to participate in energy efficiency programs was unclear.

- Some customers see efficiency as even more important in tight economic conditions; a means to better manage budgets and reduce costs with minimal capital outlay.
- For other customers, the downturn in the economy exacerbated the competition for capital problems discussed above, in that capital might be harder to access or payback periods may need to be shorter.

Still other customers noted that in a tight economic context they are more likely to let existing equipment run through its useful life, rather than retrofit it early. This creates a barrier to implementing efficiency measures as there is often insufficient time and resources to identify and procure the most efficient option at the time of equipment failure. .

Unsupportive corporate review and approval process. Some customers noted that they have no problem getting support from corporate executives to implement energy efficiency projects. However, corporate decision-making practice often requires efficiency projects to compete for capital with investments that are more germane to a customer's business (see above), and sometimes corporate practices place very tight payback periods constraints on all investments, limiting the energy efficiency measures that can obtain corporate approval. Some customers noted that their corporate executives expect to see clear reductions in their energy bills as a result of energy efficiency, and when the bills increase (due to other factors such as rate cases) the corporate executives reach the conclusion that the energy efficiency has not been successful in reducing energy bills.

Customer is convinced it has done all it can. This was not a commonly identified barrier as only three customers identified this barrier. When mentioned, it was seen as a transient barrier that would disappear over time. Customers mentioned that they had done several efficiency projects, and that, while additional savings opportunities likely exist within their buildings, the savings are not likely to outweigh the transaction costs. One customer indicated that savings opportunities from the next generation of efficient equipment would likely propel them to participate in the future.

Distrust of new technology. Only one of the customers interviewed indicated that they were reluctant to implement energy efficiency measures because they did not trust or fully understand the efficiency technology.[22] This customer was concerned that reducing energy consumption could reduce its production capability.

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[22] This may be partly a result of the fact that we primarily surveyed energy efficiency program participants.

Other barriers. A few customers mentioned barriers or topics that did not fit into the categories above. These include: people have been lulled into a sense of security with prices of electricity and natural gas being relatively low, and participants are distracted by other energy projects like solar or geothermal.

Program Barriers

Each of the program barriers summarized above is discussed in more detail below. It is important to note that the efficiency programs, by their very nature, are designed to remove barriers to participation in efficiency projects. However, customers identified issues that they see as “barriers” in the way programs are designed or administered, and recommended ways to enhance the programs to better remove barriers to efficiency implementation.

Insufficient marketing and outreach. Many of the customers feel that the program administrators could be more proactive in reaching out to and educating customers about efficiency opportunities. Some customers felt program administrators were inconsistent in their outreach, or had limited contact with their representative. Others thought that, while the program administrators do reach out to them, the customer was driving the process and had previously researched the opportunities. Several customers noted that their gas program administrator has not reached out to them with energy efficiency opportunities, or provided any technical or financial support. This is particularly troubling to several customers who are very active in the electric efficiency programs and who believe they have significant gas efficiency opportunities. Some customers have regular, annual cycles of budgeting and investing in energy efficiency equipment, and they would prefer that the program administrators coordinate their program services with the customer’s annual process.

High transaction costs. Many customers indicated that the paperwork and legwork involved in participation is too great, and that the overall process needs to be simplified. Some customers claimed that, for long lead-time projects, the time required to receive a financial incentive as well as the uncertainty about obtaining a financial incentive, especially across program years, create a barrier to their participation.

Inadequate responsiveness and timing. Several customers thought their program administrator was unresponsive to their needs, and a few customers attributed it to the program administrators being overworked. Others thought it was difficult to time their participation, such as when major equipment fails and needs to be replaced immediately, or during new construction when projects need to go forward and cannot be held up by program participation. One customer noted that the time required to get new lighting technologies approved for the Design Lights Consortium (DLC) list was so great that by the time a technology gets approved for the list it is out-of-date; that many of the technologies on the DLC list are out-of-date; and that the list does not include a lot of cost-effective emerging technologies.

Limited measures offered through the programs. Many customers expressed a desire for the programs to be more flexible and to allow the customers to recommend efficiency projects to undertake. Other customers suggested that specific equipment, such as elevators, should be incented through the programs. One customer put a lot of resources into working with a lighting manufacturer to develop a highly efficient LED lighting product to meet their exact needs, but the program administrators took a long time to review the product, and then rejected it because it did not meet the specifications of the lighting program.

Insufficient financial incentives. Many customers noted that they would implement additional efficiency measures if they were provided with greater financial incentives. Additional financial incentives would help overcome the competition for capital that many customers face, as well as reduce the payback periods needed to meet corporate requirements. Many companies indicated that there is not enough coverage of technical support costs or availability of technical support in general. Some customers wished the programs offered different incentive structures and better addressed upfront costs as well as costs over the life of the measure. Some customers mentioned that after completion of an efficiency project they were not provided with the full financial incentive that was originally anticipated from the program administrator.

Desire to opt out of the energy efficiency charge. Many customers claimed that they would be able to achieve much greater energy efficiency saving if they were able to keep all of the funds that they contribute to the Massachusetts energy efficiency programs and dedicate those funds to efficiency projects at their own facilities. This was especially true among the large customers, including those in the industrial, healthcare and schools/colleges industry types.

Programs not tailored to unique needs. Some customers thought that the program administrators did not make an effort to speak their industries' language, or that they did not understand the unique needs of their industry. This was especially true for customers in the healthcare industry, where the program emphasis on lighting and HVAC controls do not make as much sense.

Other barriers. A few customers mentioned barriers or topics that did not fit into the categories above. These include: (a) the lack of transparency with regard to the amount that the customer is providing to efficiency program funding is a barrier when employees try to convince management to take advantage of efficiency programs offered by the program administrators; and (b) customers appear to be confused by the number of energy efficiency providers in the market (i.e., ESCOs vs. renewable installers vs. lighting manufacturers/distributors vs. utilities/municipal aggregators/municipals).

Themes within Regions and Industries

The limited number of customers that participated in our survey by region and industry, and the wide variety of responses provided through the survey, made it difficult to identify themes regarding barriers to participation by region or industry. To demonstrate this point, Tables 4.5 through 4.8 provide the customer and program barriers by region and industry, as well as the number of interviews completed within the respective region or industry. We are reluctant to draw many conclusions about themes across regions or across industries from such a limited set of data.

One theme that did emerge was from the healthcare industry. Some members of the healthcare industry noted that the economic climate has had a big effect on them, given that revenues are declining due to government changes to the healthcare industry. They also felt that the efficiency programs were not tailored to their unique needs.

Table 4.5 Customer Barriers by Region

Regions	Interviews	Customer Barriers					
		Customer's Capital Constraints	Economic Climate	Corporate review & approval process	Distrust of new technologies	Company convinced it has done all it can	Total
Boston	16	8	6	5	0	1	**20**
Central Mass	5	3	2	2	0	1	**8**
Cape Cod	1	1	1	0	0	0	**2**
Western Mass	10	8	2	3	1	1	**15**
Bristol County	4	3	1	1	0	0	**5**
Total	**36**	**23**	**12**	**11**	**1**	**3**	**50**

Table 4.6 Program Barriers by Region

Regions	Interviews	Program Design & Administration Barriers								
		Insufficient Incentives	Insufficient Marketing & Outreach	Transaction Costs	Responsiveness & Timing	Limited Measures	Programs not Tailored to Unique Needs	Opt out of SBC	Others	Total
Boston	16	6	10	6	8	8	7	4	3	**52**
Central Mass	5	1	2	3	2	3	1	1	0	**13**
Cape Cod	1	1	0	0	1	0	0	0	0	**2**
Western Mass	10	4	8	8	5	3	0	4	0	**32**
Bristol County	4	3	3	2	1	1	0	1	1	**12**
Total	**36**	**15**	**23**	**19**	**17**	**15**	**8**	**10**	**4**	**111**

Table 4.7 Customer Barriers by Industry

Industry Types	Interviews	Customer Barriers					
		Customer's Capital Constraints	Economic Climate	Corporate Review & Approval Process	Distrust of New Technologies	Company Convinced it Has Done all it can	Total
Heavy industry	10	8	1	2	0	2	**13**
Warehouses & Distribution	1	1	0	0	1	1	**3**
Retail	5	3	2	1	0	0	**6**
Office	8	4	4	4	0	0	**12**
Schools & Colleges	4	1	1	1	0	0	**3**
Healthcare	5	5	3	1	0	0	**9**
Restaurants & Lodging	2	0	0	1	0	0	**1**
Miscellaneous	1	1	1	1	0	0	**3**
Total	**36**	**23**	**12**	**11**	**1**	**3**	**50**

Table 4.8 Program Barriers by Industry

Industry Types	Interviews	Program Barriers								
		Insufficient Incentives	Insufficient Marketing & Outreach	Transaction Costs	Responsiveness & Timing	Limited Measures	Programs not Tailored to Unique Needs	Opt out of SBC	Others	Total
Heavy industry	10	5	9	6	5	2	0	6	1	**34**
Warehouses & Distribution	1	0	0	1	0	1	0	0	0	**2**
Retail	5	3	4	4	2	2	1	0	0	**16**
Office	8	2	6	3	4	1	1	0	1	**18**
Schools & Colleges	4	2	1	1	2	4	3	3	2	**18**
Healthcare	5	3	1	1	2	3	2	1	0	**13**
Restaurants & Lodging	2	0	1	2	1	1	1	0	0	**6**
Miscellaneous	1	0	1	1	1	1	0	0	0	**4**
Total	**36**	**15**	**23**	**19**	**17**	**15**	**8**	**10**	**4**	**111**

Customer Anecdotes

Some customer comments and stories have struck us as important and interesting. A summary of such themes and stories are provided below.

- The interviewee feels that the program administrators do not understand healthcare at all. An assessment was conducted at the customer's business that (1) identified projects that had already been implemented (2) identified measures that are not able to be implemented in a healthcare environment (i.e., occupancy sensors and programmable thermostats with setback) and (3) did not identify opportunities that the customer was interested in (the assessment focused entirely on short term quick fixes and ignored projects with larger capital outlays). They looked at lighting in healthcare the same as for an office building, which does not work.
- If the customer does participate in the next three-years, the person interviewed stressed that gas savings needed to become a stronger focus for the customer, whether or not the program administrator's efficiency program allow opportunities and incentives for gas savings. The person interviewed felt that gas incentives were not as generous as on the electric side, and that the gas programs were not as well structured as, and even appeared disconnected from, the electric programs.
- The customer has made some effort to get up to speed on the program administrator's terminology, but it has taken special time and effort. The language is overly technical and very specific to the program administrator's process. Also, if the customer asks the program administrator a general question it is frequently directed to fill out an application before it can get this question answered. As it is too early in the process for an application to be submitted, the discussion usually stops there and efficiency opportunities are not captured.
- The program administrators are not up to speed on new developments. It can take a long time for them to come to grips with some of the possibilities of new products or projects.
- Program administrators do not treat the customer like it knows anything. Most large customers are pretty sophisticated. It would be nice if the program administrators treated them with that sophistication and understood that they are not babes in the woods.
- The customer has limited contact with its program administrators, and was not informed by its program administrators about efficiency programs. The customer was generally aware that the program administrators offer efficiency programs because it has locations in Connecticut, and has retrofitted lighting in all of its Connecticut locations through Connecticut Light and Power. However, the customer has a limited understanding of the Massachusetts efficiency programs.
- Some lighting upgrades received pushback from the customer's ownership, particularly because the color and brightness of the light was not quite right and it was changing the aesthetics of the building. The customer was not able to buy the light bulbs with the correct aesthetics right off a shelf. They had to special order them because the one that was on the approved list for program administrators rebates was not readily available. The customer had to find a light that was qualified for a rebate and then test the aesthetics of it in its building. The special order took many weeks to a couple months to arrive. It would have been easier to purchase the light bulb that was more readily available. The bulb the customer ultimately ended up buying was more expensive, so the initial cost of the program

was greater than if they had been able to use the light bulbs that were more readily available. However the rebates offered through the program made the overall cost less than the initial bulbs.

- The customer knew of the local incentives and brought in an energy consultant that helped shape the program and to get the process streamlined through the program administrator. The consultants helped the customer from start to finish doing the reporting back to the program administrator on the fixtures installed, any other controls, what the kWh saved were. Hiring the consultant was something that just made sense to the customer, knowing that, by working through the consultants, they would handle all the applications and processing and calculations. It just made sense to give the customer time to focus on what they were doing day-to-day but also to give leverage to make sure they were capitalizing on the programs to the best of the customer's ability. It was well worth the investment in time having the consultants. The customer was able to achieve the maximum benefits and rebate.
- The customer has seen a reduction in inpatients and elective healthcare services that would normally generate revenue, which the person interviewed attributes to the economy and lack of spending. Elective surgeries such as cosmetic surgeries are not taking place. This could change once the economy gets better. Notably, pregnancies are down from previous years, which also decreases future projections of revenue. This is because if a baby is delivered at the customer 's facilities, ultimately the baby is likely to become a user of the facilities due to the history and familiarity.
- It would be great if the customer's building was sub-metered and would likely help their ability to participate. The customer is an office tenant in a building set up for retail. There is one meter for the entire building with six floors. The overall energy consumption of the building is divided up to each tenant by square footage, not based off usage. The first floor is going to use more energy because they are retail establishments with restaurants and kitchens, which use more energy than an office. The customer was not even aware that this was the billing arrangement until about two years ago when the person interviewed looked into it. Now as the company considers new office spaces, sub-metering is a huge consideration.
- One customer stated that "the economy itself is not good. We're extremely slow right now. I'm laying people off tomorrow because there isn't enough work for them. There's no sense bringing them in and turning the lights on if I can't make enough money to pay for it." However, energy efficiency is seen by the customer as an opportunity to save money, so long as the payback is high, such as lighting measures. "When times are slow you have to cut back spending every place you can. Spending a few dollars to put in new light fixtures which is going to save us thousands of dollars over the long run makes sense to do it. It helps the environment and it helps your costs. It's a no brainer."
- Overall, the interviewee was very unclear as to the distinction between the incentives offered by the program administrators verses other third parties verses federal tax credits, etc. The interviewee considered them all one in the same and seemed willing to work with any party that could provide an incentive.
- The customer's relationship with their gas provider is new, but they were very satisfied with the process. They recently converted from oil to gas and received incentives towards a new gas boiler. They said their rep was excellent and eager to help.

- Most of the customer's energy efficiency activity has been in new construction, for which the customer received no rebates. The customer estimates they have achieved low savings to date for renovations/retrofits of existing equipment and space.
- The gas program administrator does not reach out to them much on efficiency issues. The gas program administrator representative is more of an account rep for billing than for efficiency. They met with the gas program administrator representative about two years ago, but have not seen him since.
- The customer makes energy efficiency decisions for their entire chain, which extends well beyond Massachusetts. They make decisions about what to purchase regardless of whether they will be getting rebates. They also did a lot of lighting upgrades to their office building without any rebates. However, they can do more efficiency investments with the funds provided by the rebates. Also, there is often a lot of deeper efficiency measures that they could adopt but that they do not adopt because of the paperwork necessary for the rebates. They build a lot of new buildings, and they are all alike; cookie-cutter. But every time they want to get rebates from the new construction program they have to re-apply from scratch. They often do not bother. Also, they typically lease the buildings and pay the energy bills. They do not bother to apply for the new construction program because of the paperwork, and because they have to chase the builder down for all the invoices. It is not worth it. They do not know if the builder goes after the new construction program rebates.
- Of course budget limitations pose a barrier. The person interviewed could think of $10 to spend for every $1 available. The customer would always like to do more efficiency, but budgets do not always allow for it.
- The economic downturn did not strongly affect the customer. To some degree the customer was tight on money, and so obtaining funding for energy efficiency was a little bit difficult prior to the program administrator's involvement in developing the long-term efficiency plan with the customer. The customer returned to a healthy financial state relatively quickly and does not expect its financial health to change going forward.
- Over the past 4 or 5 years, the customer has been pretty aggressive with energy conservation, and the person interviewed thinks they received back about 10 percent to 20 percent of what they put in. They wonder where the other 80 percent of money is going and how it is being distributed. Not sure if what that 80 percent is used for offsets the savings that the customer would get if it had been allowed to use it for efficiency.
- At the end of the last two years, the program administrator has practically doubled incentive levels for certain measures. This tells the person interviewed that the program administrators are over collecting the funds, and are literally looking to burn money by end of year.
- The cost with incentives was not the problem. The physical space prohibited the customer from being able to install more efficient equipment. The customer was presented with discounts or incentives that would largely cover the cost of the measures, but the customer was not convinced that they were going to be able to take advantage of them anyway. Most of the time the systems are running wide open. To turn the system back would potentially reduce the customer's ability to operate the system successfully with lower electricity flows.

- The last time the customer participated, they found the process much easier. They could submit to the program administrator receipts from efficiency equipment and related paperwork. Now, everything needs to be preapproved by the program administrator before the equipment can be purchased. While this adds an extra step to the participation process, the real issue is that if you need new equipment you need it now, and cannot wait for preapproval.
- The customer is working with, and still working with the program administrator, and are making "damn little progress and damn slow progress for rebates and stuff, and as far as I know I won't be getting a nickel. I put a lot of time and effort into it." The customer has not heard anything from the people that would be giving them the incentive, primarily because the engineering firm has not provided the engineering study. The customer started the audit process in the middle of summer 2011, and as of March 2012, had not received the engineering study.

Customer Recommendations

A few customers made specific recommendations for improving the efficiency programs that are not addressed above. These suggestions are summarized below, similar to the anecdotal themes and stories summarized above.

- Several of the customers we interviewed indicated that they would be interested in financing options provided by the program administrators, such as pay-as-you-save or on-bill financing, primarily to mitigate the competition for capital and to reduce the payback period of efficiency measures. One person interviewed recommended allowing customers to pay off efficiency investments on their bill, but in such a way that the monthly payment does not exceed the monthly savings. This would also relieve him of having to ask management for capital to invest in efficiency projects.
- One customer suggested that the program administrators provide a program mentor responsible for introducing efficiency projects to the customer and to go through the energy audit and stick with the customer as a contact throughout the process. It's not like the program administrators just comes into your building, screws in CFLs, and walk away. You actually have to do something. You have to revise the operating strategy of the systems, and that requires a lot of time and effort. Working with someone to understand what it is actually going to take to participate would be useful.
- The customer suggested that the program administrators revisit customers who were at one point interested in efficiency but did not follow through to see why they may have been put on hold. If he were trying to see why customers are not participating in programs, then that is where he would start asking questions. If there are open applications where things never came through to fruition that could be a good area to explore and follow up.
- Sometimes the customer would like to do a custom project that requires technical and engineering support. That money would have to come out of another expense budget, and with the economy the way it is, that pool of money can be very tight. Program administrators will offer to partially fund technical support, but it would help if the program administrators were more aggressive in helping customers clearly identify a project in terms of what it will save and cost the customer to implement it. This creates a clear picture on what project would look like, which would be beneficial. Some projects have stalled for years because they are just concepts that have not been fully developed. Technical support could clearly define

the best projects and opportunities, which would be a good use of money. The person interviewed recommended that the program administrators pay the full amount of the technical study. As currently structured, the customer could do a study, but would have to pay for half of it while the program administrators pay the other half. If the project does not get built, the money spent on the technical study is seen by management as a waste of money. This is a hard step for the customer to get past.

- The customer experienced delays during its initial enrollment in the program. A lot of data was required from the customer regarding its energy use, which pushed back the installation process. The person interviewed recommended simplifying the logistical process for participation.
- The person interviewed recommended that the program administrators divide the amount of funding available by their MW or kWh goals as a way of allocating incentive dollars. Reward or incent each kWh saved by customers in the same way. Sometimes program administrators cannot fund a project because it does not meet the program requirements. If a customer cannot do a project with the program administrators funding, it would be hard to convince that customer to do any more efficiency if they were already turned down by the program administrator. If a customer can prove that a project saved energy, they should be rewarded with the incentive. Large customers should have incentives for being aggressive as it is getting harder and harder to find efficiency projects.

5. Implications for Energy Efficiency Programs

The results of our economic forecast and customer survey lead us to draw the following conclusions with regard to energy efficiency program planning.

1. The Three-Year Energy Efficiency Plans should include savings goals that recognize that (1) the Massachusetts economy is forecasted to improve steadily over the next few years, (2) many customers do not see the state of the economy as a barrier to participation in the energy efficiency programs, (3) many customers have additional efficiency opportunities in their facilities and (4) many customers have an interest in participating in the programs again. In fact, several customers noted that in a tight economy they might be more likely to participate in energy efficiency programs as one of the few options they have to cut costs (as long as the payback periods are short enough).

2. The Three-Year Energy Efficiency Plans should recognize the potential savings available from the C&I New Construction programs, given that the economic forecast indicates that business construction activity is expected to steadily increase over the next few years. Several customers noted that they find efficiency measures easier to implement at the time of renovation and new construction, relative to their retrofit opportunities.

3. Encouraging customers to adopt a deeper level of efficiency measures will likely require additional efforts to overcome some of the key barriers identified above, particularly customer budget limits and competition for capital, burdensome transaction costs of participating in the efficiency programs, and limited efficiency measures available by the efficiency programs.

4. Encouraging customers to adopt a deeper level of efficiency measures will also likely require increased engagement from the program administrators' account executives and efficiency support staff. This will be important both to reduce the transaction costs associated with the energy efficiency programs and to better serve the unique needs of the different customers.

5. The Three-Year Energy Efficiency Plans should recognize that many customers have apparently not received much outreach regarding gas efficiency opportunities, and that additional outreach and support from gas program administrators might lead to increased gas efficiency savings.

6. Program administrators should be required to collect and report more comprehensive data regarding the customers who participate in their energy efficiency programs. A better understanding of customer participation would provide the program administrators with very useful information about where the untapped efficiency opportunities lie and how to pursue them. It would also be very useful to identify and track the different types of participation, including: active participants (i.e., recent participants), inactive participants (i.e., past participants), non-participants, and proactive participants (where the customer prefers to take the lead with assistance from the program administrator) versus reactive participants (where the customer prefers the program administrator to take the lead).

Recommendations for Further Research

Our survey indicates that there are several areas where additional research might help to increase the participation of C&I customers over the next few years.

1. Most importantly, it would be helpful to continue efforts to better assess the perspectives of the C&I customers who have not participated in the Massachusetts energy efficiency programs to date.
2. It may be helpful to conduct statewide research into opportunities for reducing the transaction costs (including timing concerns) associated with participation in the energy efficiency programs. This could include a statewide effort to identify best practices within the state and from other parts of the country.
3. It may be helpful to conduct statewide research into training the program administrators' account representatives and support staff so that they have a better understanding of the needs of different customer types and different industries. This could include a statewide effort to train account executives and support staff and to share knowledge and experience across the program administrators.
4. It may be helpful to conduct statewide research into ways to expand the types of efficiency measures eligible for financial support, reduce the time required to accept measures for eligibility, and streamline the process that is used in deciding measure eligibility.
5. It may be helpful to conduct statewide research into opportunities for the gas program administrators to better coordinate their outreach and support services with electric program administrators.
6. It may be helpful to conduct statewide research into practices for spending the efficiency budgets more evenly over the course of a year, in order to avoid the year-end blitz that sometimes occurs in order to meet annual targets.

Appendix A – Massachusetts M&V Studies

Over the past two years, numerous measurement and verification (M&V) studies have been conducted on the Massachusetts C&I programs. We reviewed recent M&V studies in an effort to better understand the current customer perspectives regarding energy efficiency. Our review focused on the following process evaluation and market characterization studies:[23]

- Study 1: Small Business Direct Install program KEMA and NMR Group, Inc. *Project 7 General Process Evaluation - Final Report; MA EE Programs Large C&I Evaluation*, February 16, 2011.
- Study 2: The Cadmus Group, Inc. and Opinion Dynamics Corporation. *Massachusetts Non-Residential Small Business Direct Install Program: Multi-Tier Program Structure Assessment - 2010 Process Evaluation*, July 7, 2011.
- Study 3: Tetra Tech. *Industry Practices and Policies on EE Program Rebates/Incentives – Final Report*, January 25, 2011.
- Study 4: KEMA. *Supply Chain Profile Project 1A New Construction Market Characterization*, June 8, 2011.
- Study 5: KEMA and Itron. *Project 6B: Comprehensive Design Approach Process Evaluation Final Report*, May 17, 2011.
- Study 6: KEMA and NMR Group, Inc. *Final Report Project 1B Chain & Franchise Market Characterization*, June 7, 2011.

Below, we summarize the key barriers to efficiency program participation as well as the suggested approaches to overcome these barriers, as detailed in the above mentioned studies.

Financial Barriers

Cost of Energy Efficiency and Financing Availability

Customers' principal objection to using energy efficient equipment or design is financial constraints, particularly the higher first capital costs associated with efficiency (Study 2, at 22, 26; Study 4, at 4-3, 4-19; Study 6, at 7-6, 7-21 through 7-24. 7-39). While the upfront costs are a concern for most customers, other customers weigh the full cost of efficient equipment during system selection (Study 4, at 4-23). For example, in a study that interviewed architects, design engineers and construction managers as part of the evaluation of the large C&I programs offered by Massachusetts Program Administrators, market actors generally agreed that clients who own and operate buildings are more willing to consider increased first costs in a trade-off for lower operating costs (Study 4, at 1-1, 4-23). Consequently, owner/operators are more likely to pursue incentives (Study 4, at 4-23). Respondents reported that more sophisticated clients, such as colleges and universities, biotechnology firms, and laboratory facilities raise additional concerns that "higher service type [equipment] requires more mechanics, more controls and more oversight to run them properly as opposed to just starting them up and running the system" (Study 4, at 4-3, 4-23). They consider the ability of their staff to control and

[23] The studies are available on the EEAC website: http://www.ma-eeac.org/EM&V%20Studies.htm

maintain equipment, the cost of maintenance and replacement, and the risk of equipment failure (Study 4, at 4-23). In these cases, it appears that incentives may not offset the risks of unfamiliar equipment and unknown maintenance reliability (Study 4, at 4-23; See also Study 4, at 4-8, 4-11,4-19 through 4-20).

Even with large financial incentives available, there are still instances when participants face upfront costs that they would not necessarily face if an alternative approach to energy efficiency were used (Study 5, at 4-15 through 4-18). For example, with the Comprehensive Design Approach (CDA) program, the upfront costs of completing a TA study -- a model of energy efficiency measures that maximizes the energy savings of the entire project – creates a financial constraint for customers (Study 5, at 4-15 through 4-18). One architect noted that "not every client is willing to put up the money for a technical study. Sometimes it's a cash-flow issue or the customer just isn't convinced that putting up the additional money is justified. More of our customers would do the program if they didn't have to pay this money up-front" (Study 5, at 4-15 through 4-18).

Increased financing, and incentives as further discussed below, is often recommended as a method to overcome cost barriers, and is generally seen as an attractive and important component to participation[24] (Study 1, at 9-3 through 9-4; Study 2, at 1, 22; Study 6, at 6-17 through 6-18, 7-7 through 7-8). A respondent in one study stressed the importance of further developing financing options, explaining that, "just like we have an industry set up and working for ESCOs, we need an industry on the financial end that is set up and can respond in the same way. We don't have the same market as, [for example] a customer says, 'I want to do some energy efficiency. How do I start?' … 'Here's a whole list of people you can go to. They'll hand-hold you through the entire process.' I don't have the same thing on the financial side" (Study 1, at 6-16). Program Administrators could also consider expanding financial or technical assistance offerings for life cycle cost analysis to demonstrate the longer term value of accepting higher first costs (Study 4, at 5-6).

Program Financial Incentives and Payback Periods

Financial incentives offered through the Massachusetts Program Administrators' C&I programs[25] are a strong motivation for customer participation[26] (Study 1, at 6-8; Study 2,

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24 One study stated that, among all participants who received financing, more than half report that it was extremely important in their decision to install equipment (Study 2, at 22-23). In addition, nearly half of participants who received financing off-bill would have been unlikely to install the energy efficient equipment if financing had not been available (Study 2, at 22-23). Offering zero interest on-bill financing for 24 months is a program modification that has the potential to encourage those customers not motivated by interest free financing alone to install energy efficient equipment (Study 2, at 27-30).

25 A study that reviewed rebate and incentive programs in key states attempted to make comparisons of incentive levels for similar programs (Study 3, at 1-1). The study found that Massachusetts commercial rebates examined for lighting were on the low end of lighting rebates offered in other states (Study 3, at 3-1; see 3-14 through 3-21). Custom rebates comparisons are less straightforward, but Massachusetts rebates appear moderate relative to the other similar programs (Study 3, at 3-1). One California program rebates a lower percentage of costs but has a higher maximum amount that will be covered (Study 3, at 3-1). Massachusetts is somewhat unique in offering a separate program for small business customers that includes incentives covering 70 percent of installed cost (Study 3, at 3-1). These are identical to many of the surrounding states, but they are often offered by the same program administrators as Massachusetts (Study 3, at 3-1). Finally, Massachusetts rebates appear to be at the high end of offerings in other states for hot-air furnaces. (Study 3, at 3-1; see 3-14 through 3-21).

