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October 7, 2020

BY RESS AND EMAIL

Ms. Christine Long
Board Secretary
Ontario Energy Board
2300 Yonge Street, 27th Floor
Toronto, ON M4P 1E4

Dear Ms. Long:

Re: Enbridge Gas Inc. (Enbridge Gas)
Ontario Energy Board File No.: EB-2020-0067
2017/2018 Demand Side Management (DSM) Deferral and Variance Account Disposition Application – Enbridge Gas Responses to Interrogatories REDACTED

On July 17, 2020, Enbridge Gas Inc. ("Enbridge Gas" or the "Company") submitted an application with the Ontario Energy Board ("Board" or "OEB") concerning the final disposition and recovery of certain 2017 and 2018 Demand Side Management ("DSM") program year-end deferral and variance account balances (the "Application").[1]

In Accordance with the Board's Procedural Order No. 1 ("PO1"), dated September 3, 2020, attached are Enbridge Gas's responses to interrogatories posed by OEB Staff and approved intervenors.

Request for Confidential Treatment

Enbridge Gas is filing with the Board two versions of the responses to SEC interrogatories 8 & 9 in a redacted and unredacted (confidential) formats. Enbridge Gas requests confidential treatment of the information which has been redacted for the following reasons:

- Many of the redactions relate to the names and personal information of third-parties and in some instances Enbridge Gas staff. This information should not be disclosed in accordance with the *Freedom of Information and Protection of Privacy Act*. As well, such information is not relevant for the purposes of this Application. Enbridge Gas notes that pursuant to the Boards Practice Direction on Confidential Filings ("Practice Direction") at section 4.3, such information should not be provided to parties to a proceeding.

[1] Enbridge Gas Inc., was formed by the amalgamation of Enbridge Gas Distribution Inc ("EGD") and Union Gas Limited ("Union") on January 1, 2019.

- Several redactions relate to the third-party contractors' banking details and tax registration numbers. This information should not be disclosed because it is both irrelevant and confidential to the third-party consultant.

- Enbridge Gas has further redacted the unit rates proposed by the consultants in their proposals to the Company. Such information is commercially sensitive and, if disclosed, would be prejudicial to the Company negotiating future contracts with competitors to the consultants as it would give the competitors knowledge about rates which the Company has accepted in the past. Enbridge Gas further submits that such information is not relevant for the purposes of this clearance application.

The above requests for confidential treatment are made pursuant to the Boards Rules of Practice and Procedure and the Practice Direction.

If you have any questions, please contact the undersigned.

Sincerely,

[original signed by]

Adam Stiers
Technical Manager, Regulatory Applications

cc.: Dennis O'Leary (Aird & Berlis)
Alexander Di Ilio (OEB Staff)
Michael Millar (OEB Counsel)
EB-2019-0067 (Intervenors)

ENBRIDGE GAS INC.

Answer to Interrogatory from
Ontario Energy Board Staff ("Staff")

Interrogatory

Reference:

(i) Exhibit A, Tab 2, Schedule 1, Pages 1-2

(ii) EB-2019-0247 Decision and Order, Page 16

Question(s):

Enbridge Gas is proposing disposing of deferral and variance account balances in the Enbridge Gas Distribution rate zone through a one-time adjustment charge, whereas for the deferral and variance account balances in the Union Gas rate zones, Enbridge Gas is proposing for disposition to occur over a six-month period.

As part of its Decision and Order related to Enbridge Gas's 2020 Federal Carbon Pricing application (EB-2019-0247), the OEB noted its interest in a common disposition period and consistent approach to variance account dispositions going forward.

a) Please discuss the different disposition methodologies between the Enbridge Gas rate zones and the rationale for the different approaches.

Response:

a) Enbridge Gas has proposed to dispose of 2017 and 2018 DSM deferral and variance account balances consistent with its historic standards for each of its respective EGD and Union rate zones, as follows:

- As a one-time billing adjustment for all customers in the EGD rate zone and for in-franchise contract and ex-franchise customers in the Union rate zones.

- As a prospective billing adjustment for general service customers in the Union rate zones.

Enbridge Gas's proposal to dispose of these balances, as a one-time billing adjustment included as part of January 2021 bills that customers receive in February 2021, is consistent between the EGD and Union rate zones. Enbridge Gas maintains that the continued use of a one-time adjustment for these customers is appropriate as it:

- Aligns cost incurrence of the deferral account balance with cost recovery by customer. The one-time adjustment avoids material mismatches that could occur between cost incurrence and cost recovery due to customer switching between rate classes and changes in customer's consumption volumes from year to year.

- Eliminates the forecast variance which results from disposing of deferral account balances prospectively.

As described in Enbridge Gas's 2020 Federal Carbon Pricing Program application ("2020 FCPP") proceeding (EB-2019-0247),[1] Enbridge Gas maintains that its proposal to dispose balances prospectively for general service customers in the Union rate zones is appropriate as Enbridge Gas is not able to administer one-time adjustments for general service customers in the Union rate zones because of limitations in the current billing system used for this group of customers. This methodology provides reasonable alignment between cost incurrence and cost recovery, recognizing the general consistency of consumption patterns throughout the year by customers in these rate classes.

Consistent with its responses to interrogatories in its 2020 FCPP proceeding, Enbridge Gas reiterates that it will be necessary to maintain this methodology for these customers until Enbridge Gas's billing systems and processes are integrated, as early as mid-2021.[2] This is consistent with the Board's Decision and Order related to the 2020 FCPP proceeding where the Board stated:[3]

[1] EB-2019-0247, Exhibit D, p. 13; EB-2019-0247, Exhibit I.EP.13 a); EB-2019-0247, Enbridge Gas Reply Argument, July 16, 2020, paragraph 16.
[2] Enbridge Gas anticipates that starting in mid-2021 at the earliest it will be able to adopt a common disposition period, as well as a common disposition approach between the EGD and Union rate zones, for balances related to 2020 and later, once integrated systems and processes are implemented.
[3] EB-2019-0247, OEB Decision and Order, August 13, 2020, p. 16.

A consistent approach to disposition of balances for each rate zone is preferable, and Enbridge Gas should provide a proposal for aligning its approach for the EGD and Union rate zones as soon as practical, and no later than its next rebasing rate application.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Ontario Energy Board Staff ("Staff")

Interrogatory

Ref:

i. Exhibit B, Tab 2, Schedule 1, Table 4.0

ii. Exhibit B, Tab 2, Schedule 1, Table 5.6 & 2017 Commentary and Lessons Learned

Question(s):

The number of 2017 participants in the Home Energy Conservation program exceeded target, however Enbridge Gas did not meet the 2017 small volume natural gas savings metric target. Natural gas savings from residential customers make up more than half of all savings reported in the small volume natural gas savings metric.

PROGRAM	2017 TARGET/SAVINGS	% of Achievement
SMALL VOLUME SAVINGS TARGET	**370,375,390**	**n/a**
Home Energy Conservation	153,917,853	52%
Residential Adaptive Thermostats	38,063,232	13%
Commercial & Industrial Programs (Custom, Direct Install, Prescriptive & Energy Leaders - Pilot)	105,002,660	35%
TOTAL	**296,983,745**	**80% of target**

Source: 2017 Annual Verification Report, Table 3-3 and 3-4

a) Please discuss the factors that contributed to missing the small volume natural gas savings metric in 2017. Within your response, please include information related to the level of program uptake by smaller commercial and industrial customers.

b) Please expand on the nature of the small commercial custom initiatives Enbridge Gas' commercial team focused on during the 2017 program year. Within your response please discuss if this has been a continued focus and any additional lessons learned.

Response:

a) The single largest factor that contributed to Enbridge Gas missing the small volume natural gas savings metric in 2017 was related to the Home Efficiency Conservation ("HEC") offer. In 2017, HEC participants with furnace replacement projects were subject to a baseline adjustment to AFUE90 (rather than using the existing furnace efficiency), reducing savings claims significantly. The impact is evident when comparing the 2016 HEC offering results of 230 million CCM savings to the 2017 HEC offering results of 154 million CCM savings.

   Specific to smaller commercial and industrial customers, overall participation across the RA program offers rose from 693 participants in 2016 to 713 in 2017. Despite the increase in participation the total savings was modestly lower. The provincial government introduced the Green Investment Fund ("GIF") in 2017 which had a negative impact on results for Enbridge Gas's Small Commercial and Small Industrial Market which Enbridge Gas attributes in-part to market confusion as GIF associated programs were offered through separate program administrators, making it difficult for customers to discern between Enbridge Gas and GIF offerings.

b) The efforts toward reaching small Commercial Customers in 2017 were not exclusive to Enbridge Gas's Custom Program Offer. Rather, Enbridge Gas's Energy Solution Consultant's work with customers and business partners to promote energy efficiency and drive participation in program offers that best meet their needs, including: Commercial Custom, Prescriptive, Direct Install and Run it Right offers as well as the Energy Leaders initiative.

   Enbridge Gas's efforts to reach small Commercial Customers, which were outlined in our 2017 Demand Side Management Annual Report,[1] included targeting customer segments that typically had low participation in its program offers such as warehouses where Enbridge Gas supported programable thermostats through a campaign that recognized customers with up to $2,000 in incentives for installing the technology. Efforts were also made to expand Enbridge Gas's business partner network to help reach a broader group of small Commercial Customers. Activities to engage these business partners included the development of a micro site to host applications and savings calculators. Marketing initiatives such as: webinars, publications, e-blasts, etc. were also launched in an effort to grow the business partner network and contractor network. Enbridge Gas also participated in several collaborative initiatives to support growth in the small Commercial sector including The City of Vaughan's Windfall event targeting small and medium Commercial

[1] Exhibit B, Tab 2, Schedule 1, p. 79.

Customers and a joint contractor training collaborative event with IESO to train business partners and contractors on the benefits of promoting energy efficiency.

Growing participation in the small Commercial segment continues to be a focus for Enbridge Gas in 2020, as it evaluates ways to expand existing program offers and launch new initiatives to reach additional customers. For example, Enbridge Gas has a direct install offer that has demonstrated success with engaging small Commercial Customers by providing turnkey solutions for the purchase and installation of selected energy efficiency measures. In 2020, this offer added a new measure and additional delivery agents and has applied lessons learned from the Air Door and Demand Control Ventilation ("DCV") Program Offers to its assessment of other technologies being considered as new Direct Install Program Offers. Enbridge Gas also launched a midstream offer in 2019 to expand the reach of select energy efficiency measures, typically to small commercial sites, through distributors and wholesalers.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Ontario Energy Board Staff ("Staff")

Interrogatory

Reference:

Exhibit B, Tab 3, Schedule 1, Pages 2-4

Question(s):

Enbridge Gas indicates that it has incurred an additional $1.087M in developing and implementing its new DSM Tracking and Reporting System. This is incremental to the OEB-approved amount of $5M as part of the Decision on the 2015-2020 DSM Plans. Enbridge Gas lists some causes for the increase, including data migration complexities, timing and vendor delays.

a) Please discuss when Enbridge Gas first expected costs to be greater than the approved budget for the DSM Tracking and Reporting IT system.

b) Please discuss the steps Enbridge Gas took to minimize cost overruns. Within your response, please provide more information on how vendor staffing turnover led to additional costs and if the vendor delays contributed to the additional costs due to a mandatory system upgrade during the development period.

c) Please discuss if and how legacy Enbridge and Union worked together to coordinate efforts on this project. Within your response, please indicate any areas of collaboration on work items, system requirements, vendor selection and any other areas of overlap.

Response:

a) Enbridge Gas suspected that costs could exceed its original high-level estimate as early as 2015. Accordingly, and as discussed further in part b) below, Enbridge Gas worked hard throughout project development to refine the scope and to re-assess core project requirements in order to reduce costs as much as possible, while still ensuring an effective system was developed to achieve its objectives. It was not until 2017, once the project was well into the development phase that Enbridge Gas could be certain that costs would exceed the original high-level estimate.

b) As discussed in part a) above, Enbridge Gas worked hard throughout project development to refine project scope and re-assess core business requirements in

order to reduce costs as much as possible, while still ensuring an effective system was developed to achieve business objectives. For example, the development of partner and customer portals, as well as mobile enablement of the solution were removed from the project scope.

Significant delays due to unforeseen turnover within the selected vendor's organization led to higher than expected time spent by and associated costs for internal Enbridge Gas resources to work on system development. While this contributed incrementally to the overall costs of the project, the final actual total cost of the project, being about 20% higher than the original high-level estimate approved by the Board, is consistent with the Company's experience in respect of IT projects given the difficulty in forecasting and estimating the costs to undertake and implement a complex solution as was the case here.[1]

It should be noted that while the vendor also experienced higher than expected costs related to this turnover, the vendor did not pass these costs onto Enbridge Gas. Rather, additional costs were incurred by Enbridge Gas in order to continue project development during this vendor delay using internal Enbridge Gas staff (please also see the response at Exhibit I.EP.5). The time and cost of these internal resources was not contemplated in the original high-level estimate.

The vendor delay was also a contributing factor to the later than expected implementation date and increased cost related to accommodating for the mandatory system upgrade during project development, rather than after system implementation as originally planned. In other words, if the system had been implemented on schedule, these mandatory system upgrade costs would have been absorbed as overhead expenses within the DSM budget.

c) It is important to note that at the time of project planning and throughout project development, EGD and Union were two separate organizations, and until January 2019 were also two separate and distinct legal entities managing unique legacy tracking and reporting systems and data sets.

During the due diligence and planning phase of the project, EGD and Union met frequently to discuss business requirements, prospective vendors, timelines, resource requirements and other aspects of project planning. Through these discussions, EGD and Union identified many similar challenges to their unique systems and projects (e.g., data migration was a challenge for both). However,

[1] Recall, that the cost of Enbridge Gas's updated tracking and reporting system project for the Union rate zones varied from its original OEB-approved budget by a similar order of magnitude. EB-2018-0300, Exhibit A, Tab 3, Section 2.1, November 30, 2018, pp. 9-10.

having developed separately, following nearly two decades of DSM delivery, the various source data for each utility was completely different, limiting the degree of collaboration possible.

