NAVIGANT CONSULTING

Draft Report

MEASURES AND ASSUMPTIONS FOR DEMAND SIDE MANAGEMENT (DSM) PLANNING

Presented to

Ontario Energy Board

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CONTENTS

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1. INTRODUCTION

Navigant Consulting, Inc. (Navigant Consulting or NCI) was retained by the Ontario Energy Board (OEB) to review and update input assumptions regarding the energy efficient measures, expected resource savings (i.e. natural gas, electricity and water), costs, equipment life and other parameters for potential use in the development of second generation DSM plans by Union Gas Limited (Union) and Enbridge Gas Distribution (Enbridge) for delivery in the 2010 rate year and beyond.

We refer generically throughout this report to the different types of energy saving opportunities simply as "measures," since the natural gas savings could arise from one or more of the following consumer actions:

- use of a specific technology (eg, high efficiency furnace),
- installation of certain materials (eg, wall insulation), or
- specific design considerations or features (such as for new construction).

Contents of this Report

Beyond this introductory chapter, the second chapter of this report – *2. Methodology* – describes the methodology employed by Navigant Consulting to review and update the various DSM measures and technologies. The third chapter – *3. Notes on Application of the Input Assumptions* – presents considerations related to the derivation and use of the input assumptions.

A glossary and definition of the terms used for the substantiation sheets is provided in Appendix A and a with a summary of the input assumptions for the various DSM measures and technologies in Appendix B. Finally, the corresponding substantiation sheets for all the measures are provided in Appendix C.

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2. METHODOLOGY

Navigant Consulting followed a three-step approach in reviewing and updating the DSM input assumptions for potential use in the development of second generation DSM plans by Union and Enbridge for delivery in the 2010 rate year and beyond. In overview, the three steps were:

1. Identify measures to be reviewed and updated
2. Research and analysis on measures and input assumptions
3. Prepare substantiation sheets

These steps are described below.

1. Identify Measures to be Reviewed and Updated

The measures to be reviewed and updated were drawn from a variety of sources as follows:

- The DSM technologies and measures provided in submissions of Union and Enbridge in the generic proceeding EB-2006-0021 before the OEB.
- The proposed input assumptions provided by Union and Enbridge on November 10, 2008 regarding energy efficiency technologies and measures for application in their 2008 DSM programs.
- A draft gas energy efficiency potential study for Union Gas (draft Union potential study)[1]
- Recent Navigant Consulting gas DSM potential studies and energy efficiency project work outside Ontario, and
- Other recent relevant studies, including gas DSM potential studies for jurisdictions with similar weather as Ontario that have identified potential measures for future implementation.

The measures that were reviewed and updated are summarized in Table 1. Please note that multiple substantiation sheets were created for all measures followed by an asterisk (" * ") to represent either the different vintages (e.g., existing, new construction) or sizes (e.g., exhaust volume, water flow, etc.) applicable for the measure.

[1] Marbek Resources Consultants Ltd, Natural Gas Energy Efficiency Potential - Residential Sector (DRAFT) Submitted to Union Gas, November 28, 2008; Marbek Resources Consultants Ltd, Natural Gas Energy Efficiency Potential – Commercial Sector (DRAFT), Submitted to Union Gas, December 2, 2008. Navigant Consulting understands that similar market potential studies are being developed for Enbridge, but these studies were not available at the time of our analysis.