26 One customer interviewed during a study of the Comprehensive Design Approach (CDA) program stated that "the main motivator is the incentive paid to include certain technologies. That is the trump card" (Study 5 at 4-20). "While the lower operational costs are a selling point, the major motivator is defraying the upfront capital

at 1, 22, 32; Study 5 at 4-20, 4-28; Study 6, at 7-7 through 7-8, 7-21 through 7-24). While financial incentives promote participation and are important in the decision-making process of customers, customers often feel that the incentive is not high enough (Study 2, at 26, 31). Equipment costs and monetary constraints are commonly cited as reasons customers chose not to participate in efficiency programs, despite the financial incentive available (Study 2, at 22, 26; Study 4, at 4-3, 4-19; Study 5, at 5-1). The manager of a program stated, “unless a customer is branding themselves as a green building or constructing as a demonstration buildings, the energy savings and incentive amounts are just not enough” (Study 5 at 6-31). Even customers that participate in the program would prefer higher incentives, as even higher incentive levels would allow them to install more energy efficiency technologies, thus further reducing the energy usage of their facilities or buildings (Study 2, at 25-26, 31; Study 5, at 4-20, 4-28). Therefore, offering higher incentives is one of the most common suggestions for improving program participation (Study 1, at 6-13, 6-18; Study 2, at 25; Study 3, at 4-1; Study 5, at 5-1).

However, incentive levels can be difficult to set accurately for each program and within each Program Administrator’s service territory (Study 2, at 13; Study 5, at 5-4 through 5-5). For example, beginning in 2010, the Program Administrators began transitioning to a uniform statewide delivery model for the Small Business Direct Install program (see, Study 2). As part of this transition, the Program Administrators established a statewide 70 percent incentive level for the program, which meant a significant increase for one PA, a slight increase for another, and consistency with existing levels for two other PAs (Study 2, at 13). There are different views among the Program Administrator staff on the preferred incentive level (Study 2, at 13). While there has been an effort to align incentive levels, some Program Administrators would like to raise the incentive level in the future (Study 2, at 13). In contrast, other Program Administrator representatives commented that the 70% incentive may be too high (Study 2, at 13). Further, implementing the new incentive level caused some challenges for vendors promoting the program and recruiting customers in the field (Study 2, at 13). As an obvious rule, the better the incentive, the more people participate (Study 2, at 13). Further, another study suggests that, to address the first-cost barrier, Program Administrators consider alternative incentive approaches such as tiered incentives for higher levels of efficiency (Study 4, at 5-6).

Additionally, the payback period of an efficiency investment is directly linked to financial incentives. Incentives help reduce the payback period for a project and this provides the impetus to use energy efficient measures (Study 5 at 4-20, 4-28; Study 1, at 6-6). In one study a customer was quoted to say, “As a client, you’re going to want to get the most value for your dollar, and you’re going to want to implement the measure that’s going to give you the best paybacks. In order to entice a customer to do more than that, the incentives would have to be larger because the client needs better payback in order to push it through management. If I’m a client, and if I have a corporate policy that says I don’t do anything [with] less than a two-year payback, well, that might be something you can do for the first measure, maybe that second measure that you’ve identified. But that

costs of construction” (Study 5 at 4-20; 4-27). Often times, the incentive is a precursor to participation. For example, one architect noted that he is not able to get daylight dimming systems into his K-12 school projects unless the first cost is subsidized by a utility incentive (Study 4 at 4-7). A CDA participant summed up his satisfaction with the level of financial incentive received by stating: "it essentially allowed me to internally get optimal systems over the lifecycle of the facility to run at the cheapest cost. So anytime I can put some money in upfront to get those systems, it helps the sustaining operational team to provide the lowest price of our product (Study 5, at 4-20)."

third, fourth, and fifth measure, even with the incentive that you're offering, is not going to get it within his restrictions" (Study 1, at 6-13).

In a weakened economic environment, customers are not going to be able to do a project that has a long payback period, and instead are looking for quick savings with paybacks as short as six-months (Study 1, at 5-3, 6-13). One technical staff respondent said that in their experience when programs "buy down the project to a one-year payback" more companies moved forward with projects (Study 1, at 6-18). He went on to say that they currently do that for some special cases but that customers rarely see a one-year payback because of stipulations or incentive caps (Study 1, at 6-18). In addition, this respondent noted that "every time we have specials and we offer more money for the customers then everybody comes flocking to the door" (Study 1, at 6-18; see also Study 1, at 9-5).

<u>Economic Conditions</u>

The recent economic downturn is commonly cited as a barrier to efficiency investments (Study 3, at 4-1; Study 5, at 4-15 through 4-18; Study 6, at 6-5, 6-12 through 6-17). One study quoted a number of program staff members on the economic climate:

> "In order to achieve the ambitious goals that we have I think the barrier is the availability of capital. You can have the best program in the world … and you can have some great information about the energy savings or the impact to production. If a client does not have the access to capital, they're not going to implement anything. It's the most critical piece of the equation. You can get them to do that first measure that's really attractive, and it can save a bunch of dollars. But they're not going to implement that third, fourth, fifth measure without realizing those energy savings first, because they need access to capital" (Study 1, at 6-12 through 6-13).

> "Right now, it's not only the actual state of the economy, but the general conception that now is not the time to act for any capital investment. It's just I got to keep the doors open. I got to attract new business. I cannot focus on saving energy. Even when I have a facilities manager in front of me who says, I agree with this, I'm ready to pull the trigger. It's just if I go to my senior management and say the utility company is willing to make a very attractive funding offer, their response is going to be, do we have orders in the hopper to support a capital investment? Unless the answer is absolutely yes, we're going to limp along with what's there. Now it's improved over the last year, but that/s still a major barrier" (Study 1, at 6-12 through 6-13; see also Study 6, at 7-21 through 7-24).

> "There's a number of companies around here that have money and want to invest the money, but because they're not sure where things are going, they're sitting on the cash. They're not putting it back into the business yet. They will do what they need to do for

maintenance, but when it comes to expansion or improvement, unless they're feeling very secure about the economy, it becomes a real struggle" (Study 1, at 6-11).

"In a good economy, I could sell ice to an Eskimo, literally. You walk in, the project costs X amount of dollars, we're going to give you 15 percent to 20 percent. It all has to do with economics. And we're in a horrible economy, and there is little or no capital funds available" (Study 1, at 6-16 through 6-17).

"The issue seems to be that the incentive levels, in some areas, [do not reflect the] economic straits our customers are in. Formerly, if you showed someone there was an investment with a three-year payback, you could tell by the body language right away: "Yes, I'm all over this". Whereas, now, customers we work with over the years who have always done a nice project a year are now saying it doesn't matter how good the payback is. I need to confirm my doors are going to be open next month and I'm meeting payroll. I'm not in a position to make capital investments" (Study 1, at 6-12 through 6-13).

"The feedback we get from facilities managers is … when I do an efficiency project, I'm competing with capital projects with the rest of my company. So literally, I walk in with an efficiency project, and one of the manufacturing managers walks in with a request to do something else. And you know, we have to compete to say which is of greater benefit? It's not like I have an open door to the management committee that says keep bringing me more efficiency projects. I have to sell it as an attractive investment. We'll get some tools to help us present that to the facilities manager, which he could then use to present to his management team, which in many cases are out of state. I guess what I'm getting at is a package of technical and marketing tools that help us promote going deeper. Right now, I have a mandate [to achieve deeper savings] and it's kind of up to me to figure out what that is, how to do it" (Study 1, at 9-9 through 9-10; see also Study 6, at 7-21 through 7-24).

The market for new construction is particularly impacted by the economic downturn (Study 5, at 4-15 through 4-18, 4-29, 6-28, 7-46). Even with the availability of incentives, the ability of builders to pursue energy efficient design is challenged (Study 5, at 6-28). One PA staff member said that "over the last couple years, a lot of [the issue] has been that people aren't building buildings. So now there are not enough buildings being built, and the ones that are being built are on such a shoestring budget that they can't proceed with putting efficiency measures in (Study 5, at 4-15 through 4-18)." National Grid estimated that new construction projects had declined by 50 percent in the past several years (Study 5, at 6-28). "With the current economic conditions, there is no new construction at all," said one WMECO representative (Study 5, at 6-28). The existence of this barrier is also supported by comments made by several of the CDA participants that were interviewed (Study 5, at 4-15 through 4-18). "There has been less new construction and a renewed focus on looking at existing facilities and how to retrofit all the systems," said one (Study 5, at 4-15 through 4-18).

For customers who participate in efficiency programs during an economic downturn, the amount of the incentive plays an increasingly important role in the decision to participate (Study 5, at 4-29). One customer noted that market conditions made them focus on their energy efficiency budget and as a result, incentives became very critical in their decision to install energy efficiency equipment in several projects in 2009 (Study, 5 at 4-29).

Increasing incentives is one approach to overcome the economic downturn. In one study, a respondent said "given the economy, if the incentives were a little bit higher, where you could bring down that payback period for the customer" (Study 1, at 6-11). Other approaches used by multiple programs to overcome the economic downturn were to focus on specialty lighting and other emerging technologies with significant market potential, and emphasize comprehensive approaches to energy efficiency at customer sites (Study 3, at 4-1). Another approach to overcome the economic downturn was to find more creative ways of marketing the programs (Study 3, at 4-1). Other AEs said that they focus on customers with stable financial conditions who have capital available that they are willing to invest in projects (Study 1, at 5-3).

One study stated that, while there is no remedy for the downturn in new construction, it is possible to mitigate the budgetary concerns of customers (Study 5, at 6-28). A successful program design may benefit from shifting the emphasis from incentives to long-term savings (Study 5, at 6-28). Sometimes, incentives are not enough for a customer to assume the additional time and responsibility required to participate (Study 5, at 6-28). Incentives, while substantial in dollar terms, may not have the desired influence if the incentive is weak relative to the entire cost of the project (Study 5, at 6-28).

Customer Awareness and Program Marketing

A key challenge for efficiency programs is reaching eligible customers with information about program offerings and the process for participation (Study 1 at 6-14, 9-4; Study 2, at 32; Study 5, at 6-26; Study 6, at 6-5, 6-16 through 6-17). One architect noted that smaller clients "usually don't have a clue" about incentive programs (Study 4, at 4-22; Study 6, at 6-5). In some instances, customers are aware that their PA offers programs to help customers save energy, however, after being read a description of specific programs, respondents said they had not heard anything about it (Study 2, at 21; Study 1, at 6-5). Customer awareness of more specialized programs, such as the CDA program, is particularly low[27] (Study, 5 at 4-13, 5-1, 6-26).

27 Conversely, one study noted that design teams did not believe customers were unaware of the CDA track and therefore did not view it as a barrier to participation (Study, 5 at 4-13). Architects expressed the viewpoint that large customers with a local presence have already had past experiences with efficiency programs and were typically already aware of incentive opportunities (Study, 5 at 4-13). "Given the emphasis on LEED, green buildings design, and energy efficiency regulations, most organizations are already familiar with such programs," said the representative of one architectural firm (Study, 5 at 4-13; 6-26). On the other hand, design firms considered new building developers from outside the region to be in need of more education regarding program opportunities (Study, 5 at 4-13).

Program Administrators typically market efficiency programs to C&I customers through account executives or word of mouth, instead of through marketing materials[28] (Study 5, at 4-29, 5-1 through 5-4). Account executives serve as the main point of contact between customers and PAs, and are therefore responsible for informing their customers of relevant energy efficiency opportunities (Study 5, at 5-1 through 5-4). One technical consultant felt that the PAs are somewhat responsible for the level of participation in programs (Study 5 at 4-20 through 4-21). He explained: “Utility program staff drives the decision to participate in a certain track, not the customers” (Study 5 at 4-20 through 4-21). One study noted that personal relationships are important in recruiting participants (Study 1 at 6-3). Based on survey results in another study, the direct outreach conducted by program staff and vendors is central in reaching customers who ultimately chose to participate in the program (Study 2, at 32; Study 1 at 6-9).

Marketing efficiency programs to customers through account executives or word of mouth successfully increases participation for some programs, but may not reach all potential participants. In some instances, account executives have a general understanding of the programs, but are not familiar enough with the details to fully describe the benefits of the programs to potential participants (Study 5, at 5-1 through 5-4). One study noted that, given the program’s use of in-person contact and the fact that information about the program is often disseminated by word of mouth, it is not surprising that marketing messages have not reached a larger proportion of non-participating customers (Study 2, at 21).

Using education materials and brochures to market to potential participants has its advantages and drawbacks as well (Study 2, at 21). According to program staff and their customers, few, if any, marketing materials are available to inform customers about the CDA track (Study 5 at 4-23). Design team members and a majority of participants that the study team interviewed noted few or no instances of receiving advertisements, brochures, or flyers describing the CDA (Study 5 at 4-23). Without such materials describing the program, it places the responsibility on the PAs to keep a look out for potential customers (Study 5 at 4-24). The PA cannot expect customers to be cognizant of the program and to seek out information (Study 5 at 4-24).

When marketing material is available, AEs reported that customers may not read mail or email, therefore these methods generally garner a low response rate (Study 1 at 6-10). Further, while many partial participants note that direct mail is a good way to reach them about program opportunities, this type of outreach may not always reach the key decision-makers at customer facilities (Study 2, at 21). In one study an account executive was concerned whether they are reaching the appropriate decision-maker. “Are those e-mails getting out to the right people within that facility that are familiar with energy efficiency and can make those decisions?” he/she wondered (Study 1 at 6-6; See also Study 1 at 6-17).

Who the account executives or program managers contact influences program participation. For example, a common sentiment among architects, engineers, and construction managers is that “more awareness and outreach is needed to the architectural and engineering community” (Study 4, at 5-5). On the other hand, several respondents suggested that the program managers currently focus more outreach and

28 Roughly 75 percent of the participants interviewed in one study did not recall receiving any marketing materials but noted that they were in contact with account executives (Study 5, at 4-29).

attention on engineers, and therefore the architectural community is less informed (Study 4, at 4-22). They also recommend distribution of mailers to the design firms - not just architects[29] but also to electrical engineers (Study 4, at 4-25).

Further, identifying a program's target market can be difficult for Program Administrators. National Grid indicated that it has been difficult for the program to gain traction because "it is very hard to determine who the players are" (Study 5, at 6-30). The program manager identified this issue as one of the most significant barriers faced by the program (Study 5, at 6-30). "A customer could be anyone from a dentist to a national firm," he noted (Study 5, at 6-30). If the program cannot clearly identify the target market, it is difficult to target outreach efforts and as a result the core message suffers (Study 5, at 6-30). One technical staff member mentioned a need to identify remaining opportunities and concentrate marketing efforts on those opportunities (Study 1 at 6-18). He went on to say: "We offer all of our programs to all of our customers all the time. What I'm hoping is that with the vast information base that we've built, we can now turn that into more of a market penetration-type study. We've got a lot of customers who have gone through our programs for lighting. The measure life for lighting can be 10 to 20 years and once you do the lighting once you know that facility is pretty much shut down for offering lighting opportunities for a substantial amount of time" (Study 1 at 6-18).

While it is important to extend the reach of the program, the Program Administrators are challenged by the need to maintain a balance of resource allocations (Study 5, at 6-26). "Of course, there are always improvements to be made in marketing, but marketing is so expensive that you don't want to spend so much that you have less incentive money to give to the customers," said one program manager (Study 5, at 6-26). "Ideally, the message has to be not only effective, but also communicated in a way that doesn't cost a lot of money" (Study 5, at 6-26).

The studies we reviewed recommended a number of ways to improve customer outreach and marketing,[30] which are summarized as follows:

- It is generally recommended that the PAs aggressively utilize both direct communication and printed marketing material to advertise programs and educate customers about programs (Study 2, at 21, 32; Study 4, at 5-8; Study, 5 at 4-34, 5-1).
- Marketing materials and tools could be improved by: making them more informative, simple, easy to understand, possibly including a checklist of ways to reduce energy costs; including more customer testimonials or case studies; and introducing technical concepts to customers (Study 1 at 1-10, 6-1, 6-17 through 6-18; Study 4, at 4-25).
- The Program Administrators should engage state and local government, the design and construction community, academic institutions, real estate associations to increase participation (Study 4 at 5-7, 5-8).

29 In the same study, the study team hypothesizes that architects do not fully recognize their roles as key contacts and drivers to engage clients/projects with the energy efficiency programs (Study 4, at 4-23). Architects are juggling multiple tasks and typically doing so under the pressure of project deadlines (Study 4, at 4-23). Consequently, many architects view energy efficiency as one of many competing objectives and do not recognize, as design team leaders, their potential influence in engaging their clients and the PA's to optimize efficiency (Study 4, at 4-23).

30 See Study 4, at 4-22, 5-8; Study 5, at 4-34, 5-1; Study 6, at 6-17 through 6-18.

- An effective implementation plan should take advantage of the favorable environment of "green building" (Study 5, at 6-27).
- Since account executives are usually the first to hear about new construction projects, the PAs should ensure that they are well informed about the programs so that they can explain the program requirements and benefits to customers when they are first in contact about a potentially qualifying project (Study 5, at 5-1 through 5-4, 6-27).
- Educate potential design team members about programs through "lunch and learn" events and making presentations at professional meetings attended by architects and engineers (Study 4, at 4-25, 5-7, 5-8; Study 5, at 5-1 through 5-4, 4-14).
- Lunch and learns should be combined with direct communications (Study 5, at 6-28 through 6-30).[31]
- Regarding deep savings, one program staff member noted the importance of developing long-term efficiency plans with customers[32] (Study 1, at 9-1).
- One study suggests that, for the Small Business Direct Install program, the facility audits associated with this program presents an opportunity both to document the condition of existing facility equipment and educate customers about the PA program offering that may suit their energy efficiency needs in the future (Study 2, at 2, 21, 32-33).

One AE emphasized the importance of persistence, saying "just be persistent and get in front of these people. Sometimes you have to beat it over their heads, because I've worked very closely with facility managers throughout my career, and if what you can offer them isn't spelled out clearly in front of them, and you don't follow up and be diligent, then they may not participate" (Study 1, at 6-17; see also Study 1 at 6-10; Study 5, at 6-28 through 6-30). There is a fine line, however, between maintaining follow-up communication and pestering the customer or design team (Study 5, at 6-28 through 6-30). Program reminders should be brief and merely serve to remind the design team of their options (Study 5, at 6-28 through 6-30). Another study suggested that a cohesive system of documenting and monitoring the status of program leads is important to the success of program implementation (Study 5, at 6-30).

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31 This study that suggest combining education events with direct communication further states that one of the greatest barriers to participation is "turning intentions into action" (Study 5, at 6-28 through 6-30). While presentations to customers and the design community is a reliable method of program outreach, the impression of these presentations is often short-lived (Study 5, at 6-28 through 6-30). The evaluation team found that program outreach was ineffective in the long-term without consistent program interaction (Study 5, at 6-28 through 6-30). One program manager explained further: "We did a round of lunch-and-learns, but later the architects forget about it. This incentive program is at the bottom of the designer's priority list because it does not provide them any revenue but only more work for the same amount of money. Our staff calls them every few months just to check in and remind them that the program is there" (Study 5, at 6-28 through 6-30).

32 This study elaborated on this point to say that: "Instead of just going in and saying 'what do you need today, what would you like to look at today?' we're trying to put in a long-term plan with the customer, to say, 'let's talk about all your opportunities, and let's make a list of them, and let's prioritize that list, and let's do the things that you can do now this year and then which things you want to plan to do next year. 'Try and get them to look more long term and holistically about doing energy efficiency. There's a lot more emphasis on that" (Study 1, at 9-1).

Program Design and Administration Barriers

Process for Participation

A number of studies suggested that participating in efficiency programs could be streamlined, especially the application process required for participation (Study 4 at 5-5 through 5-6; Study 5 at 4-33, 6-37; Study 6, at 6-17 through 6-18). Since vendors provide a crucial service to the programs - creation of projects - it is not surprising that two technical staff respondents suggested streamlining program processes so that they do not, as one respondent put it, "impede the sales process" (Study 1 at 6-18). Moving to one application and consolidating programs across the state were generally thought to be good steps towards creating a program free from such impediments (Study 1 at 6-18).

One study suggested streamlining the application process by reducing the amount of paperwork that is required for participation[33] (Study 4 at 5-7). In one study, interviewees chose not to participate in programs due to the perception that program participation is a difficult process and that the paperwork requirements are burdensome (Study 6, at 6-5, 6-16 through 6-17, 7-21 through 7-24). One architect stated that "gathering all the information and filling out the forms can take 40 hours or more for which we don't charge the client" (Study 5 at 4-1 through 4-14). In order to resolve this burden, this architect suggested placing the paperwork burden on the PA staff and the technical consultants[34] (Study 5 at 4-1 through 4-14).

Additionally, the time required to participate is a potential barrier or drawback for customers (Study 1 at 9-6; Study 4 at 4-19 through 4-20; 5-7). Despite the relatively large incentives offered, program staff reported that some customers are reluctant to assume the additional time and cost required by participation (Study 5 at 6-31). Since technical staff respondents are keenly aware that time is a barrier for customers, nearly all of them mentioned working closely with customers and other stakeholders to provide results as quickly as possible (Study 1 at 9-6). One respondent said that although "sometimes [we] take longer than expected; sometimes it is [due] to the customer" (Study 1 at 9-6).

Finally, design firms reported that confusion regarding eligibility requirements was a barrier (Study 5 at 4-18 through 4-19). One participant complained that he received conflicting information about eligibility requirements from a single Sponsor depending on if he was speaking to the account executive or PA staff (Study 5 at 4-18 through 4-19). Further, in another study, interviewees suggested various reasons for not participating, including a customer's proposed project doesn't qualify (Study 6, at 6-16 through 6-17).

Program Administrators' Staffing Skills and Availability

Studies suggested that PA's skill sets could be more diverse, and that PAs often lack technical knowledge. "Probably the biggest thing that would get better savings is making sure that the reps are aware of the broad technologies that are available, that you don't have somebody who's got a background in variable frequency drives and that's all they know. The reps have to have a broad range of what's available and be able to talk intelligently about that with customers" (Study 1 at 9-4). Some studies suggested

33 Respondents mentioned burdensome paperwork as an impediment to participation (Study 2, at 26).

34 The same study cited Efficiency Maine as an example, stating that the Efficiency Maine program makes it clear to prospective customers that the burden of paperwork will not fall upon them but upon program staff (Study 5 at 6-31). "No additional work is required," explained the program manager (Study 5 at 6-31).

increasing the number of architects, engineers, and lighting designers on the PA's efficiency staff (Study 4 at 5-7, 5-8; Study 5 at 4-1 through 4-14). The PA's staff seem to be in agreement, with one saying "I always wish my knowledge base is greater than it is to offer more to customers. We're being asked to dive deeper with customers and find complex offerings" (Study 1, at 6-1 through 6-2).

Additionally, AEs mentioned being too busy or lack of staff as an issue[35] (Study 1, at 6-1 through 6-2, 9-6). Another said that "It's just that [applications are] coming in large amounts, whether it's a small job or a big job. And like I said, until just recently, we've gotten some more bodies over there to help those people out, so it's starting to get better. But for a while, some projects just sat there" (Study 1, at 6-10). Several AEs noted the staff shortages as an impediment to identifying projects (Study 1, at 5-4). One respondent said we need "some more people just to be able to take the time and really explain to the customers, do some more analysis for [customers], and let them see why they should [proceed with project]" (Study 1, at 6-4, 6-10).

Customers' Lack of Understanding regarding Efficiency Strategies and Measures

One study found that architects', design engineers', and construction managers' understanding of best practices for efficient equipment, including lighting, HVAC, and building shell technologies, varied considerably (Study 4 at 4-6 through 4-13). For example, the study found no consistent trends in respondents' views on what constitutes best practices in regard to HVAC equipment (Study 4 at 4-10). Further, optimal envelope design continues to be a source of debate among architects and construction professionals, while confusion persists about how to piece together the different components of the wall and roof assemblies (Study 4, at 4-12, 4-13). One architect asked that the utilities provide a description of an energy efficient wall assembly (Study 4, at 4-13; see also Study 4 at 5-6). One architect suggested that the programs should be made "more understandable to architects, and maybe provide examples of good lighting practices" (Study 4 at 5-5 through 5-6).

Technologies

One recurring issue relates to the types of measures offered through the PAs programs (Study 1 at 9-7). In one study, the most common suggestion for improving the program included offering additional qualifying equipment, which could entail more equipment within a specific end-use as well as a wider range of end-uses (Study 2, at 25). Additionally, one architecture firm complained that the prescriptive programs were a little too prescriptive and had had an issue with a certain lighting specification (Study 4, at 4-25). Their suggestion was that there should be something in between a straight forward prescriptive approach and full building modeling (Study 4, at 4-25). One chain respondent mentioned that they are not in agreement with the PAs on the type of products specified for LED lighting (Study 6, at 7-39). According to this respondent, their locations use a type of LED lighting that is not approved for installation by the PAs (Study 6, at 7-39).

35 "I think it does come down to a personnel issue in house. Maybe if we had more program managers [and] engineering staff [to] do projects a little faster to prove the benefits to the customers. Sometimes we have the applications from the customer, they are looking to do a project, and we have put it through the steps of what the savings are going to be and what the incentive is going to be. And that can sometimes take a little while to get done because we have so many jobs. And so sometimes a customer gets a little discouraged because of the time it takes. And if we had more personnel working on that end, I think, we could get these jobs out the door a little faster" (Study 1, at 5-4; see also Study 1, at 9-6).

Additionally, the technical support staff respondents cited the lack of low-cost high-savings projects because they have been done already or due to the type of customers enrolled in the programs (Study 1 at 9-7). One respondent said we‘re "limited by what types of facilities and what‘s going on in those facilities" (Study 1 at 9-7). They went on to elaborate, "once you do the lighting and lighting controls, you could probably do some HVAC controls… but HVAC equipment typically doesn‘t have an incentive that induces people to retrofit it so you wait until that stuff dies to replace [it]" (Study 1 at 9-7). Another respondent commented on working with customers to "see beyond lighting" saying that "there are certainly more things that a customer can do. Maybe just take advantage of more prescriptive measures or get into their HVAC equipment… refrigeration measures, the more complex measures" (Study 1 at 9-7). However, this respondent was quick to follow-up their comment that more complex measures "come at a price. And that‘s where sometimes it‘s in conflict with what our goals are" (Study 1 at 9-7).

<u>Lack of Technical Assistance</u>

In one study, few respondents indicated that they received technical assistance from the program (Study 4, at 4-24). Most architects we spoke with indicated that they either have not received any services, have received services but couldn't identify what they were, or have received energy modeling assistance (indirectly) or lighting design assistance (Study 4, at 4-24).

Timing of Participation

Another great challenge of program implementation is establishing participation in the earliest stages of the design process (Study 5, at 6-32). For example, the CDA requires early involvement of the PAs to ensure that all relevant energy efficiency improvements are incorporated into the customer's building design (Study 5, at 4-15 through 4-18). Unfortunately, customers do not always make contact with the PAs during the conceptual design stage and therefore the opportunity to use the CDA is often lost (Study 5, at 4-15 through 4-18). As one non-participant said, "timing was the major issue for us. We were a little slow in getting the local utility involved in the beginning of the project" (Study 5 at 4-32; see also Study 5, at 4-29, 5-1 through 5-4). One major developer and construction management firm noted that in the past they haven't received feedback from the utilities in a timely manner (Study 4, at 4-24). Further, architects and engineers are not able to consistently identify the most appropriate point during the design process to contact PA's (Study 4, at 4-24). Others reported that certain customers, such as hospitals, have long-term budgeting processes, and therefore AEs have to reach out to them far in advance of project initiation (Study 1, at 5-3).

Ideally, program staff should intercept the customer and design team during the of conceptual design phase of the project, if not earlier (Study 5, at 6-32). In order to have an impact on the project design, utilities must engage the customers early, be consistently engaged throughout the course of a project, and meet project milestones (Study 4, at 4-24).

Other Barriers

A number of other reasons were cited by the various studies as barriers to participation. For example, the need to obtain corporate approval to participate is seen by customers as a barrier to participation (Study 2, at 22, 26).

Other perceived barriers related to customer hesitation to use new technology. For some clients, who may operate their facilities on a 24/7 basis, the need for equipment reliability and ease of maintenance is paramount (Study 4, at 4-3; Study 6, at 7-6, 7-21 through 7-24). Furthermore, they don't want to be "guinea pigs" for new technologies, and they cannot afford to be "embarrassed" by a system failure (Study 4, at 4-3; Study 6, at 7-6). Other cited challenges related to new technologies include convincing clients to use unproven technologies, specifying and coordinating more sophisticated equipment and controls (i.e. constructability of the design), and communications between different types of equipment (Study 4 at 4-19 through 4-20; Study 1, at 6-15; Study 6, at 7-6, 7-21 through 7-24).

Efficiency saturation was also cited as a barrier to further participation. Because of the length of time that C&I programs have been running in Massachusetts some of the technical staff reported that they are beginning to circle back around to customers they have already done projects with (Study 1 at 9-7). One respondent commented "we've been doing energy efficiency programs for 20 years and we've done projects at every one of these customers more than two or three times"[36] (Study 1 at 9-7).

One respondent stated that the rapid code changes have made things difficult for his staff (Study 4 at 4-17). The implication is that the extra time needed to master the code changes is eating into A&E firms' project fees (Study 4 at 4-17). A few architects stated they "have to pay more attention" to their designs because of new code requirements and that they now implement measures that would have before been considered alternative energy efficiency measures (Study 4 at 4-17).