Once the formal vendor selection process had commenced, EGD and Union focused on the development and implementation of their own unique respective DSM Tracking and Reporting IT systems. Closer to the implementation phase, EGD and Union met periodically to discuss challenges related to change management, user acceptance and system sustainment in case there were any valuable learnings that could be leveraged by either utility.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Ontario Energy Board Staff ("Staff")

Interrogatory

Reference:

Exhibit A, Tab 4, Schedule 1, Pages 9-12

Question(s):

a) In recommendation SM3, the EC identified cases of inaccurate savings data entries. In its response, Enbridge Gas refers to its responses to recommendations SM1 and SM2, however these responses pertain to unavailable data, not inaccurate data entry. Please provide a more complete response to EC recommendation SM3.

b) In recommendation SM5, the EC claims that the assumptions and standard modeling practices used in simulations prepared by delivery agents may not meet industry standards. In its response, Enbridge Gas notes that delivery agents are expected to follow NRCan protocols. Has Enbridge Gas confirmed that delivery agents are indeed following NRCan protocols?

c) In recommendation SM6, the EC notes that the there was no evidence that site-level auditors were qualified as Certified Energy Evaluators. Does Enbridge Gas require site-level auditors to be Certified Energy Evaluators? If so, does Enbridge confirm that the auditors hold this certification or at a minimum, are made aware of the certification?

Response:

a) Recommendation SM3 was directed towards the Union rate zone's whole home retrofit offerings (Residential Home Reno Rebate ("HRR"), Low-income Home Weatherization ("HWP"), Low-income Indigenous ("Indigenous")) and contained two parts:

- For SM3 Recommendation A, Enbridge Gas provides the following additional response to recommendations SM1 and SM2: Enbridge Gas (the Utility) continually reviews and implements improvements to program processes and

tracking to reduce errors and increase efficiency. In 2019, aligning the legacy EGD/Union processes in the Home Efficiency Rebate offering and combining the best practices of both has proven effective in reducing data errors as evidenced by the Union rate zone's strong draft audit realization rates for the 2019 DSM program year. Additionally, Enbridge Gas has made further modifications in 2020 to enable a direct upload of HRR models utilized by Energy Advisors into Enbridge Gas's upgraded tracking and reporting systems, thereby reducing data transmission errors that previously occurred when Energy Advisors extracted the data manually from the models and then submitted it to Enbridge Gas for consolidation and provision to the EC. Enbridge Gas is working to build similar upload functionality for the Low-Income Weatherization offerings effective in 2021.

- For SM3 Recommendation B, please refer to Enbridge Gas's response to recommendations SM1 and SM2 where this has been fully addressed.

b) No, Enbridge Gas does not "guarantee" compliance with NRCan protocols/standards. This as a practical matter cannot be done as it would require the devotion of substantial time and effort by internal resources to monitor and verify the protocols/standards used by the numerous Energy Advisors that are involved in relevant program offerings. It should be noted that the whole home modelling offerings are delivered by registered Energy Advisors affiliated with NRCan-licensed Service Organizations, with the expectation that NRCan protocols/standards are being followed given that this is a licencing requirement. Failure to follow these protocols/standards could result in suspension or loss of licence by NRCan, which would in turn render Energy Advisors ineligible to participate in Enbridge Gas's program.

c) The whole-home modelling offerings (Residential and Low-Income) are delivered by certified and registered Energy Advisors. This requirement is outlined in the contracts with Service Organizations, who are all NRCan-licensed, and is confirmed when they enter into an agreement with Enbridge Gas. At any time, Enbridge Gas can re-confirm this with the Service Organization or NRCan. In turn, the Service Organizations ensure that all Energy Advisors remain certified, registered and in good standing. This is part of the requirements to be a licensed Service Organization. Lack of compliance could result in suspension or termination of license agreements with NRCan as well as termination of agreements with Enbridge Gas.

   The only exception to this is in select situations for Low-Income Weatherization where there is limited availability of current NRCan-registered Energy Advisors. Maintaining registration includes training and periodic re-testing, which is a challenging process, and is only offered at certain intervals. In this case, previously

certified Energy Advisors may collect the on-site information. However, only a registered Energy Advisor completes the savings modeling in HOT2000. Enbridge Gas is in the process of ensuring all on-site data collection and modelling is conducted exclusively by current NRCan-registered Energy Advisors. This is nearly complete and was expected in 2020 but the COVID-19 pandemic has created some delays due to access to training, specifically for those in remote areas.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Ontario Energy Board Staff ("Staff")

Interrogatory

Reference:

(i) 2015-2020 DSM Guidelines, Section 6.6
(ii) Exhibit C, Tab 2, Schedule 1, Page 128, Table 11.0 – Summary of 2017 Budget and Spending
(iii) Exhibit C, Tab 3, Schedule 1, Pages 2-3
(iv) 2017 Natural Gas Demand Side Management Annual Verification, Appendix P, Table 6-155

Question(s):

As noted in the 2015-2020 DSM Guidelines, a utility must notify the OEB of any program budget fund transfers in excess of 30%. In Item 6 of Exhibit C, Tab 3, Schedule 1, Enbridge Gas states that it did not transfer more than 30% of program budget funds between programs for the Union rate zone in 2017. However, Table 6-155 of the 2017 Natural Gas Demand Side Management Annual Verification report indicate that spending on the Resource Acquisition, Large Volume, Market Transformation, and Performance-Based programs deviated by more than 30% from the OEB-approved budget.

Further, Table 11.0 – Summary of 2017 Budget and Spending in the Union Gas 2017 Annual DSM Report includes Column D titled "Budget Transfers".

Program	2017 Spend ($)	2017 Budget ($)	Variance ($)	Variance (%)
Resource Acquisition	44,240,315	33,404,162	10,836,153	32.44
Low-Income	10,882,721	12,342,841	(1,460,120)	(11.83)
Large Volume	2,622,762	4,000,000	(1,377,238)	(34.43)
Market Transformation	1,698,246	2,338,070	(639,824)	(27.37)
Performance-Based	532,776	843,000	(310,224)	(36.8)

Source: Exhibit C, Tab 2, Schedule 1, Table 11.0

Program	Utility Spending ($)	OEB-Approved Budget ($)	Variance ($)	Variance (%)
Resource Acquisition	44,240,314	33,404,162	10,836,152	32
Low-Income	10,882,721	12,342,841	(1,460,120)	(12)
Large Volume	2,622,762	4,000,000	(1,377,238)	(34)
Market Transformation	1,620,246	2,338,070	(717,824)	(31)
Performance-Based	532,776	843,000	(310,224)	(37)

Source: 2017 Natural Gas Demand Side Management Annual Verification, Appendix P, Table 6-155

a) Please explain the program budget deviations that exceeded 30% in the Union rate zones as shown in the 2017 Annual Verification Report with the reported budget transfers in the Union 2017 Annual DSM Report.

b) Please discuss all budget transfers and clearly show what approved program funding was transferred across the portfolio.

c) Please explain why the actual amount spent on the Market Transformation program changed from 2017 to 2018.

Response:

a) The 'budget deviations' in the Union rate zones as shown in the 2017 Annual Verification Report are different from the 'reported budget transfers' in the Union 2017 Annual DSM Report. The former presentation is simply the calculated difference between actual program costs and budgeted program costs. The latter is a breakdown of whether the 'budget deviation' was classified as a budget transfer or whether it flowed through the DSMVA deferral account.

b) Funding transfers are managed in aggregate relative to the OEB-approved program budget categories. Accordingly, the details of the funding transfers between programs in 2017 is shown in Column "D" of Table 11.0 at Exhibit C, Tab 2, Schedule 1.

In 2017, Union took the following actions to transfer budgets within the tolerance set out by the 2015-2020 DSM Framework and Guidelines ("Guidelines") (EB-2014-0134) to the same (summarized in Table 1):[1]

a. Transferred spending variances on program and portfolio evaluation costs into the Residential Program to partially cover the overage in residential program evaluation costs (amounting to $1,028,721 as set out in Table 1, Column (a)).

b. Transferred a portion of spending variances on program and portfolio administration costs (including portfolio research costs and a portion of Pilot Program expenses) into the Residential Program to cover the remaining overage in residential program evaluation costs (amounting to $321,779), as well as a portion of the overage in Residential Program costs (amounting to $977,923) (as set out in Table 1, Column (b)).

c. Transferred a portion of spending variances from the Commercial/Industrial and Performance based programs into the Residential Program to cover a portion of the overage in Residential Program costs (up to the 30% allowable transfer threshold into the Residential Program) (amounting to $1,082,225 as set out in Table 1, Column (c)).

d. Transferred spending variances from Pilot Program expenses to cover the cost of the Future Infrastructure Planning Study (amounting to $192,233 as set out in Table 1, Column (d)).

[1] Guidelines, Section 6.6, pp.14-15.

Table 1:
Summary of 2017 DSM Program Year Budget Transfers

	Budget Transfer Detail				Total Budget Transfers
	(a)	(b)	(c)	(d)	(e) =(a)+(b)+(c)+(d)
Program Budget					
Resource Acquisition Scorecard					
Residential Program*		$977,923	$1,082,225		$2,060,148
Residential Evaluation**	$1,028,721	$321,779			$1,350,500
Commercial/Industrial Program*			($1,049,808)		($1,049,808)
Commercial/Industrial Evaluation**	($189,000)				($189,000)
Low-Income Scorecard					
Low-Income Program*		($456,102)			($456,102)
Low-Income Evaluation**	($59,115)				($59,115)
Large Volume Scorecard					
Large Volume Program*		($291,443)			($291,442)
Large Volume Evaluation**	($63,000)				($63,000)
Market Transfomation Scorecard					
Market Transfomation Program*		($153,489)			($153,488)
Market Transformation Evaluation**	($36,820)				($36,820)
Performance-Based Scorecard					
Performance-Based Program*		($6,746)	($32,418)		($39,163)
Performance-Based Evaluation**	($35,000)				($35,000)
Programs Sub-total	**$645,786**	**$391,923**	**$0**	**$0**	**$1,037,709**
Portfolio Budget					
Research		($444,154)			($444,154)
Evaluation**	($645,786)				($645,786)
Administration		$69,324			$69,323
Pilot Programs		($17,092)		($192,233)	($209,325)
Portfolio Sub-total	**($645,786)**	**($391,923)**	**$0**	**($192,233)**	**($1,229,942)**
Incremental DSM Projects 2017 Spend					
Future Infrastructure Planning Study				$192,233	$192,233
Total 2017 DSM Spending	**$0**	**$0**	**$0**	**$0**	**$0**

*Program costs include incentives, promotion and administration costs

** Costs related to the OEB staff coordinated evaluation and audit process are not provided detailed by program. These costs are recorded at the portfolio level.

The details of the funding transfers between programs in 2018 is shown in Column D of Table. 4.10 at Exhibit C, Tab 2, Schedule 2. In 2018, Union took the following actions to transfer budgets within the tolerance set out by the 2015-2020 DSM Framework and Guidelines to the same (summarized in Table 2):[2]

a. Transferred spending variances on program and portfolio evaluation costs into the Residential Program to partially cover the overage in residential program evaluation costs (amounting to $825,338 as set out at Table 2 Column (a)).

b. Transferred a portion of spending variances on program and portfolio administration costs (including portfolio research costs and a portion of Pilot Program expenses) into the Residential Program to cover the remaining overage in residential program evaluation costs (amounting to $733,362 as set out at Table 2 Column (b)).

c. Transferred a portion of spending variances from the Commercial/Industrial, Performance Based and Market Transformation programs into the Residential Program to cover a portion of the overage in Residential Program costs (up to the 30% allowable transfer threshold into the Residential Program) (amounting to $2,613,609).

d. Transferred a portion of the spending variance from the Commercial/Industrial Program to cover the development and implementation costs of the Open Bill Access Program (amounting to $821,395), as well as spending variances from Pilot Program expenses to cover the cost of the Future Infrastructure Planning Study (amounting to $82,464) (as set out at Table 2 Column (d)).

[2] Guidelines, Section 6.6. pp. 14-15.

Table 2:
Summary of 2017 DSM Program Year Budget Transfers

	Budget Transfer Detail				Total Budget Transfers
	(a)	(b)	(c)	(d)	(e) =(a)+(b)+(c)+(d)
Program Budget					
Resource Acquisition Scorecard					
Residential Program*			$2,613,609		$2,613,609
Residential Evaluation**	$825,338	$733,362			$1,558,700
Commercial/Industrial Program*		($288,762)	($2,341,626)	($821,395)	($3,451,783)
Commercial/Industrial Evaluation**	($189,000)				($189,000)
Low-Income Scorecard					
Low-Income Program*		($439,138)			($439,138)
Low-Income Evaluation**	($70,023)				($70,023)
Large Volume Scorecard					
Large Volume Program*		($306,181)			($306,181)
Large Volume Evaluation**	($63,000)				($63,000)
Market Transfomation Scorecard					
Market Transfomation Program*		($139,083)	($5,257)		($144,341)
Market Transformation Evaluation**	($36,820)				($36,820)
Performance-Based Scorecard					
Performance-Based Program*		($24,674)	($266,726)		($291,400)
Performance-Based Evaluation**	($35,000)				($35,000)
Programs Sub-total	**$431,495**	**($464,475)**	**$0**	**($821,395)**	**($854,375)**
Portfolio Budget					
Research		($327,386)			($327,386)
Evaluation**	($431,495)				($431,495)
Administration		$1,016,510			$1,016,510
Pilot Programs		($224,649)		($82,464)	($307,113)
Portfolio Sub-total	**($431,495)**	**$464,475**	**$0**	**($82,464)**	**($49,483)**
Incremental DSM Projects 2018 Budget Spend					
Achievable Potential Study					$0
Open Bill Project				$821,395	$821,395
Future Infrastructure Planning Study				$82,464	$82,464
Total 2018 DSM Spending	**$0**	**$0**	**$0**	**$0**	**$0**

*Program costs include incentives, promotion and administration costs

** Costs related to the OEB staff coordinated evaluation and audit process are not provided detailed by program. These costs are recorded at the portfolio level.

c) There are differences between the actual costs for the Market Transformation Program included in the 2017 Natural Gas Demand Side Management Annual Verification report, and the final costs included in the 2017 Annual DSM Report due to the inclusion of costs related to deferred incentives (as described at Exhibit C, Tab 3, Schedule 1, pp. 3-4) in the Annual DSM Reports (which are being sought for clearance in this proceeding). Detailed 2017 costs that included Market Transformation deferred incentives were provided to the auditor when requested but the auditor did not include these amounts in its final 2017 Natural Gas Demand Side Management Annual Verification report.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Canadian Manufacturers & Exporters ("CME")

Interrogatory

Reference:

Cover Letter

In its cover letter for this application, EGI proposed that the variance and deferral account balances be implemented in alignment with other rate changes through the quarterly rate adjustment mechanism. In its most recent QRAM, EGI determined that the bill increases for that quarter caused impacts that required mitigation (for instance 25% increases to commodity prices and 10% total bill impacts). According to EGI's evidence in that proceeding, the U.S. Energy Information Administration forecasts higher than normal gas prices in late 2020 and early 2021.