Table 1: Energy Efficiency Measures with Substantiated Inputs and Assumptions

Sector	End Use	Energy Efficient Measure
Residential	Space Heating	Air Sealing Basement Wall Insulation (R-12) Ceiling Insulation (R-40) Enhanced Furnace (Electronically Commutated Motor)* Energy Star Windows (Low-E) Heat Reflective Panels High Efficiency (Condensing) Furnace Programmable Thermostat Wall Insulation (R-19)
	Water Heating	Faucet Aerator (Bathroom) Faucet Aerator (Kitchen) Low-Flow Showerhead* Pipe Wrap (R-4) Solar Pool Heater Tankless Gas Water Heater*
	Low Income Space Heating(1)	Programmable Thermostat Weatherization
	Low Income Water Heating(1)	Faucet Aerator (Bathroom) Faucet Aerator (Kitchen) Low-Flow Showerhead* Pipe Wrap (R-4)
Commercial	Space Heating	Air Curtains* Condensing Boilers Demand Control Kitchen Ventilation* Destratification Fans Energy Recovery Ventilation (ERV)* Enhanced Furnace (Electronically Commutated Motor)* Heat Recovery Ventilation (HRV)* High Efficiency (Condensing) Furnace Infrared Heaters Gas-Fired Rooftop Unit Programmable Thermostat Prescriptive Schools*
	Water Heating	Condensing Gas Water Heater Pre-Rinse Spray Nozzle* Tankless Gas Water Heater
	Cooking	Energy Star Fryer High-Efficiency Griddles
	Multi-Family Water Heating	Energy Star Front-Loading Clothes Washer Faucet Aerator (Multi-Res Bathroom) Faucet Aerator (Multi-Res Kitchen) Low-Flow Showerhead*

Note (1) Not intended to be an exhaustive list of measures applicable to the low income segment, other residential measures (including those listed herein) may also be applicable for the low income segment

The above list is not an exhaustive list of all possible natural gas savings measures expected to be available in the market in 2010 and beyond. Rather, it reflects Navigant Consulting's professional judgement regarding measures that are commercially available with reasonable cost-effectiveness and for which the savings and / or the cost can be determined, in advance, with reasonable certainty. Furthermore, although Navigant Consulting identified specific measures that could apply to low income customers, it should be noted that other residential measures may also be applicable for the low income sector. Finally, although some of the commercial measures can be applied to the industrial sector, most industrial measures tend to be "custom" measures, and therefore have not been included in the above list.

The vast majority of the measures identified in the draft Union potential study have also been covered by Navigant Consulting and are listed in the table above. Reasons that some of the measures identified in the draft Union potential study have not been covered herein include:

- The measure's estimated TRC benefit / cost ratio was less than 0.75 (such as was estimated in the potential study for waste water heat recovery)
- The existing market share for the measure is very high which suggests limited DSM program opportunities (such as for Energy Star dishwashers, based on recent Navigant Consulting work in Minnesota. Further, the annual natural gas savings for Energy Star dishwashers were estimated in the OPA's measures and assumptions list to be 7 – 15 m^3 whereas the gas potential study estimated savings from 42 – 63 m^3).
- The savings or costs are highly variable and / or cannot be determined with any degree of certainty in advance (such as for building recommissioning and high efficiency new commercial construction). Such types of measures are better analyzed as "custom" projects rather than as a single prescriptive measure, due to the large variability in the input assumptions.
- Limited information was available to independently verify the energy savings and/or cost for the measure.

When the potential studies are finalized and as new information is available on any measures not covered herein (such as from pilot studies, load research or findings from other jurisdictions), Enbridge and/or Union can propose any additional promising measures for their DSM plans for 2010 rate year and beyond.

2. Research and Analysis

For each of the measures to be reviewed and updated, Navigant Consulting undertook the following as appropriate / available:

- Review of current and reputable studies and publications pertaining to the identified measures including information provided by Union and Enbridge.
- Literature review to identify assumptions used for the same measures in other jurisdictions from either initial program design documents or program evaluations reports. Any relevant findings from these other jurisdictions were adjusted for Ontario weather and market conditions (eg, house size, building standards, customer behaviour, etc.).
- Assessment of the potential impact of changes in regulations and standards (eg, Ontario Building Code) on the baseline technology.
- Simulation of savings through energy-use simulation software, such as HOT2000 and RESFEN.

Navigant Consulting also met with DSM staff from each of Union and Enbridge to better understand the methodologies and calculations underlying their input assumptions and to explore the various data sources utilized including any relevant recent DSM evaluation reports and market research. Staff from both utilities were forthcoming with information regarding their assumptions. Most of the documentation provided by Union and Enbridge during or immediately subsequent to these meetings was either otherwise publicly available or provided on a "open-access" basis, but certain data and information considered to be either proprietary or confidential to one or both of these utilities was provided to Navigant Consulting on a confidential basis.