36 An account executive was quoted to say that "unfortunately, you reach a saturation point, and I'm at that point now with the biggest customers. There's only so efficient that you can be. Unless there is a change in technology, then you can only change so much lighting, you can only change so many motors. It comes to a point where you've hit all the biggest customers. And then you start moving down to the next quartile of size of customers that are within the realm of the programs that we are responsible for" (Study 1, at 5-4; see also Study 1, at 6-14).

Appendix B – Survey Tools

Questionnaire Sent Out With Invitations

Synapse
Energy Economics, Inc.

Synapse Energy Economics, Inc.
485 Massachusetts Ave., Suite 2
Cambridge, MA 02139
617-661-3248

Survey of Commercial & Industrial Customer Perspectives on Massachusetts Energy Efficiency Programs

On behalf of the Massachusetts Energy Efficiency Advisory Council, Synapse Energy Economics is currently investigating incentives and barriers to commercial- and industrial-sector participation in the Massachusetts energy efficiency programs. This survey represents the first phase of our study, and will be followed up by a phone or in-person interview with respondents to discuss pertinent details. A staff member at Synapse will be in touch to schedule this interview.

The answers you provide to this survey will be shared as part of a Synapse report to the Advisory Council. All information that could be used to identify you or your company will be kept strictly confidential, and will not be presented in our report.

Thank you for participating, and for helping to inform the development of the Massachusetts energy efficiency programs.

If you have any questions about this survey, please contact Janice Conyers at Synapse: 617-453-7020 or JConyers@Synapse-Energy.com. Please SUBMIT using the button at the top right, or email as an attachment.

Company Information

1) **Company name:**

2) **Company address:**

3) **Company product(s) / service(s):**

4) **Approximate number of company employees located in Massachusetts:**

    ○ 1 to 4.

    ○ 5 to 9.

    ○ 10 to 19.

    ○ 20 to 50.

    ○ Greater than 50.

5) **Building ownership:**

    ○ Owned. ○ Leased.

6) **Electricity provider:**

7) **Natural gas provider:**

Information about the Person(s) Being Interviewed

8) Name(s):

9) Title(s):

10) General responsibilities:

11) Which specific responsibilities does your job include? (Choose all that apply.)

- ☐ Administration
- ☐ Building operations/maintenance management
- ☐ Property management
- ☐ Construction management
- ☐ Engineering
- ☐ Purchasing and procurement
- ☐ Financial management
- ☐ Environmental management
- ☐ Owner/Founder/President/CEO
- ☐ Other (please specify)

Information about Energy Usage

12) Average monthly electric bill.
(Please provide what information you have readily available. Please explain whether the information is for a particular building, a facility, a division within the company, the company as a whole, or some other grouping.)

Electricity consumption (in kWh):

Electricity cost (in dollars):

13) Annual electric costs as a percent of annual operating expenses.
(Please choose one of the following, based upon your best estimate.)

- ◯ One percent or less.
- ◯ Between five and one percent.
- ◯ Between ten and five percent.
- ◯ Between twenty and ten percent.
- ◯ Twenty percent or greater.

14) Average monthly natural gas bill.
(Please provide whatever information you have readily available. Please explain whether the information is for a particular building, a facility, a division within the company, the company as a whole, or some other grouping.)

Gas consumption (in therms):

Gas cost (in dollars):

15) Annual natural gas costs as a percent of annual operating expenses.
(Please choose one of the following, based upon your best estimate.)

- ◯ One percent or less.
- ◯ Between five and one percent.
- ◯ Between ten and five percent.
- ◯ Between twenty and ten percent.
- ◯ Twenty percent or greater.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

17) If the answer to the question above is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities? (Choose all that apply.)

- ☐ Internal rate of return.
- ☐ Payback period.
- ☐ Benefit-cost ratio.
- ☐ Energy bill savings.
- ☐ Other. (Please describe.)
- ☐ The company has not specified criteria regarding efficiency measures.

Information about Awareness of the Mass. Energy Efficiency Programs

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

- ◯ Yes.
- ◯ No.

19) Have you ever been solicited to participate in any energy efficiency program? (Choose all that apply.)

- ☐ By your gas company.
- ☐ By your electric company.
- ☐ By someone else. (Please specify.)

Commercial and Industrial Customer Survey — Page 3 of 4

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility? (Choose all that apply.)

- ☐ Yes, within the past three years.
- ☐ Yes, prior to the past three years.
- ☐ No.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company.

Please name one or two things about the program that did not work well for your company.

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate these programs within the next three years?

- ○ Yes.
- ○ Maybe.
- ○ No.

If not, why not.

Scheduling a Follow-Up Interview

As mentioned above, you will be contacted by a staff member at Synapse to schedule a phone or in-person interview as a follow-up to this survey. During the interview, you will be asked a series of specific questions designed to address the following overarching topics:

- How well do the Massachusetts energy efficiency programs address your company's needs?
- What are the primary barriers that your company faces in participating in the Massachusetts energy efficiency programs?
- How can the programs be changed to provide greater value to your company? How can they be changed to help overcome the barriers?
- What is the likelihood that your company will participate in the Massachusetts energy efficiency programs in the next three years?

Thank you for taking the time to fill out this survey; your input is greatly appreciated! Please save your answers and return the completed survey to Synapse as an attachment to an email Please address the email to JConyers@Synapse-Energy.com

You may also submit your completed survey using the submit button at the top right.

Interview Questions for Program Participants

Specific follow-up questions to be asked in person of respondents who completed Synapse's survey for program participants.

These questions are not provided to the interviewee in advance.

General questions:

1. How important are energy costs to your company?
    a. What level of priority do you give energy costs? High, medium, low?
    b. Who sets the priority?
    c. How is the priority communicated? What is it based on?
2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.
    a. Who makes the request? What department of the company?
    b. How is a request communicated?
    c. Who makes the decision? What department of the company?
    d. How is the decision made? Which metrics are used (e.g., hurdle rates, payback periods, age of equipment)?
    e. How is the decision communicated?
3. Please expand upon your answer to question 17 in Synapse's survey for program participants. (What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?)
4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.
    a. Reduced costs?
    b. Improved services?
    c. Improved operations?
    d. Environmental benefits?
    e. Other?
5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?
    a. What could the representative have done differently to address your company's interests and needs better?
6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?
    a. If yes, please explain why not.

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?
    a. If yes, what factors are motivating you to participate again?
    b. If no, why not?
        i. What is the most significant barrier to your participation?
        ii. What are the other barriers to your participation?
        iii. What could be done differently to help motivate you to participate?

Specific Questions: (to be asked if the respondent has not provided sufficient detail to the general questions above)

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?
    a. Who in your company sets the budgets?
    b. Where do energy costs and energy efficiency investments fit within the company's budget structure?
9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?
    a. Who in your company makes the decisions about financing opportunities and limitations?
    b. What sort of financing opportunities does you company provide with regard to energy efficiency investments.
10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

7.

If time allows:

11. What type of support did your company receive through the Massachusetts energy efficiency programs? (Choose all that apply.)

    Equipment rebates.

    Technical support.

    Energy audit or technical assessment.

    Loans or other forms of financing.

    Other. (Please describe.)

12. Approximately how much are you expecting to save as a result of participating in the Massachusetts energy efficiency programs? (Please provide whatever information you have readily available.)

    Energy savings (kWh, therms) per month.

Bill savings (dollars) per month.

Percent reduction in overall energy consumption.

Payback period.

Other. (Please describe.)

Interview Questions for Program NON-Participants

Specific follow-up questions to be asked in person of respondents who completed Synapse's survey for program non-participants.

These questions are not provided to the interviewee in advance.

General questions:

1. How important are energy costs to your company?
    a. What level of priority do you give energy costs? High, medium, low?
    b. Who sets the priority?
    c. How is the priority communicated? What is it based on?
2. Has your company purchased or installed equipment in the past three years that consumes a significant amount of electricity, gas or oil?
    d. In purchasing this equipment, did your company consider the implications of your energy bills?
    e. Did you company consider purchasing equipment that is more efficient than standard practice?
3. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.
    f. Who makes the request? What department of the company?
    g. How is a request communicated?
    h. Who makes the decision? What department of the company?
    i. How is the decision made? Which metrics are used (e.g., hurdle rates, payback periods, age of equipment)?
    j. How is the decision communicated?
4. Please expand upon your answer to question 17 in Synapse's survey for program non-participants. (What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?)
5. For those customers that were aware of the Massachusetts energy efficiency programs prior to this interview (answered yes to question 18 in Synapse's survey for program non-participants): How did you become aware?
6. If you were aware of the Massachusetts energy efficiency programs prior to this interview, why has the company not participated in them to date?
    k. What is the most significant barrier to your participation?
    l. What are the other barriers to your participation?
    m. What could be done differently to help motivate you to participate?
7. Have you communicated with a representative of the Massachusetts energy efficiency program administrators?

n. How well did the representative understand your company's interests and needs?

o. What could the representative have done differently to better address your company's interests and needs?

8. For those customers that were not aware of the Massachusetts energy efficiency programs prior to this interview (answered no to question 18 in Synapse's survey for program non-participants): Do you plan to purchase equipment in the next three years that consumes a significant amount of energy? If so, would you be interested in participating in a program that offers you financial incentives and technical support for installing energy efficiency equipment?

    p. If yes, what are the main reasons for doing so?

    q. If no, why not?

        i. What is the most significant barrier to your participation?

        ii. What are the other barriers to your participation?

        iii. What could be done differently to help motivate you to participate?

Specific Questions: (to be asked if the respondent has not provided sufficient detail to the general questions above)

9. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

    r. Who in your company sets the budgets?

    s. Where do energy costs and energy efficiency investments fit within the company's budget structure?

10. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

    t. Who in your company makes the decisions about financing opportunities and limitations?

    u. What sort of financing opportunities does you company provide with regard to energy efficiency investments.

11. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

Appendix C – Survey Responses

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Bristol County

Industry: Heavy Industry

Person(s) Interviewed: Energy Systems Program Manager

Interview Number: 1

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

Greater than 50.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

Declined to respond.

15) Annual natural gas costs as a percent of annual operating expenses:

Declined to respond.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Internal rate of return; Payback period; Benefit-cost ratio; Energy bill savings.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, within the past three years, and prior to the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

Being allowed to pass the rebate on to the contractors so I did not need to ask for as much capital.

Please name one or two things about the program that did not work well for your company:

Engineering support to help move projects along.

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Maybe. Capital is very tight. Changes in financing options might help move projects forward.

Predetermined Interview Questions

1. How important are energy costs to your company?

The customer preferred not to disclose its energy use as a percentage of annual operating expenses through the questionnaire, but stated during the interview that energy costs comprise a large enough percentage to be a motivating factor. Partly because Massachusetts has some of the highest energy rates in the United States, the customer recently took steps to reduce costs by opening a location overseas and is considering opening a location in a southern state. The customer has tried to lower consumption, and program participation is important to the customer for staying competitive.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

The customer annually considers capital investment projects. Projects that are presented to management as absolutely necessary to business operations and sales are prioritized as Tier 1 projects, and receive the requested capital. Capital projects not absolutely necessary for business operations are categorized as Tier 2 projects, and receive financing based on the value (i.e., savings potential or improved quality) the project can bring to the customer. Energy projects are never prioritized as Tier 1 projects because the person interviewed could never say that the business cannot continue without an energy efficiency project. Efficiency projects then compete with other capital investment projects on a value added basis, and may take a number of years to receive the required capital.

The customer's annual review of capital investments can differ from year to year. The annual review depends on the amount of capital the customer has available to allocate to the proposed projects, and the projects that have been proposed in a given year. In some years efficiency projects have received a lot of capital, and other years only small projects are completed (including 2012).

Efficiency is seen as non-essential, although something the customer would like to do. Goes in cycles: some years more capital spending on other big projects, followed by a lull where efficiency can fit into.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

Efficiency equipment combined with the utility incentive generally needs to provide a payback between 2 and 3 years for the company to install the efficient equipment. The customer generally does not consider a payback beyond 5 years.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

The customer stated that it has participated in efficiency programs a number of times. The person interviewed indicated that, in the past, either he would contact the utility company directly to enquire about rebates when the customer was considering an efficiency project, or the utility would contact him. When the utility contacted him, it was usually at the end of the year, and the utility explained that it was short of meeting its goals and would offer him a higher incentive than normal if the customer participated that year. In recent years, the utility has reached out to the customer more in the middle of the year than at the end of the year. Sometimes the customer would be in the process of considering an efficiency project when the utility called, and the additional incentive allowed the customer to move forward with the efficiency project. The person interviewed found that having the utility contact him at the end of the year aligned well with the customer's internal capital planning schedule (see response to question 2).

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

The person interviewed indicated that experiences with account representatives have been generally positive and did not have anything negative to say about the representatives.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

n/a – see description of company's decision making process in question 2.

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Maybe. The person interviewed recommended making a number of program design changes that would better allow the customer to participate in the future. First, the customer strongly recommended greater transparency in program spending and funding. The customer noted that it puts a lot of money towards efficiency programs through its utility bills, but cannot track how much it is actually spending because rates are not transparent. Further, the customer feels that it is putting a lot of money towards efficiency projects, without getting the full advantage of the programs. The person interviewed recommend that, instead of charging the customer the amount collected through its utility bills, allow the customer to retain the money, with the understanding that that exact amount of money would have to spent on efficiency projects at the customer. That money could only be used for efficiency projects at the customer, and could not be used for other capital investments within the customer. This would relieve the person interviewed from having to ask management for capital to invest in efficiency projects. Such a change would help tremendously in moving projects forward. This may require a policy change before it can happen, but it does need to happen.

Second, the person interviewed recommended considering on-bill financing for large commercial customers, similar to the program offered to small commercial customers. He recommended allowing customers to pay off efficiency investments on their bill, but in such a way that the monthly payment does not exceed the monthly savings. This would also relieve him of having to ask management for capital to invest in efficiency projects.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

See description of company's decision making process in question 2.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

See description of company's decision making process in question 2.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

See description of company's decision making process in question 2. Because the customer's annual review of capital projects can vary from year to year, every year it can be difficult to count on capital availability for efficiency projects. It depends not only on economy but also on business model and company's business cycle.

The person interviewed also stated that the economy has definitely been very tight for the past 2 or 3 years. Also, the customer is recently under new ownership, and the person interviewed is unsure how that will change the customer's long-term operations.

People have been lulled into a sense of security with prices of electricity and natural gas being suppressed. Back in 2008, everyone was through the roof trying to figure out how to conserve because budgets were getting out of control. Now with this long period of sustained pricing, efficiency is not on the top of people's mind, so that definitely plays into companies' decision making.

Barriers to Participation

A. Financial limits

B. Economic downturn

Maybe.

C. Customer awareness and marketing

D. Program design and administration

At the end of the last two years, the utility has practically doubled incentive levels for certain measures. This tells the person interviewed that the utilities are over collecting the funds, and are literally looking to burn money by end of year.

The customer indicated that greater engineering support from the Program Administrators would allow it to convince management that efficiency projects are worthwhile. The customer does not have the man power to do a study that would determine whether an efficiency project could benefit the customer. Energy efficiency is only a portion of a person's job at the customer, and when a potential efficiency project is identified, it can sit in a database waiting for someone to fully define the project. Management won't consider projects that are not fully developed. The person interviewed indicated that they have reached out to the utility to see if they would fund such an engineering analysis for a potential project, but found that the assistance offered by the utility was not compelling to participate. According to the person interviewed, the utility would only offer to pay a certain amount for evaluations, but only after the customer decided to go ahead with the project, whereas the customer needed the assistance before it could go ahead with a project.

Sometimes the customer would like to do a custom project that requires technical and engineering support. That money would have to come out of another expense budget, and with the economy the way it is, that pool of money can be very tight. Utilities will offer to partially fund technical support, but if the utilities were more aggressive in helping companies clearly identify a project in terms of what it will save and cost the company to implement it. This creates a clear picture on what project would look like, which would be beneficial. Some projects have stalled for years because they're just concepts that haven't been fully developed. Technical support could clearly define the best projects and opportunities, which would be a good use of money. Help get projects in front of management and identify rebate opportunities. Person interviewed recommended that the utility pay the full amount of the technical study. As currently structured, the customer could do a study and would have to pay for half of it, but then the project doesn't get built so it's seen as a waste of money. This is a hard step for the customer to get past. Don't have expense money to spend on reports. Expense money has been really tight in the past few years.

E. Corporate review and approval process

Yes – see description of company's decision making process in question 2.

F. Timing of program administrators

G. Customer distrust of new technologies

H. Customer convinced it has done all it can.

I. Others

People have been lulled into a sense of security with prices of electricity and natural gas being suppressed. Back in 2008, everyone was through the roof trying to figure out how to conserve because budgets were getting out of control. Now with this long period of sustained pricing, efficiency is not on the top of people's mind, so that definitely plays into companies' decision making.

Other Comments

The person interviewed noted that it has a CHP system, and would like to install another system as it is a tremendous efficiency project, but that standby rates hurt its full potential.

The person interviewed stated that MOU agreements between large customers and utility company has value, but would prefer it were a more open process and allow others to see what incentives work for other customers.

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Bristol County

Industry: Retail

Person(s) Interviewed: n/a

Interview Number: 2

Key Questionnaire Responses

The Company did not provide the questionnaire.

Predetermined Interview Questions

1. How important are energy costs to your company?

n/a

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

The persons interviewed prepare a proposal regarding an efficiency project for the CFO to review. If acceptable, the CFO approves the project and provides the capital investment.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

An efficiency measure's ROI needs to be between 2 and 3 years in order for the customer to install the measures. The CFO of the customer is receptive to and generally will approve efficiency projects with a low payback period.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

A third-party energy company approached the customer about two years ago and surveyed its locations for efficiency opportunities. The third-party energy company offered rebates from the utility combined with on-bill financing structured so that the monthly on-bill repayment charge would break even with the monthly savings. As a result, the customer upgraded lighting in 5 or 6 of its 12 locations in Massachusetts. The zero dollars out of pocket and a 2 to 2.5 year payback allowed the customer to easily go forward with the efficiency projects.

The customer was always interested in efficiency but was not actively seeking projects when the third-party energy company approached it. Previously, the customer looked for efficiency projects and was told there were no opportunities available in its locations.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

The customer has limited contact with its utility, and was not informed by its utility about efficiency programs. The customer was generally aware that the utility's offer efficiency programs because it has locations in Connecticut, and has retrofitted lighting in all of its Connecticut locations through Connecticut Light and Power. However, the customer had a limited understanding of the Massachusetts efficiency programs.

Competitive suppliers regularly contact the customer, some of which offer efficiency measures. Lighting efficiency is being aggressively pushed by third parties at the moment. The customer was indifferent as to whether its utility or a third party provided efficiency services and incentives, so long as the financial incentives offered are in line with the customer's goals.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

The customer has looked into HVAC equipment, but the ROI is usually 5 to 10 years which is not worth the investment to the customer. The customer would love to do more than lighting retrofits.

The customer has locations in Connecticut, and is aware that CL&P packages lighting with HVAC incentives. The customer is more likely to consider such a packaged offering if the ROI stays within 2 to 3 years.

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Yes, although likely not directly through the utility. The customer plans to upgrade lighting in a couple of its Massachusetts locations in the next few years through the third-party energy company.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

The customer has a set number of capital dollars available for investment. Efficiency projects may compete against other investment projects depending on the projects proposed in a given year. If the project has a 2 to 3 year payback, then it will likely receive approval along with the other proposed 2 to 3 year payback projects.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

The customer favors an on-bill repayment structure. The customer feels like there is a lot of legwork involved in accessing federal and state incentives for efficiency. If the financial incentives were research and packaged together, the customer would be more likely to participate.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

The customer was not very affected by the economy and has been doing alright. 2008 and 2009 were a little slow, but the customer has been pleased since then.

Barriers to Participation

A. Financial limits

The customer is very receptive to on-bill repayment.

B. Economic downturn

C. Customer awareness and marketing

Yes. The customer was unaware of the utility's program offerings, and had not been in touch with its utility.

D. Program design and administration

Legwork involved in accessing incentives.

E. Corporate review and approval process

no so long as short payback period.

F. Timing of program administrators

G. customer distrust of new technologies

H. customer convinced it has done all it can.

Yes, to some degree. The customer previously thought they had done all they could until a third party approached them to conduct an audit. While the customer has only done lighting projects, they are unwilling to install measures with a longer payback.

I. Others

Other Comments

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Bristol County

Industry: Miscellaneous

Person(s) Interviewed: Executive Director

Interview Number: 3

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

n/a

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

One percent or less.

15) Annual natural gas costs as a percent of annual operating expenses:

Between five and one percent.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Payback period; Energy bill savings.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, with the past three years and prior to the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

Energy efficient common hallway lighting, bulb replacement with CFL's, replace torchiere lamps.

Please name one or two things about the program that did not work well for your company:

Greater focus on gas/heating measures.

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Yes.

Predetermined Interview Questions

1. How important are energy costs to your company?

Energy costs are very important to the customer. The person interviewed oversees housing complexes, but each housing unit does not pay for its own utilities. Energy is one of the major line items on the budget for this customer.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

The Executive Director is the decision maker. If there's a way to save money, she will take advantage of it.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

The shorter payback the better. If a decent, favorable return was expected from an efficiency project, it would certainly be considered.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

The a certain state department assertively recommended taking advantage of the efficiency programs, and the person interviewed wanted to get the audit taken care of so that the customer could consider what else could look to do in the future.

Bill savings was another motivating factor. Energy is a huge line item on the budget for this customer. The customer does not have a lot of money available beyond paying for its energy bill, so they have to save money everywhere they can.

The customer seemed to have trouble bringing all the pieces together for funding, scheduling, logistics, and participation in the utility programs.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

The person interviewed could not recall whether they participated through the utility program or a third party like CSG.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

Some projects were considered, but the utility company informed them that it would not have produced enough savings so it was eliminated from the list because the utility was not willing to do it. The person interviewed found this to be an unfavorable aspect of the program.

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

The customer will participate anytime there is anything you can offer. The customer can only participate when equipment needs replacing, and is not likely to proactively retire equipment early.

When asked how the program could be improved going forward, the person interviewed indicated that they would participate again, although anything that simplified the process would be good.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

Yes. The customer's budgets are very controlled. It won't have the money on hand to upgrade equipment until the equipment needs to be replaced. Efficiency has not been factored into the customer's capital investment plan as it's not high on the priority list.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

The person interviewed was not well informed about financing opportunities but may have been interested if given more information.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

The customer's income has been relatively stagnant for the past few years – not decreasing but definitely not increasing. The customer recently developed a capital investment plan that should consistently provide annual funds for improvements, but very few dollars will be put towards efficiency upgrades. If the economy improves, the customer does not expect it would start doing efficiency projects immediately – there's just too many other things. The customer just needs to pay its bills.

Barriers to Participation

A. Financial limits

Yes. Budget and capital are very tight for the customer. Efficiency is not considered a priority, although energy costs are very important to the customer.

B. Economic downturn

Yes. Less income available for capital improvements.

C. Customer awareness and marketing

To some degree. The person interviewed was not well informed about financing opportunities.

D. Program design and administration

The customer experienced delays during its initial enrollment in the program. A lot of data was required from the customer regarding its energy use, which pushed back the installation process. The person interviewed recommended simplifying the logistical process for participation.

Some projects were considered, but the utility company informed them that the project would not have produced enough savings so it was eliminated from the list because the utility was not willing to do it.

The person interviewed felt that there was a bigger push towards electric measures, and would have liked to see more heating measures.

E. Corporate review and approval process

F. Timing of program administrators

Yes. customer can only participate when equipment needs to be replaced.

G. customer distrust of new technologies

H. customer convinced it has done all it can.

No. customer would like to do more but does not have the budget available.

I. Others

Other Comments

The customer has received favorable feedback on common lighting upgrades, which the person interviewed found encouraging.

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Boston

Industry: Schools & Colleges

Person(s) Interviewed: Manager of Sustainable Engineering and Utility Planning

Interview Number: 4

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

Greater than 50.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

One percent or less.

15) Annual natural gas costs as a percent of annual operating expenses:

One percent or less.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Payback period.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, within the past three years, and prior to the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

Customized MOU, 3 year program, generous incentives.

Please name one or two things about the program that did not work well for your company:

Nothing for gas/thermal.

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Yes.

Predetermined Interview Questions

1. How important are energy costs to your company?

Energy costs are not a significant consideration for the customer, especially compared to a large manufacturer. The customer would not need to lay off employees if energy costs increased. Energy costs are not going to change the customer's competitiveness. The customer is going to be able to obtain the energy it needs to operate its facilities.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

An engineer at the customer needs to ask a number of division or department directors for approval for an energy efficiency project. This process of approval can be long and slow, sometimes taking years for approval. Management needs to be convinced through reasonable justification that the potential savings are worth moving internal funds from the designated energy cost bucket, to the capital project budget bucket.

As further discussed in question 4, the increased amount of efficiency funding beginning in 2010 caught management's attention and made management more receptive to approving efficiency projects, which made for a more efficient internal approval process. It took the increase in available utility funding and a large efficiency investment plan for management to see the value in efficiency.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

n/a

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

Beginning in 2010, the customer worked closely with its utility to design a custom three-year efficiency plan for its property through a Memorandum of Understanding (MOU). Through the MOU, the customer set aggressive goals and has been successful in meeting those goals. The utility provided greater amounts of funding than in previous years of participation, which allowed the customer to design a large efficiency investment plan. The customer's efficiency plan was funded in roughly equal amounts by the utility MOU, internal capital, and the reinvestment of savings resulting from efficiency projects.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

The relationship between the customer and utility is generally positive, and the two parties are in regular contact. The customer found that the utility's engineers and technical assistance were improved during this period of participation from previous experiences with the utility.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

n/a

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

The customer hopes to extend the efficiency plan it currently has with its utility for the next three-years, but has not yet discussed the opportunities and plan with the utility or internally with management. The customer expects to reference the success with its current three-year plan to receive approval from management.

If the customer does participate in the next three-years, the person interviewed stressed that gas savings needed to become a stronger focus for the customer, whether or not the utility's efficiency program allow opportunities and incentives for gas savings. The person interviewed felt that gas incentives were not as generous as on the electric side, and that the gas programs were not as well structured as and even appeared disconnected from the electric programs. The customer acknowledged that it is not a typical gas customer in that it has in place a co-generation facility and has a number of labs that require chilled water and steam. To address gas efficiency projects, the customer needs to spend a significant amount of time developing an engineering analysis. In the past, the potential savings were not worth this effort. The person interviewed indicated that the utility is getting better at providing this service and has employed more people, but greater improvement is needed.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

The customer is hopeful that there will not be budget limitations for efficiency program participation in future years. However, the customer has not yet begun to plan for next year or future years, so is not yet fully aware of its budget availability.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

The person interviewed indicated that greater transparency with regard to the amount that the customer is providing to program funding would better allow him to convince management to take advantage of efficiency programs offered by the utilities. He said that he is aware of the amount the customer pays through the system benefits charge, but cannot see its full contribution via other charges on the bill. He understood that by reducing consumption he would pay less into the efficiency pool of funds, and considered aggressive participation the only way to keep the energy budget in control. Going forward, if he could show management the amount of money they're contributing to efficiency, that would allow him to convince management that they need to go up to the trough and get their share of program funding, or else they would be subsidizing someone else's program participation.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

The economic downturn did not strongly affect the customer. To some degree the customer was tight on money, and so obtaining funding for energy efficiency was a little bit difficult prior to the utility's involvement in developing the long-term efficiency plan with the customer. The customer returned to a healthy financial state relatively quickly and does not expect its financial health to change going forward.

Barriers to Participation

J. Financial limits

K. Economic downturn

L. Customer awareness and marketing

M. Program design and administration

Gas programs need improvement

N. Corporate review and approval process

Potentially – depends on size of funding and potential savings.

O. Timing of program administrators

P. Customer distrust of new technologies

Q. Customer convinced it has done all it can.

R. Others

The person interviewed indicated that greater transparency with regard to the amount that the customer is providing to program funding would better allow him to convince management to take advantage of efficiency programs offered by the utilities.

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Western Massachusetts

Industry: Retail

Person(s) Interviewed: Corporate Energy - Retail Facilities Mgr.

Interview Number: 5

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

3,000 employees.

5) Building ownership:

Both owned and leased.

13) Annual electric costs as a percent of annual operating expenses:

Unsure.

15) Annual natural gas costs as a percent of annual operating expenses:

Unsure.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Absolutely. Efficiency is one of the main factors in consideration.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

n/a

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

Flexibility and creativeness in allowing custom programs that are unique. Resources provided by utility to develop projects. Overall MassSAVE program is very easy to work with.

Please name one or two things about the program that did not work well for your company:

Nothing.

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Yes.

Predetermined Interview Questions

1. How important are energy costs to your company?

Extremely important. Energy is the only controllable cost in the customer's operations. The use of more efficient equipment has a dramatic impact on the customer's bottom line and its profitability. The lower the customer can keep those costs, either through the commodity itself or reducing the consumption, the more dramatic an impact it will have on the customer's bottom line.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

Upper management is supportive of efficiency. The person interviewed submits a project proposal to upper management for approval after the utility has approved the project. However, as discussed in question 3, the ROI has to be within 2 years for management to approve an efficiency project.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

The customer looks at the ROI. While the customer considers the equipment's expected life and the specific building and area that the building is in, the bottom line is that the project needs to have a 2 year ROI. The equipment also has to be a quality piece of equipment and meet the customer's need.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

The customer is a regular participant. Sometimes the person interviewed seeks out the utility rebates, while at other times the utility approaches the customer. The customer has a national reach and works closely with utilities around the country.