Question(s):

a) Does EGI still propose to implement the variance and deferral account balances as early as January 1, 2021, given the economic forecasts?

b) If so, has EGI developed any specific mitigation plans that might include the recovery of the variance and deferral account balances?

Response:

a) Enbridge Gas supports clearance of account balances from this proceeding with the next available Quarterly Rate Adjustment Mechanism ("QRAM") application following the Board's approval. Enbridge Gas will review the impacts from all rate changes at the time of the QRAM application and in the event that the QRAM rate impacts are significant, Enbridge Gas would consider a rate mitigation proposal at that time. Please also see the response at Exhibit I.LPMA.1 for additional discussion regarding the timing of disposition of DSM deferral and variance accounts.

b) No, Enbridge Gas has not developed specific mitigation plans for the January 1, 2021 QRAM application at this time.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Canadian Manufacturers & Exporters ("CME")

Interrogatory

Reference:

Exhibit B, Tab 3, Schedule 1, page 3 of 9

At Exhibit B, Tab 3, Schedule 1, page 3 of 9, EGI stated that the original high-level cost estimate for the upgraded tracking and reporting system for the EGD rate zone "was not fully reflective of the final project scope and schedule and did not take into account certain rate zone specific key elements."

Question(s):

a) Please describe how the "one stop shop" element was not included in the original project scope, or was specific to the EGD rate zone. Was the decision to have all the information in one place made after the original scoping? Please describe fully.

b) With respect to "Vendor delay", what is EGI's usual allocation of risk between itself and contractors? Was EGI entirely at risk for delays or failures on the part of the contractor, were holdbacks or other contractual mechanisms negotiated that would put the contractor at risk for delays?

Response:

a) The "one stop shop" element was part of Enbridge Gas's original project plan for each of the EGD rate zone and Union rate zones' upgraded tracking and reporting systems. As EGD and Union filed their original project plans and cost estimates ($5 million for the EGD rate zone and $6 million for the Union rate zones) in April 2015, the complexity of the requirements to achieve this goal were not fully understood. In its 2015-2020 DSM Plan application (EB-2015-0049) EGD stated that while it expected some incremental details regarding its plans to be shared as part of that proceeding, some uncertainty around the final costs of the project were likely to persist,[1]

[1] EB-2015-0049, Exhibit B, Tab 1, Schedule 6, p. 8.

> While this plan will contain greater granularity and likely more detailed cost estimates, there will remain some uncertainty as to costs until the preferred application's supplier(s) is selected.

Further, Enbridge Gas did not receive approval for these upgrade projects until nearly 1-year later, in January 2016. Once project development commenced, the complexity and technical requirements to create a "one stop shop" became increasingly clear. Accordingly, and considering that the then existing systems had reached the end of their useful life and a new system was "…necessitated by the demands and rigors of the DSM Framework and the resulting significant expansion of the Company's DSM activities…"[2] Enbridge Gas's focus shifted to developing the functionality required to create the "one stop shop" at the lowest possible cost to ratepayers (please also see the response at Exhibit I.STAFF.3 for discussion of Enbridge Gas's efforts to manage the cost of its upgraded tracking and reporting system project).

The quality of data reporting resulting from the upgraded tracking and reporting systems has benefited ratepayers by making it possible for Enbridge Gas to comply with an increasing number of recommendations from the EC as part of the DSM annual evaluation, measurement and verification ("EM&V") process:

- The evaluation contractor has often requested that Enbridge Gas deliver tracking data in a single flat file but due in part to system limitations Enbridge Gas was previously unable to facilitate this.[3] The upgraded system has played an important part in allowing Enbridge Gas to provide this information going forward.

- The "one stop shop" has allowed Enbridge Gas to address elements of more recent EC recommendations regarding improved project documentation and data quality.[4]

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[2] EB-2015-0049, Exhibit B, Tab 1, Schedule 6, p. 9.

[3] Please see repeat Recommendation O2 on page 29 of in the Ontario Gas DSM Evaluation Contractor's 2017 Natural Gas Demand-Side Management Annual Verification Report https://www.oeb.ca/sites/default/files/2017-DSM-Annual-Verification-Report.pdf and the utility response at Exhibit A, Tab 4, Schedule 1, p. 6.

[4] Please see Recommendation 8 on page 41 and Recommendation 20a on page 44 of in the Ontario Gas DSM Evaluation Contractor's 2018 Natural Gas Demand-Side Management Annual Verification Report https://www.oeb.ca/sites/default/files/2018-DSM-Annual-Verification-Report.pdf and the utility response at Exhibit A, Tab 4, Schedule 1, pp. 25 and 32.

b) Enbridge Gas's allocation of risk between itself and contractors varies from contract to contract based on variables such as the nature of the project and the selected vendor. In this case, the contractor was responsible for the additional time and effort resulting from the “Vendor Delay” referenced. However, due to the “Vendor Delay” Enbridge Gas was forced to utilize greater internal resources for system development than originally estimated, causing it to incur additional internal resource costs for the project. Please also see the response at Exhibit I.STAFF.3 for additional details of the impact of the “Vendor Delay” to the upgraded tracking and reporting system for the EGD rate zone.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Canadian Manufacturers & Exporters ("CME")

Interrogatory

Reference:

Exhibit C, Tab 2, Schedule 1, page 92 of 141

At Exhibit C, Tab 2, Schedule 1, page 92 of 141, EGI's evidence is that the cumulative natural gas savings for the large volume scorecard are significantly lower than targets.

Question(s):

a) What are the drivers of the relatively low savings amount in this segment relative to the metric target levels?

b) Is EGI contemplating changes to this program as a consequence of these results, or does EGI anticipate further increases in natural gas savings like it did between 2016 and 2017 (60%)?

Response:

a) As per the OEB's Revised Decision and Order on Enbridge Gas's 2015-2020 DSM Plans,[1] the Large Volume program targets are based upon an average of the previous 3 years results and a 2% productivity factor. The primary driver for the relatively low savings amount compared to target is the variance between the Net to Gross ("NTG") values applied to the program targets vs. results. A higher three-year running average NTG value is used to set targets for 2017 (46% NTG value), while 2017 results rely upon a lower NTG value of 15%. The resulting variance between NTG values used to determine targets vs. results contributes to the relatively low savings amount realized for the Large Volume program relative to the target.

   A second driver is that as of 2016, the utility no longer incented steam leak projects. Customers typically have other reasons to fix steam leaks (i.e. safety) in addition to improve energy performance. This would have been reflected in 2017 results, but not yet be fully accounted for in the 2017 targets.

[1] EB-2015-0029/0049, OEB Revised Decision and Order, February 24, 2016, p. 3.

b) At the current time, Enbridge Gas does not contemplate any significant changes to its OEB-approved DSM Plans through 2021. As set out in its 2015 DSM Deferral and Variance Account Clearance proceeding (EB-2017-0323),[2]

> Furthermore, it is Union's contention that the unique design of Union's Large Volume Direct Access program is incompatible with the concept of a NTG Study. The amount of funds available to Direct Access program participants is fully transparent and customers access their own pool of funds for eligible projects. If Large Volume customers do not use their funds, they become accessible to other Large Volume customers. While Union can attempt to influence Large Volume customers by providing incentives, identifying opportunities to save energy, and quantifying savings estimates, customers prioritize project investment based on their own needs and with consideration for the amount of DSM funding available to them. If a project meets the eligibility criterial of the program, Union will not refuse a customer access to its own money regardless of whether the program has influenced the customer. Despite Union raising these concerns over the course of the NTG Study, a separate survey instrument for the Large Volume custom project participants was not developed.

To resolve this matter, Enbridge Gas believes that the methodology to determine NTG for Large Volume programs should be re-assessed for the Post-2021 DSM Framework in order to take unique program design characteristics and the concept of a 3-year rolling target into consideration.

[2] EB-2017-0323, Exhibit A, Tab 2, pp. 38-39.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Canadian Manufacturers & Exporters ("CME")

Interrogatory

Reference:

Exhibit B, Tab 2, Schedule 1, pg. 142 of 173 / Exhibit C, Tab 2, Schedule 1, pg. 128 of 141/ Exhibit B, Tab 2, Schedule 2, Page 19 of 23/ Exhibit C, Tab 2, Schedule 2, Page 19 of 22/

At various places in the evidence, EGI provided that spending on commercial and industrial programs as well as large volume programs are lower than budget.

Question(s):

a) Please provide and describe the drivers of the underspending.

b) Has EGI contemplated any changes to the Commercial/Industrial programs to bring spending levels closer to budget levels? If so, please describe them. If not, why not?

c) Please describe the process used by EGI to determine where overspending (of up to 15% of the total OEB-approved budget) is allocated.

Response:

a) Underspending in the commercial and industrial ("C&I") programs is primarily a result of the prescriptive and direct install offerings.

   Underspend in the prescriptive and direct install offers is generally a result of lower than expected participation levels due to the challenges with reaching and engaging customers in Enbridge Gas' small commercial and small industrial markets. These customers generally have fewer conservation opportunities as well as fewer resources (both financial and personnel) to dedicate to energy conservation projects, requiring higher incentive levels and different approaches to engagement. In addition, as noted at Exhibit I.STAFF.2, the provincial government introduced the Green Investment Fund ("GIF") in 2017 which had a negative impact on results for Enbridge Gas' Small Commercial and Small Industrial market.

Underspend in the Large Volume program is due to the late timing of customer decisions with respect to projects identified in their Energy Efficiency Plans ("EEP"). When projects identified in a customer's EEP don't proceed, due to unique customer circumstances such as shifting resource priorities, it is often too late for those funds to be dispersed to the aggregate pool to be re-allocated.

b) Enbridge Gas continually improves its programs as part of its annual planning process, which includes a focus to increase program results such that it can fully utilize OEB-approved budgets. Within the C&I Program, Enbridge Gas has evaluated and implemented initiatives with the intent of increasing program uptake and therefore closing any spending gap.

With respect to small business customers, Enbridge Gas believes the direct install program offer is a viable solution to engage the small commercial market and continues to adapt and grow the offering. The direct install air door program offer was successful in engaging harder to reach customers in 2017 and 2018 and the Direct Install Demand Control Kitchen Ventilation ("DCKV") offer was launched in the EGD rate zone in 2018. The direct install air door offer has since been expanded to serve additional regions as well as to introduce a new measure (dock door seals). The Direct Install DCKV offer was expanded province wide in 2019 and the incentives and customer experience were enhanced through joint delivery with the IESO's Save-On-Energy offer for this measure.

To further expand the reach of the C&I Program into the small commercial market, Enbridge Gas launched a province-wide mid-stream offer in 2019 for select HVAC and Foodservice prescriptive measures.

c) Enbridge Gas's process for determining where overspending (of up to 15% of the total OEB-approved budget) is allocated is as follows:

- The company forecasts its results and spending based on the market potential of the programs in market.

- If programs are forecast to achieve greater than 100% of their target, then they can access additional spending.

- If programs are forecasting to achieve less than 100% of their target but require more than 100% of their budget, the Company will review if this can be managed through budget transfers.

- Enbridge Gas monitors the overall spend to ensure it does not exceed the OEB-approved budget or the OEB-approved budget plus the 15% overspend if the Company is forecasting overachieving the 100% OEB target(s).

- If the forecast spend exceeds the OEB budget plus the 15% overspend, Enbridge Gas will focus the spend on programs that drive the greatest results, however, Enbridge Gas has typically been limited in this regard by market potential.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Energy Probe ("EP")

Interrogatory

Reference:

Exhibit A, Tab 4, Schedule 1, Page 13, Table 3 Cost Effectiveness CE2;
EB-2019-0194, Exhibit N1, Tab1, Schedule 1, Settlement Agreement, Page 8

Preamble:

The utilities continue to use different discount rates. Recommendation: Increase transparency around the inflation selected and why.

Question(s):

a) Please provide the calculations of the discount rates for CE estimates (TRC Plus and PAC) for each rate zone for each of 2017 and 2018, including specifically the sources of the inflation factors and the choice of discount rate(s).

b) Please provide the 2017 and 2018 CE calculations for each of the EGI and Union Residential Home Retrofit offers as provided to the EC.

c) As an illustrative example, please use the same discount rate for both zones for the Residential Home Conservation programs and provide and compare the results.

d) Please comment on the materiality of the difference(s).

e) Please confirm that starting in 2019, EGI will be adopting a common inflation factor and discount rate for both Rate Zones

Response:

a) The real discount rate used in 2017 and 2018 was 4% for the EGD rate zone and the Union rate zones, as per the OEB's Filing Guidelines to the Demand Side

Management Framework for Natural Gas Distributors (2015-2020) ("Guidelines") (EB-2014-0134):[1]

> The Board is of the view that the gas utilities should use a discount rate (real) of 4% when screening prospective DSM programs to determine if they are cost-effective for consideration as part of the new 2015 to 2020 multi-year DSM plan.