3. Prepare Substantiation Sheets

Prior to documenting the findings from the previous steps, Navigant Consulting developed a substantiation sheet template modeled on the substantiation sheet developed by the OPA for electricity conservation and demand management measures and submitted this for the OEB's review.

Using this template and based upon our detailed review of the existing substantiation sheets and the underlying assumptions, data sources and estimation methodologies, Navigant Consulting then prepared a detailed substantiation sheet for each of the DSM measures.

A glossary of terms used for the input assumptions is provided in Appendix A with a summary of the measures and input assumptions in Appendix B and finally the substantiation sheets for these measures are provided in Appendix C.

The input assumptions presented in Appendices C reflect Navigant Consulting's independent research and analysis. For some measures, Navigant Consulting findings were consistent with the underlying assumptions, data sources and estimation methodologies in the substantiation sheets provided by Union or Enbridge.

Where applicable, the listed efficiency or rating of the energy efficient measure (e.g., 92% Annual Fuel Utilization Efficiency [AFUE], Energy Factor [EF] = 0.64, etc.) and its associated baseline measure identified in any of the substantiation sheets provided by Union or Enbridge were used to develop the new substantiation sheets. In cases where the efficiency or rating of the energy efficient measure or its associated baseline measure was ambiguous and for new measures where there were no previous substantiation sheets, Navigant Consulting determined the appropriate efficiency and ratings based on our assessment of current market practices and trends.

Where applicable, Navigant Consulting used appropriate quasi-prescriptive units for measures where the energy savings associated with a measure can vary considerably given the wide range of sizes or end uses for measure. Best efforts were made to use the same units (e.g., m^3/ Btu/hr, m^3/CFM) identified in substantiation sheets provided by Union or Enbridge, however, if Navigant Consulting determined that the units were inappropriate for the measure, more appropriate units were used.

Finally, incremental costs for all measures were updated to reflect current market prices.

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3. NOTES ON APPLICATION OF THE INPUT ASSUMPTIONS

As discussed, Navigant Consulting was asked to review and update the input assumptions for potential use in the development of second generation DSM plans by Union and Enbridge for delivery in the 2010 rate year and beyond. The accuracy of these assumptions will vary by measure and by type of assumption, as discussed below.

The savings from a given technology or measure implemented in 2010 or later can be estimated with reasonable confidence if the technology is relatively mature and if the base technology (or mix of technologies) is relatively certain. In some cases, such as for measures that would be applied on a retrofit basis to existing homes, the mix of base technologies is relatively stable and only changes slowly over time. In other cases, expected changes in regulation that will affect the base technology (such as changes in the minimum efficiency standard for residential furnaces in new home construction) are known in advance and these changes can be reflected in the savings estimates. On the other hand, the savings for a measure based upon a rapidly evolving technology cannot be determined with accuracy because the technology is changing. Similarly, the base technology for a given measure and or the costs for a measure may be changing rapidly which makes it difficult to establish firm input assumptions in advance.

With respect to the incremental costs for a given technology or measure, Navigant Consulting has provided current incremental costs and has forecast what these costs would be in 2010 and beyond. For relatively mature technologies, there may be some inflationary impact through 2010 that would result in slightly higher prices. On the other hand, the incremental costs for new technologies with increasing sales, economies of scale, experience curve impacts and increased competition are likely to be lower in 2010 than they are today. Overall, Navigant Consulting believes that using current incremental costs for determining the cost-effectiveness of DSM programs for implementation in 2010 and beyond is conservative, given that incremental costs across the portfolio of DSM technologies and measures considered (some of which are relatively mature and others of which are relatively new) are likely to be lower in 2010 than they are today.

With respect to free-ridership, Navigant Consulting is not able to provide estimates of the free-ridership for any of the technologies and measures for DSM programs to be implemented in 2010 because the design of the DSM program and the specific customer segments targeted can influence free-ridership. The specific programs to be implemented and customer segments to be targeted by Union and/or Enbridge in 2010 and beyond are not known at this time. We believe that Union and Enbridge will be in the best position to provide free-ridership estimates for these programs for planning purposes based on evaluation results and/or experience in other jurisdictions when they are being proposed. Ultimately, Navigant Consulting notes that free-ridership is most accurately determined on an ex post basis through program evaluations.