The customer's headquarters are located in Massachusetts, which includes its manufacturing facility, distribution center, corporate offices, flagship store, as well as a number of retail stores. The customer is totally committed to energy efficiency, so both types of facilities have participated extensively in efficiency programs.

The customer cannot do efficiency projects without the utility's rebates. The efficiency savings from equipment installations does not allow the customer to reach its required ROI on its own. The combination of energy savings, maintenance savings, and rebates allows the customer to meet its 2 years or less ROI objective.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

The customer works very closely with its utilities and has so for the last five or six years. The customer has a true partnership with its utility and feels that the utility is absolutely representing its interests and needs.

MassSAVE has been a key partner to the customer in achieving efficiency goals for its facilities. By far Massachusetts utilities are extremely ahead of most utility companies across the country and have been proactive in their approach to efficiency. The person interviewed has had a lot of input and involvement in program development, especially lighting for the retail sector. The utility has tailored its efficiency programs to meet the customer's needs and far exceed anyone across the country. The Massachusetts utilities are head and shoulders above everybody. At first the customer planned for efficiency projects that did not qualify for rebates from the utility. The person interviewed finally met the right people at the utility and worked with them on what the customer was trying to accomplish. The utility agreed that they should be incentivizing the type of projects the customer was looking into, and provided the rebate to the customer.

The person interviewed is very appreciative of the support provided by the utilities to help the customer complete the efficiency projects. It's a win-win for both of them.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

The customer was unable to pursue an LED lighting upgrade project for exterior lighting primarily because the ROI was about 3 years. The LED technology is still quite expensive and the savings did not allow for a low enough ROI. The utility was flexible and tried to lower the ROI. The customer likely would have gone with the project if the ROI had been 2.5 years.

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Yes. Likely within the next 2 months.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

Although blessed with the financial and professional support of upper management, budget limitations may pose a challenging barrier beginning this year. The customer is looking very closely at projects, and the ROI requirement may even come down to 1.5 years. The primary reason for the budget constraint is the state of the economy.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

The customer does not elect to take the offered financing options. This is a corporate decision. The customer would prefer to purchase the equipment out right to take advantage of any tax opportunities or depreciation, or the ability to claim the equipment as an asset.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

The customer does not have a lot of capital to spend at the moment. The customer has done a lot of projects and has hit most of its efficiency objectives, but right now upper management is looking to spend money in other places. There are different priorities for the limited funds that are available at this time, and efficiency projects are competing with those projects for the limited capital available. It's not that the customer wouldn't consider efficiency and wouldn't look to fund projects through another way in the future, but at the moment the customer is not taking such actions.

Barriers to Participation

A. Financial limits

n/a, so long as ROI is within 2 years.

B. Economic downturn

Yes. The customer has limited capital available and efficiency projects are now competing against other capital investments.

C. Customer awareness and marketing

n/a

D. Program design and administration

There are a couple areas for which the utility has eliminated rebates (some lighting measures for example). This may prevent some companies from participating in efficiency programs because they may not have the capital available that the rebate would have otherwise provided. There are some programs where the utility does not allow a company to receive rebates for using more efficient equipment (motors and drives for example). That may not eliminate a company's ability to upgrade equipment but it may make the more efficient equipment less attractive to a company.

The utilities could provide more technical support to companies. It's not as if the utilities do not provide technical support, but they could adopt a more proactive approach. The utilities do not do enough to promote energy conservation or access to funds that are available to a company. The customer felt like it had to do more leg work to participate in the program then should have been required. The person interviewed was coming up with the efficiency ideas, because he had the experience and knowledge to know what projects to look for. He searches out projects to bring to the utility's attention and doesn't think the utility does a good enough job bringing efficiency opportunities to the customer. He has not had a utility representative recommend looking into specific equipment for potential efficiency opportunities. The utilities promote energy conservation but they do not promote specific technology. The utilities do promote efficient technology at their annual forums which are beneficial, but if the person interviewed did not attend those forums he likely would not have been made aware of the projects and technology that is available.

E. Corporate review and approval process

No, so long as ROI is within 2 years.

F. Timing of program administrators

G. Customer distrust of new technologies

H. Customer convinced it has done all it can

I. Others

Other Comments

The person interviewed feels that going forward efficiency opportunities will get better because the cost of efficiency products and materials has dropped. The customer will be better able to meet its objectives as technology changes and as more affordable projects and materials become available.

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Boston

Industry: Healthcare

Person(s) Interviewed: Energy Manager

Interview Number: 6

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

Greater than 50.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

One percent or less.

15) Annual natural gas costs as a percent of annual operating expenses:

One percent or less.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

n/a

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Payback period; Energy bill savings; The customer has not specified criteria regarding efficiency measures.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, within the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

Provided needed funds to continue efficiency efforts.

Please name one or two things about the program that did not work well for your company:

Processing of applications was painfully slow and inconsistent.

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Yes.

Predetermined Interview Questions

1. How important are energy costs to your company?

Very important.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

If equipment is not working, needs replacing, or inefficient, then the person interviewed will find funding through the customer's capital process. The capital process usually takes 3-12 months.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

The customer takes each equipment purchase on a case-by-case basis. Payback plays a part. The average payback the customer looks for is 3 years. Overall costs and benefits of the equipment are considered, such as reduction in utility bills. Availability of funds to purchase equipment is also considered.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

Program participation helped the customer fund efficiency projects. The person interviewed conducted a building assessment to learn which efficiency projects could qualify for incentives or rebates, and then approached the utility. During site visits, the utility recommended other projects that the customer could do that would qualify for additional funding. The customer found this helpful as it gave them more money. The program incentives offered were about what the customer expected prior to contacting the utility. The incentives are helpful and can help the customer spend more on future projects. Sometimes the incentives can determine whether a project goes forward, other times it does not. The incentive is not the only determinant.

The customer tries to participate every year. The customer is currently working on an MOU with its utility that would provide for a three year efficiency incentive program. The person interviewed likes the idea of the MOU, but is in the early phases of discussion and so it is too early to provide feedback on the MOU and negotiation process. It looks promising so far.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

Pretty well. However, the participation process was not smooth as there were delays in communication. There was a lot of inconsistency. Sometimes the person interviewed would receive five calls in one week from the utility, and then the utility wouldn't return calls for months (i.e., feast then famine). There does not seem to be a particular time of year that this happens.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

No. The customer knew ahead of time which projects were going to be completed.

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Definitely. There are still opportunities in HVAC and other areas that the customer hopes to implement.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

Of course budget limitations pose a barrier. The person interviewed could think of $10 to spend for every $1 available. The customer would always like to do more efficiency, but budgets do not always allow for it.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

customer has not considered financing.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

Yes. Two or three years ago the amount of money available to spend on projects was reduced. The customer is slowly improving, just like the economy.

Barriers to Participation

A. Financial limits

Always a constraint for consideration.

B. Economic downturn

Is a consideration but does not seem like a barrier for the customer.

C. Customer awareness and marketing

D. Program design and administration

The person interviewed wished that the utility programs were less stringent and rigid. He wished the programs would let customers be more creative and employ alternative ways to be more efficient. Other products could be incentivized that customers should be allowed to submit for incentives.

The utility company doesn't seem to have enough people to do the work that's needed. Delays in communication make completing projects difficult. It's not that the people are not doing a good job, it's that they have too much workload.

E. Corporate review and approval process

F. Timing of program administrators

G. Customer distrust of new technologies

H. Customer convinced it has done all it can.

I. Others

Other Comments

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Boston

Industry: Office

Person(s) Interviewed: Assistant Property Manager

Interview Number: 7

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

5 to 9.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

Between five and one percent.

15) Annual natural gas costs as a percent of annual operating expenses:

Between five and one percent.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Internal rate of return; Payback period; Benefit-cost ratio; Energy bill savings.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, within the past three years and prior to the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

VFDs; re-lamping for energy savings; light sensors.

Please name one or two things about the program that did not work well for your company:

n/a

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Yes.

Predetermined Interview Questions

1. How important are energy costs to your company?

Hugely important. Only controllable cost. The customer can control the quantity of use by controlling load through controls, as well as improve the quality of equipment by improving its longevity. The customer reviews its energy budgets very thoroughly each year.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

The customer manages properties and brings efficiency projects to the attention of the building owner. The owner can then decide whether to make the capital investment, or pass the cost of the project onto the tenants. Property owners typically chose to make the investment as it makes the property more attractive and allows equipment to last longer.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

The customer focuses on the largest area of consumption, which is usually HVAC and elevators. The customer also looks into the low-hanging fruit such as lighting and timers.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

The property management customer works with a third party engineering company to audit properties and put together a program for the property owner. Every property is audited annually.

At the end of last year, the utility approached the customer and offered significantly larger program incentives than in previous years. The customer found this surprising because normally it finds that there is not enough money available at the end of each year.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

New construction has the most opportunity for savings, and building owners will usually try to include as much efficiency as possible during new construction projects. However, the downturn in the economy has reduced the amount of new construction activities. More renovations have taken place as the focus is on getting savings.

Since March 2009, the customer has seen improvements each year, and improvements increase from year to year.

Efficiency products seem cheaper and more available since the downturn in the economy.

Barriers to Participation

A. Financial limits

B. Economic downturn

Economy and participation rates have been getting better each year. Expect efficiency program participation to continue improving.

C. Customer awareness and marketing

The property management customer works with owners and tenants. Often the amount of time required to work with individual tenants to participate in efficiency programs is not worth the time and potential savings to the customer, especially because the response rate for tenants is not great.

The person interviewed identified three barriers: timing, education, and familiarity. The time commitment needed to participate is too great. "Analysis paralysis" could be overcome by greater education on behalf of the utility. Familiarity with the participation process and efficiency products could improve participation.

D. Program design and administration

Upfront incentives are a bigger motivator than rebates. With rebates, the amount you expect to receive could differ from the amount you actually get, and sometimes the rebate arrives much later than anticipated, making it hardtop plan for.

E. Corporate review and approval process

Building owners normally have interest in efficiency, but don't normally have the time and don't prioritize or commit to projects. Because there is no deadline for action, projects won't get the appropriate attention and action.

F. Timing of program administrators

G. Customer distrust of new technologies

H. Customer convinced it has done all it can.

I. Others

Participants are distracted by other energy projects like solar or geothermal. It's not clear what project can give you the biggest bang for your buck and provide largest savings. Customers often cannot participate in every activity at the same time.

Other Comments

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Boston

Industry: Office

Person(s) Interviewed: Environmental Program Manager

Interview Number: 8

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

Greater than 50.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

Between five and one percent.

15) Annual natural gas costs as a percent of annual operating expenses:

Between five and one percent.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes. We look for Energy Star equipment, and consider the lifecycle costs.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Payback period; Energy bill savings; Other.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, within the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

Product cost after the incentives.

Please name one or two things about the program that did not work well for your company:

Timing is always an issue, along with communications along the way.

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Yes.

Predetermined Interview Questions

1. How important are energy costs to your company?

It is a medium priority for company as a whole. It is a top priority for the division in which the interviewee works. This division has formalized GHG emissions reduction goals recently and backed out specific kWh and therm reductions that need to be met in order to accomplish the GHG emissions reduction goal.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

The division in which the interviewee works is very active in planning for equipment upgrades. The division generates a list of ideas that are converted into capital expenditure projects which is then shared with and considered by the company. The interviewee is typically well integrated in the process and is aware of equipment upgrades that the company needs to make and the timeframe of those upgrades. As long as there is enough advance notice, the interviewee is in a good position to recommend whether more efficient equipment should be considered when making these upgrades. However, the interviewee is not the only decision maker and energy efficiency and environmental footprint are not the only priorities. For example, if new products (such as bed linens) and services for customers are required, these usually take precedence over other capital expenditures.

In the event of an equipment failure, there isn't always time for consideration and coordination of energy efficiency. Past experience seems to stop the company from reaching out to its utility in the event of an equipment failure, as the interviewee indicated that the response has not been as timely as is required. For example, rooftop HVAC units had to be replaced without due diligence on efficiency due to the timeframe involved.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

In addition to payback period and energy bill savings, the company is conscious of its environmental footprint and has goals to reduce its footprint. However, the need to provide top quality products and services, which is a priority, also interferes with the goal of energy efficiency. For example, some energy efficiency products are lower quality than conventional products or do not meet the needs of the company's customers.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

Their efforts on energy efficiency are important marketing and reputational/branding tools that the company leverages in differentiating itself from other players in the market.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

The utilities are not consistent in how they connect with customers. Some utilities are more proactive than others in terms of reaching out to the company. The interviewee's primary critique is that the utility does not make enough effort to speak the company's language. The company has made some effort to get up to speed on the utilities terminology, but it has taken special time and effort. The language is overly technical and very specific to the utilities process. Also, if the company asks the utility a general question it is frequently directed to fill out an application before it can get this question answered. As it is too early in the process for an application to be submitted, the discussion usually stops there and efficiency opportunities are not captured.

Also, the utilities are not the only entity the company has had contact with. There are third party implementation vendors and lighting distributors as well. For example, an LED distributor recently came to one or more of the properties, did a walk through, and installed free LEDs through the utility upstream buy down initiative.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

Yes, there have been cases where this has occurred. The utility did a walk through and suggested upgrades to walk-in refrigerators and freezers and additional areas where occupancy sensors could be effective. Some of these recommendations have not been implemented to date due to the need to focus on other equipment upgrades and other capital expenditure priorities.

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Yes, the customer needs to replace some equipment and energy efficiency will be a consideration.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

The impact of budget limitations on participation differs by company property. However, energy efficient equipment has been installed in the past without utility incentives, when coordination with the utility was not possible, indicating that budget is not a key barrier. Also, generally, budget has been made available for participation since a core goal of the company is to reduce its environmental footprint.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

The company generally does not finance energy efficiency investments. The company prefers to pay off the costs upfront.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

Like any company, reductions to the capital budget tend to put the company focus on upgrades that are deemed absolute necessities. Currently, there is more money in the bank and more of an opportunity to get things done. In general though, the economy is not a major driver. The company does these projects because they are great business opportunities.

Barriers to Participation

A. Financial limits

Not really.

B. Economic downturn

Not really.

C. Customer awareness and marketing

Yes. It sounds like more opportunity to integrate utility- and company-initiated ideas would be beneficial to both parties.

D. Program design and administration

Yes. More targeted discussions of program offerings tailored to the industry would be more productive.

E. Corporate review and approval process

No. The company has integrated energy efficiency into its corporate goals and prioritization process for equipment upgrades.

F. Timing of program administrators

Yes. Not able to serve company in a timely manner in the event of a major equipment failure. This is compounded by the fact that company impressions from past interactions limit the company's interest in reaching out to the utility at the time of the failure.

G. Company distrust of new technologies

No.

H. Company convinced it has done all it can.

No. The company views its commitment to energy efficiency as a long term effort.

I. Others

Other Comments

The division that the interviewee has worked for was started in 1991. The company has a long history of staying ahead of green opportunities.

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Boston

Industry: Office

Person(s) Interviewed: Property Owner

Interview Number: 9

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

n/a

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

n/a

15) Annual natural gas costs as a percent of annual operating expenses:

n/a

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

n/a

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes – through two different third party companies.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

Please name one or two things about the program that did not work well for your company:

The subcontractors did not clean up the old lighting fixtures once the new ones were installed.

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Yes.

Predetermined Interview Questions

1. How important are energy costs to your company?

Energy is a huge cost to this condo property owner and manager. Forty-two percent of the condo's fees are for utilities. The person interviewed disagrees with the mindset that energy costs are fixed and are therefore not controllable. He takes efficiency very seriously and is very involved in efficiency projects.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

The person interviewed is the final gate keeper for decision making. There is also a board of trustees.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

A three year payback is required for any capital investment.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

The bill savings and free lighting. The person interviewed also received risk management savings in that higher efficiency lighting reduces the risk of fires, which resulted in insurance savings.

More generally, the person interviewed indicated that people participate in efficiency programs not just for the savings, but for other reasons including health improvements and marketing ability.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

The person interviewed had very little contact with his utility. He has called 1-800 numbers on his bills to participate in the utility programs, but found the people he dealt with under sophisticated and not action oriented, and considered the process useless and endless. He called 2 or 3 times over the course of 5 to 6 weeks before he reached out to the two third party companies. He was pleased with one of the third party companies because he found that the things got done and people quickly put him in touch with the right people.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

n/a

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Yes, plenty of buildings that still need to be upgraded.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

None, so long as incentives continue to reduce costs and provide free upgrades.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

The person interviewed was not aware of condo owners taking up the financing or loan options, as he had not heard a lot of buzz about the options. He thinks that the offerings should be better marketed through contractors that are working with small and medium sized businesses.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

The person interviewed felt that the economy can affect efficiency both positively and negatively. A down economy can make people fearful, as well as more cognizant of their costs. People are more sympathetic to savings opportunities in a down economy.

Barriers to Participation

A. Financial limits

Upfront costs are a huge barrier to participation, which is why financing is key component of efficiency programs.

B. Economic downturn

Not specifically for this Company, although the person interviewed felt that the economy can both increase and decrease savings potential.

C. Customer awareness and marketing

The person interviewed thought that information about the programs needs to get out there as knowledge is the number one barrier. Information needs to be better presented for the lay person who doesn't have the time to research efficiency opportunities.

D. Program design and administration

The person interviewed felt that certain measures that save substantial amounts of energy should be included in the programs (elevator equipment, for example).

E. Corporate review and approval process

F. Timing of program administrators

G. Company distrust of new technologies

H. Company convinced it has done all it can.

I. Others

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Central Massachusetts

Industry: Heavy Industry

Person(s) Interviewed: Purchasing and Energy Procurement; Engineering Manager; Facilities Manager; Finance Manager

Interview Number: 10

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

Greater than 50.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

Between five and one percent.

15) Annual natural gas costs as a percent of annual operating expenses:

Between five and one percent.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes, energy efficiency is one of many criteria.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Internal rate of return; Payback period; Benefit-cost ratio; Energy bill savings.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, within the past three years, and prior to the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

We were able to cost justify the project with the help of EEI funds.

Please name one or two things about the program that did not work well for your company:

> We did not have enough energy savings projects to recoup our contribution.

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Maybe. Yes - we would like to so that we get our contribution back, this will be dependent upon capital spend money available.

Predetermined Interview Questions

1. How important are energy costs to your company?

Very important. If energy costs go up too much, then their facilities will be moved to other states or countries.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

NA.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

IRR and payback periods. Payback must be less than 3 or 4 years.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

Lower their costs.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

The electric company representative is very engaged, and provides the technical support that they need. They are available to help when called upon. The electric company representative would give them an audit if they asked for it. The last time the electric company offered an audit was about two years ago.

The gas company does not reach out to them much on efficiency issues. The gas company representative is more of an account rep for billing than for efficiency. They met with the gas company representative about two years ago, but have not seen him since. The challenge is finding the right projects for EE improvements. The gas EE presentation was limited to space heating.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

They typically implement all that is eligible for financial support.

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Maybe. If they can find more efficiency measures to implement.

They would like the utilities to open up the criteria for what qualifies for the EE programs; e.g., they would like to get rebates for changing out windows.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

NA

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

Capital is tight in their company, but they are able to come up with enough to combine with what the utilities offer.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

This is not so much of a factor. However, if they do not remain economical and cost-effective, then their owners would re-locate them to other states or even other countries.

Barriers to Participation

A. Financial limits

No.

B. Economic downturn

Not really.

C. Customer awareness and marketing

This is only a barrier in that the customer is convinced that they do not have a lot of efficiency opportunities left.

D. Program design and administration

No.

E. Corporate review and approval process

No.

F. Company distrust of new technologies

Maybe.

G. Company convinced it has done all it can.

Yes.

H. Others

Not in contact with the gas company much.

Other Comments

This company is well aware of the benefits of energy efficiency investments, and does not seem to have any clear internal barriers to participating in the programs and adopting EE measures.

The biggest hurdle for them is finding new EE opportunities. They believe that they have already picked the low-hanging fruit, and there is not much more to pick.

They have gas-fired kilns that use a lot of gas. They are not planning to replace the kilns soon, but when they do they will call the gas company for financial support to buy smaller, more efficient kilns. There may be an opportunity to install more efficient burners.

They have some roof-top heating elements. Their plan is to wait until the elements die, and then get a rebate for efficient equipment from the gas company. If the rebates were higher, e.g., 80% or more, then they would replace the equipment before it dies.

One example of how the electric company really helped them out: At the end of one year the company called to tell them that they had a lot of money to spend by the end of the year. The electric company identified air leaks and sealed them up, all for free. The customer would welcome more of this on a regular basis.

However, based on this experience the customer believes that the company has too much EE money; and that they should either collect less from all customers or they should offer better deals to EE participants. "The utilities do not know what to do with all of the money that they have."

When asked how the utilities can serve them better, the response was that they would better served if they could fund the efficiency projects themselves, without putting their money into the EE funds.

They mentioned many times that they pay much more into the EE funds than they get out in rebates, and they are not happy about this. They think it makes no sense to pay more money into the fund each year than what they get back in rebates. They do not have enough EE projects to use up all the funds they put in.

They would like the electric and gas companies to be more creative with their funding options, e.g., to offer an industrial customer EE opt-out option.

They believe that the large customers subsidize the EE programs for the small and residential customers.

They believe that the utilities "mismanage" the EE funds. They did not provide specific anecdotal evidence of this belief. It was based on the view that as regulated companies the utilities do not have the competitive pressure to help them manage the programs well. They also have a guaranteed rate of return, which reduces the incentive for good management.

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Western Massachusetts

Industry: Office

Person(s) Interviewed: Electrical Manager

Interview Number: 11

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

Greater than 50.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

Not indicated.

15) Annual natural gas costs as a percent of annual operating expenses:

Not indicated.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Internal rate of return; Payback period; Energy bill savings.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

No comment.

Please name one or two things about the program that did not work well for your company:

No comment.

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Maybe.

Predetermined Interview Questions

1. How important are energy costs to your company?

Very important. They look at them every month. The production director, facility operators and electrical manager determine this priority.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

The electric program administrator has been in frequent contact with the company (6-7 times a year) and had 4-5 audits conducted in the past 17 years. The electrical manager and operations director review these audits and use payback as the key criteria to establish if they will move forward. The company requires a payback of 1.5 years or less to proceed with a payback of 1.0 being a 'no brainer'. This is established at the corporate level. If energy efficiency were to be implemented, the publisher would need to approve it. The company has not moved forward on any of the opportunities identified in the audits due to the fact that the payback requirement was not met, not even on lighting measures (which showed a 20 month payback).

The company's perception is that the natural gas program administrator has not been active in the market. The natural gas program administrator has never contacted the company to pursue efficiency. Natural gas energy efficiency opportunities have never been examined by the company.

A third party has been in touch with the company and made a proposal regarding efficiency which the company has also not acted on. They proposed a plan whereby the company would pay for the upfront costs using the savings, but the company did not act on this proposal.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

Payback period primarily. The interviewee believes that the company uses stingy criteria to evaluate efficiency opportunities but does not seem to be in a position to change it. Also, the interviewee feels that the building that he is in charge of is probably not the most inefficient facility that the company owns and operates, which could be making it harder to get improvements done at this building. The money could be better spent at other buildings.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

The company's most recent audit was conducted on lighting and air compressor opportunities in 2008. The payback requirement was not met so no action was taken but limited improvements to the air system were made afterwards.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

Well. She keeps them up to date as to the opportunities and is frequently in contact with them regarding the low hanging fruit that they should be addressing. The interviewee feels that the company is wasting her time and has said this to her, but she has assured them that this effort is not a waste of her time.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

Yes. The payback requirement was not met. Also, the building is undergoing some changes to usage (i.e., changes in occupied space vs. unoccupied space), which is an additional barrier to moving forward.

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Possibly. There is one opportunity that the interviewee is looking at now. Since the interviewee did not seem to have reviewed the proposal, he was not in a position to speak about it in more detail. If the payback is there, then the interviewee will look to see if the capital is there to move forward. This could occur within the first half of 2012.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

None. If the payback is there, the company will move forward.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

None. Financing has not been considered in the past and all costs would have been paid upfront. However, there is some new management now so this might change.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

The bottom line is being watched month to month. If there is money available, it's there to use. But, the economy, especially being in the newspaper business, has made it a lot more difficult.

The interviewee has authorized Synapse to quote him on the statements made in response to this question, including: "[We are] definitely dotting our I's and crossing our T's on everything we do – everything."

Barriers to Participation

A. Financial limits

Not really.

B. Economic downturn

Yes.

C. Customer awareness and marketing

For electric, no. for gas, yes.

D. Program design and administration

No.

E. Corporate review and approval process

Yes, specifically the company's payback criteria in order to get approval.

F. Timing of program administrators

No.

G. Company distrust of new technologies

No.

H. Company convinced it has done all it can.

No.

I. Others

Other Comments

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Boston

Industry: Office

Person(s) Interviewed: Global Director of Facilities & Engineering

Interview Number: 12

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

Greater than 50.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

Between twenty and ten percent.

15) Annual natural gas costs as a percent of annual operating expenses:

Between twenty and ten percent.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Internal rate of return; Payback period.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, within the past three years and yes, prior to the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

Decreased payback period

Please name one or two things about the program that did not work well for your company:

Minimal programs for municipality.

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Yes.

Predetermined Interview Questions

1. How important are energy costs to your company?

It is important. They are a for profit company, so any reduction in energy costs improves their bottom line.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

Business unit leaders submit capital improvement proposals to an executive committee comprised of the CEO, CFO and VPs of the various business units (6-7 members total). This committee determines which projects get approved based on each proposals impact to the bottom line. There is no mandate on EE – it is weighted using the same considerations as other projects such as expanding operations, etc. The metric for approval of these projects is simple payback. The threshold for approval is 4 years or less. Anything with a payback of 3 years or less will likely be approved. Anything with a payback of 3-4 years will be considered, but may not get approved, depending on what other projects are on the table for a given year.

After projects are approved, there is a kick off meeting with the site leaders and facility managers. These folks would have been involved in the proposal upfront, so they are already very knowledgeable about the project and supportive of it. Early buy in from these folks is critical for scientific reasons – there are risks in this industry to savings energy such as risks to equipment, products and experiments conducted in laboratories that, if compromised, could hurt the bottom line. Also, a procurement specialist is included in discussions to ensure the equipment is being procured at the best price.

Each year, this interviewee submits 2-3 significant energy savings proposals. His hit rate is one for every three proposals submitted.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

Mid-sized projects are based on payback. Larger projects (i.e., over $100M) require lifecycle cost analysis and other analyses and may be approved even with a payback that is longer than 4 years.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

Simple economics – to reduce cost.

The interviewee would like to note that not all equipment offered improves operations. Some technologies make operations more complex and therefore expensive. For example, the company looked at a centralized boiler plant vs. distributed gas fired furnaces. The company found that MA regulations require more expensive staff and extra dedicated staff for a centralized boiler plant, offsetting the energy savings that could have been realized. The interviewee states that one fault of the programs is that they don't account for the full operations impacts over the life of the system including any changes in staff costs required to run the equipment.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

Neither the municipal electric utilities nor the gas companies have reached out to this company. The company has reached out to the appropriate administrators at various times to determine what incentives were available for specific projects.

At one location, the company has leveraged the amount offered annually for electric upgrades for many years. However, this only allows a small bit of lighting renovations to occur in a given year. The gas opportunities have been mostly tapped out using the amount available annually in incentives, which the company has leveraged 2 or 3 times. The company would renovate their entire campus if more electric incentives were available. They have an air handler that is 50 years old and a lot of lighting. This is a big space.

At another location, the company has not applied any rebates. The company looked at a cogeneration plant for this location, but abandoned the project after the site was temporarily closed. If the site comes back online, they would revisit efficiency opportunities.

The company has received one off rebates for specific equipment only; no technical support, audits or assessments have been provided by the PA.

Most of the company's energy efficiency activity has been in new construction, for which the company received no rebates. The company estimates they have achieved low savings to date for renovations/retrofits of existing equipment and space.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

No efficiency measures have been proactively offered. Of the measures the company has identified, all that were approved as economically sound were implemented.

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

The company could continue to replace lighting fixtures for the next 10 years using the incentive amount available annually to one of its locations.

The company anticipates participating in other ways too, but no projects have been proposed or approved for this timeframe yet. In Sept/Oct before the year in which measures would be implemented, proposals are submitted. In December, the capital funds that are available are known and allocated. There are at least three projects approved and in process for 2012, but none are in Massachusetts.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

If the payback is there, budget is likely not an issue.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

The company generates a lot of cash, so financing has not been considered. If the project were large enough, the company would consider a shared savings approach through a third party.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

[He can be quoted if it is anonymous, meaning Synapse cannot attribute this quote to the company or the interviewee]

"What it has caused is, it has caused us to want to spend less capital, spend less money to increase shareholder returns. So don't spend any money and maintain your existing clients and improve profitability at the same time somehow.