The real discount rate was converted to nominal discount rates using the inflation rates set out in Table 1 below:

Table 1:
2017/2018 Inflation Factors

Year	EGD Rate Zone	Union Rate Zones
2017	1.96%[2]	1.98%[3]
2018	2.11%[4]	1.27%[5]

The resulting nominal discount rates calculated are set out in Table 2 below:

Table 2:
2017/2018 Nominal Discount Rates

Year	EGD Rate Zone	Union Rate Zones
2017	6.04%	6.06%
2018	6.20%	5.32%

b) Cost-effectiveness data is requested by the Evaluation Contractor in a flat file, as opposed to only the calculations. For details on TRC-Plus and PAC results for 2017, please refer to the EC's 2017 Natural Gas Demand-Side Management Annual Verification report ("2017 Annual Verification").[6] For details on TRC-Plus and PAC

[1] Guidelines, p. 35.
[2] 5-year average inflation (2017-2021) from Conference Board of Canada's Ontario CPI forecast for the period of 2017-2040 (March 23, 2017).
[3] Q2 2015 4-quarter moving inflation rate based on the Gross Domestic Product Implicit Price Index ("GDP IPI").
[4] 5-year average inflation (2018-2022) from Conference Board of Canada's Ontario CPI forecast for the period of 2018-2040 (January 19, 2018).
[5] Q2 2017 4-quarter moving inflation rate based on the GDP IPI.
[6] 2017 Annual Verification, March 13, 2020, Tables 6-159 to 6-174, pp. 255-262; https://www.oeb.ca/sites/default/files/2017-DSM-Annual-Verification-Report.pdf

results for 2018, please refer to the EC's 2018 Natural Gas Demand-Side Management Annual Verification report ("2018 Annual Verification").[7]

c) & d)

The EC conducted the scenario analysis requested by EP and included its findings within its 2017/2018 Annual Verification reports. For the 2017 scenario analysis, please refer to the 2017 Annual Verification report, page 253.[8] For the 2018 scenario analysis, please refer to the 2018 Annual Verification report, page 257.[9]

The findings were as follows:

- In 2017, the difference in TRC-Plus and PAC was 0%
- In 2018, the difference in TRC-Plus and PAC was between +/- 6% to 8%, depending on the rate zone and program in question.

For the Union rate zones' 2018 Residential Program (which consists of the residential retrofit offering), using the EGD rate zone's discount rate would decrease TRC-Plus by 7%, based on the EC's analysis. In terms of materiality, this would decrease the program's TRC-Plus from 1.43 to 1.33, well above the cost-effectiveness threshold of 1.0.

For the EGD rate zone's 2018 Resource Acquisition Program (which consists of the residential retrofit offering), using the Union rate zones' discount rate would increase TRC-Plus by 7%, based on the EC's analysis. In terms of materiality, this would increase the program's TRC-Plus from 2.26 to 2.43.

e) Confirmed. For the 2019 DSM program year Enbridge Gas applied an inflation factor of 1.27% and calculated a nominal discount rate of 5.32% across all rate zones.

[7] 2018 Annual Verification, March 13, 2020, Tables 6-163 to 6-178, pp. 259-266; https://www.oeb.ca/sites/default/files/2018-DSM-Annual-Verification-Report.pdf
[8] https://www.oeb.ca/sites/default/files/2017-DSM-Annual-Verification-Report.pdf
[9] https://www.oeb.ca/sites/default/files/2018-DSM-Annual-Verification-Report.pdf

ENBRIDGE GAS INC.

Answer to Interrogatory from
Energy Probe ("EP")

Interrogatory

Reference:

Exhibit B, Tab 2, Schedule 1, Page 32 Tables 4.3 and 4.4; Exhibit B, Tab 2, Schedule 1, Page 129

Preamble:

"As proposed in the Guidelines, the Company is expected to use the PAC test as a secondary reference tool in assessing the programs' cost-effectiveness. Table 4.4 below summarizes the PAC screening calculations for the 2017 Enbridge DSM Portfolio. The portfolio as a whole had a positive overall PAC ratio of 3.02."

Question(s):

a) Please provide details of the 2017 PAC Benefits for the EGD Rate Zone Home Energy Conservation Program. Specifically include gas savings (m^3) and customer savings ($) based on the residential cost of gas.

b) Please provide details on the 2017 PAC Costs for the Home Energy Conservation Program. Specifically indicate utility, contractor and other costs, including evaluation costs.

c) Please comment why the 2017 PAC ratio of 1.19 is low.

d) For the Run it Right Program please explain the significance of TRC negative ratio (Table 4.3) and PAC negative cost and PAC ratio of 0.13 (Table 4.4).

e) Please indicate based on cost-effectiveness criteria, why RIR is continuing in 2018 and beyond.

Response:

a) & b)
Details of the 2017 PAC Results, including annual natural gas savings (m^3), can be found in the Ontario Gas DSM Evaluation Contractor's 2017 Natural Gas Demand-Side Management Annual Verification ("2017 Annual Verification") report.[1]

Table 6-160 within the 2017 Annual Verification report lists program-level general administration costs of approximately $6,808,000. This is comprised of $5,713,339 of direct program delivery costs and $1,095,017 of allocated overhead and administration costs. There were no evaluation costs attributed to the Residential PAC Results.

DSM cost-effectiveness tests, including TRC-Plus and PAC, do not use residential cost of gas and thus such costs are not included in the details of the PAC Benefits referenced above. Instead, DSM cost-effectiveness tests use avoided cost rates. For more details on avoided costs for the purposes of cost-effectiveness screening, please refer to Section 10.0 of the OEB's Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015-2020) ("Guidelines") (EB-2014-0134).[2] For the 2017 EGD rate zone avoided costs rates, please refer to Exhibit B, Tab 2, Schedule 1, p. 151.

c) The 2017 Home Energy Conservation offering was a holistic offering designed to achieve deep savings through the installation of high-efficiency space heating and water heating equipment, as well as building envelope improvements. As such, it requires higher costs to influence and implement whole-home, deep savings measures. Furthermore, increasing furnace baselines have reduced the natural gas savings claimed by the offering, putting downward pressure on cost-effectiveness. While the offering's PAC results are lower than other DSM offerings, they remained well above the 1.0 cost-effectiveness threshold. For more information on the 2017 Home Energy Conservation offering, please refer to Section 5.11 of the EGD rate zone's 2017 Demand Side Management Annual Report (Exhibit B, Tab 2, Schedule 1, pp. 37-44).

[1] 2017 Annual Verification, Table 6-160, March 13, 2020, p. 255; https://www.oeb.ca/sites/default/files/2017-DSM-Annual-Verification-Report.pdf
[2] Guidelines, p. 34; https://www.oeb.ca/oeb/_Documents/EB-2014-0134/Filing_Guidelines_to_the_DSM_Framework_20141222.pdf

d) & e)

The Run-It-Right offering focused on building optimization by providing customers with education, metering infrastructure and incentives for low cost/no-cost opportunities.

When viewed as a Resource Acquisition offer, the driver for the low TRC and PAC is due primarily to the fact that the offer is resource intensive (due to the need to upgrade metering infrastructure for many participants) and the incentivized low-cost/no-cost measures generate low savings in comparison to capital upgrades.

Enbridge Gas continues to offer Run-it-Right within its portfolio because of its effectiveness at engaging smaller customers, influencing them to become more energy aware, and because of how it works in concert with Enbridge Gas's other offers by identifying all energy savings opportunities (capital and operational) through its building optimization process.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Energy Probe ("EP")

Interrogatory

Reference:

Exhibit B, Tab 2, Schedule 1, Page 44; Exhibit C, Tab 2, Schedule 1, Page 48
Table 5.9 HRR Offering Measure Rebates

Preamble:

"The HEC offer will continue in 2018. In an attempt to decrease barriers to customer participation and diversify measure uptake as well as align this offer with Union's Home Reno Rebate program, Enbridge will re-design the HEC offer in 2018. The Company will implement a quasi-prescriptive incentive structure for this offer that aligns with the Union's Home Reno Rebate program. Enbridge will monitor the offer through the course of 2018 to determine if these design changes will result in an increase customer participation and measure uptake through higher incentives available to HEC participants."

Question(s):

a) Please confirm if EGI has harmonized the residential Home Conservation programs for the EGD and Union Rate zones.

b) Please provide a side-by-side comparison of the EGD 2017 and 2018 HEC incentive structures with the Union Home Retrofit program.

c) Please comment on the differences and steps/timing to harmonize (based on Union Program)

Response:

a) Customer incentives for the Home Conservation program offers (Home Efficiency Rebate) have been harmonized across the EGD and Union rate zones.

b) Please see Attachment 1 for the 2017 rebate values for the Home Efficiency Rebate offer (formerly known as Home Reno Rebate the Union rate zones and Home

Energy Conservation for the EGD rate zone). While these two residential offers were not aligned in 2017 both received co-contributions from the Green Investment Fund ("GIF") during 2017 and 2018. In 2017, the GIF provided supplementary funding to participants in the Union rate zones at the rebate level which is also illustrated in Attachment 1.

Please see Attachment 2 for the 2018 rebate values for the Home Efficiency Rebate offer (formerly known as Home Reno Rebate in the Union rate zones and Home Energy Conservation in the EGD rate zone). In 2018, Enbridge Gas aligned the residential offer in the EGD rate zone to reflect the same rebates as in the Union rate zones. The rebate values in Attachment 2 are identical as in 2018, the Home Efficiency Rebate offers were the same and both offers had the same GIF co-contribution (identical to the amount for the Union rate zones in 2017).

c) Please see the response at part a) above.

Following the alignment of the customer facing elements of the program offers in 2018, as discussed in Enbridge Gas's responses to interrogatories in its 2021 DSM Plans Proceeding (EB-2019-0271),[1] Enbridge Gas proceeded to harmonize the Home Energy Conservation and Home Reno Rebate offers into one joint offer called Home Efficiency Rebate in 2019.

Further harmonization and alignment of the backend elements of the offer proceeded throughout 2019 and into 2020, as timing allowed and as appropriate.

[1] EB-2019-0271, Exhibit I.EP4,art a), p. 2.

Union Gas

Measure	Current Rebate	New Rebate	Description	Contribution from GIF (on DSM Homes)
Basement Insulation	$ 1,000	$ 1,250	For adding at least R23 to 100% of basement	$ 250
	$ 500	$ 750	For adding at least R12 to 100% of basement	$ 250
	$ 800	$ 1,000	For adding at least R23 to 100% of crawl space wall	$ 200
	$ 400	$ 500	For adding at least R10 to 100% of crawl space wall	$ 100
	$ 450	$ 500	For adding at least R24 to 100% of floor above crawl space	$ 50
Exterior Wall Insulation	$ 1,500	$ 1,750	Add at least R9 for 100% of building to achieve a minimum of R12	$ 250
	$ 1,000	$ 1,250	Add at least R3.8 for 100% of building to achieve a minimum of R12	$ 250
Attic Insulation	$ 500	$ 500	For increasing attic insulation from R12 or less to at least R50 from R12 or less	$ -
	$ 250	$ 250	For increasing attic insulation from R13 to R25 to at least R50	$ -
	$ 500	$ 500	For increasing cathedral/flat roof insulation by at least R14	$ -
Air Sealing	$ 150	$ 150	Achieve 10% or more above base target	$ -
	$ 100	$ 100	Achieve base target	$ -
Furnace/Boiler	$ 500	$ 1,000	For replacing a	$ 500
			Replace a 94% or less AFUE with a 95% or higher AFUE natural gas, propane, or oil furnace; OR,	
			Replace an 89% or less AFUE with a 90% or higher AFUE natural gas, propane, or oil boiler.	
Water Heater	$ 200	$ 500	For replacing water heater with ENERGY STAR natural gas water heater with EF of 0.80 or higher	$ 300
Window/Door/Skylight	$ 40	$ 80	For each window, door or skylight replaced with ENERGY STAR-qualified model	$ 40

Enbridge Gas

Measure	Rebate
Whole Home Rebate Tier 1*	$ 850
Whole Home Rebate Tier 2*	$ 1,450
Whole Home Rebate Tier 3*	$ 1,950

**From May 29th, 2017 (when the IESO Whole Home Pilot commenced) only the $1,450 tier was offered to customers)*

**An additional $150 was also credited to the customer for their initial Energy Audit for each tier.*

Union Gas

Measure	Current Rebate	New Rebate	Description	Contribution from GIF (on DSM Homes)
Basement Insulation	$ 1,000	$ 1,250	For adding at least R23 to 100% of basement	$ 250
	$ 500	$ 750	For adding at least R12 to 100% of basement	$ 250
	$ 800	$ 1,000	For adding at least R23 to 100% of crawl space wall	$ 200
	$ 400	$ 500	For adding at least R10 to 100% of crawl space wall	$ 100
	$ 450	$ 500	For adding at least R24 to 100% of floor above crawl space	$ 50
Exterior Wall Insulation	$ 1,500	$ 1,750	Add at least R9 for 100% of building to achieve a minimum of R12	$ 250
	$ 1,000	$ 1,250	Add at least R3.8 for 100% of building to achieve a minimum of R12	$ 250
Attic Insulation	$ 500	$ 500	tic insulation from R12 or less to at least R50	$ -
	$ 250	$ 250	For increasing attic insulation from R13 to R25 to at least R50	$ -
	$ 500	$ 500	For increasing cathedral/flat roof insulation by at least R14	$ -
Air Sealing	$ 150	$ 150	Achieve 10% or more above base target	$ -
	$ 100	$ 100	Achieve base target	$ -
Furnace/Boiler	$ 500	$ 1,000	For replacing a Replace a 94% or less AFUE with a 95% or higher AFUE natural gas, propane, or oil furnace; OR, Replace an 89% or less AFUE with a 90% or higher AFUE natural gas, propane, or oil boiler.	$ 500
Water Heater	$ 200	$ 500	For replacing water heater with ENERGY STAR natural gas water heater with EF of 0.80 or higher	$ 300
Window/Door/Skylight	$ 40	$ 80	For each window, door or skylight replaced with ENERGY STAR-qualified model	$ 40

Enbridge Gas

Measure	Current Rebate	New Rebate	Description	Contribution from GIF (on DSM Homes)
Basement Insulation	$ 1,000	$ 1,250	For adding at least R23 to 100% of basement	$ 250
	$ 500	$ 750	For adding at least R12 to 100% of basement	$ 250
	$ 800	$ 1,000	For adding at least R23 to 100% of crawl space wall	$ 200
	$ 400	$ 500	For adding at least R10 to 100% of crawl space wall	$ 100
	$ 450	$ 500	For adding at least R24 to 100% of floor above crawl space	$ 50
Exterior Wall Insulation	$ 1,500	$ 1,750	Add at least R9 for 100% of building to achieve a minimum of R12	$ 250
	$ 1,000	$ 1,250	Add at least R3.8 for 100% of building to achieve a minimum of R12	$ 250
Attic Insulation	$ 500	$ 500	For increasing attic insulation from R12 or less to at least R50 from R12 or less	$ -
	$ 250	$ 250	For increasing attic insulation from R13 to R25 to at least R50	$ -
	$ 500	$ 500	For increasing cathedral/flat roof insulation by at least R14	$ -
Air Sealing	$ 150	$ 150	Achieve 10% or more above base target	$ -
	$ 100	$ 100	Achieve base target	$ -
Furnace/Boiler	$ 500	$ 1,000	For replacing a Replace a 94% or less AFUE with a 95% or higher AFUE natural gas, propane, or oil furnace; OR, Replace an 89% or less AFUE with a 90% or higher AFUE natural gas, propane, or oil boiler.	$ 500
Water Heater	$ 200	$ 500	For replacing water heater with ENERGY STAR natural gas water heater with EF of 0.80 or higher	$ 300
Window/Door/Skylight	$ 40	$ 80	For each window, door or skylight replaced with ENERGY STAR-qualified model	$ 40

ENBRIDGE GAS INC.