Given that the measures are for potential use in the development of second generation DSM plans by Union and Enbridge for delivery in the 2010 rate year and beyond, Navigant Consulting has not applied the Total Resource Cost (TRC) test. Natural gas prices are highly volatile and, given this volatility, we recommend application of the most current natural gas (and electricity and water) avoided cost forecasts during development of the DSM program portfolio for 2010 and beyond.

Lastly, some of the measures listed herein reflect the savings available to average customer and others reflect opportunities for specific subsets of the customer population with unique characteristics (eg, customers in homes constructed before 1980 for weatherization measures). Other measures that were explored did not appear to be cost-effective for an average customer and no information was available regarding the "distribution" of customers as pertaining to the measure being investigated. Navigant Consulting expects that there are likely to be cost-effective niche opportunities for customers with special circumstances (eg, special equipment, high usage, low retrofit costs, etc.). Future efforts to refresh and refine the input assumptions should attempt to identify the most significant of these opportunities, the expected number of customers these opportunities might be available for and the "defining" characteristics of these customers. We recognize that specifically targeting these customers may be challenging from a program design perspective, but note that there may be significant energy savings opportunities available to these customers who are not "average".

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APPENDIX A: GLOSSARY AND DEFINITION OF TERMS USED IN THE SUBSTANTIATION SHEETS

Measure Name

Revision #	Description/Comment	Date Revised

Efficient Equipment and Technologies Description
Description of energy efficient technology
Base Equipment and Technologies Description
Description of base technology.

Decision Type	Target Market(s)	End Use
Description of the decision type (e.g. New, Retrofit, Removal)	Description of the target market(s) for the measure (e.g. Residential / Small Commercial, New homes / Existing Homes, Single-Family / Multi-Family)	Description of the end use of the measure (e.g., space heating, water heating)

Codes, Standards, and Regulations

Description of any applicable codes, standards, and / or regulations that governing the performance (e.g, energy consumption) of the equipment.

Resource Savings Table (10 year Effective Useful Life [EUL] illustrated)

	Electricity and Other Resource Savings			Equipment & O&M Costs of Conservation Measure	Equipment & O&M Costs of Base Measure
Year (EUL=)	Natural Gas (m^3)	Electricity (kWh)	Water (L)	($)	($)
1	Annual natural gas savings for lifetime of measure	Annual electricity savings for life of measure (if applicable)	Annual water savings for life of measure (if applicable)	Annual equipment and operations and maintenance cost of energy efficient measure	Annual equipment and operations and maintenance cost of baseline measure
2					
…					
9					
10					
TOTALS	**Total natural gas savings**	**Total electricity savings**	**Total water savings**	**Total equipment and O&M cost**	**Total equipment and O&M cost**

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Resource Savings Assumptions

Annual Natural Gas Savings	**m^3**
Basis for determination of natural gas savings.	
Annual Electricity Savings	**kWh**
Basis for determination of electricity savings.	
Annual Water Savings	**L**
Basis for determination of water savings.	

Other Input Assumptions

Effective Useful Life (EUL)	**Years**
Description and rationale of how many years the savings for the energy efficient measure are expected to last.	
Base & Incremental Conservation Measure Equipment and O&M Costs	**$**
Description and rationale of difference in the equipment cost and any operation and maintenance cost associated for the energy efficient measure and the baseline measure.	
Customer Payback Period (Natural Gas Only)	**Years**
Rationale used to determine the length of time required to recover the cost of the energy efficient measure based on the natural gas savings only.	
Market Penetration or Market Share	**% or level**
High level description and rationale used to determine the current penetration level of the energy efficient measure in the target market area or the current market share of the energy efficient measure in the target market area. When available, the current market penetration or market share percentage is provided, else, an estimated "low", "medium" or "high" scale is used, where "low" is below 5%, "medium" is between 5 and 50%, and "high" is greater than 50%.	