We are a public company and the impact of that cannot really be understated. We have to present numbers to shareholders quarterly, on a quarterly basis, and the big grand finale at the end of the year. And you know they are not so much concerned with, you know did you reduce your energy consumption. They are looking at the amount of impact you made in that quarter and that year on the profitability so in some cases we will even though you have something that pays for itself in 3 years, if the savings isn't going to be realized until year 4, then the climate might not be right with the downturn to implement all of the measures that we come up with."

The straight answer to the question is that economic downturns do slow down energy efficiency initiatives.

Barriers to Participation

A. Financial limits

Yes

B. Economic downturn

Yes

C. Customer awareness and marketing

Possibly – it is not clear whether increased communication from the PA to the company would result in more/deeper projects

D. Program design and administration

No

E. Corporate review and approval process

Yes, specifically competition with other projects on payback

F. Timing of program administrators

Yes, outreach should coincide with planning cycle

G. Company distrust of new technologies

Yes, somewhat. The company is wary that the full operational costs are often not represented correctly.

H. Company convinced it has done all it can.

No

I. Others

Other Comments

The interviewee stated that the biggest benefit of these programs has been to impact product development and manufacturing, that results in reduced cost of leading technologies. Provided one example of VFDs where cost was $50,000 and now is $5,000 due to program promotion/acceleration of this technology.

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Central Massachusetts

Industry: Healthcare

Person(s) Interviewed: Facilities

Interview Number: 13

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

Greater than 50.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

Twenty percent or great.

15) Annual natural gas costs as a percent of annual operating expenses:

Between twenty and ten percent.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Internal rate of return; Payback period.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, within the past three years and prior to the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

The reduction in energy consumption and the rebate check.

Please name one or two things about the program that did not work well for your company:

The paperwork required.

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Yes.

Predetermined Interview Questions

1. How important are energy costs to your company?

Energy costs are extremely important. The customer spends a large amount of its budget on electric and natural gas use.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

If the measure has no cost, then it's implemented. If costs are required, the project needs to be approved by the capital planning department. The approval process can take a few weeks to a month depending on the numbers. It could take up to 6 months to implement a project after it has been approved. Combined with budget limitations, internal approval of a project is the customer's biggest barriers to efficiency participation. Efficiency projects are often turned down in favor of other projects more germane to the customer's core business.

Sometimes the person interviewed will try to work around the capital approval process. When equipment fails it becomes an emergency capital replacement project. The person interviewed is aware of equipment that could be perceived as an emergency replacement, and does the homework to find out what would be the most efficient replacement. Once the equipment fails, capital approval is received for the most efficient equipment. The customer pursues the utility rebate after the fact.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

Return on investment is considered during the capital planning process. Capital approval usually requires a 2 year or less payback period. Whenever the customer replaces equipment they always look for the most efficient model.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

The customer primarily participates for the bill/budget savings. The customer regularly installs or replaces lighting and HVAC related measures. The person interviewed is obligated to maintain a budget, the more energy efficient equipment that can be installed and automated cost controls, than the budget can be maintained better. By reducing the operational budget, the customer can spend more on other projects, both efficiency related and other facilities management projects.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

The utility understands the customer very well. The customer has had no issues. The utility has been helpful and supportive and keeps the person interviewed well informed.

If the utility has something new to offer they will contact the customer. If the customer has an efficiency project it wants to do, then the person interviewed will contact the utility. The paperwork doesn't usually take that long, and it's not that bad of a process. The availability of money is beneficial because the customer has been paying into the state efficiency funds for years. The turnaround is pretty quick. The documentation isn't that hard to fill out; relatively straight forward.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

Only if the project does not receive capital approval internally.

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

The customer would like to participate going forward. No barriers from utility side. Only barrier would be getting capital approval.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

There is only a certain number of dollars that can go around. If a capital investment project is proposed that is more in line with the customer's core business, that project will likely receive funding over the efficiency project. Efficiency projects are often turned down because of the limited capital available. Have to spend dollars wisely to keep customer up-to-date on current technology.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

n/a

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

The economic environment is causing the customer to require payback periods less than 2 years, which is the customer's normal payback standard.

The customer is in the healthcare industry, and is concerned about the effect of the political environment on its budget and planning. Specifically the customer is concerned about the reimbursements they will receive from Medicare or Patrick-care, Obamacare or whatever the next president will offer. The customer has concerns as to the amount of dollars that will be available for operations, expansion or new programs, and are getting much more frugal with money.

The customer has seen a reduction in inpatients and elective healthcare services that would normally generate revenue, which the person interviewed attributes to the economy and lack of spending. Elective surgeries such as cosmetic surgeries are not taking place. This could change once the economy gets better. Notably, pregnancies are down from previous years, which also decreases future projections of revenue. This is because if a baby is delivered at the customer's facilities, ultimately the baby is likely to become a user of the facilities due to the history and familiarity.

The customer has also seen an increase in emergency care services, especially for uninsured patients. If someone is out of a job and has used up any health benefits they may have, then they become uninsured and use emergency care as they would normally use a primary care provider. Because they are uninsured, the customer essentially gives away the medical services for free and is not likely to be reimbursed by the insurance company. The person interviewed thinks this will change as soon as unemployment decreases to 4-6 percent.

Barriers to Participation

A. Financial limits

Yes. Capital is tight and efficiency competes against projects that are more closely related to the customer's core business.

B. Economic downturn

Definitely.

C. Customer awareness and marketing

no

D. Program design and administration

no

E. Corporate review and approval process

Yes. Largest barrier for the customer.

F. Timing of program administrators

no

G. Customer distrust of new technologies

no

H. Customer convinced it has done all it can.

no

I. Others

Other Comments

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Boston

Industry: Schools & Colleges

Person(s) Interviewed: n/a

Interview Number: 14

Key Questionnaire Responses

The Company did not provide the questionnaire.

Predetermined Interview Questions

1. How important are energy costs to your company?

Very important.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

n/a

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

n/a

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

n/a

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Yes.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

For three years put little money into efficiency. Competing for funds in a bunch of other areas and efficiency is not a high priority for the Company. Anything that supports the main goal of the Company will receive funding before conservation. The Company recently received approval for an efficiency project, but for three years the Company didn't do anything.

Barriers to Participation

A. Financial limits

B. Economic downturn

Previously, yes. Uncertain going forward.

C. Customer awareness and marketing

D. Program design and administration

The real money seems to be on the retrofit side. It's much harder to get money on the new construction side than on the retrofit side and there is only a certain amount of that that you can do.

E. Corporate review and approval process

F. Timing of program administrators

G. Company distrust of new technologies

H. Company convinced it has done all it can.

I. Others

Large companies should be allowed to retain the amount they pay into state efficiency programs and use that money within their company only for efficiency purposes. On the gas side, companies don't pay into program and don't participate in programs and seems to work well. Companies don't get nearly as much money out of the program on the electric side as they put into it. It would be helpful if companies could retain the money. If there was a cap on the amount that could be used in total, perhaps the amount spent can't be greater than funds normally paid into the utility programs, it could be a reasonable constraint. Company feels forced to leave money on the table; money that could be used towards conservation.

On a universal basis, if a company can help the utilities meet their savings goals, there should be a simple reward that applies to everyone, perhaps a universal ratio of incentive dollars per savings achieved. Could get more people to jump on board because it's a simpler approach to participation. If a project has real savings but is too complicated like a behavioral based program, then it won't get done because it doesn't fit into the utilities programs. This could open up funding to more people.

Companies that have done all the low hanging fruit could receive higher incentives for the harder, more complicated projects. They need to be incented to do more, and meeting paybacks is difficult with more complex projects. The incentive could be based on a scale of previous projects, where the more you've done the more incentive you receive for a future project. Could be a difficult program to manage however.

There should be better transparency on the amount the utilities spend and save relative to the amounts they planned for.

Other Comments

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Boston

Industry: Schools & Colleges

Person(s) Interviewed: Associate Director of Energy Supply and Utility Administration

Interview Number: 15

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

Greater than 50.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

Between five and one percent.

15) Annual natural gas costs as a percent of annual operating expenses:

Between five and one percent.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Internal rate of return; Payback period; Energy bill savings.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, within the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

The rebates and technical assistance.

Please name one or two things about the program that did not work well for your company:

> The process is not well defined. There is too much turn over in personnel. Utilities should not keep 100% of the FCM credit.

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Yes.

Predetermined Interview Questions

1. How important are energy costs to your company?

Very important.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

n/a

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

n/a

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

The utilities are not very up to speed on new thing. It can take a long time for the them to come to grips with some of the possibilities of new products or projects. The person interviewed finds it very frustrating that behavioral programs are not well incorporated into utility programs. The utilities say they want to do behavioral things but there is really no reward for it. The customer has brought very clear behavioral programs to the utilities but it's been difficult to get anything going.

The utilities are not proactive enough on informing companies on how best to use money for efficiency and how can the utilities help in efficiency projects.

Utilities don't treat the customer like it knows anything. Most large companies are pretty sophisticated. It would be nice if the utilities treated them with that sophistication and understood that they're not babes in the woods.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

n/a

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Yes.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

The person interviewed feels that utilities should cover more of the technical support costs.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

n/a

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

It is important that there is enough money to support more efficient option all the time. If money is available, companies will do efficiency projects, but they have to be made aware that the money is available, and there has to be enough money so that it's worthwhile and won't take too much out of the customer's budget to participate.

Barriers to Participation

A. Financial limits

B. Economic downturn

C. Customer awareness and marketing

D. Program design and administration

Yes. The utilities are slow to adopt new projects or savings opportunities, and are not proactive enough in assisting companies in recognizing projects.

The person interviewed feels that utilities should cover more of the technical support costs.

E. Corporate review and approval process

F. Timing of program administrators

G. Customer distrust of new technologies

H. Customer convinced it has done all it can.

I. Others

Utilities don't treat the customer like it knows anything. Most large companies are pretty sophisticated. It would be nice if the utilities treated them with that sophistication and understood that they're not babes in the woods.

Other Comments

The customer strongly recommends the right to opt-out of efficiency programs. Large companies should be allowed to retain the amount they pay into state efficiency programs and use that money within their company only for efficiency purposes. MOUs help but do not address the problem. The customer would spend a lot on efficiency even if it didn't feel compelled to get the money back out of the programs that it put into it. Make it so that the customer gets to keep more of its money to spend on electricity savings.

Larger companies would benefit from FCM credits, and the person interviewed feels that the utility is stealing that money.

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Boston

Industry: Healthcare

Person(s) Interviewed: Utilities Manager

Interview Number: 16

Key Questionnaire Responses

The Company did not provide the questionnaire.

Predetermined Interview Questions

1. How important are energy costs to your company?

Very important.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

n/a

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

n/a

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

n/a

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Yes.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

When dealing with budget issues, money does not go to efficiency. Even easy projects with a 6 month payback can take time to convince management to participate.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

n/a

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

Barriers to Participation

A. Financial limits

B. Economic downturn

C. Customer awareness and marketing

D. Program design and administration

The person interviewed recommended that the utilities should divide the amount of funding available by their MW or kWh goals as a way of allocating incentive dollars. Reward each kWh saved in the same way. Sometimes utilities can't fund a project because it doesn't meet the program requirements. If a company can't do a project with the utility's funding, it would be hard to convince that company to do any more efficiency if they were already turned down by the utility. If a company can prove that a project saved energy they should be rewarded with the incentive. Large companies should have incentives for being aggressive as it's getting harder and harder to find efficiency projects.

MOUs are not blind to other project requirements. It can be difficult and time consuming to document costs, such as behavioral or automation costs, although the savings can be well documented. If you can document savings clearly with the M&V protocols that utilities establish, then that should be the rule, not anything else involved in the project. If the Company saves an amount of kWh that meets the utilities' goals for the savings for that amount of money, then that money should just be paid out to the Company to make it easier. Buy the kWh the Company is saving, regardless of the cost to implement the efficiency savings. Requires a rigid way of documenting and measuring savings.

The person interviewed feels that utilities should cover more of the technical support costs.

E. Corporate review and approval process

F. Timing of program administrators

G. Company distrust of new technologies

H. Company convinced it has done all it can.

I. Others

Large companies should be allowed to retain the amount they pay into state efficiency programs and use that money within their company only for efficiency purposes. Companies can pay millions into the state efficiency funds without getting close to that back. Utilities should make it easier for companies to access that money. If businesses could keep the amount they pay into the state efficiency funds, they could avoid having to raise additional capital for efficiency projects. That would be the fairest way, people would look for projects, and projects would move faster.

Over the past 4 or 5 years, the Company has been pretty aggressive with energy conservation, and the person interviewed thinks they received back about 10% to 20% of what they put in, and they have been aggressive. Wondering where the other 80% of money is going and how it's being distributed. Not sure if what that 80% is used for offsets the savings that the Company would get if it had been allowed to use it for efficiency.

The low-hanging fruit is gone. As you get into more complex projects, payback and costs change dramatically.

There are rules in place that don't allow utilities to give money for certain projects. The regulators don't allow them to do certain things. The project has to meet certain metrics according to the regulator. Needs to be a policy change that makes the utility want to give you the money for efficiency projects.

The person interviewed does not like that FCM payments are not returned to the Company.

Other Comments

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Boston

Industry: Schools & Colleges

Person(s) Interviewed: Energy Manager

Interview Number: 17

Key Questionnaire Responses

The Company did not provide the questionnaire.

Predetermined Interview Questions

1. How important are energy costs to your company?

Very important.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

n/a

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

n/a

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

n/a

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Yes.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

n/a

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

The Company had a lot of new construction projects stopped because of the economic downturn, and so any efficiency associated with those projects obviously isn't happening anymore. Digging into existing facilities is more difficult, but the only place to spend money on efficiency at the moment. Such projects would probably have a better efficiency outcome though.

Barriers to Participation

A. Financial limits

B. Economic downturn

Yes. Less new construction.

C. Customer awareness and marketing

D. Program design and administration

New construction side is a tremendous amount of effort to try to coordinate the utility programs with the construction process and not get in the way of it. The reward in the end is not huge so you have to wonder if it was worth it

Anything that simplifies the process breaks down a barrier.

The person interviewed would like outside lighting to be incented more by the utilities. Outside lighting reductions don't work well in the utilities formulas because it's off peak load.

E. Corporate review and approval process

F. Timing of program administrators

Utilities have problems with scale. When the Company is ready to roll out a project and when the utility is ready to roll out a project it's not necessarily the same time. The utilities can't always be there to support a project and the Company needs to move forward with the project, so opportunities are missed. It doesn't always happen in the same timeframe that the programs are working within.

G. Company distrust of new technologies

H. Company convinced it has done all it can.

I. Others

Large companies should be allowed to retain the amount they pay into state efficiency programs and use that money within their company only for efficiency purposes. Company feels forced to leave money on the table because the Company has already done the easy stuff that the rebate programs are designed around. The Company has changed its light bulbs multiple times, but the next level of work is much more complex. If the Company could keep its efficiency money in house, it would be easy for the Company to make a commitment to only spending that money on efficiency projects.

Other Comments

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Western Massachusetts

Industry: Heavy Industry

Person(s) Interviewed: Plant Superintendent

Interview Number: 18

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

20 to 50.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

Between five and one percent.

15) Annual natural gas costs as a percent of annual operating expenses:

One percent or less.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

n/a

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

The company has not specified criteria regarding efficiency measures.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes,

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, prior to the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

We received money from {utility} for purchasing new energy efficient light fixtures

Please name one or two things about the program that did not work well for your company:

n/a

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Yes.

Predetermined Interview Questions

1. How important are energy costs to your company?

Very important.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

The customer was recently purchased by a different parent company, and is still working through the new capital approval process. For projects that are large than $10,000, capital expenditure approval is required from the new parent company. The approval process takes about 8 to 10 weeks. Anything less than $10,000 the customer does not need capital approval.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

The customer looks for a 2 to 2.5 year payback.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

The customer primarily participates as a way to save money and to make the process simpler. The customer couldn't have done efficiency projects without the rebates offered by its utility.

Anytime equipment needs to be replaced, the customer looks for a more efficient model with newest technology available.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

The utility company is easy to work with but could be more helpful. "They don't make the process as easy as they could." The customer first learned of efficiency opportunities through contractors that knew about the programs and not from the utility company. The customer heard of efficiency opportunities from three other sources before the utility called the person interviewed to say that they will pay him to change the lights.

The customer would prefer that the utility contact them directly, especially given the amount they pay into the state efficiency funds. "They send me a bill every month, you'd think they'd put on the bottom 'Hey you could save some money if you did this.' But with all those taxes and fees on the back there's probably no room on the same piece of paper."

The utility should "have someone come out to you facility and show you the potential you could have. To me it's pretty much a no brainer: they have endless amounts of money because all they have to do is raise the rate a penny and they pick up a half a million dollars a year. How simple is it to go out and see who's using the most electricity and say "Hey you guys are using a lot of electricity. Why don't we see if we can give you guys some help? Let's come into your place look around and see what we can do to save you money."

The person interviewed is attending a seminar hosted by its utility to learn more about efficiency opportunities.

The utility provided an audit and recommended lighting upgrades, including upgrades for more efficient exit signs. The person interviewed did homework on pricing for lighting contractors and then went to the utility for the rebate. Contractors charge different rates for bulbs and installations, so the person interviewed shopped around for the best rate from a contractors. The customer also had an audit for its air compressor system.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Yes. The customer planned to undergo a lighting upgrade last year, but the project was stalled because of the corporate restructuring and new ownership (see question 2). The project was approved by the last parent company, so the person interviewed doesn't see why the project would not receive approval from the new parent company, especially because the new company has a more "green" focus.

The customer also plans to participate so that it can upgrade aging equipment, and so that the customer can be more cost-efficient. The person interviewed has been looking into such projects.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

At the moment the person interviewed does not see budgets posing a barrier, although with the new ownership it is uncertain.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

The previous parent company had troubles with the economy, and the person interviewed is uncertain about the new parent company. "The economy itself is not good. We're extremely slow right now. I'm laying people off tomorrow because there isn't enough work for them. There's no sense bringing them in and turning the lights on if I can't make enough money to pay for it."

Energy efficiency is seen as an opportunity to save money, so long as the payback is high, such as lighting. "When times are slow you have to cut back spending every place you can. Spending a few dollars to put in new light fixtures which is going to save us thousands of dollars over the long run makes sense to do it. It helps the environment and it helps your costs. It's a no brainer."

The customer changed its lighting in the 1990s when the economy was affecting the customer's business and it had to stay competitive. The customer is changing out its lighting again to remain competitive still.

About three years ago the customer condensed its operations into half of its building facilities and the other half is vacant. This does not eliminate processes or production potential. This was done solely to save on utilities. The customer has shut down the water to that side of the building except for sprinklers, turned off the lights, and keeps the heat down to a minimum so the pipes don't freezing. The customer has tried to rent out the other half of its facilities but has not been successful.

Barriers to Participation

A. Customer Barriers

a. Financial limits

b. Budget limits

Potentially – depends on new corporate structure.

c. Economic downturn

Yes. customer has been downsizing but efficiency is seen as something that can help with the down economy.

d. Corporate review and approval process

Potentially, but unlikely.

e. customer distrust of new technologies

f. customer convinced it has done all it can

No.

B. Program Design & Administration Barriers

a. Insufficient incentives

No – the more the better.

b. Insufficient marketing and outreach

Strong yes. The customer would like for the utility to be much more proactive about identifying and promoting efficiency.

c. Transaction costs

d. Responsiveness and timing

Not really.

e. Limited measures offered

No.

f. Policy Issues (Opt out of SBC)

Yes – "I'll never figure out any of these utilities' billing. When I have to pay more for electricity to come here than I actually use, it makes no sense to me. There's more taxes on these damn things."

g. Other (note)

Other Comments

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Central Massachusetts

Industry: Retail

Person(s) Interviewed: Manager of Utility and Energy Services

Interview Number: 19

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

Greater than 50.

5) Building ownership:

Leased.

13) Annual electric costs as a percent of annual operating expenses:

One percent or less.

15) Annual natural gas costs as a percent of annual operating expenses:

Between one and five percent.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Internal rate of return; Payback period; Other.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, within the past three years.

Yes, prior to the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

We like the concept of the Upstream Program. It shows that the utilities are trying to help their customers get incentive dollars without having to submit a lot of paperwork.

Please name one or two things about the program that did not work well for your company:

There is little or no flexibility reemerging technologies and the DLC list that many of the utilities use to determine of the product qualifies for rebates. There should be some flexibility that allows the utility or the vendor to get the product approved for a rebate when there is a minor difference such as color temperature.

Finally, the company has changed the way our stores are constructed. We have gone from actually owning the building to "build to suit." The developer ultimately owns the building but is buying the energy efficient equipment according to the company's specifications. With these types of projects, it is very difficult to get the necessary documentation (such as invoices) from the developer to show the utility what is actually installed. Since build to suit projects are becoming more common the utilities need to come up with a better system to make it easier to get incentive dollars.

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Yes.

Predetermined Interview Questions

1. How important are energy costs to your company?

Very important. They have a staff of four full-time people managing energy costs; for 200 stores, including some office buildings.

They build six to twelve new stores per year.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

The energy management team oversees all the procurement and energy needs. "If they can find an EE measure, they will adopt it."

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

They are always looking for ways to reduce their energy bills.

Their decision-making process on how deep to go has evolved over the past five years. It used to be that they would focus on lighting, and it would need a payback period of two years or less. Now with LEDs with long lives and O&M savings they have stretched out the payback period. They have seen their light O&M bills drop significantly with LEDs.

For deeper retrofits, beyond lighting, they might adopt measures with paybacks of longer than two years.

Their standard lease for new buildings is 20 years, it used to be six years. This is very long for a retailer. This long-term perspective carries over to their EE investment perspective.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

Not asked.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

They have had mixed experience. "It all comes down to the personnel."

One of the electric companies used to be really good. Now they have been less responsive with new personnel.

Another one of the electric companies used to be "horrendous," but have recently been much better.

The PAs should be more pro-active in helping with the paperwork.

In general, the PAs have been more supportive in the past; where the applications were filled out in advance and they (the customer) "just had to sign the forms."

If they only have one account rep, then that rep is likely to be a bottleneck to the process.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

No, they have the opposite problem. They would like to get rebates for efficiency measures that are not offered by the programs.

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Yes, they want to get as much financial support as they can get. They want to get refunds that are closed to the amount of money that they contribute to the efficiency programs.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

This is not a limitation for them.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

This is not a barrier for them.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

This was never mentioned as a barrier for them.

Barriers to Participation

A. Customer Barriers

a. Financial limits

No.

b. Budget limits

No.

c. Economic downturn

No.

d. Corporate review and approval process

No.

e. Company distrust of new technologies

No.

f. Company convinced it has done all it can

No.

B. Program Design & Administration Barriers

a. Insufficient incentives

Yes. They would like to see incentives available for a much broader range of efficiency measures.

b. Insufficient marketing and outreach

Yes. They would prefer more pro-active engagement from the PAs.

They do not hear much from gas companies and do very little gas efficiency.

c. Transaction costs

Yes. Paperwork and invoices. One of the biggest barriers.

d. Responsiveness and timing

Yes. One of the biggest barriers.

e. Limited measures offered

Yes. The PAs should be more on top of emerging technologies.

f. Policy Issues (Opt out of SBC)

Mentioned briefly.

g. Other (note)

The DLC list is too confining, cumbersome and slow. See below.

Other Comments

The three biggest issues for this company are (1) the programs do not sufficiently support emerging technologies, (2) the application process is too cumbersome and should be streamlined, and (3) the new building program requires a new application for each new building even though the build many that are exactly alike.

This company has several stories of how the programs were too slow and burdensome in approving new technologies – technologies that were clearly highly energy efficient. They are especially frustrated with the Design Lights Consortium (DLC) list, and the time it takes to get new products on the list.

- When they moved to a new building they had an immediate need for new LED floodlights. They put a lot of work into finding the right fixture, but the one they needed was not on the DLC list, due to the color temperature.
- They also needed 3,500 LEDs to go from 50W to 9W, but they were not on the DLC list because they were not directional.
- They gave a manufacturer a set of specs for a specific LED lights, they got what they wanted, a great design, but it took six to twelve months to get it approved for rebates.
- The products change every month, but it takes much longer for the DLC list to be updated to reflect new products.
- In the time it takes a manufacturer to get on the DLC their product can be out of date. Three-quarters of measures on the DLC is out of date and no longer available.
- One of the specs on the DLC was in error.
- DLC is a regional / national list – the MA program administrators could go beyond what is on the list, but they do not.
- They have seen a similar problem with upstream measures.

They are trying to be more progressive and pro-active, but they feel like they "get slapped" by the programs.

They put in lots of LED in their parking lots and expected to get paid $40k, according to the program offerings, but were only paid $20k.

They make energy efficiency decisions for their entire chain, which extends well beyond Massachusetts. They make decisions about what to purchase regardless of whether they will be getting rebates. They also did a lot of lighting upgrades to their office building without any rebates.

- However, they can do more efficiency investments with the funds provided by the rebates.
- Also, there often is a lot of deeper efficiency measures that they could adopt but that they do not adopt because of the paperwork necessary for the rebates.

They build a lot of new buildings, and they are all alike; cookie-cutter. But every time they want to get rebates from the new construction program they have to re-apply from scratch. They often don't bother. Also, they typically lease the buildings and pay the energy bills. They don't bother to apply for the NC program because of the paperwork, and because they have to chase the builder down for all the invoices. It is not worth it. They do not know if the builder goes after the NC program rebates.

Their experiences in New York and New Jersey have been even worse, because those programs are run by the government.

In general they applaud what the states are doing on energy efficiency, and want to be a part of it.

They are investing in a lot of roof-top PV. However, all of it is through PPAs with private companies; they just get a bill reduction. None of this is through the energy efficiency programs.

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Central Massachusetts

Industry: Office

Person(s) Interviewed: Project Manager

Interview Number: 20

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

Not provided.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

Not provided.

15) Annual natural gas costs as a percent of annual operating expenses:

Not provided.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Internal rate of return, payback period, benefit-cost ratio, energy bill savings, but mostly whether the incentives are there and energy bill savings.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, within the past three years and yes, prior to the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

Not provided.

Please name one or two things about the program that did not work well for your company:

Not provided.

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Yes.

Predetermined Interview Questions

1. How important are energy costs to your company?

Very important. They are a small company, so energy expenditures immediately affect expenses. They are always looking to streamline manpower and energy.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

When new tenants trigger a retrofit, or a tenant space opens up and allows for upgrades, the company typically contacts the utility with ideas and to see if there are incentives for those projects. If so, the interviewee discusses the opportunity with the property manager and they make the decision.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

The company does not have a threshold for savings or payback. They evaluate the merits of energy efficiency project by project and implement energy efficiency as it makes sense.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

The company trusts the utilities guidance on energy efficiency products and services.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

The company's relationship with their gas provider is new, but they were very satisfied with the process. They recently converted from oil to gas and received incentives towards a new gas boiler. They said their rep was excellent and eager to help.

The company's relationship with their electric provider has been ongoing for at least 7 years. They have been happy with the relationship until recently. Recently, they have been experiencing an issue that is straining this relationship. The electric provider has hired a third party as a go between the company and electric provider. This third party is responsible for assisting with the application process and answering the company's questions. The company does not trust this third party as they suspect there is some incentive involved for the third party and also is concerned that this duplication of effort is costing additional money that is being charged to ratepayers, including themselves.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

No. The electric provider did a technical assessment of the building and did not recommend anything outside of lighting to the company. They have cooling towers and HVAC systems. The company has mostly focused on lighting opportunities and has been transitioning to new lighting over the past 10-13 years. Their building was built in the late 1800s and is on the historical registrar which limits opportunities somewhat. They are interested in doing window replacements, but there isn't currently an incentive for this so they probably won't get done.

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Yes, every step the company takes affects long run expenses. Even though they must do this in a phased approach, eventually they will get to it all.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

Tenant fit outs, when expensive, compete with dollars for EE. But usually, they have enough capital to do what needs to get done. Fortunately they have remained busy/full. However, this takes away from their ability to do as much EE as they could be doing. They evaluate opportunities on a year by year basis.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

They haven't financed any projects to date. They typically have the cash on hand to cover it. However, they would consider financing if they find cost effective savings.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

[the interviewee has granted Synapse permission to quote her]

"With this economy a lot of businesses have a hard time."

"Because we have tenants that have a difficult time, which means they have a difficult time paying the rent and so forth, it does somewhat affect us. Without the income it is hard to carry the expense side of the building, so at times you find, when things are bad, you are taking care of the most necessary and not doing as many improvements as you would like to. We've been fortunate enough where our tenant base has not been as bad as it could be. We have a lot of state tenants in our building, because they are large and here for large periods of time it helps out our expenses, our income so that when the smaller tenants because all of the spaces are rented to different businesses."

They found that mortgage brokers and attorneys specifically went through hard times, and it impacted the company.

Barriers to Participation

A. Financial limits

No

B. Economic downturn

Not really

C. Customer awareness and marketing

Yes, to the extent that there are other opportunities other than lighting that could be addressed.

D. Program design and administration

No

E. Corporate review and approval process

No

F. Timing of program administrators

No

G. Company distrust of new technologies

No

H. Company convinced it has done all it can.

Partly. The company knows it has more to do, but does not seem to be aware that they could be going much deeper than they are today.