Answer to Interrogatory from
Energy Probe ("EP")

Interrogatory

Reference:

Exhibit B, Tab 2, Schedule 2, Page 18 Tables 4.6 and 4.7

Question(s):

a) Please provide details of the 2018 PAC Benefits for the EGD Rate Zone Home Energy Conservation Program. Specifically include gas savings (m3) and customer savings ($) based on residential cost of gas.

b) Please provide details on the 2018 PAC Costs for the Home Energy Conservation Program. Specifically indicate utility, contractor and other costs, including evaluation costs.

c) Please comment on the change in PAC from 2017.

Response:

a) & b)
Details of the 2018 PAC Results, including annual natural gas savings (m^3), can be found in the Ontario Gas DSM Evaluation Contractor's 2018 Natural Gas Demand-Side Management Annual Verification ("2018 Annual Verification") report.[1]

Table 6-164 within the 2018 Annual Verification report lists program-level general administration costs of approximately $2,694,000. This is comprised of $1,487,964 of direct program delivery costs and $1,206,174 of allocated overhead and administration costs. There were no evaluation costs attributed to the Residential PAC Results.

DSM cost-effectiveness tests, including TRC-Plus and PAC, do not use residential cost of gas and thus such costs are not included in the details of the PAC Benefits

[1] 2018 Annual Verification, Table 6-164, March 13, 2020, p. 259; https://www.oeb.ca/sites/default/files/2018-DSM-Annual-Verification-Report.pdf

referenced above. Instead, DSM cost-effectiveness tests use avoided cost rates. For more details on avoided costs for the purposes of cost-effectiveness screening, please refer to Section 10.0 of the OEB's Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015-2020) ("Guidelines") (EB-2014-0134).[2] For the 2018 EGD rate zone avoided costs rates, please refer to Exhibit B, Tab 2, Schedule 2, p. 21.

c) The EGD rate zone's Home Energy Conservation offering's 2018 PAC (1.17)[3] did not materially change from 2017 (1.19)[4]. Please also see the response at Exhibit I.EP.2 part c) for further detail regarding the offering's PAC results.

[2] Guidelines, p. 34; https://www.oeb.ca/oeb/_Documents/EB-2014-0134/Filing_Guidelines_to_the_DSM_Framework_20141222.pdf
[3] 2018 Annual Verification Report, March 13, 2020, p. 259, Table 6-164; https://www.oeb.ca/sites/default/files/2018-DSM-Annual-Verification-Report.pdf
[4] DNV GL: 2017 Natural Gas Demand-Side Management Annual Verification Report, March 13, 2020, p. 255, Table 6-160; https://www.oeb.ca/sites/default/files/2017-DSM-Annual-Verification-Report.pdf

ENBRIDGE GAS INC.

Answer to Interrogatory from
Energy Probe ("EP")

Interrogatory

Reference:

Exhibit B, Tab 3, Schedule 1, Pages 2-4, Table 1

Preamble:

The costs of the EGD Rate Zone DSM Tracking and Reporting system have increased above the $5 m Budget by $1.087M.

Question(s):

a) Please explain in detail why did the expected costs become greater than the approved budget for the DSM Tracking and Reporting IT system.

b) Given the circumstances cited, why is EGI requesting that the costs be recovered from the DSMVA?

Response:

a) As noted in Exhibit B, Tab 3, Schedule 1, p. 3, paragraph 9, the original high-level estimate (ultimately approved by the OEB) was not fully reflective of the final project scope and schedule and did not take into account certain rate zone specific key elements (please also see the response at Exhibit I.STAFF.3 for discussion of Enbridge Gas's efforts to manage the cost of its upgraded tracking and reporting system project), including:

- Data Migration Complexities – Costs associated with the storage of years of historic records for various programs, which has significantly enhanced the efficiency of DSM program execution by Enbridge Gas, were higher than anticipated. Enbridge Gas's data was more complex and less structured than initially anticipated resulting in a longer than expected amount of time to learn the data, properly map it and effectively migrate it into the upgraded system. The migration of this data into a central location enables Enbridge Gas to perform data analysis that was previously

not possible, such as more reliable market segmentation/penetration analysis. It also enables Enbridge Gas to better support external data requests and reporting requirements (e.g., those made by the Evaluation Contractor ("EC") as part of the annual evaluation, measurement and verification ("EM&V) or audit process).

- Timing – Implementation of the DSM tracking and reporting system upgrade took longer than expected resulting in increased costs due to a mandatory Microsoft system upgrade that occurred during the development period. The mandatory upgrade from Microsoft was pushed to all Microsoft Dynamics systems and required time and resources to ensure it would not cause disruption to the stability of the upgraded DSM tracking and reporting system. As noted in the response at Exhibit I.STAFF.3, if the system had been launched on time, these associated costs would have been incurred outside of project costs and would have been absorbed in DSM overhead costs.

- One-Stop-Shop – In order to have all DSM information in one place, it was necessary to build a robust system with the ability to handle unique offer-specific information delivered in different ways. This was more difficult than expected in part due to the number and variation between programs, resulting in greater time and effort than original anticipated. This included the development of custom uploader tools, for offers with large numbers of participants such as residential and low income offers. Without the additional time and focus on this approach, Enbridge Gas would not have been able to capture reliable results for all its DSM programs within its upgraded DSM Tracking and Reporting system. Enbridge Gas considered this to be a key requirement, supporting enhanced integrity and reliability of DSM results. Without these additions, Enbridge Gas would have required additional overhead costs to track and process these high-volume programs manually. As discussed in its response at Exhibit I.CME.2 a), once the complexity and technical requirements to create a one stop shop became clear Enbridge Gas's focus shifted to developing the desired functionality at the lowest possible cost to ratepayers. The quality of data reporting resulting from the upgraded tracking and reporting system has benefited ratepayers by making it possible for Enbridge Gas to comply with an increasing number of recommendations from the EC as part of the DSM annual EM&V process.

- Vendor Delay – In 2017, the selected system developer experienced significant delays due to unforeseen turnover of support staff, resulting in increased project costs. As noted in the response at Exhibit I.STAFF.3, the vendor absorbed the costs they incurred as a result of unforeseen turnover, but additional costs were incurred by internal Enbridge Gas staff who were required to support project development and work with vendor resources during this time to ensure timely completion of the project.

b) In Enbridge Gas's (EGD) 2015-2020 DSM Plan filing, the original budget filed for the upgraded DSM Tracking and Reporting system was clearly presented as a high-level estimate:[1]

> "The forecast capital cost for this work is approximately $5 million…"
>
> "…there will remain some uncertainty as to costs until the preferred application's supplier(s) is selected."

The Company went on to state that it intended to clear any over or underspends through the clearance of accounts which it is proposing to do in this proceeding:

> "These amounts will then be brought forward for review by the Board as part of the annual DSM accounts clearance application, and any variance from the amounts embedded in rates will be cleared through to rates as either a credit or debit."

This proposed treatment is also consistent with the treatment of such costs for the Union rate zones upgraded DSM tracking and reporting system.[2]

[1] EB-2015-0049, Exhibit B, Tab 1, Schedule 6, p. 8.
[2] EB-2018-0300, Exhibit A, Tab 3, Section 2.1, November 30, 2018, pp. 9-10.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Energy Probe ("EP")

Interrogatory

Reference:

Exhibit B, Tab 3, Schedule 1, Page 8, Table 5 - 2018 DSM Deferral and Variance Account Balances by Rate Class - EGD Rate Zone.

Preamble:

"Enbridge Gas proposes to dispose of the 2017 and 2018 DSM-related deferral and variance account balances as a one-time billing adjustment for the EGD rate zone. The one-time billing adjustment will be derived for each customer individually by applying the disposition unit rates to each customer's actual consumption volume for the period January 1, 2018 to December 31, 2018. Enbridge Gas anticipates that starting in mid-2021 at the earliest it will be able to adopt a common disposition period, as well as a common disposition approach between the EGD and Union rate zones once integrated systems and processes are implemented."

Question(s):

Given the amount of the EGD Rate zone Residential charge why would EGI not phase the recovery over 3 months?

Response:

The estimated bill impact for a typical Rate 1 customer in the EGD rate zone consuming 2,400 m^3 of natural gas per year is approximately $10.80 or about a 1% bill impact based on the total annual bill using the October 2020 QRAM rates. Given that the impact is not significant, Enbridge Gas is proposing to implement the recovery over one month instead of 3 months.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Energy Probe ("EP")

Interrogatory

Reference:

Exhibit C, Tab 1, Schedule 1, Page 1; Exhibit C Tab 3 Schedule 2 Appendix A1

Preamble:

For general service customers in the Union Rate Zones (Rate M1, Rate M2, Rate 01 and Rate 10), Enbridge Gas proposes to dispose of the 2017 and 2018 DSM-related deferral and variance account balances prospectively over six-months.

Question(s):

a) Please confirm the Bill Impact is a $27 charge for Union South Rate M1 customers and this will be recovered over 6 months.

b) Please explain why a one-time adjustment (credit) cannot be implemented for Rates 01,10 and M2.

Response:

a) Confirmed.

b) Enbridge Gas is not able to administer one-time adjustments for general service customers in the Union rate zones because of limitations in the current billing system used for this group of customers. Please also see the response at Exhibit I.STAFF.1 for additional detail regarding the proposed prospective recovery for general service customers in the Union rate zones.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Energy Probe ("EP")

Interrogatory

Reference:

Exhibit C, Tab 2, Schedule 1, Page 34-36 Table 4.0 and Table 4.2

Question(s):

a) For 2017, please provide the average savings per participant and compare to the prior three years.

b) Please explain for 2017 why Home Reno Program Savings are just over target but the participants is almost double. Specifically why are savings per participant declining?

c) For the 2017 Home Reno program, please provide the TRC plus and PAC ratios for 2015-2017.

d) If the response to part b) shows that TRC plus is declining please provide an explanation.

Response:

a) Please see the response at Exhibit I.EP.10 part a) for details of annual average cumulative natural gas savings per participant from 2014 to 2018.

b) For clarity, a savings target did not exist specifically for the Home Reno Rebate offering in 2017. The savings target from Tables 4.0 and 4.2 referenced refer to the entire Resource Acquisition scorecard savings target. Therefore, while the Resource Acquisition scorecard savings target was just over target, this was driven by multiple offerings (including offerings from the Commercial/Industrial Program).
For savings per participant for the Home Reno Rebate offering, please refer to the response at Exhibit I.EP.10, part a).

Declining savings per participant can be attributed to furnaces for two reasons:

(i) Starting in 2016, participants with furnace projects were subject to a baseline adjustment to AFUE90 (rather than using the existing furnace efficiency) reducing savings claims going forward; and

(ii) Beyond 2016, Enbridge Gas saw increased interest in the furnace measure from participants. This resulted in further downward pressure on savings per home. Since then, Enbridge Gas has made efforts to adjust the offering to influence a more diverse participant measure mix (e.g., to increase participation in attic insulation which can result in higher natural gas savings per home). Enbridge Gas's efforts in this regard are described in more detail in Sections 5.1.1 and 6.1.1 of its 2019 draft DSM Annual Report.[1]

c) The TRC-Plus and PAC ratios for 2015-2017 for the Union rate zones' Home Reno Rebate offering are set out in Table 1:

[1] https://www.oeb.ca/sites/default/files/EGI-2019-Draft-DSM-Annual-Report-20200529.pdf

Table 1:
TRC-Plus and PAC Ratios

Program Year	TRC-Plus Ratio	PAC Ratio
2015[2]	0.77	2.25
2016	1.67	2.00
2017	1.18	1.50

These values have been taken from the Ontario Gas DSM Evaluation Contractor Natural Gas Demand-Side Management Annual Verification Report (DNV GL) for the corresponding years. These reports are available on the OEB's Evaluation webpage at https://www.oeb.ca/industry/policy-initiatives-and-consultations/natural-gas-demand-side-management-dsm-evaluation.

d) Please see the response at part c) above.

There is not a linear decrease in TRC-Plus between 2015 and 2017 (in addition, the 2018 Home Reno Rebate offering TRC-Plus result was 1.30).[3] Please see the response at Exhibit I.EP.2, part c) for discussion of the cost-effectiveness of whole-home residential offerings.

[2] For 2015, values are TRC and not TRC-Plus, while the PAC Ratio was computed for the Residential Program, which included the Energy Savings Kit offering. The screening threshold for TRC is at the program level, not the offering level. The TRC Ratio for the Residential Program in 2015 was 1.03. In 2016 and 2017, the Residential Program only included the Home Reno Rebate offering.