Measure Assumptions Used by Other Jurisdictions

Source	Annual Natural Gas Savings (m3)	Effective Useful Life (Years)	Incremental Cost ($)	Penetration/Market Share
Source of database reported by other jurisdiction	Annual gas savings reported by other jurisdiction	Effective useful life reported by other jurisdiction	Incremental cost by reported by jurisdiction	Market penetration/share reported in other jurisdiction
Comments Description of any input assumptions or values used by the other jurisdictions to determine their savings.				

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APPENDIX B: SUMMARY OF MEASURES AND INPUT ASSUMPTIONS

The following table is a summary of the input assumptions used to develop the substantiation sheets presented in Appendix C.

	Target Market		Equipment Details				Annual Resource Savings			Other			
	Sector	New / Existing	Efficient Equipment	Details of efficient equipment	Base Equipment	Details of base equipment	Natural Gas (m^3)	Electricity kWh	Water (L)	EUL	Inc. Cost ($)	Payback (Yrs)*	Market Share/Pen.+
	Residential Space Heating												
1	Residential	Existing	Air Sealing	Air infiltration reduction (6 ACH50)	Existing infiltration controls	(8 ACH50)	231	101	0	15	$1,000	8.3	Med
2	Residential	Existing	Basement Wall	R-1 Insulation	R-12 Insulation		237	87	0	25	$2 / ft^2	13.4	High
3	Residential	Existing	Ceiling	R-40 Insulation	R-10 Insulation		348	214	0	20	$0.7 / ft^2	3.2	Med
4	Residential	Existing	Enhanced Furnace	ECM (continuous)	Mid-efficiency furnace	PSC motor	-183	1,387	0	15	$960	22*	Low
5	Residential	Existing	Enhanced Furnace	ECM (non continuous)	Mid-efficiency furnace	PSC motor	-26	324	0	15	$960	51*	Low
6	Residential	New	Enhanced Furnace	Furnace only (continuous)	Mid-efficiency furnace		-166	1,403	0	15	$960	18*	Low
7	Residential	New	Enhanced Furnace	Furnace only (non continuous)	Mid-efficiency furnace		-26	207	0	15	$960	137*	Low
8	Residential	Existing	Energy Star Windows	Low E, argon filled (R-3.8)	Standard windows	Double pane, standard glazing (R-2.0)	121	206	0	20	$150 / unit	28	High
9	Residential	Existing	Reflector Panels		No reflector panels		143	0	0	18	$229	3.1	Low
10	Residential	Existing	High Efficiency Furnace	AFUE 90	Mid-efficiency furnace	AFUE 80	268	0	0	18	$667	4.8	Med
11	Residential	Existing	High Efficiency Furnace	AFUE 92	Mid-efficiency furnace	AFUE 80	317	0	0	18	$1,067	6.5	Med
12	Residential	Existing	High Efficiency Furnace	AFUE 96	Mid-efficiency furnace	AFUE 80	407	0	0	18	$2,433	11.5	Med
13	Residential	Existing	Programmable Thermostat		Standard Thermostat		146	182	0	15	$25	0.3	65%
14	Residential	Existing	Wall Insulation	R-8 Insulation	R-19 Insulation		405	194	0	30	$2.5 / ft^2	11.2	High
	Residential Water Heating												
15	Residential	Existing	Faucet Aerator	Kitchen, 1.5 GPM	Average existing stock	2.5 GPM	38	0	7,797	10	$2	0.1	90%
16	Residential	Existing	Faucet Aerator	Bathroom, 1.5 GPM	Average existing stock	2.2 GPM	10	0	2,004	10	$2	0.4	90%
17	Residential	Existing	Low-flow showerhead	1.5 GPM	Average existing stock	2.2 GPM	33	0	6,334	10	$6	0.4	65%
18	Residential	Existing	Low-flow showerhead	1.25 GPM	Average existing stock	2.2 GPM	60	0	10,570	10	$13	0.4	65%
19	Residential	Existing	Low-flow showerhead	1.25 GPM	Average existing stock	2.0 GPM	49	0	8,817	10	$13	0.5	65%
20	Residential	Existing	Low-flow showerhead	1.25 GPM	Average existing stock	2.25 GPM	62	0	10,886	10	$13	0.4	65%
21	Residential	Existing	Low-flow showerhead	1.25 GPM	Average existing stock	3.0 GPM	102	0	17,168	10	$13	0.3	65%
22	Residential	Existing	Pipe insulation for DHW outlet pipe	R-4 insulation	Uninsulated DHW outlet pipes	R-1	25	0	0	10	$2	0.2	47%