I. Others

Other Comments

The company has saved 5% of its energy costs by implementing efficiency measures until this year. They expect greater savings moving forward from their oil to gas conversion project.

The company met with a company recently to set up sustainability goals but no action has been taken at this time. The company considers itself to be very environmentally conscious (i.e., they recycle lighting, electronics).

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Boston

Industry: Healthcare

Person(s) Interviewed: VP Property Management

Interview Number: 21

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

Greater than 50.

5) Building ownership:

Leased.

13) Annual electric costs as a percent of annual operating expenses:

Twenty percent or greater.

15) Annual natural gas costs as a percent of annual operating expenses:

Between ten and five percent.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Payback period and energy bill savings.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, within the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

No cash upfront, the ability to pay through savings.

Please name one or two things about the program that did not work well for your company:

Not indicated.

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Maybe.

Predetermined Interview Questions

1. How important are energy costs to your company?

High importance. The fact that all buildings in MA are leased has not raised any limitations as all parties benefit from efficiency; the company is responsible for all utility costs and the building owners also see the benefit of having new equipment and more efficient equipment.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

The interviewee drives the process. He makes a proposal to the CFO including capital costs, payback analysis, and what rebates are available. If the capital and payback are there the interviewee gets approval. The company will only consider projects with a payback of three years or less. Energy efficiency competes with patient care and other infrastructure upgrades for capital. Once approval is given, the interviewee manages the process by working with maintenance directors on site and hiring contractors to do the work.

Over the past 5 years, the interviewee has upgraded 10 facilities and done 1-2 projects per year. The projects they have pursued include lighting upgrades, boiler replacements, domestic hot water, kitchen appliances, and cogeneration.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

A payback period of 3 years or less is the primary criteria.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

Reduced costs. Utility costs come directly out of the bottom line.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

The program administrators do reach out, but the company generally drives the process.

The interviewee feels that the program administrators don't understand health care at all. An assessment was conducted that 1) identified projects that had already been implemented 2) identified measures that are not able to be implemented in a healthcare environment (i.e., occupancy sensors and programmable thermostats with set back) and 3) did not identify opportunities that the company was interested in (the assessment focused entirely on short term quick fixes and ignored projects with larger capital outlays). They look at lighting in healthcare the same as for an office building which doesn't work.

The company believes the ideal program would be a no capital outlay, pay as you save program and wants the utility to offer this. They feel that 100% of customers would participate if this program were available. A third party company has approached the company with proposals of this nature, but the company finds that ESCOs are too focused on energy management systems for lighting and space heating and cooling that don't work well for healthcare. Also, the company is required by EPA to have a certain number of air changes, which limit opportunities for air sealing improvements.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

The company did not implement the recommended measures from the assessment, but has implemented measures that it has identified on its own.

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Maybe. Future opportunities include more boiler replacements, domestic hot water opportunities, and rooftop unit retrofits. However, the company's capital is constrained by government action which is difficult to plan for.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

This is a key issue for health care. Revenue streams are restricted (i.e., Medicare/Medicaid) and at the whim of the government. The rate cuts have impacted them greatly. The company has a forward looking 5 year capital plan that is reviewed on an annual basis.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

They have looked at financing both in terms of leasing equipment and financing equipment replacement, but the interest rates were too high (i.e., 8-9%) to bring the payback to below three years. They would do much more if there was low interest financing with an interest rate of 2-4%. They feel that if a well-designed financing program were available that many customers would take advantage of it.

"If there was a program out there that had low interest for some of these capital projects I'm willing to bet you more and more people would take advantage of it because it makes a lot of sense and not just in my industry but in a lot of industries. This equipment is expensive."

For example, the company looked at cogeneration which met the 2-3 year payback requirement, but required a $1M capital outlay that they couldn't afford. The financing pushed the payback out of their comfort zone.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

[interviewee has granted Synapse permission to quote him on this]

"It has dramatically hurt us. The rate cuts on Medicaid and Medicare have really put a strain on our revenue. You put a strain on the revenue, you can't turn around and take that revenue and put it into what some would deem discretionary projects. You know, we like to replace things before they break at the end of their expected useful life. But that's a luxury, not a necessity. So, you know, we end up having to replace when we have to replace and then a lot of times you just don't have the time to go through the process of seeking out energy rebates, you got to try to do it after the fact. And, after the fact you are not always successful."

Barriers to Participation

A. Financial limits

Yes.

B. Economic downturn

Yes.

C. Customer awareness and marketing

No.

D. Program design and administration

No.

E. Corporate review and approval process

No.

F. Timing of program administrators

No.

G. Company distrust of new technologies

No.

H. Company convinced it has done all it can.

No.

I. Others

Other Comments

The company has seen its utility cost decrease 40% over the past 3 years due to a combination of a unique natural gas commodity purchasing arrangement with an energy supply company, energy efficiency, and a reduction in heating and cooling degree days. The company estimates that 5% of this reduction is due to its efforts on energy efficiency.

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Western Massachusetts

Industry: Heavy Industry

Person(s) Interviewed: President

Interview Number: 22

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

This company did not complete a questionnaire. The information below was obtained through the interview.

4) Approximate number of company employees located in Massachusetts:

NA.

5) Building ownership:

NA.

13) Annual electric costs as a percent of annual operating expenses:

Between one and ten percent.

15) Annual natural gas costs as a percent of annual operating expenses:

Between one and five percent.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes. It is an important issue.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

The capital costs required and the project ROI relative to other uses of that capital.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, within the past three years.

Yes, prior to the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

NA

Please name one or two things about the program that did not work well for your company:

NA

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Yes.

Predetermined Interview Questions

1. How important are energy costs to your company?

Very important.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

She makes the decisions, and has wide latitude to undertake EE investments.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

Based on the use of capital, and project ROI. They do not have a problem getting access to capital, because of the size and nature of their company. However, competition for capital is the big question for them – if they can get a better ROI on a different capital project, they will forgo the EE project.

They have competing capital projects, some with great ROIs.

They use a payback criterion of three to five years for EE projects. However, their own projects have much shorter payback periods.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

Reduce energy costs.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

The electric company account manager does fairly well. However, it seems like the problem occurs "behind" them, i.e., they do not have enough support from the rest of the electric company.

They see very little of the gas company account representatives.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

Yes, due to competition for capital for other projects.

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Yes. They want to do more projects, but the program administrators need to make it easier with more real-time commitments to projects and higher funding levels to help address the competition for capital.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

Not really. The issue is competition for capital.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

Again, the primary barrier for them is competition for capital. They have no shortage of capital opportunities that compete for the capital that is required for the EE projects.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

The economy is not an issue for them.

Barriers to Participation

A. Customer Barriers

   a. Financial limits

Yes, in terms of competition for capital

   b. Budget limits

No.

   c. Economic downturn

No.

   d. Corporate review and approval process

No.

   e. Company distrust of new technologies

No.

   f. Company convinced it has done all it can

No.

B. Program Design & Administration Barriers

   a. Insufficient incentives

Yes. This is an important issue as it would address the competition for capital.

   b. Insufficient marketing and outreach

No for electric program administrators. Yes for gas program administrators.

c. Transaction costs

Yes.

d. Responsiveness and timing

Yes.

e. Limited measures offered

No.

f. Policy Issues (Opt out of SBC)

Yes. They believe they should be able to opt-out and use the money more efficiently on their own EE.

g. Other (note)

Other Comments

They could utilize the EE programs much more.

They have done many projects and never seem to get the full 50 percent of rebates. It always turns out to be less.

They are not provided with good information, for example regarding payback periods.

They see energy as a whole; electric, gas, oil, etc. They did a study of a CHP project. The payback period turned out to be seven years, even with the incentive from the program. They were uncertain that they would actually get the incentive, which turned them off. They chose to replace the oil boiler with gas, but not to install CHP.

There is too much paperwork. It took them over two years to get a rebate for an EE project, primarily because of the need for data and measurements.

The programs should be less bureaucratic. Contracts must go through legal review with the customer's legal team. This slows things down on their end.

Their gas company has been terrible in outreach. They have not heard from them at all, even though they have lots of gas end-uses.

There is inefficiency in the communication with the account reps. There needs to be more information up front.

The amount of the incentive offered by the program administrators must be clear up front, and the program administrators must follow through and make the payments offered.

Participating customers should get a portion of the shareholder incentives that the program administrators get.

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Western Massachusetts

Industry: Heavy Industry

Person(s) Interviewed: Manager of Environmental Affairs

Interview Number: 23

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

This company did not complete a questionnaire. The information below was obtained through the interview.

4) Approximate number of company employees located in Massachusetts:

Greater than 50. They also have facilities globally.

5) Building ownership:

NA.

13) Annual electric costs as a percent of annual operating expenses:

Between one and ten percent.

15) Annual natural gas costs as a percent of annual operating expenses:

Between one and five percent.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes. It is an important issue.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

The capital costs required and the project ROI relative to other uses of that capital.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, within the past three years.

Yes, prior to the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

NA

Please name one or two things about the program that did not work well for your company:

NA

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Yes.

Predetermined Interview Questions

1. How important are energy costs to your company?

Very important.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

They have wide latitude to undertake EE investments. See below.

However, their finance executives take a macro view to all this. They want to see the bills going down, but they continue to go up despite their EE investments. While it is true that they are better off with the EE, this is still a very big issue at the corporate executive level. They need to see the data to convince them that EE makes sense for them.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

Based on the use of capital, and project ROI. They do not have a problem getting access to capital, because of the size and nature of their company. However, competition for capital is the big question for them – if they can get a better ROI on a different capital project, they will forgo the EE project.

They have many competing capital projects, some with great ROIs.

They see environmental benefits of the EE programs, but they are small. It is better to show a reduced environmental footprint from their own operations.

They do want to be good corporate citizens, but they can only do so many “feel good” projects.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

Reduce energy costs.

5. How well did the representative of the energy efficiency program administrator understand your company’s interests and needs?

They see very little of the gas company account representatives.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

Yes, due to competition for capital for other projects.

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Yes. They want to do more projects, but the program administrators need to make it easier with more real-time commitments to projects and higher funding levels to help address the competition for capital.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

Not really. The issue is competition for capital.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

Again, the primary barrier for them is competition for capital. They have no shortage of capital opportunities that compete for the capital that is required for the EE projects.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

The economy is not an issue for them.

Barriers to Participation

A. Customer Barriers

   a. Financial limits

Yes, in terms of competition for capital

   b. Budget limits

No.

   c. Economic downturn

No.

   d. Corporate review and approval process

Limited.

   e. Company distrust of new technologies

No.

   f. Company convinced it has done all it can

No.

B. Program Design & Administration Barriers

   a. Insufficient incentives

Yes. This is an important issue as it would address the competition for capital.

b. Insufficient marketing and outreach

No for electric program administrators. Yes for gas program administrators.

c. Transaction costs

Yes.

d. Responsiveness and timing

Yes.

e. Limited measures offered

No.

f. Policy Issues (Opt out of SBC)

Yes. They believe they should be able to opt-out and use the money more efficiently on their own EE.

g. Other (note)

Other Comments

None.

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Western Massachusetts

Industry: Heavy Industry

Person(s) Interviewed: Manager of Engineering

Interview Number: 24

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

This company did not complete a questionnaire. The information below was obtained through the interview.

4) Approximate number of company employees located in Massachusetts:

Greater than 50. They also have facilities globally.

5) Building ownership:

NA.

13) Annual electric costs as a percent of annual operating expenses:

Between one and ten percent.

15) Annual natural gas costs as a percent of annual operating expenses:

Between one and five percent.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes. It is an important issue.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

The capital costs required and the project ROI relative to other uses of that capital.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, within the past three years.

Yes, prior to the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

NA

Please name one or two things about the program that did not work well for your company:

NA

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Yes.

Predetermined Interview Questions

1. How important are energy costs to your company?

Very important.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

They have wide latitude to undertake EE investments. See below.

However, their finance executives take a macro view to all this. They want to see the bills going down, but they continue to go up despite their EE investments. While it is true that they are better off with the EE, this is still a very big issue at the corporate executive level.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

Based on the use of capital, and project ROI. They do not have a problem getting access to capital, because of the size and nature of their company. However, competition for capital is the big question for them – if they can get a better ROI on a different capital project, they will forgo the EE project.

They have competing capital projects all over the world, some with great ROIs.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

Reduce energy costs.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

They have had great experience with the electric company representative.

They see very little of the gas company account representatives.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

Yes, due to competition for capital for other projects.

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Yes. They want to do more projects, but the program administrators need to make it easier with more real-time commitments to projects and higher funding levels to help address the competition for capital.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

Not really. The issue is competition for capital.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

Again, the primary barrier for them is competition for capital. They have no shortage of capital opportunities that compete for the capital that is required for the EE projects.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

The economy is not an issue for them.

Barriers to Participation

A. Customer Barriers

a. Financial limits

Yes, in terms of competition for capital

b. Budget limits

No.

c. Economic downturn

No.

d. Corporate review and approval process

Limited.

e. Company distrust of new technologies

No.

f. Company convinced it has done all it can

No.

B. Program Design & Administration Barriers

a. Insufficient incentives

Yes. This is an important issue as it would address the competition for capital.

b. Insufficient marketing and outreach

No for electric program administrators. Yes for gas program administrators.

c. Transaction costs

Yes.

d. Responsiveness and timing

Yes.

e. Limited measures offered

No.

f. Policy Issues (Opt out of SBC)

Yes. They believe they should be able to opt-out and use the money more efficiently on their own EE.

g. Other (note)

Other Comments

They were only able to recover ten to twenty percent of the incremental costs of some EE projects.

The program administrator offered a “crash” replacement program that they liked. If you fit in to their standard programs designs, they work great. Otherwise, they do not fit your needs well.

The program administrators do not offer a program to improve power factor, or for induction motors.

The program administrators should plan their expenditures better so that they spend it all in time, and are not left at the end of the year with unspent funds.

The amount of the incentive offered by the program administrators must be clear up front, and the program administrators must follow through and make the payments offered.

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Western Massachusetts

Industry: Heavy Industry

Person(s) Interviewed: Director of Procurement Operations, Americas

Interview Number: 25

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

This company did not complete a questionnaire. The information below was obtained through the interview.

4) Approximate number of company employees located in Massachusetts:

Greater than 50. They also have facilities globally.

5) Building ownership:

NA.

13) Annual electric costs as a percent of annual operating expenses:

Between one and ten percent.

15) Annual natural gas costs as a percent of annual operating expenses:

Between one and five percent.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes. It is an important issue.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

The capital costs required and the project ROI relative to other uses of that capital.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, within the past three years.

Yes, prior to the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

NA

Please name one or two things about the program that did not work well for your company:

NA

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Yes.

Predetermined Interview Questions

1. How important are energy costs to your company?

Very important.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

They have wide latitude to undertake EE investments. See below.

However, their finance executives take a macro view to all this. They want to see the bills going down, but they continue to go up despite their EE investments. While it is true that they are better off with the EE, this is still a very big issue at the corporate executive level. They need to see the data to convince them that EE makes sense for them.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

Based on the use of capital, and project ROI. They do not have a problem getting access to capital, because of the size and nature of their company. However, competition for capital is the big question for them – if they can get a better ROI on a different capital project, they will forgo the EE project.

They have competing capital projects all over the world, some with great ROIs.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

Reduce energy costs.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

They see very little of the gas company account representatives.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

Yes, due to competition for capital for other projects.

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Yes. They want to do more projects, but the program administrators need to make it easier with more real-time commitments to projects and higher funding levels to help address the competition for capital.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

Not really. The issue is competition for capital.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

Again, the primary barrier for them is competition for capital. They have no shortage of capital opportunities that compete for the capital that is required for the EE projects.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

The economy is not an issue for them.

Barriers to Participation

A. Customer Barriers

a. Financial limits

Yes, in terms of competition for capital

b. Budget limits

No.

c. Economic downturn

No.

d. Corporate review and approval process

Limited.

e. Company distrust of new technologies

No.

f. Company convinced it has done all it can

No.

B. Program Design & Administration Barriers

a. Insufficient incentives

Yes. This is an important issue as it would address the competition for capital.

b. Insufficient marketing and outreach

No for electric program administrators. Yes for gas program administrators.

c. Transaction costs

Yes.

d. Responsiveness and timing

Yes.

e. Limited measures offered

No.

f. Policy Issues (Opt out of SBC)

Yes. They believe they should be able to opt-out and use the money more efficiently on their own EE.

g. Other (note)

Other Comments

They have done a lot of efficiency projects already, including lighting, steam process and CFDs.

They believe that the program administrators are not efficient; they spend 35% of the program fund on administration and profit. The customer could be more efficient with that money.

It feels to them like they are paying for the efficiency twice, first through their bills and second with the resources and money that they have to invest to participate in the programs.

The programs should be less bureaucratic. Contracts must go through legal review with the customer's legal team. This slows things down on their end.

There is inefficiency in the communication with the account reps. There needs to be more information up front.

The amount of the incentive offered by the program administrators must be clear up front, and the program administrators must follow through and make the payments offered.

Participating customers should get a portion of the shareholder incentives that the program administrators get.

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Bristol County

Industry: Retail

Person(s) Interviewed: Controller

Interview Number: 26

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

Greater than 50.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

Between five and one percent.

15) Annual natural gas costs as a percent of annual operating expenses:

One percent or less.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Internal rate of return, payback period and energy bill savings.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

No.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, within the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

Payback made the jump to gas financially attainable.

Please name one or two things about the program that did not work well for your company:

Slow turnaround on the payback of the rebate due to computer issues at the agency. Could not get a confirmation that the application was received.

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Maybe.

Predetermined Interview Questions

1. How important are energy costs to your company?

They are very important. Energy costs are a regular topic of conversation at the senior team level.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

The building maintenance manager is in charge of making a request at the time that a piece of equipment needs replacing. The controller helps to evaluate the incentives available and the payback.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

They are looking for a 3-5 year payback. Also mentioned that environmental cost avoidance (as in the case with inspection costs that motivated their recent switch from oil to gas boilers) plays a role.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

Reduced and avoided costs.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

Not really applicable. The Company has a municipal electric utility, a new relationship with its gas utility and is working on a solar project with a third party. However, the company indicated that the incentive program allowed them to really jump at the opportunity to convert from oil to gas. The gas program administrator did a presentation for the company which kicked off the process. They also provided a technical efficiency analysis and explained the operation of the new technology.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

No.

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Maybe. They have a 30 year old building and 4 AC units with compressors that need replacing. They also need to replace all lighting due to recent legislation and need to look at other options. Lastly, they are also hoping to get a federal credit for a solar installation.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

They don't really feel constrained by budget.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

They are not aware of any financing available, but would absolutely take advantage of financing if it were available. They would need to see a 5-6% interest rate to pursue financing.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

They had one tough year where they had to right size their staff, but other than that they haven't really been too constrained that they couldn't move forward with energy efficiency projects when they wanted to.

Barriers to Participation

A. Customer Barriers

   a. Financial limits

      Yes.

   b. Budget limits

      No.

   c. Economic downturn

      No.

   d. Corporate review and approval process

      No.

   e. Company distrust of new technologies

      No.

   f. Company convinced it has done all it can

      No.

B. Program Design & Administration Barriers

   a. Insufficient incentives

      Yes, in that they have a municipal electric utility.

   b. Insufficient marketing and outreach

      No.

   c. Transaction costs

No.

d. Responsiveness and timing

No.

e. Limited measures offered

No.

f. Programs not tailored to customer's unique needs

No.

g. Policy Issues (Opt out of SBC)

Yes, in that they have a municipal electric utility.

h. Other (note)

Other Comments

Overall, the interviewee was very unclear as to the distinction between the incentives offered by the program administrators vs. other third parties vs. federal tax credits, etc. The interviewee considered them all one in the same and seemed willing to work with any party that could provide an incentive.

The interviewee was also not that knowledgeable about the overall process and relationship between the program administrator and company. Was not aware whether a technical assessment has been completed or not. The building maintenance manager would likely have been a better person to talk with about this.

They expected to save 30% of energy costs with their oil to gas conversion. Even with the mild winter, it has been more than that so far.

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Central Massachusetts

Industry: Restaurant & Lodging

Person(s) Interviewed: CFO

Interview Number: 27

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

Greater than 50.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

One percent or less.

15) Annual natural gas costs as a percent of annual operating expenses:

One percent or less

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Payback period; Energy bill savings.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, within the past three years and prior to the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

Simplicity of paperwork, ease of financing cost.

Please name one or two things about the program that did not work well for your company:

Identifying qualified light bulbs that suit our design.

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Yes

Predetermined Interview Questions

1. How important are energy costs to your company?

Very important.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

The approval process can be a little bit long and cumbersome. The CFO does the initial investigation of the possibilities and then presents it to the ownership who then weighs it with other factors, such as payback and initial cost of the program and how seamlessly it will integrate into their existing environment.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

“We see what’s available for energy savings solutions. We see what’s involved with the expense of making any changes. We also like to know if it’s going to give us similar results to what we’re seeing without the efficiency, in terms of lighting quality and refrigeration performance. Then look to see payback period. Then we typically do a trial on a smaller scale then do a full scale installation.”

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

Primarily for financial reasons and trying to increase the bottom line and save as much money as possible. The person interviewed is always looking for things that would achieve those goals but not require a lot of hands on, constant working at a project. For instance, it’s easier to change a light bulb that’s going to payback for five plus years and not have to worry about it, just get it done and enjoy the savings. The customer is always looking for new options that might save it some energy and some money.

5. How well did the representative of the energy efficiency program administrator understand your company’s interests and needs?

Some lighting upgrades received pushback from the ownership, particularly because the color and brightness of the light was not quite right so it was changing the aesthetics of the building. The company was ultimately able to find some products that were qualified with the rebate program as well as provided the correct quality of light.

The company participates regularly, and sometimes the company will be interested in projects that it brings to the utility and other times the utility will approach the company with projects.

Generally speaking the process goes smoothly and there is not an excessive amount of paperwork.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

n/a

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Yes.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

No.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

The company has financed efficiency. The process was very easy. They installed some refrigeration controls and the cost of that installation was spread out over one year and was added to the utility bill so it wasn't a large initial outlay of money. As the savings were coming in the customer was paying for the expense of doing it and that made it a lot easier. This definitely helped overcome upfront costs.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

If business levels were higher, there would be more cash available to spend on efficiency. The company is not suffering in the economy and is doing fairly well all things considered. It hasn't been a major factor. It's actually probably encouraged the customer to be more careful in how it spends its money. Investing in efficiency is a little more on the forefront because of the down economy. Profits are not as easy to come by, it makes the customer more careful without expenses. If there are ways the customer were able to save on its utility bills without too much of an investment then obviously the customer would be more likely to pursue some of those efficiency measures to capture some more money. Rather than spending it on utilities the customer can enjoy those profits instead.

Barriers to Participation

A. Customer Barriers

   a. Financial limits

   b. Budget limits

   c. Economic downturn

   d. Corporate review and approval process

   e. Company distrust of new technologies

   f. Company convinced it has done all it can

Still some more opportunities. Some of them are bigger investments in terms of HVAC so the customer is slower to make decisions because the existing equipment is working and functional, and doesn't necessarily know if it makes sense to replace it. It's easier to replace something when it needs to be replaced rather than when it's still working.

B. Program Design & Administration Barriers

a. Insufficient incentives

Incentives are generally adequately set. It would be nice if they were even greater to minimize or eliminate the initial investment and decrease the payback period. Accelerate the savings.

b. Insufficient marketing and outreach

Utility is very helpful in identifying projects.

c. Transaction costs

It's absolutely worth taking the time to participate. Participating does eat into my available time to work on other projects, but the benefits are great enough that it's worthwhile. That's also why the person interviewed likes projects that generate the benefit but don't require a lot of maintenance along the way. Once the measure has been put in place it runs itself rather than requiring maintenance and continually eating up my time. Set it and forget it.

It takes up more time in terms of researching the models that are available and see what kind of incentives they qualify for. Certainly it'd be a lot easier to call someone up and say I need a new piece of equipment and just take what they give you. You do have to weigh some other issues, so it does take extra time.

d. Responsiveness and timing

There have been some instances when equipment needed to be replaced quickly. At that time the customer was looking for the more energy efficient model to see if they qualified for any rebates.

e. Limited measures offered

The color quality and brightness of the light and availability of the light bulbs. The Company wasn't able to buy a light bulb off a shelf. They had to special order them because the one that was on the approved list for rebates was not readily available. The company had to find a light that was qualified for a rebate and then test the aesthetics of it in its building. The special order took many weeks to a couple months to arrive. It would have been easier to purchase the light bulb that was more readily available. The bulb the company ultimately ended up buying was more expensive, so the initial cost of the program was greater than if they had been able to use the light bulbs that were more readily available. However the rebates offered through the program administrator made the overall cost less than the initial bulbs.

f. Policy Issues (Opt out of SBC)

g. Other (note)

Other Comments

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Boston

Industry: Office

Person(s) Interviewed: Sustainability Practice Leader

Interview Number: 28

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

Greater than 50.

5) Building ownership:

Leased.

13) Annual electric costs as a percent of annual operating expenses:

One percent or less.

15) Annual natural gas costs as a percent of annual operating expenses:

One percent or less.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

We look for Energy Star or equivalent where appropriate.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

No.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

No.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

n/a

Please name one or two things about the program that did not work well for your company:

n/a

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

No. We will probably be relocating our office within this amount of time, so there is no financial incentive to do such

Predetermined Interview Questions

1. How important are energy costs to your company?

The person interviewed wished they were more important. The customer is looking to save money and energy but it's actually not a huge priority right now, just because the customer is not documenting it or sub-metering it. A lot of that has to do with the fact that the customer is a tenant in a building that's not being sub-metered. It's a huge priority whenever the person interviewed makes it a priority, but it's not something that is brought up before the building's board.

It would be great if they were sub-metered and would likely help their ability to participate. The company is an office tenant in a building set up for retail. There is one meter for the entire building with six floors. The overall energy consumption of the building is divided up to each tenant by square footage, not based off usage. The first floor is going to use more energy because they're retail establishments with restaurants and kitchens, which use more energy than an office. The company realizes that it is probably paying for a lot of the electrical use of its neighbors. It would definitely be in the company's interest to have more energy focus, but it's the virtue of the building and the way that it was set up. The company was not even aware that this was the billing arrangement until about 2 years ago when the person interviewed looked into it. Now as the company considers new office spaces, sub-metering is a huge consideration.

If the company were to install efficient equipment, they would only see a very small bill reduction, and wouldn't be able to calculate the return on investment.

The company does not discourage employees if they request new plug loads (i.e., new computers or a space heater). As they need energy, it is freely given.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

When the company first moved to its current office space, efficiency was a huge priority. The company has high efficiency lighting. The company is considering moving within the next few years, so there is no incentive to do any efficient upgrades, no matter how slight they might be. The ability to sub-meter and energy efficiency is something that is being considered by the company for their next office space.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

Over time the company has done lighting and retrofitted its space to be efficient. The person interviewed did not know if the company had taken advantage of utility rebates or incentives because it was before his time at the company.

A year and a half ago the company had an energy audit. The person who conducted the audit was only able to find a couple hundred dollars' worth of efficiency measures. A lot of it had to do with getting read of redundant lighting and adding motion sensors. He said they had the top of the line efficiency fixtures, and couldn't go any lower and justify the costs. The company only focused on lighting measures, as their lease is very clear that they cannot alter base building features such as HVAC systems. If the company were to upgrade base building equipment, their lease stipulates that they are required to re-retrofit back to the previous equipment. The company has no incentive to upgrade such equipment.

The company is an architectural firm and often works with its clients to engage in efficiency and tries to help its clients utilize efficiency rebates and incentives in various states.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

The person interviewed is not in regular contact with its utility.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

The company would like to install occupancy sensors but cannot justify the costs. There is pushback to install anything if the company may vacate within the year, primarily due to rental prices in the area.

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

The customer does not see budgets being an issue. Obviously no one wants to over pay for anything and everyone wants to get the most for their money. As long as you can demonstrate an ROI of about 3 to 5 years on any item, that's usually a no-brainer. The customer works with clients that have tight budget concerns, but the customer usually likes to demonstrate the benefits of each measure, and would consider a payback up to 8 years if it was worth it. It's not so much about the budget as it is about the payback. HVAC tends to be within the 10, 12, or 15 year payback range, so those tend to be a little more difficult, especially as a tenant when leases are about 10 years.

The best situation would be if the customer could find a building to occupy as it was being built, and then work with the owner to configure the building to their needs. It would be difficult to find that and negotiate such a situation.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

Because of the economy, the customer's employee base has shrunk to about a third of what it was before the economic downturn. The customer is in the architectural industry, and architecture and new construction have been hit pretty hard by the economy. Over the years the customer has gotten leaner and leaner and leaner. The customer used to occupy two floors of the building, and now occupies one floor and is a third of the size it used to be. There's just not a lot of work out there. Everyone is afraid of taking risk and competition for architectural projects is fiercer than in previous years. There's definitely a difference in the market.

The economy is a huge part of the company's decision to move. Rent prices are high and the company wants to remain profitable. Business was better last year than it was before, but because it hasn't been what it was a few years ago. The company has to sincerely look at its overhead to see if it can be reduced and see if there are benefits to moving. Energy is part of the overhead, and the ability be responsible about how you use a resource like energy and not using it at will like the company currently does.