[3] 2018 Natural Gas Demand-Side Management Annual Verification Report, March 13, 2020, p. 265, Table 6-177; https://www.oeb.ca/sites/default/files/2018-DSM-Annual-Verification-Report.pdf

ENBRIDGE GAS INC.

Answer to Interrogatory from
Energy Probe ("EP")

Interrogatory

Reference:

Exhibit C, Tab 2, Schedule 1, Page 34-36 Table 4.3 Program Costs

Question(s):

a) Please provide a version of Table 4.3 that shows Program Total costs by category for the years 2015-2018.

b) Please add lines that show the annual Budget and percentage of costs.

c) Please comment on trends in costs.

Response:

a) & b)
Please see Table 1 below for actual spend/cost by category for the Union rate zones, also shown as a percentage of total actual spend/costs, and the corresponding annual OEB-approved program budget for the 2015 to 2018 DSM program years.

Table 1:
2015-2016 Program Costs and Budget

	2015		2016		2017		2018	
Cost Category (a)	**Actual Spend (a)**	**% of Spend (b)**	**Actual Spend (a)**	**% of Spend (b)**	**Actual Spend (a)**	**% of Spend (b)**	**Actual Spend (a)**	**% of Spend (b)**
Incentives	$ 19,504,930	67%	$ 42,858,833	71%	$ 42,858,833	71%	$ 44,766,899	71%
Promotion	$ 3,251,535	11%	$ 8,011,692	13%	$ 8,011,692	13%	$ 8,253,229	13%
Evaluation*	$ 816,519	3%	$ 2,213,400	4%	$ 2,213,400	4%	$ 2,573,625	4%
Administration	$ 5,561,713	19%	$ 6,892,894	11%	$ 6,892,894	11%	$ 7,032,792	11%
Total Program Spend	**$ 29,134,697**	100%	**$ 59,976,819**	100%	**$ 59,976,819**	100%	**$ 62,626,545**	100%
Annual Program Budget (b)	**$ 28,995,558**		**$ 45,586,373**				**$ 57,630,305**	

* Costs related to the OEB Staff-coordinated annual evaluation, measurement and verification (“EM&V”) or audit process are not provided detailed by program. These costs are recorded at the portfolio level.

c) Evaluation-related expenditures have increased significantly in terms of total dollars, however remained relatively flat in terms of percentage of total spend. The increase in total dollars is primarily driven by an increase in evaluation costs associated with higher participation for the residential program offer.

Administration costs have increased in terms of total dollars but decreased as a percentage of total spend. New programs launched in 2016 required additional internal resources to design, manage, sell and track, which drove higher administrative costs. However existing resources were leveraged where possible, resulting in overall efficiencies and, thus, in a smaller increase in Administration costs relative to incentive and promotion expenditures.

There was a significant increase in incentive and promotion related expenditures from 2015 to 2016. 2016 saw the launch of new programs and partnerships with associated incentive and marketing costs. As the increase in program related spending occurred faster than increases in administration spending, incentive and promotion spending also increased as a percentage of total spend.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Energy Probe ("EP")

Interrogatory

Reference:

Exhibit C, Tab 2, Schedule 2, Page 14 Table 4.1

Question(s):

a) Please provide the Average Savings per participant from 2015-2018.

b) Please provide the Average Cost per participant 2015-2018.

Response:

a) The average cumulative natural gas savings per participant for the Home Reno Rebate for the 2014-2018 DSM program years is set out in Table 1 below:

Table 1:
2014-2018 Home Reno Rebate Natural Gas Savings

Program Year	Participants	Net Cumulative m^3 Natural Gas Savings ("CCM")	Average Net CCM per Participant
2014	1,000	26,518,351	26,518
2015	2,541	57,744,701	22,725
2016	6,595	110,310,927	16,726
2017	13,729	194,625,102	14,176
2018	16,118	205,146,928	12,728

b) The average cost per Home Reno Rebate participant for the years 2015-2018 DSM program years is set out in Table 2 below:

Table 2:
2015-2018 Home Reno Rebate Cost Per Participant

Program Year	Participants	Total Home Reno Rebate Costs[1]	Average Cost per Participant
2015[2]	2,541	$4,789,009	$1,885
2016	6,595	$11,201,397	$1,698
2017	13,729	$24,034,261	$1,751
2018	16,118	$27,216,207	$1,689

[1] Total costs include all costs attributed to the offering (incentives, promotion, administration, evaluation).
[2] The cost per participant for 2015 is slightly overstated as it includes administration costs from the Energy Savings Kit offering.

ENBRIDGE GAS INC.

Answer to Interrogatory from
London Property Management Association ("LPMA")

Interrogatory

Reference:

Exhibit A, Tab 2, Schedule 1, page 1

Question(s):

a) Given that submissions are due October 28, 2020 and reply submission by EGI is due November 12, 2020, does EGI still believe the recovery of the deferral and variance account amounts can take place effective January 1, 2021? If not, does EGI believe that April 1, 2020 is a more realistic recovery date?

b) Please calculate the bill impacts assuming an April 1, 2020 implementation, including interest costs.

Response:

a) Enbridge Gas has stated its intention to file a draft Rate Order with the OEB following receipt of a Board Decision and Order concerning its Application.[1] For Enbridge Gas to reflect final unit rates for disposition of 2017/2018 DSM deferral and variance account balances as part of its January 1, 2021 QRAM application it requires OEB approval of those rates (and presumably its draft Rate Order) by December 3, 2020. Enbridge Gas recognizes the current procedural timing may not accommodate a disposition effective January 1, 2021 in which case Enbridge Gas supports disposition effective April 1, 2021.

[1] Exhibit A, Tab 3, Schedule 1, p. 4.

b) Please see Attachment 1 for the bill impacts including interest costs for the EGD and Union rate zones assuming April 1, 2020 implementation.

Please note that the monthly interest costs effective July 1, 2020 have been updated and calculated using the most recent OEB prescribed interest rate of 0.57% which is lower than the rate of 1.38% used in the interest cost calculation in the original application.[2]

[2] The OEB revised the Q3 2020 prescribed interest rate from 1.38% to 0.57% in a letter dated July 30, 2020.

ENBRIDGE GAS INC.
EGD Rate Zone
2017 and 2018 DSM Deferral and Variance Account Clearing
Bill Adjustment in April 2021 for Typical Customers

ITEM NO.	COL. 1	COL. 2	COL. 3	COL. 4	COL. 5	COL. 6	COL. 7	COL. 8	COL. 9	COL. 10
			UNIT RATES				BILL ADJUSTMENT			
	GENERAL SERVICE	**ANNUAL VOLUME** m^3	**Sales** ¢/m^3	**Ontario TS** ¢/m^3	**Dawn TS** ¢/m^3	**Western TS** ¢/m^3	**Sales Customers** $	**Ontario TS Customers** $	**Dawn TS Customers** $	**Western TS Customers** $
1.1	**RATE 1 RESIDENTIAL**									
1.2	Heating & Water Heating	2,400	0.4519	0.4519	0.4519	0.4519	10.8	10.8	10.8	10.8
2.1	**RATE 6 COMMERCIAL**									
2.2	Commercial - Heating & Other Uses	22,606	(0.1659)	(0.1659)	(0.1659)	(0.1659)	(37.5)	(37.5)	(37.5)	(37.5)
2.3	General Use	43,285	(0.1659)	(0.1659)	(0.1659)	(0.1659)	(71.8)	(71.8)	(71.8)	(71.8)
	CONTRACT SERVICE									
3.1	**RATE 100**									
3.2	Industrial - small size	339,188	0.0000	0.0000	0.0000	0.0000	-	-	-	-
4.1	**RATE 110**									
4.2	Industrial - small size, 50% LF	598,568	(0.1616)	(0.1616)	(0.1616)	(0.1616)	(967.3)	(967.3)	(967.3)	(967.3)
4.3	Industrial - avg. size, 75% LF	9,976,121	(0.1616)	(0.1616)	(0.1616)	(0.1616)	(16,122.5)	(16,122.5)	(16,122.5)	(16,122.5)
5.1	**RATE 115**									
5.2	Industrial - small size, 80% LF	4,471,609	(0.4009)	(0.4009)	(0.4009)	(0.4009)	(17,927.4)	(17,927.4)	(17,927.4)	(17,927.4)
5.3	Industrial - large size, 80% LF	69,832,850	(0.4009)	(0.4009)	(0.4009)	(0.4009)	(279,970.4)	(279,970.4)	(279,970.4)	(279,970.4)
6.1	**RATE 135**									
6.2	Industrial - Seasonal Firm	598,567	0.4278	0.4278	0.4278	0.4278	2,560.8	2,560.8	2,560.8	2,560.8
7.1	**RATE 145**									
7.2	Commercial - avg. size	598,568	(6.6087)	(6.6087)	(6.6087)	(6.6087)	(39,557.3)	(39,557.3)	(39,557.3)	(39,557.3)
8.1	**RATE 170**									
8.2	Industrial - avg. size, 75% LF	9,976,121	(1.3684)	(1.3684)	(1.3684)	(1.3684)	(136,514.8)	(136,514.8)	(136,514.8)	(136,514.8)

Notes:
Col. 7 = Col. 2 x Col. 3
Col. 8 = Col. 2 x Col. 4
Col. 9 = Col. 2 x Col. 5
Col. 10 = Col. 2 x Col. 6

ENBRIDGE GAS INC.
Union Rate Zones
Calculation of General Service Bill Impacts
2017 & 2018 DSM Deferral Account Disposition Effective April 1, 2021

Line No.	Particulars	Unit Rate for Prospective Recovery/(Refund) (cents/m^3) (1) (a)	Volume (m^3) (2) (b)	Bill Impact ($) (3) (c) = (a x b) / 100
	Union North - Delivery			
1	Rate 01	(1.8199)	521	(9.49)
2	Rate 10	(2.2735)	26,039	(592.01)
	Union South - Delivery			
3	Rate M1	5.1048	521	26.62
4	Rate M2	(1.2903)	17,228	(222.29)

Notes:
(1) Unit rates updated per Exhibit I.LPMA.1 part b) to reflect disposition beginning April 1, 2021.
(2) Average consumption, per customer, for the period April 1, 2021 to September 30, 2021.
Rate 01 volume based on annual consumption of 2,200 m^3.
Rate 10 volume based on annual consumption of 93,000 m^3.

ENBRIDGE GAS INC.
Union Rate Zones
Calculation of One-Time Adjustments for Typical Small and Large Customers
2017 & 2018 DSM Deferral Account Disposition Effective April 1, 2021

Line No.	Particulars	Unit Rate (cents/m^3) (1)	Annual Volume (m^3)	Bill Impact ($) (2)
		(a)	(b)	(c) = (a x b) / 100
	Union North - Delivery			
1	Small Rate 20	(0.3548)	3,000,000	(10,644)
2	Large Rate 20	(0.2177)	15,000,000	(32,655)
3	Average Rate 25	-	2,275,000	-
4	Small Rate 100	(0.2177)	27,000,000	(58,779)
5	Large Rate 100	(0.2177)	240,000,000	(522,480)
	Union South			
6	Small Rate M4	0.4657	875,000	4,075
7	Large Rate M4	0.4657	12,000,000	55,884
8	Small Rate M5 Interruptible	0.6663	825,000	5,497
9	Large Rate M5 Interruptible	0.6663	6,500,000	43,310
10	Small Rate M7	0.2756	36,000,000	99,216
11	Large Rate M7	0.2756	52,000,000	143,312
12	Small Rate M9	-	6,950,000	-
13	Large Rate M9	-	20,178,000	-
14	Rate M10	-	94,500	-
15	Small Rate T1	0.3249	7,537,000	24,488
16	Average Rate T1	0.3249	11,565,938	37,578
17	Large Rate T1	0.3249	25,624,080	83,253
18	Small Rate T2	(0.0229)	59,256,000	(13,570)
19	Average Rate T2	(0.0229)	197,789,850	(45,294)
20	Large Rate T2	(0.0229)	370,089,000	(84,750)
21	Large Rate T3	-	272,712,000	-

Notes:
(1) Unit rates updated per Exhibit I.LPMA.1 part b) to reflect disposition beginning April 1, 2021.
(2) One-time adjustment for sales service and direct purchase customers.

ENBRIDGE GAS INC.

Answer to Interrogatory from
London Property Management Association ("LPMA")

Interrogatory

Reference:

Exhibit A, Tab 2, Schedule 1 and EB-2019-0247 Decision and Order

Question(s):

EGI proposes to clear the balances to rates M1, M2, 01 and 10 in the Union rate zone over six months and through a one-time adjustment to all other Union rate zone rates classes and all rate classes in the EGD rate zone. In the EB-2019-0247 Decision and Order dated August 3, 2020, the OEB approved the disposition of federal carbon charge related accounts over three monthly installments for all rate classes in each of the EGD and Union rate zones. The Board also stated (page 16) that a consistent approach to the disposition of balances for each rate zone is preferable and that EGI should provide a proposal for aligning its approach for the EGD and Union rate zones as soon as practical.

Are there any impediments to EGI clearing the balances to all rate classes in both the EGD and Union rate zones over a three-month period? If so, please describe any such impediment fully.

Response:

Please see responses at Exhibit I.STAFF.1 and at Exhibit I.EP.6 for discussion of the differences in historic standard disposition methodologies across the EGD and Union rate zones and the proposed disposition period. It is notable that the Board issued its Decision on Enbridge Gas's 2020 Federal Carbon Pricing Program ("2020 FCPP") application (EB-2019-0247) on August 13, 2020, nearly a month after Enbridge Gas filed its Application in this proceeding. It is also notable that the Board's statement goes further than LPMA has indicated, to clarify that "…Enbridge Gas should provide a proposal for aligning its approach for the EGD and Union rate zones as soon as practical, and no later than its next rebasing."[1] In that same 2020 FCPP proceeding, Enbridge Gas clarified its intention to comply with the Board's expectation, by stating that it anticipates that starting in mid-2021 at the earliest it will be able to adopt a

[1] EB-2019-0247, OEB Decision and Order, August 13, 2020, p. 16.

common disposition period, as well as a common disposition approach between the EGD and Union rate zones once integrated systems and processes are implemented.