	Target Market		Equipment Details				Annual Resource Savings			Other			
	Sector	New / Existing	Efficient Equipment	Details of efficient equipment	Base Equipment	Details of base equipment	Natural Gas (m^3)	Electricity kWh	Water (L)	EUL	Inc. Cost ($)	Payback (Yrs)*	Market Share/Pen.+
23	Residential	New/Existing	Solar Pool Heater	Solar Heating System	Conventional Gas-fired Heating System	50% seasonal efficiency	493	-57	0	20	$1,450	5.7	Med
24	Residential	Existing	Tankless Water Heater	EF = 0.82	Storage Tank Water Heater	EF=0.575	137	0	0	18	$750	10.5	Low
25	Residential	New	Tankless Water Heater	EF = 0.82	Storage Tank Water Heater	EF=0.575	137	0	0	18	$750	10.5	Low
	Low Income Space Heating												
26	Low Income	Existing	Programmable Thermostat		Standard manual thermostat		146	182	0	15	$25	0.3	65%
27	Low Income	Existing	Weatherization	full weatherization	No Weatherization		1,134	165	0	23	$2,284	3.9	Med
	Low Income Water Heating												
28	Low Income	Existing	Faucet Aerator	Kitchen, 1.5 GPM	Average existing stock	2.5 GPM	38	0	7,797	10	$2	0.1	90%
29	Low Income	Existing	Faucet Aerator	Bathroom, 1.5 GPM	Average existing stock	2.2 GPM	10	0	2,004	10	$2	0.4	90%
30	Low Income	Existing	Low-flow showerhead	1.5 GPM	Average existing stock	2.2 GPM	33	0	6,334	10	$6	0.4	65%
31	Low Income	Existing	Low-flow showerhead	1.25 GPM	Average existing stock in one of three ranges.	2.0 GPM	49	0	8,817	10	$13	0.5	65%
32	Low Income	Existing	Low-flow showerhead	1.25 GPM	Average existing stock in 1 of 3 ranges.	2.25 GPM	62	0	10,886	10	$13	0.4	65%
33	Low Income	Existing	Low-flow showerhead	1.25 GPM	Average existing stock in 1 of 3 ranges.	3.0 GPM	102	0	17,168	10	$13	0.3	65%
34	Low Income	Existing	Low-flow showerhead	1.25 GPM	Average existing stock	2.2 GPM	60	0	10,570	10	$13	0.4	65%
35	Low Income	Existing	Pipe insulation for DHW outlet pipe	R-4 insulation	Uninsulated DHW outlet pipes (R-1)		25	0	0	10	$2	0.2	47%
	Commercial Cooking												
36	Commercial	New/Existing	Energy Star Fryer	50% cooking efficiency	Standard fryer	35% cooking efficiency	1,099	0	0	12	$3,250	5.9	Med
37	Commercial	New/Existing	High Efficiency Griddle	40% cooking efficiency	Standard griddle	32% cooking efficiency	503	0	0	12	$1,570	6.2	Med
	Commercial Space Heating												
38	Commercial	Existing	Air Curtains	Single door	Non-air curtain doors		2,191	172	0	15	$1,650	1.5	Med
39	Commercial	Existing	Air Curtains	Double door	Non-air curtain doors		4,661	1,023	0	15	$2,500	1.1	Med
40	Commercial	Existing	Condensing Boilers	88% seasonal efficiency (est.)	Non-condensing boiler	76% estimated seasonal efficiency	0.0104 / Btu/hr	0	0	25	$12	2.3	High