Barriers to Participation

A. Customer Barriers

   a. Financial limits

The incentives continually change, making it difficult to stay on top of them.

   b. Budget limits

   c. Economic downturn

   d. Corporate review and approval process

   e. Company distrust of new technologies

   f. Company convinced it has done all it can

B. Program Design & Administration Barriers

   a. Insufficient incentives

   b. Insufficient marketing and outreach

Awareness only goes so far as you're willing to look. The customer wasn't aware of efficiency opportunities through the program administrators until another employee asked about it. Once the customer was aware of the opportunities, it continues to look for rebates for its clients. It's hard to be in the know. The person interviewed did the research on the program administrators programs.

The customer noted a trend with its national clients that, in new construction, owners and companies in the construction industry are learning to look to the utility early in the design process to access rebates. There is also a benefit to the utility knowing that a new hospital or other building is going to be joining the electricity grid. The energy provider needs to be part of the design team.

As long as you know who the provider is, it's pretty easy to go out and look up the incentives yourself. If there were campaigns or commercials or something to get the general public more aware, that would help. However, these programs have become more common place, so keep up the good work.

c. Transaction costs

d. Responsiveness and timing

e. Limited measures offered

f. Policy Issues (Opt out of SBC)

g. Other (note)

Other Comments

The customer spoke of a situation where it helped a company in Massachusetts receive one of the biggest efficiency packages provided by a program administrator because other customers were not taking advantage of the incentives and the program administrator needed to spend the money. The company was exquisitely happy.

Education of the clients is a big barrier. A new build, or a tenant situation also create barriers and unique situations. Sub-metering would be a great way to overcome the tenant-owner barrier. Sub-metering can quickly identify inefficiencies and problems, thereby quickly resolving the problems and identifying opportunities for efficiency. The customer would have more leverage to make the argument to participate if they were sub-metered. Also, the customer doesn't use that much energy to begin with.

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Boston

Industry: Office

Person(s) Interviewed: n/a

Interview Number: 29

Key Questionnaire Responses

The customer did not provide the questionnaire.

Predetermined Interview Questions

1. How important are energy costs to your company?

Very important. With the size of the facility, it’s a considerable investment each year.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

The customer has to do a cost analysis and determine the return on investment and have that approved. The approval is based on the dollar costs and what the payback is based against the term of the customer’s lease. If the payback is 2 years, and the lease extends out five years, than it makes sense to go ahead with the efficiency project.

The process can take time; depends on the dollars spend. If it’s hundreds of thousands of dollars, it has to go through a couple levels and can take from 2 weeks to 10 weeks.

Efficiency projects are generally straight forward and received very well.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

The customer has to do a cost analysis and determine the return on investment. Anything with a payback under 2 years is a no brainer; it’s pretty attractive.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

The customer did a complete re-lamping and rebalancing in a number of buildings, and installed occupancy lighting sensors and controls in all restrooms, copy/fax, and kitchen areas in all buildings.

The company knew of the local incentives and worked with an energy consultant that helped shape the program and what the company wanted to do to get the process streamlined through the utility. The company brought in the energy consultants to help out with the process. The company explained to them what they were looking for: they wanted to get a grasp on what the incentives were for the programs. The consultants helped them from start to finish doing the reporting back to the utility on the fixtures installed, any other controls, what the kWh saved were. They did it from top to bottom:

proceed the paper work, did all the calculations in terms of what the utility was looking for in order to make it a smoother process.

Hiring the consultant was something that just made sense to the customer, knowing that, by working through the consultants, they would handle all the applications and processing and calculations. It just made sense to give the company time to focus on what they were doing day to day but also to give leverage to make sure they were capitalizing on the programs to the best of the customer's ability. It was well worth the investment in time having the consultants. The customer was able to achieve the maximum benefits and rebate.

The customer does receive frequent updates from its utility on what efficiency incentives are available.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

Yes. In the past few years, it's become more evident that they're doing a much better job in announcing and pushing these programs out. The person interviewed receives information from its local utility on different types of products that are available for rebates; everything from variable speed frequency drives to lighting packages.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

Yes. At the time of participation, the customer was also looking at ultra HVAC implementation (retrofits and change outs) throughout all the customer's buildings. At the time, there wasn't enough interest in that with the payback at about 6 years, the age of the equipment (too young to benefit from the program) and the dollar amount to do the project.

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Yes. The customer feels that, with the ever changing lighting and energy field, they would probably be at the point within the next three years to start considering other options to take advantage of the programs.

A lot of the customer's ability to participate in the future is based on where the customer is (a sole tenant in a multi building facility), and based on the customer's lease. If the customer renews in the next couple years, there would be a lot of changing and work within the facilities to take advantage of some programs.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

Any budget limitations would be based on the terms of the lease and the return on investment.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

The customer has never really looked into the financing option. Actually, when the customer did the lighting retrofit there was a finance option, but they thought it was better to purchase outright and use the savings on maintenance and cost of the utility to get a return. The upfront cost was not an issue. If the upfront costs come into the millions of dollars, then there might be options there.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

The current state of the economy when the customer was doing the lighting retrofit had a positive effect on the customer. Companies were in that cut back mode looking to save anything they can. Sometimes you do have to spend to save so it made sense in the long term to the customer. Sometimes when the economy is down, but if you can put out a structure to show savings over a course of time, those things get approved quickly.

The customer made it through the economy alright. The company provides information for the financial markets, so when the stock market was down it hurt everybody. There were tough times when the reigns were pulled back on spending, but if you were showing a good turn around and considerable savings, that was considered money well spent.

Barriers to Participation

A. Customer Barriers

a. Financial limits

No, unless upfront costs get in the millions.

b. Budget limits

No, so long as payback is shorter than the building's lease.

c. Economic downturn

No. Economy had a positive effect on the customer's energy use.

d. Corporate review and approval process

No so long as there is a short payback and does not conflict with the customer's lease.

e. customer distrust of new technologies

n/a

f. customer convinced it has done all it can

No, would like to do more HVAC.

B. Program Design & Administration Barriers

a. Insufficient incentives

Thought the incentives were very good this last time around. It was very nice. It was incomparable to what the cost savings were in utility charges, too. Those two combined worked out really well.

Overtime, the person interviewed would expect the incentives to get more attractive as government regulations put them in that corner to offer these programs. It seems that in the past couple years there's been a big push on being environmentally friendly and reducing energy costs. Obviously the utilities have a responsibility to provide to their customers options. Over the next couple years you're going to see that grow and grow and their programs will probably become more attractive to some people that thought they weren't attractive. For the customer right now, they are very attractive and it worked out well.

b. Insufficient marketing and outreach

No. customer thought they were well informed.

c. Transaction costs

Potentially. The customer needed to hire an energy consultant to make sure they were taking full advantage of the efficiency programs.

d. Responsiveness and timing

n/a

e. Limited measures offered

Everything was fine. Fit the customer's needs at the time.

Lighting and HVAC are large portions of utility costs. If could get over hurdles and make HVAC systems more attractive that would be something that the customer would be interested in pursuing.

f. Programs not tailored to customer's unique needs

g. Policy Issues (Opt out of SBC)

h. Other (note)

Other Comments

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Boston

Industry: Heavy Industry

Person(s) Interviewed: Controller

Interview Number: 30

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

Greater than 50.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

Between five and one percent.

15) Annual natural gas costs as a percent of annual operating expenses:

n/a

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Payback period; Benefit-cost ratio; Energy bill savings.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

No.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

No.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

n/a

Please name one or two things about the program that did not work well for your company:

n/a

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Maybe.

Predetermined Interview Questions

1. How important are energy costs to your company?

Very important.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

The approval process varies based on the dollar volume being discussed. If it's a relatively inexpensive measure or the payback is very quick then it becomes a no brainer and the decision process is relatively quick. As the dollar amount gets bigger and the payback gets longer, more discussions happen, more analysis is need, therefore the decision making process gets expanded out.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

The company looks at how much it is going to cost. Cash flow for the company right now is definitely a challenge and something that is managed very closely. Before implementing any type of policy or change they need to make sure they have a way to pay for it and analyze what the benefit is going to be. The company looks at the break even, how long it is going to take to pay it back, and the cost-benefit.

The company looks for a payback before 18 months. That's the latest they would want to go.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

The company is not in regular contact with its utility. If they company has a problem, the utility tries to address it as best they can.

The company has not been very proactive in trying to look for cost saving measures, and the program administrators have not been very proactive in trying to assist the customer in cost saving. The company would be receptive if the utility were to reach out to them.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

n/a

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

It would depend on the cost, but would definitely be something the company would entertain. The company is not actively looking for opportunities, but if opportunities were brought to the company's attention, then they would consider them.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

Budgets would definitely play a major role in the company's ability to participate.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

Would depend on the dollar amount and the payback. The company wouldn't be opposed to that option if it made sense and within the 18 month break event that they're looking for.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

Significantly. The customer is a manufacturing company. The last recession had an impact on its business. It does seem to be picking up and moving in the right direction, but the economic climate and conditions definitely play in the customer's decision making.

Capital is not tighter because of the economy. Their bank has told the company that they have mandates form corporate to lend as much as possible, so capital is not a major issue at this point.

Business is slow, margins are tighter, a lot more price shopping is taking place. The company is making less money on its bottom line because of all that.

Because of the economy the company has cut back and is wearing more hats so there is less time to devote to efficiency.

Efficiency viewed favorably at the company and as a way to cut costs.

Barriers to Participation

A. Customer Barriers

   a. Financial limits

   b. Budget limits

Yes. Capital is a big barrier.

   c. Economic downturn

Yes. The company has less time to devote to efficiency and profit margins are tighter.

   d. Corporate review and approval process

Yes – 18 month payback.

   e. Company distrust of new technologies

f. Company convinced it has done all it can

B. Program Design & Administration Barriers

a. Insufficient incentives

b. Insufficient marketing and outreach

Yes. The company has only a general understanding of the programs and has not been given much information by its utility on the programs.

c. Transaction costs

Yes. The company does not have time to devote to efficiency participation. The easier the process is the more likely the company is to participate.

d. Responsiveness and timing

e. Limited measures offered

f. Policy Issues (Opt out of SBC)

g. Other (note)

Other Comments

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Western Massachusetts

Industry: Heavy Industry

Person(s) Interviewed: Purchasing; Plant Manager

Interview Number: 31

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

Greater than 50.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

Between ten and five percent.

15) Annual natural gas costs as a percent of annual operating expenses:

n/a (uses propane)

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Payback period; Energy bill savings.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

No (10 years ago)

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

n/a

Please name one or two things about the program that did not work well for your company:

n/a

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Yes.

Predetermined Interview Questions

1. How important are energy costs to your company?

Very important.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

The customer has an audit conducted to identify areas for energy improvement. From there the customer does the repairs or implement what they have to do.

The Finance Manager/Vice President is in charge of energy approvals. He goes through proposals thoroughly before giving approval. The person interviewed was not aware of the Finance Manager/Vice President turning down efficiency projects. His review of efficiency projects is usually pretty quick.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

The customer is always looking for some kind of a payback period anytime they look to invest in something. The customer generally looks for a quick payback, anywhere from 2 to 7 years. When buying a new machine, the customer is always looking at how long is it going to take to get the payback on it as well as what are they going to save on their energy bill compared to the last machine. The customer is always trying to go a little more energy efficient. A lot of new machines you can't really be more efficient with. The customer looks at machines that will allow them to increase their productivity and at that point, they're not looking at the efficiency as much. The customer needs equipment that will do the job that needs to be done. The customer needs to get what it's got to have to run the product. If they can combine it with energy efficiency they will.

Equipment planning is done pretty well in advance of whether a machine is likely to fail. Machines usually stay around for 10 to 15 years or more. There are plenty of warning signs that they will need to start shopping for new machines, and don't usually need to replace equipment on an emergency basis.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

The customer is aware that rebates and incentives are available through its utility. About 10 years ago the customer completed a lighting upgrade through its utility. The customer also had a new furnace installed, which could possibly have a rebate available for it.

Within the past few months, the customer had an audit completed by the University of Massachusetts' Department of Mechanical and Industrial Engineering. The UMass Department approached the customer and offered to do the free audit. They walked around and identified where the customer was losing or wasting energy, mostly around fixing air leaks and compressors, meaning that the compressors were running more than they should be. Air leaks had the shortest payback. Because of the audit, the customer made adjustments to its air compressor systems.

The UMass Department gave a list of everything they found, along with recommendations for repairs and calculated paybacks with the savings they would receive and what the customer was losing. Some repairs were identified but did not have a payback associated with it. The customer then did the upgrades on their own based on the recommendations in the report. The UMass Department did not identify rebates or incentives in their report. Most of the things identified by the UMass Department were not available to be incented by the utility programs. There may have been a few things that were eligible, but the customer did not look into it.

There's a lot of stuff out there that you can get for free. To pay someone to come in and do the same type of evaluations doesn't work well for the customer. The customer doesn't like to pay people to come in and do evaluations. A bunch of people have been offering to do free audits. It seems to come in spurts. Right now everybody's calling about it. The UMass Department was different because the Finance Manager/Vice President told the person interviewed to get them into the building to do the audit.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

The persons interviewed were not sure if their utility had reached out to the customer regarding efficiency measures. The utility may have contacted someone else at the customer.

The customer is not in regular contact with its utility unless there is a power outage. When asked whether the customer would prefer to be in more regular contact with its utility, the person interviewed questioned what benefit that would bring. There's been no real problems.

The customer gets people calling all the time about different types of efficiencies, primarily third party suppliers trying to bid on the next energy supply contract when its current contract expires.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Yes. No specific plans yet. Once the Finance Manager/Vice President makes a decision to move forward, which should be soon, the customer will move forward with efficiency projects. There's no other barriers to participation other than the Finance Manager/Vice President making the call to say let's do it.

The main motivating factor to participate in the next few years is to reduce energy costs and make things more efficient, and to make everything greener. The Finance Manager/Vice President is figuring out it's a good time to get going on some efficiency projects again and they have some good opportunities and a good window coming up. He had some time freed up after the end of the year was finished, and wants to take another look at energy use around the customer and cost savings and improvements. He's big on trying to get his arms around the heat loss in the building.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

No budget or capital barriers. The customer is not just going to spend money on efficiency just for the sake of saying they're spending money on efficiency if it's not going to give any payback.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

No, finance is not a problem.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

The biggest effect was in 2008. The customer had a substantial layoff and business just dropped off because people weren't ordering products. Since 2008, the customer has been steadily climbing back to where they were.

Going forward, as long as the economy is going pretty well it's not likely to pose a barrier to participation. If it crashed again like it did back then, than that will have an effect. The customer would be on locked down and wouldn't be allowed to spend extra money on anything. Going along now, it should be business as usual.

Barriers to Participation

A. Customer Barriers

a. Financial limits

No.

b. Budget limits

No, so long as decent payback.

c. Economic downturn

No.

d. Corporate review and approval process

Yes. The Finance Manager/Vice President seems to control the direction of efficiency projects.

e. customer distrust of new technologies

n/a

f. customer convinced it has done all it can

There are always opportunities to do more efficiency.

B. Program Design & Administration Barriers

a. Insufficient incentives

b. Insufficient marketing and outreach

Possibly. The customer is not in regular contact with its utility, and was just aware that incentive programs are available.

c. Transaction costs

Time is the only barrier identified by the person interviewed. The customer is very busy so it's just a matter of finding the time to looking into everything and get it going.

d. Responsiveness and timing

e. Limited measures offered

Potentially. Air compressors seemed to be an area of improvement that were not incentivized through the program.

f. Programs not tailored to customer's unique needs

Customer is not unique. Big old steel building with high ceiling, big windows, concrete floors.

g. Policy Issues (Opt out of SBC)

h. Other (note)

Other Comments

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Boston

Industry: Heavy Industry

Person(s) Interviewed: VP of Finance

Interview Number: 32

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

Greater than 50.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

Between five and one percent.

15) Annual natural gas costs as a percent of annual operating expenses:

Between ten and five percent.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Internal rate of return; Payback period; Benefit-cost ratio; Energy bill savings.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, both within the past three years and prior to the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

n/a

Please name one or two things about the program that did not work well for your company:

n/a

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Maybe.

Predetermined Interview Questions

1. How important are energy costs to your company?

Quite important. The customer pays a nice piece of change each month for electricity and natural gas. They keep an eye on it and contract out for gas and electricity so that they can fix the cost for a period of time and do their costing for other materials.

Energy costs are typically a low priority until the contract is up. The company usually signs up for a one or two year contract. As it's time to renew, it starts picking up the pace and then the customer is able to put it behind them knowing that they're locked in and can move on from there. It's certainly an important piece, but it's not like they're buying on a daily or monthly basis.

When buying the contract, the customer gets an estimate of how much they expect to use for electricity or gas, based on how they expect their business to do over the year.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

The customer certainly looks to see if new equipment is going to be energy efficient. On the other hand, there may not be too many choices for the type of industrial equipment that is needed to get the job done. It's going to take whatever amount of horse power or gas it's going to take. They look to see what the operating costs will be like but they also look to see how well the equipment will perform.

The President, the VP of Manufacturing, and the VP of Finance (the person interviewed) get together and look around to see how buying new equipment would affect the company. "It's like getting a razor for free but having to spend an awful lot of money for the blades. Electricity is the same way. If the equipment is inexpensive but it's going to cost a lot to power it, you may look for something else. In other cases, we don't have a much of a choice. If it's a unique piece of equipment, then that's pretty much all we can buy." Energy is part of the decision making process but it's not the only factor.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

If it's a payback of many many years, it's probably not going to happen. If the payback is less than a year, it's probably going to happen. Less than a 1 year payback is pretty self-explanatory unless it's going to disrupt production. Changing lights is not going to shut your facility down. There's no real rule in place on the payback period, but it's been the customer's practice to go with a payback of less than a year, and it's not too difficult to sign off on such a project because you'll see the results real quickly. Once the payback is longer than a year, there are a number of different factors considered. What those factors are depends on the situation.

At the end it comes down to economics. The lighting upgrade (discussed below) was a no brainer. Anything with a long payback would probably be put on the back burner and probably wouldn't be acted on immediately.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

A couple years back (probably not within the past 2 years) the customer had an energy audit conducted on its facilities. The company relighted with efficient lamps in its warehouse facility. The PA did the audit, showed the company what they could save and what it would cost them to do and it was basically a no brainer to the customer. With a payback period of less than a year the company went for it and had the warehouse re-lamped. The audit seemed very thorough to the customer. The customer had just installed some new equipment, which probably limited the extent of the opportunities in the audit. Any recommendation that could be made was positive to the company. The lighting was very easy. As far as some of the other things, it's more difficult to change motors. The company also took care of a compressor issue and a couple of smaller recommendations from the audit.

About every 5 years the company has an audit conducted. From time to time the customer does have measures identified in the audits taken care of to see what else they can do. The two buildings that the customer used to occupy were audited.

The company doesn't know what it will be like the next time around, because you get to a certain point when you get the low-hanging fruit and after that it gets more difficult. Payback becomes a strong consideration.

They also participated in demand response programs.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

The person interviewed believes that the PA approached the customer to conduct the audit, although was not entirely sure. When the "utility" approached the customer about demand response programs, the person interviewed believed that that is when they were made aware of efficiency programs.

The customer had not done any specific research ahead of time to assess rebates or opportunities. When the customer was contacted for the interview, it reminded them to see what new opportunities are available. The customer acknowledged that natural gas is low now, but will go up in time, and so is considering adjusting its supply contract.

The customer was not aware of whether it had been contacted by its gas utility.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

The person interviewed could not remember if recommendations were made on some of the bigger equipment and motors. Because a lot of equipment was new, there was not a lot that could be addressed for bigger pieces of equipment in the audit. The company did most or all of the measures and recommendations that were worthwhile. The customer did not adopt any recommendations because it didn't believe in them; there weren't any measures that made sense to some people but didn't make sense to others. There may have been some measure that the customer may want to consider at some point.

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

The customer said "maybe" because they couldn't respond yes or no. They probably could have said yes, but didn't want to be definitive about it. With energy costs relatively low, it's not the number one priority. Right now the customer is looking to make more sales and get more business.

If the customer could be pointed in the right direction as far as who to contact, the person will certainly take notes and see what they can do. At some point the company will look to see what they can do, but at the moment it's not on their radar. The person interviewed asked whether they should be contacting the EEAC for information on program participation. They were directed to contact their utility/PA, and they said they would at some point. Anything that could be done in the short term or kept in mind for down the road about something they haven't thought about would help the customer.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

There might be some budget limitations, but without knowing what the projects might be, the person interviewed could not say. There are always budget limitations for something. The company looks at the cost of most projects, but also evaluates what benefit it will give them. There is no fixed dollar limit as to what can or cannot be spent. It's more a matter of what makes sense. The customer has a parent company that supports them well. In 2004 the parent company leant the customer some money for a project, and at the time no one else would have leant funds to the customer. The loan is now paid back. If they can justify the expense, they can usually get the money.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

No. The customer goes through its parent company (the customer is a subsidiary of a privately held company). The parent company mostly leaves the customer alone except for money matters and insurance matters. Everyone has a limit somewhere, but financing has never been a concern of the customer.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

With the economy the way it is right now the customer is more interested in making sales. With gas prices the way they are, efficiency is not something that is foremost in the customer's mind. Usually you take care of these things when it's too late. If gas prices started to rise, it would peak the customer's interest in efficiency.

The customer certainly felt the downturn in the economy. They felt it like everyone else did. The company works in an industry that is mostly based on new construction or capital investment activities. When the economy took a down turn and companies stopped new construction or refurbishing projects, the customer felt the decrease in business. The customer's business is slowly picking up again as the business it depends on start to pick up again. Historically, the customer's business slows down after the slowdown because contracts are already in place. They also pick up after other businesses pick up because their one of the last considerations in a new construction project. They follow the economic curve but are always a little later than other businesses.

The nice thing is, that with the customer's parent company, they do not feel that the economy would affect the customer's ability to participate in efficiency programs going forward. The parent company has allowed the customer to take advantage of economic dips from time to time depending on what it is. Once, the company bought equipment when it wasn't the best time to be equipment if you were going to go to a bank. The company was able to get good pricing from a manufacturing company because they were looking for business, and the customer was able to negotiate a low price with the help of its parent company.

Barriers to Participation

A. Customer Barriers

a. Financial limits

No.

b. Budget limits

Maybe, likely not.

c. Economic downturn

Could be a barrier, but person interviewed does not think so.

d. Corporate review and approval process

No.

e. Company distrust of new technologies

f. Company convinced it has done all it can

Maybe. Right now, the customer has done several improvements. That's not to say that there isn't the next generation of motors ore equipment that isn't going to be coming down the pike that might be worthwhile. The majority of the customer's equipment is new and they had the lighting taken care of. Sometime down the line when it's time to replace equipment the customer will look into efficient options.

B. Program Design & Administration Barriers

a. Insufficient incentives

No.

b. Insufficient marketing and outreach

The power companies are doing what they can do and it's up to the customer to take advantage of them and seek them out further. The customer has to help themselves.

There's always that friendly reminder that could come across and wouldn't hurt to jog the company's memory to participate in programs. The customer is well aware of the programs offered. If the customer was not aware, then they would suggest that the utilities need to do a better job of outreach. Because the customer is aware, it's on them to see what they can do.

c. Transaction costs

The person interviewed did not remember any significant paperwork involved with the energy audit the customer conducted. There was more paperwork for demand response. It was all within the regular course of business and was not a real problem.

d. Responsiveness and timing

The customer does not have the time to devote to participation, and is more concerned with business and sales than efficiency.

e. Limited measures offered

No.

f. Programs not tailored to customer's unique needs

No.

g. Policy Issues (Opt out of SBC)

No. Customer needs to help itself.

h. Other (note)

Other Comments

Probably not a lot of things would prevent the customer from at least talking to the PAs.

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Western Mass

Industry: Office

Person(s) Interviewed: Senior Property Manager

Interview Number: 33

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

1 to 4.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

Between ten and five percent.

15) Annual natural gas costs as a percent of annual operating expenses:

Between ten and five percent.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Internal rate of return; Payback period; Benefit-cot ratio; Energy bill savings.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

No.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

n/a

Please name one or two things about the program that did not work well for your company:

n/a

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Yes.

Predetermined Interview Questions

1. How important are energy costs to your company?

Very important. A high priority is set for energy costs. The customer is a property management company that communicates this high priority to the building owners. The company looks at each building's usage and energy costs, and then looks for ways to reduce them.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

The company has not installed energy using equipment in its building recently. The company looks to install new equipment only when it breaks down. The maintenance staff at the building will monitor equipment and notify the management company when it's at the end of its life. The maintenance staff calls a vendor to find new equipment, and then asks the management to fund the new equipment. The management company then considers payback and the equipment's usage, before bringing the proposal to the building owner for approval.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

When looking to purchase new equipment, the customer looks at its energy savings, the payback period, and whether it will work or not for the building. The company looks for a 2 year payback.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

The PA contacted the customer about efficiency programs. Prior to being contacted, the customer was not aware of the efficiency programs (later the person interviewed indicated that they are aware of the programs). The customer has been in discussions with its PA, and is expecting to have an audit to see what can be done. The audit looked into HVAC and lighting opportunities, and the customer just received the engineering report and is currently deciding how to proceed. Gas measures are being looked into as part of the audit process. The next step is to work with the PA to determine the incentives available for the recommendations in the engineering report. The company has not yet made investments in efficiency, but expects to address HVAC and lighting measures.

The building owners can see efficiency as a more expensive option at times. One building in particular is very old. There could be a lot of efficiency opportunities but the owner is hesitant because it could be a lot of upfront money. It's a huge building and to upgrade or replace the HVAC system will likely result in astronomical costs that would be too expensive to undertake in one year. The customer is considering a phased approach to spread the costs out over time. The PA is accommodating to the phased approach.

The company primarily conducted the audit to look for ways to save money. The company is also trying to be proactive and avoid not being able to participate because of equipment failure.

The company has replaced some converters and some pumps. Equipment does not need to be replaced often. The company tries to look for something that's energy efficient if it's going to be replaced. Sometimes trying to get equipment incented from the PAs doesn't work because the equipment needs to be replaced immediately. They don't have the time to go to the PA and request incentives. Everything has to be preapproved and that takes a while, and the customer doesn't have a while because they need it immediately.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

Well. There is nothing the PA could have done differently to address the customer's needs. The customer is in regular contact with its utility. The customer finds them be very helpful. If the customer calls with a question, they give you an answer and if they don't have an answer, they call back quickly with someone who can answer the question.

The company keeps in contact with its gas PA, but not as often as its electric PA. The gas PA has not mentioned efficiency, whereas the electric PA is in regular discussions with the customer regarding efficiency.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

There could be budget constraints; it all depends on what the bottom line is. The person interviewed does not think that efficiency projects would compete with other capital investments.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

No.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

The customer is lucky in that it has been preforming really well over the past couple years. The customer did not have much of an issue with the economy. The company's performance does not affect its views on efficiency. The company is hopeful that they will continue to perform well going forward.

Barriers to Participation

A. Customer Barriers

a. Financial limits

No.

b. Budget limits

Maybe.

c. Economic downturn

No.

d. Corporate review and approval process

Maybe. Owners determine what gets funding.

e. Company distrust of new technologies

No.

f. Company convinced it has done all it can

No.

B. Program Design & Administration Barriers

a. Insufficient incentives

No.

b. Insufficient marketing and outreach

Likely no.

c. Transaction costs

Yes. The process is taking a little while. There have been lags getting the engineering report.

d. Responsiveness and timing

Yes. When equipment breaks the customer needs it to be replaced immediately, and the programs are not responsive to that.

The customer has done minor efficiency upgrades in one building (even though the person interviewed stated earlier that they were unaware of the programs). The last time the person participated, they found the process much easier. They could submit to the PA receipts from efficiency equipment and related paperwork. Now, everything needs to be preapproved by the utility before the equipment can be purchased. While this adds an extra step to the participation process, the real issue is that if you need new equipment you need it now.

e. Limited measures offered

No.

f. Programs not tailored to customer's unique needs

No.

g. Policy Issues (Opt out of SBC)

No.

h. Other (note)

Other Comments

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Western Massachusetts

Industry: Warehouses & Distribution

Person(s) Interviewed: Facilities & Systems Engineering

Interview Number: 34

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

20 to 50.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

Between ten and five percent.

15) Annual natural gas costs as a percent of annual operating expenses:

Between ten and five percent.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Of course.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Payback period,

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

No.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

n/a

Please name one or two things about the program that did not work well for your company:

n/a

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Maybe.

Predetermined Interview Questions

1. How important are energy costs to your company?

Energy represents 10% of operating costs between gas and electric, so they're not trivial, but they're not the overriding piece of it. Energy is probably a medium priority for the customer. They've secured good electric rates and they have natural gas so that's working in their favor at this point in time. This priority is not officially set or communicated to employees.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

The CFO considers projects and provides approval. He makes a fairly quick decision. He generally views efficiency favorably.

The company is in the process of replacing the roof over the summer, so any other projects are not likely to be approved in the near term.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

If a project doesn't have a very quick 24 month payback, then it wouldn't be considered. A project within 24 months is more likely to be considered. The shorter the better, but it needs to be something that will provide real savings in the near term.