No, there are no impediments to Enbridge Gas disposing of 2017/2018 DSM deferral and variance account balances over a three-month period though Enbridge Gas expects that doing so would place a greater administrative burden upon its billing team.[2] Enbridge Gas's preference is to clear the balances consistent with its historic standard methodologies as it does not believe it is necessary to vary the approach at this time.

[2] Consistent with the 2019 Federal Carbon deferral and variance account disposition (EB-2019-0205) a three-month disposition period can be administered as a one-time adjustment disposed of through three equal installments for all customers in the EGD rate zone and in-franchise contract and ex-franchise customers in the Union rate zones and prospectively over three months for general service customers in the Union rate zones.

ENBRIDGE GAS INC.

Answer to Interrogatory from
London Property Management Association ("LPMA")

Interrogatory

Reference:

Exhibit A, Tab 3, Schedule 1, page 1

Question(s):

EGI has requested the approval of a rate mitigation plan as part of its October, 2020 QRAM application (EB-2020-0195) because of the increase in the gas commodity forecast of 25% or more. Assuming EGI receives Board approval in time to implement the recovery of the DSM related account balances as part of the January, 2021 QRAM and if gas commodity costs remain high when that QRAM is filed, would EGI be willing to defer the recovery of the DSM related account balances to April 1, 2021 in order to mitigate significant rate increases for the winter months? If not, please explain fully.

Response:

Please see the responses at Exhibit I.LPMA.1 and at Exhibit I.CME.1 for discussion of the timing of disposition and the disposition period.

ENBRIDGE GAS INC.

Answer to Interrogatory from
London Property Management Association ("LPMA")

Interrogatory

Reference:

Exhibit A, Tab 3, Schedule 1, page 1

Question(s):

Is EGI able to have different disposition periods for the different rate classes in the Union rate zones? For example, could EGI dispose of the credit balances for rates M2, 01 and 10 over the January, 2021 through March, 2021 period, while delaying the recovery of the debit balance for rate M1 to April, 2021 through June, 2021?

Response:

Yes, it is technically feasible for Enbridge Gas to have different disposition periods for different general service rate classes in the Union rate zones. Any such accommodation would require incremental administration by Enbridge Gas's billing team.

ENBRIDGE GAS INC.

Answer to Interrogatory from
London Property Management Association ("LPMA")

Interrogatory

Reference:

Exhibit C, Tab 3, Schedule 1, page 2

Question(s):

The evidence states (paragraph 7) that EGI did not transfer more than 30% of program budget funds between programs in either 2017 or 2018. However, Table 11.0 in Exhibit C, Tab 2, Schedule 1 shows that the actual 2017 spend was different from the 2017 budget by more than 30% for the residential program, the large volume program and the performance-based volume. Similarly, Table. 4.10 in Exhibit C, Tab 2, Schedule 2 shows variances between 2018 actual and budget figures in excess of 30% for the residential program and the performance-based program.

a) Please reconcile the statement on page 2 of Exhibit C, Tab 3, Schedule 1 with the figures noted above.

b) Please explain fully how EGI determines the amounts noted in the "Budget Transfers" columns in each line in each of the tables referenced above. For example, how did EGI determine a budget transfer of $2,060,148 for the residential program and ($1,049,808) for the commercial/industrial program for 2017 in Table 11.0 of Exhibit C, Tab 2, Schedule 1?

c) Please confirm that if the budget transfers figures were re-allocated in a different manner, the impact on rate classes resulting from the DSMVA clearance would be different. If this cannot be confirmed, please explain fully

Response:

a) Please see the response at Exhibit I.STAFF.5, part a) for an explanation of budget deviations vs budget transfers.

b) Please see the response at Exhibit I.STAFF.5, part b) for a description of how budget transfers were determined for 2017 and 2018 for the Union rate zones.

c) Not confirmed.

The manner in which Enbridge Gas presents the source of actual spending variances compared to budget as either 'budget transfers' or as flowing to/from the DSMVA deferral mechanism does not impact the actual allocation of costs by rate class.

The presentation in Table 11.0 in Exhibit C, Tab 2, Schedule 1, and in Table. 4.10 in Exhibit C, Tab 2, Schedule 2 is intended to demonstrate that Enbridge Gas followed OEB approved methodology in how budgets were spent in 2017 and 2018 in the Union rate zones.

As indicated at Exhibit C, Tab 3, Schedule 1, p. 1, actual DSM costs are allocated consistent with OEB-approved methodology:

> "Enbridge Gas followed the OEB-approved methodology for the Union rate zones to calculate the 2017 and 2018 DSMVA balances. The customer incentive was allocated based on the amount spent within each rate class. All other program costs were allocated by customer class (e.g. Residential, Commercial/Industrial) and assigned by rate class based on the percentage allocation of the customer incentive costs. All portfolio-level costs that cannot be attributed to an individual program were allocated to a rate class based on the percentage allocation of the program costs by rate class. The variance between the Low-Income DSM budget included in rates and the actual amount spent on Low-Income DSM programs is recovered in proportion to the OEB-approved distribution revenue by rate class for the respective year."

ENBRIDGE GAS INC.

Answer to Interrogatory from
London Property Management Association ("LPMA")

Interrogatory

Reference:

Exhibit C, Tab 3, Schedule 1

Question(s):

Has EGI changed any of the methodologies used to allocate any of the deferral and variance accounts to the rate classes in the Union rate zones? If yes, please explain the change and provide the rationale for the change.

Response:

No, Enbridge Gas has not changed any of the methodologies used to allocate any of the 2017/2018 DSM deferral and variance account balances to rates classes in the Union rate zones.

ENBRIDGE GAS INC.

Answer to Interrogatory from
School Energy Coalition ("SEC")

Interrogatory

Reference:

[Ex. A/2/1 p. 3]

Question(s):

Please describe the rationale for the six month adjustment for Union legacy customers, and the one time adjustment for Enbridge legacy customers. Please describe how the methodologies ensure that both approaches are fair to all customers, including customers whose January to June load is higher than their July to December load.

Response:

Please see response at Exhibit I.STAFF.1 for discussion of historic standard disposition methodologies and Enbridge Gas's estimate of the timing of billing system and process integration for the EGD and Union rate zones.

ENBRIDGE GAS INC.

Answer to Interrogatory from
School Energy Coalition ("SEC")

Interrogatory

Reference:

[Ex. A/4/1. P 4 et seq.]

Question(s):

The EC has provided what appear to be 82 recommendations, but for many of them Enbridge appears to either reject the recommendations or agree only to further study. Please provide a list of all EC recommendations that the Applicant proposes to implement in the manner recommended, and the actual or planned timing of that implementation.

Response:

While SEC references 82 recommendations, in many cases the EC has grouped multiple related recommendations under a single finding. Because of the structure of the EC's report, Enbridge Gas addressed the EC's feedback at the finding level. Accordingly, no EC finding/recommendation has gone unaddressed by Enbridge Gas.

Table 1 below identifies four categories of responses to the EC's findings/recommendations, their frequency and a corresponding reference to Enbridge Gas's 2017/2018 Summary Responses to the Natural Gas Demand Side Management Annual Verification Recommendations report ("Verification Recommendations Report"). A description of the categories used by Enbridge Gas is provided at the end of this response following Table 1. For ease of reference, Enbridge Gas has also attached a copy of the Verification Recommendations Report with these categories added to each response at Attachment 1. Please also see Enbridge Gas's response at Exhibit I.Staff.4 for updated responses to recommendations SM3, SM5 and SM6. No other changes to Enbridge Gas's responses were made.

Table 1:
Enbridge Gas Responses to Verification Recommendations

Category of Response	Frequency[1]	Finding ID
(A) Enbridge Gas has implemented the recommendation per its response in time for the 2019 audit	12	O2, O5, CE2, CE3, CE4, DS10, DS11, DS12, DS15, DM20a, DM20b, DM22
(B) Enbridge Gas has addressed the recommendation via next steps[2]	9	DS8, DS13, DS14, DS15, DS18, DS19, FR3, CI5, CI7
(C) Enbridge Gas has addressed the recommendation via clarification and/or additional information[3]	29	O1, O3, O4, SM1, SM2, SM3, CE1, ES4, ES5, ES6, VP7, DS8, DS9, DS11, DS12, DS13, DS14, DS16, DS17, DM20a, DM21, FR1, FR5, FR6, FR7, CI1, CI3, CI4, CI6
(D) The recommendation was not addressed to Enbridge Gas	13	O3, SM4, SM5, SM6, SM7, ES2, ES3, DM20c, FR2, FR4, FR9, FR10, FR11

NOTES:
1- Some Enbridge Gas responses have been assigned to more than one category.
2- Recommendations within this category of Enbridge Gas response are best addressed via continuous improvement, and therefore, next steps do not always have a definitive implementation date.
3- Enbridge Gas responses in this category are often also included in category (A) or (B).

Category A – were provided in response to recommendations such as aligning avoided cost inflation rates used for each rate zone (Finding CE2) or including Remaining Useful Life data in tracking databases (Finding DM22). These are examples of direct recommendations for which an action has been implemented by Enbridge Gas prior to the 2019 DSM program year audit.

Category B – were provided in response to recommendations such as suggesting that Enbridge Gas continue its incremental improvement of project documentation (Finding DS8 and others). These types of recommendations are best addressed by outlining the continuous improvement next steps that Enbridge Gas can take. They do not necessarily have definitive start and completion dates.

Category C – were provided in response to recommendations such as requests that Enbridge Gas provide HOT2000 home energy modeling files that are no longer made available by HOT2000 (Finding SM1), or to change the OEB-approved manner in which program costs for each rate zone are allocated (Finding CE1). These types of recommendations are best addressed via clarification and/or by providing additional information to the EC.

Category D – were provided in response to recommendations that were not directed to Enbridge Gas specifically, but rather, to successive EC's contracted by OEB Staff to audit future DSM program years or to the Evaluation Advisory Committee.

2017/2018 Summary Responses to the Natural Gas Demand Side Management Annual Verification Recommendations

Enbridge Gas Inc.

[July 17, 2020]

ENBRIDGE

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1. Introduction

The Evaluation Contractor ("EC") submitted its 2017 and 2018 Natural Gas Demand Side Management Annual Verification reports ("Auditor Reports") to the Evaluation Advisory Committee ("EAC") relating to Enbridge Gas Inc's. ("Enbridge Gas" or "the Utility") 2017 and 2018 DSM program year activities, on March 13, 2020. The Auditor Reports include findings and recommendations addressing the Utility's Union rate zones DSM portfolio (referred to as "Union" in the Auditor Reports), the Utility's EGD rate zone DSM portfolio (referred to as "Enbridge" in the Auditor Reports), and on future evaluation work. The EC's findings and recommendations are identical for the 2017 and 2018 program years, reflecting the fact that the audits were completed concurrently.

This document reproduces all parts of Section 5 of the Auditor Reports (Findings and Recommendations) which are copied verbatim from the Auditor Reports[1], with the addition of the Utility's responses to each of the EC's recommendations. This document is structured in the same manner as Section 5 of the Auditor Reports, which includes four categories with associated sub-categories as follows:

- Annual Verification Recommendations (Section 2 of this document)
    - Overall annual verification
    - Whole home simulation modeling
    - Cost effectiveness
- CPSV Recommendations (Section 3 of this document)
    - Energy savings and program performance
    - Verification process
    - Documentation and support
    - Data management
- Free Ridership Based Attribution Report Recommendations (Section 4 of this document)
- Commercial & Industrial Prescriptive Program NTG Verification Recommendations (Section 5 of this document)

Where the EC's 2017/2018 recommendations are unique from those that it provided in relation to previous DSM program year verification reports, Enbridge Gas provides its plans to address the recommendations and/or reasons why changes are not possible or appropriate. Where the EC's 2017/2018 recommendations are identical to recommendations that it provided in relation to previous DSM program year verification reports, Enbridge Gas reiterates the changes made as a direct result of these initial recommendations and/or the reasons why such changes remain impossible or inappropriate.

[1] References mentioned in these sections refer to content within the Auditor Reports.

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2. Annual Verification Recommendations

This section reproduces the tables, findings, recommendations, and outcomes from Section 5.1 of the Auditor Reports (Annual Verification Recommendations), as well at the Utility's responses to each recommendation, which includes the following sub-categories:

- Overall annual verification
- Whole home simulation modeling
- Cost-effectiveness recommendations

2.1. Overall annual verification

Table 1. Overall annual verification - summary of recommendations

#	Finding	Recommendation	Previously Recommended	Applies to			Primary Outcome		
				Union	Enbridge	Evaluation	Reduce Costs	Improve Accuracy	Decrease Risk
O1	The Enbridge tracking file does not currently include information that allows the evaluator to identify all the projects installed by a single customer.	A: Enbridge should include site-level information for all measures installed through the program.	✓		✓			✓	✓
O2	The format of Enbridge's tracking data is not well suited to a combined evaluation with the Union data.	A: Enbridge should deliver tracking data in a single flat file.	✓		✓		✓	✓	✓
O3	Neither Union nor Enbridge tracking databases currently use prescriptive measure descriptions that map directly to the approved energy savings spreadsheet (TRM).	A: Develop, maintain, and use an electronic summary spreadsheet of the TRM.	✓	✓	✓	✓	✓	✓	✓
		B: Once the electronic TRM spreadsheet is developed, track prescriptive savings using unique measure descriptions that map to electronic TRM.	✓	✓	✓	✓	✓	✓	✓
		C: Once the electronic TRM spreadsheet is developed, utilize the same electronic TRM for both utilities		✓	✓	✓	✓	✓	✓
		D: OEB: develop means for consistent system				✓	✓	✓	✓

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O4	Explicit documentation was not available for all program stages, specifically for non-savings metrics	A: Document each required element and stage for non-savings metrics.		✓	✓	✓	✓		✓
		B: Data, information, and documentation is overly redacted		✓	✓			✓	✓
O5	Programs that rely on external reference sources required additional verification to identify the appropriately used source.	A: Documentation should record and explicitly cite the external source that was used for each program.		✓	✓		✓	✓	✓
		B: Program design should strive for the most up-to-date reference source to improve and promote greater energy efficiency outcomes.		✓	✓		✓	✓	✓

O1. Finding: The Enbridge tracking file does not currently include information that allows the evaluator to identify all the projects installed by a single customer. While Enbridge does provide IDs, these may or may not be consistent across programs or metrics, or from year to year.