	Target Market		Equipment Details				Annual Resource Savings			Other			
	Sector	New / Existing	Efficient Equipment	Details of efficient equipment	Base Equipment	Details of base equipment	Natural Gas (m^3)	Electricity kWh	Water (L)	EUL	Inc. Cost ($)	Payback (Yrs)*	Market Share/Pen.+
41	Commercial	Existing	Demand Control Kitchen Ventilation	5,000 CFM	Kitchen ventilation without DCKV		4,801	13,521	0	10	$10,000	4.2	Low
42	Commercial	Existing	Demand Control Kitchen Ventilation	10,000 CFM	Kitchen ventilation without DCKV		11,486	30,901	0	10	$15,000	2.6	Low
43	Commercial	Existing	Demand Control Kitchen Ventilation	15,000 CFM	Kitchen ventilation without DCKV		18,924	49,102	0	10	$20,000	2.1	Low
44	Commercial	New / Existing	Destratification Fans		No destratification fans		6,129	-511	0	15	$7,021	2.3	Low
45	Commercial	Existing	Energy Recovery Ventilator		Ventilation without ERV		3.95 / CFM	0	0	20	$3 / cfm	1.5	Low
46	Commercial	New	Energy Recovery Ventilator		Ventilation without ERV		3.75 / CFM	0	0	20	$3 / cfm	1.6	Low
47	Commercial	Existing	Enhanced Furnace	ECM (continuous)	Standard PSC Motor		(-)2.7 kBtu/hr	20.5/kBtu/hr	0	15	$960	14*	Low
48	Commercial	Existing	Enhanced Furnace	ECM (non-continuous)	Standard PSC Motor		(-)0.4 / kBtu/hr	4.8 / kBtu/hr	0	15	$960	31*	Low
49	Commercial	New	Enhanced Furnace	ECM (continuous)	Standard PSC Motor		(-)2.5 kBtu/hr	20.8/kBtu/hr	0	15	$960	11*	Low
50	Commercial	New	Enhanced Furnace	ECM (non-continuous)	Standard PSC Motor		(-)0.3 / kBtu/hr	3.1 / kBtu/hr	0	15	$960	55*	Low
51	Commercial	Existing	Heat Recovery Ventilation	Ventilation with HRV	Ventilation without HRV		4	0	0	20	$3.40	1.8	Low
52	Commercial	New	Heat Recovery Ventilation	Ventilation with HRV	Ventilation without HRV		3	0	0	20	$3.40	2.0	Low
53	Commercial	Existing	High Efficiency Furnace	AFUE 90			3.6 / kBtu/hr	0	0	18	$6.7 / kBTu/h	3.7	Med
54	Commercial	Existing	High Efficiency Furnace	AFUE 92			4.2 / kBtu/hr	0	0	18	$11 / kBTu/h	5.2	Med
55	Commercial	Existing	High Efficiency Furnace	AFUE 96			5.4 / kBtu/hr	0	0	18	$22 / kBTu/h	8.1	Med
56	Commercial	New / Existing	Infrared Heaters	0 - 75,000 BTUH	Regular Unit Heater		0.015 / Btu/hr	245	0	20	$0.02	1.6	Med
57	Commercial	New / Existing	Infrared Heaters	76,000 - 150,000 BTUH	Regular Unit Heater		0.015 / Btu/hr	559	0	20	$0.02	1.6	Med
58	Commercial	New / Existing	Infrared Heaters	151,000 - 300,000 BTUH	Regular Unit Heater		0.015 / Btu/hr	870	0	20	$0.02	1.6	Med
59	Commercial	New	Rooftop Unit	Two-stage rooftop unit	Single stage rooftop unit		255	0	0	15	$375	2.9	Med
60	Commercial	Existing	Programmable Thermostat		Standard thermostat		239	251	0	15	$110	0.9	Med
61	Commercial	Existing	Prescriptive Schools - Elementary	hydronic boiler with 83%+ efficiency	hydronic boiler with 80% - 82% efficiency		10,830	0	0	25	$5,646	1.0	Low
62	Commercial	Existing	Prescriptive Schools - Secondary	hydronic boiler with 83%+ efficiency	hydronic boiler with 80% - 82% efficiency		43,859	0	0	25	$8,470	0.4	Low
	Commercial Water Heating												
63	Commercial	New / Existing	Condensing Gas Water Heater	95% thermal efficiency	Conventional water heater	80% efficiency, 91 gal. tank.	338	0	0	13	$2,230	13	Low