At one point the customer considered a co-generation facility, but with the low gas costs and electric rates, it had a 5 or 6 year payback, so it was not considered.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

In 2006 and 2007 the company put on a major addition, adding about 40% capacity to the company's operations. At that time, the customer added about 140 horse power worth of electric motors. Since then, equipment alterations have only been to replace equipment. No substantial changes since 2007.

Energy efficiency is a consideration when replacing equipment, but it hasn't been given a lot of thought, or there have been expeditious swap outs. The system runs with relatively high efficient motors, some of which include VSDs. The company has considered adding more VSDs, but the physical constraints are daunting, so they haven't gone far with it. The customer has spoken with local vendors and its PA about efficiency opportunities. They got to the point where they understood what the cost would be, but weren't able to pull it off at that point in time and haven't been back to it. The cost and capital outlay and ability to do the install prevented the customer from pulling off the project. Physically the customer doesn't have the space in the electric room to add the gadgetry to add the VSDs and efficient equipment. The physical, practical aspects of the installations stood in the way. There are other things that come up that need attention all the time.

The cost with incentives was not the problem. The physical space prohibited the customer from being able to install more efficient equipment. The customer was presented with discounts or incentives that would largely cover the cost of the VSDs, but the customer wasn't convinced that they were going to be able to take advantage of them anyway. Most of the time the systems are running wide open. To turn the system back would potentially reduce the customer's ability to operate the system successfully with a lower electricity flows.

The customer has been contacted by both its gas and electric PA. The gas PA has been in touch with the customer and they installed high efficiency munchkin boilers in 2000. The electric PA worked with Applied Dynamics to determine the savings estimates.

The customer feels like it's done a lot in terms of savings and has done a lot of the low-hanging fruit. When the offices were built, they were state of the art in terms of lighting. There may be some savings achievable with more lighting.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

The customer is in occasional contact with its utilities. The person interviewed attended a conference a few years ago organized by its gas PA where efficiency was a big topic. He felt like that was an indication that the PAs are reaching out to customers.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

n/a

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

Not likely.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

Budget limitations are always going to be a consideration. If a project doesn't have a very quick 24 month payback, then it wouldn't be considered.

There are other things that come up that need attention all the time.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

n/a

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

The economy has had an effect on the company over the past few years. The company's employee base has remained fairly constant.

The economy has not had an impact on the customer's decision to participate in efficiency projects. The uncertainties have made the company more hesitant to invest in something that doesn't have a highly guaranteed returned. It's hard to create a compelling argument when you only have 10% of the operating costs going into energy.

Barriers to Participation

A. Customer Barriers

a. Customer's financial limitations

n/a

b. Customer's competition for capital

Yes. Other projects (such as a roofing project) compete for capital, and other things are always coming up.

c. Economic downturn

No.

d. Corporate review and approval process

No.

e. Company distrust of new technologies

The customer is concerned that reducing energy consumption may reduce production capability. This was an impediment to implementing efficiency but was not a stopper.

f. Company convinced it has done all it can

Maybe. The customer thinks there are opportunities out there, but doesn't feel like the savings are significant enough to prompt them to throw the man power at it. The customer thinks it has done all the low hanging fruit. Participating in an energy audit would probably be a great idea to have someone with a fresh set of eyes view the facility. The person interviewed had been there for 20 years and admitted he is probably jaundiced and may not see things that someone else from outside the facility would see things. The customer does not think they have huge savings to be had, maybe talking on the order of 5-10% of consumption at best, which is half or one percent of operating costs. There's just so much else going on, that it's not something the person interviewed can get their arms around. Having an energy audit might be useful to figure out what's going on.

B. Program Design & Administration Barriers

a. Insufficient incentives

No.

b. Insufficient marketing and outreach

No.

c. Transaction costs

Yes. The customer believes it would take a lot of time and manpower to participate in the programs. About ten years ago, the customer tried to install lighting and in house staff would have needed to do the installation as part of the package of incentives offered by the PA. The measures would only be completely incented with an installation contribution by the customer. This makes it not free and not without commitment of resources on the customer's part.

Because of this, the customer figured that this time around would require similar time commitments. Justifying the time commitment to participate is a barrier for the customer.

d. Responsiveness and timing

n/a

e. Limited measures offered

Yes. The equipment the customer needed to be efficient could not fit into the space in the electrical room.

f. Programs not tailored to customer's unique needs

n/a

g. Policy Issues (Opt out of SBC)

h. Other (note)

Other Comments

The customer suggested that more effort or assistance in evaluating the achievable energy reductions and implementing the projects would help customers. The customer didn't have a firm sense of whether the energy savings were really achievable, and whether they could practically implement them. There was not a huge motivation to go the more efficient version. Even if the measures were free, there would still be system upsets that would go along with trying to install them and providing their piece of whatever the incentive was. A lot of businesses don't have someone dedicated to energy and conservation looking at these things. It would be better to have someone shepherd the project and evaluate whether the project would be feasible under the certain circumstances a customer has. That was a missing piece for the customer. They did speculate that they could periodically turn down the system, but they didn't do a system level analysis on the impact that would have on operations. They realized it was free, but the energy savings were like to be sporadic.

Having a better understanding of what's realistically achievable and having a compelling case for change stands in the way of executing projects. Everyone is supportive of the idea of conservation, and the company considers itself to be a sustainable company. Actually getting from there to executing concrete actions there is a process that the customer has not gone through yet in terms of pulling it off.

Someone to shepherd the project a little more: to introduce it to the company and go through the energy audit and stick with it as a mentor or contact would be useful to get the company to the point that they're confident that the energy savings are going to be significant enough that they impact the bottom line enough to warrant the investment. It's not like the PA just comes into your house, screws in a CFL, and walks away. You actually have to do something. You have to revise the operating strategy of the systems and that requires a lot of time and effort. Working with some to understand what its actually going to take would be useful.

Building a stronger case for the practicality and achievability of the conservation measures is something the customer would recommend would be useful for the programs.

The customer was curious to know how successful the programs have been to warrant Synapse conducting this study.

The customer suggested that the PAs revisit customers who were at one point interested in efficiency but did not follow through to see why they may have been put on hold. If he were trying to see why customers aren't participating in programs, that's where he would start asking questions. If there is a dead-letter file or are open applications where things never came through to fruition that could be a good area to explore and follow up.

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Cape Cod

Industry: Healthcare

Person(s) Interviewed: Director of Engineering

Interview Number: 35

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

Greater than 50.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

Between five and one percent.

15) Annual natural gas costs as a percent of annual operating expenses:

One percent or less.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes for the larger equipment. Smaller equipment depends on up front cost.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Internal rate of return; Payback period; Benefit-cost ratio; Energy bill savings; Other.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, within the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

Having some one knowledgeable filling out the paper work.

Please name one or two things about the program that did not work well for your company:

On the electric side, the energy efficiency engineers were dreadfully slow. I need to produce and I can't be waiting on others. It certainly makes me wonder about the qualifications of the company that is being used for the engineering analysis.

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Yes.

Predetermined Interview Questions

1. How important are energy costs to your company?

Very important. Energy costs are a high to medium priority for the customer.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

Efficiency or energy projects have to go through capital budgets.

Once equipment is about to reach the end of its useful life, that's when it will get approved. The company has an annual review process that starts in the spring and is approved by October for the following year. If a project has savings associated with it, it's an easier sell. This past year, the customer had a lighting project and new chillers approved. Originally the customer was supposed to receive incentives for the lighting projects but, as further discussed below, the customer no longer expects the incentives. The customer needs plans now for efficiency upgrades to start putting it through the system for approval for 2013.

There is a chain of review. The person interviewed comes up with a plan, submits it, then all the department managers review everyone's requests, sees which ones are the best, serve the needs of the patients and the facility, then it goes to corporate to see how much money they have to fund everything, they chop out a few more things, then a list of approved projects is provided in October for the following year.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

When purchasing new equipment, the customer considers the implications to its electricity bills and knew it was going to be a significant cost. They didn't buy the equipment based on how much energy it used; they based it on the quality of treatment that is provided to their patients. The decision was made solely on what is the best product for their customers. They knew the equipment would use a lot of electricity, but that was not a consideration in which purchase they made. Patient care first; energy second, or not at all.

Patient care is number one for the customer. But on the other hand, you have to have a facility or else you can't have patient care. There's got to be compromise there. The organization is very good at trying to improve the quality of the facility. The engineering department probably gets more than half of the capital funds available for the plant, equipment, and building, which are big ticket items.

Management is generally receptive to efficiency projects. A lighting project did not pass the corporate review last year. They knew it was going to save money, but they didn't have the funds for it. This year, the project was approved. They do give efficiency serious consideration.

The dollar amount is also considered. The efficiency program incentives allow the person interviewed to ask for less funding from corporate, which makes it more likely to pass approval. Corporate does ask about the rebates and incentives offered through the program and needs a number. As discussed below, the person interviewed does not have an incentive number available for projects because the engineering study has not yet been provided to the customer, so projects have more trouble receiving corporate approval.

The customer looks for shorter paybacks. The CEO stated that the customer is not going to do any projects that have a payback greater than 3 years. But the person interviewed stated that there aren't that many projects with a payback period of less than 3 years out there. Five to seven years is more typical, but are not likely to get approved. When money is tight, they look for shorter paybacks. If there is any money left over at the end of year, then they look at longer paybacks.

However, the company recently purchased air conditioners, and the particular brand purchased by the customer was chosen for its energy efficiency.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

The customer approached its PA to see if incentives could be received for the air conditioning equipment purchased. The PA also suggested that the customer complete an energy audit, which the customer allowed, but was mostly interested in the air conditioning incentives. The customer is working with, and still working with the PA, and are making "damn little progress and damn slow progress for rebates and stuff, and as far as I know I won't be getting a nickel. I put a lot of time and effort into it." The customer hasn't heard anything from the people that would be giving them the incentive, primarily because the engineering firm has not provided the engineering study.

The customer started the audit process in the middle of summer 2011, and as of March 2012, had not received the engineering study. The engineering company did a "preliminary audit: it was a couple of days of walking through the facility, but it wasn't a detailed study." That was the last the customer has seen or heard from the engineering company, unless the person interviewed calls them directly. When the customer calls, he's told the engineering company needs more information or that they're still looking into it, but nothing definitive. The customer is told that they need to figure out how much the old machines were using and compare that to how much the new machines are using, which doesn't seem that complicated to the person interviewed (who is an engineer). As far as the person interviewed is concerned, it's a waste of his time. "It doesn't take an awful lot of math to figure this stuff out. It doesn't take 9 months. So quite frankly, I'm not going to put my job in jeopardy to save my organization maybe a couple of dollars. It's not worth it."

He's called several times. The customer hasn't tried to call back the engineering company in months, and had no interest in talking to them at all anymore. The customer is unsure if the engineering company is overwhelmed and has too much going on, but the customer hears nothing. They usually have short conversations. They're either overwhelmed or under performers. Dealing with the PAs and engineering company has not been difficult; it's the lack of response that upsets the customer.

The PA isn't the problem, but they're at the mercy of the engineering firm they favor. The PA initially tried to help the customer deal with the engineering firm, but over the last several months the customer "threw up his hands and said to hell with it."

The customer doesn't know how much the air conditioners are going to be incented for, and is getting tired of waiting. The person interviewed thinks it would take another year before they will get the process completed, and has gone ahead with purchasing the ACs without waiting for the PAs. "Their response is poor, and that's being kind." The person interviewed "doesn't have a clue if we'll get a nickel back, or $1,000 back." The customer expected significant rebates when planning to buy the ACs, because its half a million dollars of equipment. The customer is annoyed that they still have not received the engineering study, and that any discussions have been verbal and there is nothing in writing to indicate the incentive amount.

All of the above information is specific to electric. The customer has been in conversations and had an audit with its gas PA but doesn't really have a lot of opportunities with gas measures just yet. The customer doesn't have any equipment that it would replace that would save copious amounts of gas. If the customer had the engineering study, they could at least see what the gas opportunities would be and could set aside capital dollars for it. The customer expects gas measures to be included in the engineering report. However, because of the lack of response from the engineering company, the customer is just going to go ahead with whatever gas measures that need to be done and won't consider the efficiency programs.

There could be small things that the customer does that could be incented through the programs, but the customer is not going to waste his time participating, unless his boss specifically tells him to participate. The person interviewed is just going to go ahead and buy the equipment. The person's time "is a hell of a lot more valuable than the service I'm getting from the people I'm dealing with."

"This is not unusual by the way. Thirty years ago we had programs similar to this, and I threw up my hands then, too. A $70,000 grant to do stuff cost me $200,000 of my time to get it done. So I said nope never again. But I tried it here, and it ain't working here any better than it did 30 years ago."

If the person interviewed is waiting on someone forever and ever and ever, that means he's not getting his job done. If he doesn't get his job done, he's going to have to work someplace else. He's not going to jeopardize his job for someone else's incompetence. Every month, the person interviewed sends status reports to management. Every month, the same projects are not going forward, which makes the person interviewed look bad.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

The person interviewed has to look at the incentives and programs or else he would be negligent at his job. But he does not plan to aggressively pursue them. He just doesn't have the time to be chasing after people. That's the bottom line. If his boss doesn't insist that he participate, then he's not going to bother. "What's $5,000? That's nothing for an organization of this size. It's a huge amount of effort."

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

A lighting project did not pass the corporate review last year. They knew it was going to save money, but they didn't have the funds for it.

The new healthcare plan could affect how much money the customer has to put into the building.

The facility is allotted only so many dollars, which are determined by administration of the financing.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

The economy will definitely affect efficiency as new healthcare policies take effect. "We give that very serious consideration because we're going to get reimbursed significantly less, which means we're not going to be able to replace aging equipment for new more efficient equipment. Those things are brought up at almost every meeting; we have to be prepared. Every healthcare organization is giving it serious consideration. We have to be able to pay the bills and take care of the patients. If the more efficient equipment has to wait because we don't have the funds, that's the way it is. The better care we give, the better reimbursement we get. We're going to go with the best possible medical equipment we can get to get the best possible outcomes we can get for the patient so we can get reimbursed for a higher rate." They expect to get millions of dollars less than they got before. It's a lot of money. "People are very weary, so they're going to keep money in their pocket so we can get through. If something breaks, then we'll fix it if we have a dollar in the bank." Management is trying to take care of things now while they have the money, and are preparing for the storm.

Barriers to Participation

A. Customer Barriers

   a. Customer's financial limitations

   b. Customer's competition for capital

Yes. A lighting project did not pass the corporate review last year. They knew it was going to save money, but they didn't have the funds for it.

   c. Economic downturn

Yes. Customer is definitely affected by the economy and healthcare policies.

d. Corporate review and approval process

No.

e. Company distrust of new technologies

No.

f. Company convinced it has done all it can

B. Program Design & Administration Barriers

a. Insufficient incentives

Maybe. The person interviewed seemed to think that participation would not save the customer much money, especially compared to the opportunity cost of the time required to participate.

b. Insufficient marketing and outreach

No. Customer was well aware of the programs.

c. Transaction costs

Not really. More the responsiveness and timing.

d. Responsiveness and timing

YES. The customer was very upset that the engineering company took so long to get back to them, and will likely not participate again because of it.

e. Limited measures offered

Not really.

f. Programs not tailored to customer's unique needs

Not really.

g. Policy Issues (Opt out of SBC)

No. Likes the SBC idea.

h. Other (note)

Other Comments

The programs should be changed to provide a faster response. It's not rocket science to figure out how much energy equipment uses or saves. "In a matter of days, I should have an answer as to how much the new equipment is going to cost, save, and be incented for. The money has been paid into the system, and if that's what it's for then I'll try to do my part." "I like the idea that we all put into this little kitty and have the opportunity to get some money back."

The PAs should make it easier to see how much the programs are going to benefit the customer. “Don’t make me wait 9 months to tell me nothing.” Make it simple for the customer and the engineering company. It’s not worth the effort.

The PAs seem to be on top of things and that worked well. They were clear and filled out all the appropriate stuff. Then it went over to the engineering firm and that’s where everything fell apart. The reps are in tune with the programs and what the customer wanted to do, but that’s where it stops.

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Boston

Industry: Retail

Person(s) Interviewed: Regional Energy Manager

Interview Number: 36

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

Greater than 50.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

Not indicated.

15) Annual natural gas costs as a percent of annual operating expenses:

Not indicated.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Internal rate of return, payback period, benefit cost ratio, and energy bill savings.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, prior to the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

Ease of filling out the applications.

Please name one or two things about the program that did not work well for your company:

The time to receive the incentive.

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Yes.

Predetermined Interview Questions

1. How important are energy costs to your company?

Very important; this priority is communicated from the top down.

2. Please describe the decision-making process that your company undertakes to decide whether to implement an energy efficiency measure.

When a store is about to be built or remodeled, the design managers sit down with the electric, HVAC, and refrigeration experts and determine what energy efficiency upgrades make sense for the space. As early as possible, the interviewee, who is the liaison between the utilities and the company on efficiency, reaches out to the appropriate utility to determine what incentives are available. The incentive is used to calculate ROI for the project. After reviewing the analysis provided by the design managers, the interviewee makes the call on whether to proceed with the measures. The interviewee takes into account her time and effort when determining the measures to proceed with. If a measure offers only a marginal return, but will take a lot of her time and effort, it may not be worth it. Also, she manages stores from Virginia to Maine and is responsible for efficiency across that entire territory.

3. What criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facilities?

The extent to which it can save the company money on their energy usage.

4. Please explain why the company chose to participate in the Massachusetts energy efficiency programs.

Reduced energy costs. The company does have a department in charge of sustainability, but these projects are not the responsibility of that department.

5. How well did the representative of the energy efficiency program administrator understand your company's interests and needs?

The electric program administrators are pretty good; the company has had good relationships with these folks. They have received rebates and incentives from the electric program administrators, but no audit or technical assessment has been conducted (the company has its own engineers to do this).

The company has not heard from the gas companies, though in talking with its electric program administrator, gas programs did come up once.

6. Did your company decide not to implement any efficiency measures that were offered through the energy efficiency programs?

The company drives the boat in terms of which efficiency measures to install. Most of the focus has been on lighting, HVAC and refrigeration, with the biggest savings coming in refrigeration measures.

7. Do you plan to participate in Massachusetts energy efficiency programs in the next three years?

They hope to but it depends on what they will be doing and the ROI of the projects.

8. To what extent do budget limitations pose a barrier to your company's participation in energy efficiency programs?

The interviewee cannot say. This is the responsibility of the design managers.

9. To what extent do financing limitations pose a barrier to your company's participation in energy efficiency programs?

Financing has not been used yet. The interviewee would have to look into this further with her director to determine whether the company would be interested in financing.

10. In general, how does the current state of the economy affect your interest and ability to participate in the energy efficiency programs?

It affects it. They have to make sure that revenues always offset the costs of any energy efficiency improvements they are making.

Barriers to Participation

A. Customer Barriers

   a. Customer's financial limitations

      Not sure.

   b. Customer's competition for capital

      Not sure.

   c. Economic downturn

      Yes.

   d. Corporate review and approval process

      Yes.

   e. Company distrust of new technologies

      No.

   f. Company convinced it has done all it can

      No.

B. Program Design & Administration Barriers

   a. Insufficient incentives

No.

b. Insufficient marketing and outreach

Yes, in that they have not heard about gas opportunities.

c. Transaction costs

Yes, in that this is factored into ROI.

d. Responsiveness and timing

Yes, must align with construction of new stores or remodeling of existing stores.

e. Limited measures offered

No.

f. Programs not tailored to customer's unique needs

No.

g. Policy Issues (Opt out of SBC)

No.

h. Other (note)

Other Comments

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Western Massachusetts

Industry: Restaurants & Lodging

Person(s) Interviewed: General Manager

Interview Number: N/A: only provided questionnaire

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

Greater than 50.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

One percent or less.

15) Annual natural gas costs as a percent of annual operating expenses:

One percent or less.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Payback period; Energy bill savings.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

No.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

No.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

Not aware of any.

Please name one or two things about the program that did not work well for your company:

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

I have no information about any electric or gas efficiency programs.

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Boston

Industry: Office

Person(s) Interviewed:

Interview Number: N/A: only provided questionnaire

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

Greater than 50.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

Twenty percent or greater.

15) Annual natural gas costs as a percent of annual operating expenses:

Between ten and five percent.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Benefit-cost ratio.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, within the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

Enhanced modeling of building

Please name one or two things about the program that did not work well for your company:

Inclusion conditions tied to rebate.

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Maybe.

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Central Massachusetts

Industry: Heavy Industry

Person(s) Interviewed: Plant Manager

Interview Number: N/A: only provided questionnaire

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

Greater than 50.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

One percent or less.

15) Annual natural gas costs as a percent of annual operating expenses:

One percent or less.

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Payback period; energy bill savings.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, prior to the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

Please name one or two things about the program that did not work well for your company:

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Maybe.

Survey of Commercial and Industrial Customer Perspectives of Massachusetts Energy Efficiency Programs

Interview Notes

Region: Cape Cod

Industry: Heavy Industry

Person(s) Interviewed: Associate Manager, Facilities/Project Engineer

Interview Number: N/A: only provided questionnaire

Key Questionnaire Responses

Note: question numbers correspond to the order in which questions are asked in the questionnaire.

4) Approximate number of company employees located in Massachusetts:

Greater than 50.

5) Building ownership:

Owned.

13) Annual electric costs as a percent of annual operating expenses:

n/a

15) Annual natural gas costs as a percent of annual operating expenses:

n/a

16) When purchasing new equipment, does your company consider the efficiency with which that equipment consumes energy?

Yes.

17) If the answer to question 16 is yes, what criteria does your company use to determine whether to purchase equipment that is relatively energy efficient or to undertake energy efficiency improvements to your facility?

Internal rate of return; Payback period; Benefit-cost ratio; Energy bill savings.

18) Prior to being contacted for this interview, were you aware of the energy efficiency programs offered by your electric and gas utilities?

Yes.

20) Has your company ever participated in the energy efficiency programs offered by your electric or gas utility?

Yes, within the past three years.

21) If your company has participated in the energy efficiency programs offered by your electric and gas utilities within the past three years:

Please name one or two things about the program that worked well for your company:

Contractor was familiar with the reimbursement process and coordinated the majority of those activities.

Please name one or two things about the program that did not work well for your company:

n/a

22) Based on your current knowledge of the efficiency programs offered by your electric and gas utilities, does your company plan to participate in these programs within the next three years?

Maybe.

Ontario Energy Board
Commission de l'énergie de l'Ontario

DECISION AND ORDER

EB-2015-0029 / EB-2015-0049

UNION GAS LIMITED AND

ENBRIDGE GAS DISTRIBUTION INC.

Applications for approval of 2015-2020 demand side management plans.

BEFORE: **Christine Long**
Presiding Member

Allison Duff
Member

Susan Frank
Member

Wednesday January 20, 2016

Union proposed a new Large Volume program based on feedback from its customers. After the DSM Framework was issued, Union discontinued its prior program that enabled large volume customers to self-direct funds for energy efficiency upgrades based on a customer-specific energy plan.

Union - Large Volume Program

Union's proposed program provides large volume customers with technical support and customer training. The program does not include financial incentives. The objective is for customers to benefit from training presentations, energy efficiency calculation tools, energy use analysis, and other technical assistance from Union's Technical Account Managers.

Union - Large Volume - Program Details

Large Volume	2014 (actuals)	2015 (proposed)	2016	2017	2018	2019	2020
Proposed Budget	$4,101,725	$3,587,000	$400,000	$349,000	$373,000	$397,000	$421,000
Approved Budget		***$3,587,000***	***$ 3,150,000***	***$ 3,150,000***	***$ 3,150,000***	***$ 3,150,000***	***$ 3,150,000***
Proposed Lifetime savings (CCM)	870,195,452	1,545,121,755	0	0	0	0	0
Approved Lifetime savings (CCM)		***1,545,121,755***	***Formula - see section 9.4***				
TRC-Plus Ratio	4.15	Not available	Not available				

References:
2014 budget from Table 3 of 2014 annual report includes program-level overheads; 2014 savings from Table 3.2 of 2014 annual report; 2014 TRC from Table 6.1 of 2014 annual report
2015 budget at Union's IRR to APPro.4; 2015 lifetime savings from 2014 annual report (includes T2/R100 and T1 metrics)
Proposed 2016-2020 budget from Union's Plan: Table 25 (Exhibit A, Tab 3, Appendix A)
Data was not available to calculate the 2016 target. See below for the formula.
Approved 2016 target is explained in section 9.3
Approved 2016-2020 budget is $4 million including overheads. The approved budget shown above is $4 million minus estimated overheads.

Comments

OEB Staff recommended that the OEB approve Union's Large Volume program as proposed, subject to some reporting requirements. Some parties recommended that Union's 2013-2014 self-direct Large Volume program be continued.

Several parties representing large volume customers, including APPrO, CME and IGUA submitted that Large Volume programs should either not be offered to gas-fired electricity generators, or to any large volume customers.

Mr. Neme’s evidence recommended that Union re-instate its prior self-direct Large Volume program with the following modifications:

- self-directed funds should available over a multi-year period to give customers more flexibility
- payback threshold eligibility criteria should be implemented, particularly (or perhaps exclusively) for operational improvements

- opt-out criteria should be included for customers already addressing all cost-effective opportunities in their facility

Union submitted that while abandoning its existing program would involve the forgoing of associated savings, in doing so it was responsive to affected customers and complied with the OEB's direction in the DSM Framework. Union's proposed technical support and customer training program for large volume customers provides balance and is responsive to the DSM Framework, and therefore should be approved.

Decision

The OEB finds that Union's large volume customers should be a part of Union's DSM programs. The OEB was assisted by the evidence provided by Union and the expert witnesses. The OEB benefitted from the fuller evidentiary record produced in this proceeding, which was not available to the OEB at the time the DSM Framework was established.

Experience demonstrates that Union can achieve material savings through the continued delivery of its existing self-direct program, rather than a program providing only technical advice with no estimated gas savings.

The DSM Framework highlighted two concerns with mandated rate funded DSM for the large volume customer class. First, the OEB was of the view that large volume customers would already be competitively motivated to ensure that their systems were efficient. The OEB found the evidence of the expert witnesses, which was that large volume customers would not initiate all cost-effective conservation if DSM programs similar to those offered until 2015 were not available, compelling. Furthermore, the expert evidence was that in jurisdictions which offered an "opt-out" provision, large volume customers did not actively pursue all available conservation and when given the opportunity to demonstrate that they had spent an equivalent amount of money on conservation, the large volume customers did not avail themselves of this option.[4] Submissions from parties also made it clear to the OEB that the lost opportunity for natural gas savings from this customer segment would be substantial.

Approximately 50% of Union's CCM savings in 2013 and 2014 were as a result of savings realized from the large volume customer class.[5] The OEB finds it impossible to maintain a goal of achieving all cost-effective conservation, while simultaneously

[4] EB-2015-0029 / EB-2015-0049, Exhibit L. GEC.1, p. 31
[5] Ibid., p. 5

excluding the customer segment with the largest gas consumption and the greatest potential for savings.

In the DSM Framework, the OEB was also concerned with the issue that given the small number of customers in this customer class, there was a risk of cross-subsidization. The OEB heard evidence that in fact, given the nature of the self-direct program, all customers are provided with the opportunity to use an equal portion of the program funds for energy efficiency upgrades. This lessens, if not eliminates, the risk of cross-subsidization.

The OEB heard the concerns raised by large volume customers and generators related to cost competitiveness of rate funded DSM programs. However, the priority on increasing conservation efforts and opportunities in Ontario continues to grow. The OEB must balance the benefits of rate funded conservation activities with the costs of those activities. The OEB finds that the significant benefits of continuing Union's self-direct Large Volume program outweigh the costs of delivery and it would be inappropriate to stop a program that has been so cost-effective.

The DSM Framework also proposed an introduction of a fee-for-service program for large volume customers with the objective of trying to balance the need to continue to get CCM savings from this group without a utility-sponsored program recovered through distribution rates.

The OEB finds that large volume customers expressed no interest in a fee-for-service offering. The lack of customer interest in the fee-for-service proposal was a factor in the OEB's decision to direct the continuation of the self-direct program.

The OEB directs Union to continue its large volume self-direct program with an annual budget of $4M for the remaining duration of the DSM Framework term, from 2016 to 2020. The OEB has inferred targets and incentives as outlined below.

The OEB will not direct Enbridge to develop a program for large volume customers. The OEB finds that Enbridge's customer mix is distinct from Union's.

The 2016 target metric for Union's Large Volume self-direct program is based on Union's 2013-2015 program results, discounted by 25% to account for a late program launch date in 2016. The approved scorecard for 2016 is as follows:

2016 Large Volume Rate T2/Rate100 Scorecard					
Program	Metrics	Metric Target			Weight
		Lower Band	Target	Upper Band	
Large Volume Program for T2/R100 customers	Cumulative Natural Gas Savings (m^3)	75% of Target	Three-year rolling average (2013-2015) Rate T2/Rate 100 cost effectiveness* x 2016 budget without overheads x 1.1 x 0.75	150% of Target	100%

Note:
*Cost-effectiveness = Final verified metric achievement used for LRAMVA purposes divided by final actual program spend for that year

The program's shareholder incentive is based on the proportion of the approved budget allocated to this program. The scorecard metric for this program is lifetime natural gas savings.