	Target Market		Equipment Details				Annual Resource Savings			Other			
	Sector	New / Existing	Efficient Equipment	Details of efficient equipment	Base Equipment	Details of base equipment	Natural Gas (m^3)	Electricity kWh	Water (L)	EUL	Inc. Cost ($)	Payback (Yrs)*	Market Share/Pen.+
64	Commercial	New / Existing	Condensing Gas Water Heater	95% thermal efficiency	Conventional water heater	80% efficiency, 91 gal. tank.	905	0	0	13	$2,230	5.0	Low
65	Commercial	New / Existing	Condensing Gas Water Heater	95% thermal efficiency	Conventional water heater	80% efficiency, 91 gal. tank.	1,614	0	0	13	$2,230	2.8	Low
66	Commercial	Existing	Pre-Rinse Spray Nozzle	1.6 GPM	Standard pre-rinse spray nozzle	3.0 GPM	387	0	116,086	5	$41	0.2	Med
67	Commercial	Existing	Pre-Rinse Spray Nozzle	1.24 GPM	Standard pre-rinse spray nozzle	3.0 GPM	486	0	145,937	5	$60	0.3	Low
68	Commercial	New	Tankless Water Heater (100 gal/day)	84% thermal efficiency	Conventional water heater	80% efficiency, 91 gal. tank.	215	0	0	18	-$1,570	0.0	Low
69	Commercial	New	Tankless Water Heater (500 gal/day)	84% thermal efficiency	Conventional water heater	80% efficiency, 91 gal. tank.	57	0	0	18	$510	18	Low
70	Commercial	New	Tankless Water Heater (1000 gal/day)	84% thermal efficiency	Conventional water heater	80% efficiency, 91 gal. tank.	-142	0	0	18	$2,590	N/A	Low
	Multi-Family Water Heating												
71	Multi-Family	Existing	EnergyStar Clothes Washer	MEF=1.72, WF=8.0	Conventional top-loading, vertical axis clothes washer	MEF=1.26, WF=9.5	79	201	19,814	11	$150	3.8	High
72	Multi-Family	Existing	Faucet Aerator	Kitchen, 1.5 GPM	Average existing stock	2.5 GPM	26	0	5,377	10	$2	0.2	90%
73	Multi-Family	Existing	Faucet Aerator	Bathroom, 1.5 GPM	Average existing stock	2.2 GPM	7	0	1,382	10	$2	0.5	90%
74	Multi-Family	Existing	Low-flow showerhead	1.5 GPM	Average existing stock	2.2 GPM	23	0	4,369	10	$6	0.5	65%
75	Multi-Family	Existing	Low-flow showerhead	1.25 GPM	Average stock	2.0 GPM	34	0	6,081	10	$13	0.7	65%
76	Multi-Family	Existing	Low-flow showerhead	1.25 GPM	Average stock	2.25 GPM	43	0	7,507	10	$13	0.6	65%
77	Multi-Family	Existing	Low-flow showerhead	1.25 GPM	Average stock	3.0 GPM	70	0	11,840	10	$13	0.4	65%
78	Multi-Family	Existing	Low-flow showerhead	1.25 GPM	Average existing stock	2.2 GPM	42	0	7,289	10	$6	0.6	65%

* Payback for measures with natural gas savings is based on natural gas savings only; payback for measures that increase natural gas consumption (ie, furnaces with ECMs) is based on net energy cost savings (ie, electricity savings less incremental natural gas costs)

+ When available, the current market penetration or market share percentage is provided, else, an estimated "low", "medium" or "high" scale is used, where "low" is below 5%, "medium" is between 5 and 50%, and "high" is greater than 50%.