Recommendation A: Enbridge should include a unique site-level or customer-level identifier for every measure installed in the program to allow the evaluator to identify all projects installed at a single customer, regardless of program.

Outcome: Confirmation that each installation is unique and assessment of interactive effects.

Utility Response: EGD rate zone's projects are designated with a unique project ID and a unique site ID that connects all projects completed at a given site. However, EGD rate zone's account structure does not assign a unique ID that connects multiple sites to a single organization.

The utility does provide customer contact information for each site that is sampled by the EC for custom project verification purposes. This allows the EC to understand which contacts are associated with each site, and whether there are some sites that have the same contact person.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via clarification and/or additional information.

O2. Finding: The format of Enbridge's tracking data is not well suited to a combined evaluation with the Union data, meaning that the format requires a significant investment of time to extract the necessary data for verifying each program's savings. In addition to increased time and thus verification cost, the need for manual extraction of data introduces many opportunities for error, which potentially decreases savings accuracy and increases risk.

Recommendation A: Deliver to evaluators a single, flat file of tracking data.[2] Each record should have measure-level information which includes the information listed below:

- Program identification information, such as scorecard, and program name
- Customer identification information, such as a unique customer ID, rate class, and location
- Measure identification information, such as measure description, unique measure identification, measure group, measure life, free rider rate, and savings per unit for prescriptive measures
- Savings information, such as annual gross and net savings, cumulative gross and net savings, and non-gas savings
- Additional information as needed to allow the evaluator to verify lost revenue and cost effectiveness

A "verification ready" flat file would not require summary rows, hidden rows or columns, links or formulas but would include all necessary variables in a single tab or table for all projects and measures, regardless of type.

Outcome: Reduced burden on program staff, more flexibility for evaluators.

Utility Response: Updated DSM tracking and reporting systems were rolled out for the 2018 program year for the Union rate zones and for the 2019 program year for the EGD rate zone. These systems include many upgrades and make providing data simpler for annual savings evaluation and verification.

Starting with the 2019 program year, Enbridge Gas is aligning the tracking files for the EGD rate zone and the Union rate zones as best as possible and drawing best practices from each. This includes providing requested data to the EC in a single flat file that is "verification ready" as described in the recommendation.

Response to Exhibit I.SEC.2: The Utility has implemented the recommendation per its response in time for the 2019 audit.

O3. Finding: Both Union and Enbridge tracking databases currently use prescriptive measure descriptions that map directly to internally consistent measure names. However, there remains a lack of a universally accessibly (i.e. public) dataset that is fully transparent and comprehensive for all prescriptive and quasi-prescriptive measures. New versions of the Technical Reference Manual (TRM) provide full documentation for new or updated measures; this limited update does not provide a comprehensive resource for all currently accepted measures nor does it provide a concise location for all items that can impact gross or net savings such as detailed accounting of free ridership.

Recommendation A: Develop, maintain, and use an electronic summary of the TRM, such as an Excel file. Each measure (identified as a unique savings value) should have an assigned measure ID number, and new ID numbers should be assigned when a measure is updated with a new savings value. This allows for a historical record of the changes in the TRM and allows the evaluation to identify outdated values. Once

[2] In this context, a flat file is a table with one record per line and no summary information.

developed or agreed to, both utilities should utilize this system for simplification and transparency.

Recommendation B: Once the electronic TRM is developed, track prescriptive savings using unique measure descriptions that clearly map to the electronic TRM.

Recommendation C: Once the electronic TRM is developed, utilize the same electronic summary file for both utilities.

Recommendation D: As the entity with primary ownership of the TRM, the OEB should develop the references for parties to directly refer to specific measures in a consistent way which accounts for variations in energy savings due to capacity or other characteristics.

Outcome: Reduced burden on utility staff and reduced evaluation costs. Fewer errors in the tracking data.

Utility Response: The Utility supports the development of an electronic TRM measure list with measure IDs to make it easier to cross-reference TRM measures with the Utility's measure data. However, as noted in recommendation D, OEB Staff has ownership of the TRM and coordinates the TRM update process. Therefore, the Utility submits the development of such a product is best facilitated by OEB Staff.

Regardless, the Utility submits that it does provide sufficient detail to connect its measure data to the appropriate TRM measure. The Utility also works with the EC when requested to clarify the connection between the naming conventions in its tracking databases and the measure names within the TRM.

Response to Exhibit I.SEC.2: The recommendation was not addressed to the Utility; The Utility has addressed the recommendation via clarification and/or additional information.

O4. Finding: Explicit documentation was not available for all program stages for programs such as Enbridge's Market Transformation Run-it-Right program. In that program, there was no documentation for participants moving to step 4 of the program (see Appendix J), only documentation that the participants had completed step 3 and utility confirmation that this is equivalent to engagement in step 4. Similar recommendations are included in section 5.1.2 for whole home simulation modeling programs.

Recommendation A: Documentation for each required element and stage for non-savings metrics should be recorded. The majority of these elements for future years have been identified in this evaluation, in the scorecard and program-relevant appendix sections.

Outcome: Reduced burden on utility staff and reduced evaluation costs.

Utility Response: Enbridge works with the EC to provide requested documentation and additional follow-up material where available for all savings and non-savings metrics. Contrary to this finding (which may be a carry-over from the 2016 annual verification report where it was first made), the EC's 2017 and 2018 verification reports confirm documentation was provided in 2017 and 2018 to demonstrate participants have moved into Step 4 of the Run it Right program: "Enbridge provided an EMIS file that listed the starting date

for monitoring of all 29 sites after project implementation, satisfying the fourth step identified in Figure 6-8."[3,4]

If the EC has other examples where it recommends further documentation be provided, Enbridge suggests the EC identify these more specifically.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via clarification and/or additional information.

O5. Finding: Programs that rely on external reference sources required additional verification to identify the appropriately used source. One such program is Union's Optimum Home program. In that program, additional verification was needed to identify which building code was required for program qualification.

Recommendation A: Documentation should record and explicitly cite the external source that was used for each program.

Recommendation B: Program design should strive for the most up-to-date reference source to improve and promote greater energy efficiency outcomes.

Outcome: Reduced burden on utility staff and reduced evaluation costs. Improve program implementation and goals.

Utility Response: The Utility strives to provide the EC with the most up to date and relevant offering information, eligibility and qualifications. In the Utility's 2019 Draft Annual Report, the Utility has included appendices with offering details to outline important offering information, eligibility and qualifications. This was done to help clarify these items for external stakeholders, including the EC. However, with such a large DSM portfolio across Ontario and significant levels of detail for each offering, providing all information in a single document is challenging. The Utility continues to improve its documentation based on specific feedback from the EC. As more specific feedback is provided by the EC, the Utility will make improvements based on that feedback. It should be noted that no adjustments were made to Union rate zones' Optimum Home offering in either 2017 or 2018.

Response to Exhibit I.SEC.2: The Utility has implemented the recommendation per its response in time for the 2019 audit.

2.2. Whole home simulation modeling

[3] Ontario Gas DSM Evaluation Contractor 2017 Natural Gas Demand-Side Management Annual Verification report. March 13, 2020. Pg 172
[4] Ontario Gas DSM Evaluation Contractor 2018 Natural Gas Demand-Side Management Annual Verification report. March 13, 2020. Pg 171

Table 2. Whole home simulation modelling - summary of recommendations

#	Finding	Recommendation	Previously Recommended	Applies to			Primary Outcome		
				Union	Enbridge	Evaluation	Reduce Costs	Improve Accuracy	Decrease Risk
SM1	Both utilities use building simulation modeling to estimate energy savings	A: Provide both simulation file (HSE) and output file (TSV) to the evaluation team for every project.	✓		✓		✓		✓
SM2	Both utilities collect and deliver *some* photographs to support retrofit site improvements.	A: Provide more explicit support for major measure installations.	✓	✓	✓				✓
SM3	There were some inaccurate savings entries.	A: Consider reviewing and modifying program processes to avoid data entry or outdated simulation result errors.		✓			✓		✓
		B: Provide more explicit support for major measure installations.	✓	✓	✓		✓		✓
SM4	Air sealing as a savings measure is present in a high percentage of single-family home retro-fit projects.	A: Evaluation: distribute before and after equivalent leakage area and energy savings attributable to reduced air leakage (if possible).				✓		✓	✓
SM5	The energy savings from the home retrofit programs rely exclusively on the simulations provided by the delivery agents.	A: Consider funding a study to verify the models produced by the utility agents.	✓			✓		✓	

SM1. Finding: Both utilities use building simulation modeling to estimate energy savings for their home retrofit programs, including the Home Energy Conservation, Home Reno Rebate, Winterproofing, Home Weatherization and Indigenous Programs. HOT2000 is the program used for those simulations, which is a program developed and released by NRCan for certified energy advisors. Because of the restrictions on the program, the evaluator could not consistently run the simulation files and produce the same result reported by the program. Because of a previous round of evaluation, Enbridge and Union provided TSV files for all sites that improved the accuracy of verification. However, it would be useful to include full supporting documentation for all claimed project measures.

Recommendation A: Provide the building simulation file (HSE), the program output file (TSV), and full supporting documentation for all claimed project measures for every sampled project.

Outcome: Reduced burden on utility staff and reduced evaluation costs.

Utility Response: Recent versions of HOT2000, including versions supported by NRCan and used by field agents during the 2017 and 2018 program years, no longer generate TSV files. The Utility provides all available building simulation files (HSE), program output files (TSV), and full supporting documentation for the Home Energy Conservation, Home Reno Rebate, Winterproofing, Home Weatherization and Indigenous Programs as described below.

2017 Home Reno Rebate files provided to the EC include:

- Pre- and post-installation HOT2000 HSE modeling files
- TSV model output files if HOT2000 version 10.51 was used or an Excel-based equivalent of these files for subsequent versions of HOT2000 that no longer generate a TSV file
- Photos, invoices and other supporting documentation as requested

2018 Home Reno Rebate files provided to the EC include:

- Pre- and post-installation HOT2000 HSE modeling files
- TSV model output files if HOT2000 version 10.51 was used or an Excel-based equivalent of these files for subsequent versions of HOT2000 that no longer generate a TSV file
- When applicable, an Excel-based file that converts savings based on the existing furnace basecase modeling to savings based on a 90% furnace basecase modeling
- Photos, invoices and other supporting documentation as requested

2017 Home Energy Conservation files provided to the EC include:

- Pre- and post-installation HOT2000 HSE modeling files
- TSV model output files if HOT2000 version 10.51 was used or an Excel-based equivalent of these files for subsequent versions of HOT2000 that no longer generate a TSV file
- Excel-based file that shows calculation of savings based on modeling files
- Photos, invoices and other supporting documentation as requested

2018 Home Energy Conservation files provided to the EC include:

- Pre- and post-installation HOT2000 HSE modeling files
- TSV model output files if HOT2000 version 10.51 was used or an Excel-based equivalent of these files for subsequent versions of HOT2000 that no longer generate a TSV file
- Excel-based file that converts savings based on the existing furnace basecase modeling to savings based on a 90% furnace basecase modeling
- Photos, invoices and other supporting documentation as requested

2017 and 2018 EGD rate zone's Winterproofing files provided to the EC include:

- Pre- and post-installation HOT2000 HSE modeling files
- TSV model output files if HOT2000 version 10.51 was used or an Excel-based equivalent of these files

for subsequent versions of HOT2000 that no longer generate a TSV file or in the event HOT2000 was not run in Energuide mode, a PDF summary document that supports the savings claims.

- Photos, invoices and other supporting documentation as requested

2017 and 2018 Union rate zones' Home Weatherization Program offering and 2017 Indigenous program offering files provided to the EC include:

- Pre- and post-installation HOT2000 HSE modeling files
- TSV model output files if HOT2000 version 10.51 was used or an Excel-based equivalent of these files for subsequent versions of HOT2000 that no longer generate a TSV file
- Photos, invoices and other supporting documentation as requested

For the 2018 Union rate zones' Indigenous program offering, a HOT2000 Version 11.5 House Data Comparison report that supports the savings claim was provided. HOT2000 Version 11.5 does not generate a TSV file.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via clarification and/or additional information.

SM2. Finding: Both utilities collect and deliver some photographs to support many of the changes made at a home retrofit site as well as additional documentation for installed equipment and performed measures. However, the evaluator could not consistently confirm the number or type of major measures installed based on the photographs or other documentation provided.

Recommendation A: Consider providing more explicit support for each measure to eliminate uncertainty around project savings and participation. Full project documentation (pre/post photos, documentation of all installations or actions such as invoices and/or photos of each measure, data collection reports, pre-and post blower door tests for all sites) to the evaluation team. By delivering all documentation, the evaluation team would not have to follow up with the utility to obtain output for models that could not be run but could still verify the output for models that can be run.

Outcome: Greater certainty around scorecard achievements.

Utility Response: Enbridge provides all available supporting information (e.g., documents/photos/invoices) collected by external delivery agents to the EC as requested. The supporting information gathered for the offering is consistent with what Natural Resources Canada ("NRCan") requires be collected for use of HOT2000 software. Building simulation ("HSE") files as well as project data output files ("TSV") are also provided, where available.

Of note, in some projects, confirming measures after they have been installed can be challenging. By way of example, wall insulation once completed is covered up by drywall, making a post-installation photo difficult however, an invoice confirms that work was complete.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via clarification and/or additional information.

SM3. Finding: The evaluator identified a number of inaccurate savings entries due to data entry errors or outdated Union home retrofit simulation results. Many of these errors could be avoided through changes in program processes.

Recommendation A: Consider reviewing and modifying program processes to avoid similar errors in the future.

Recommendation B: Consider providing more explicit support for each measure to eliminate uncertainty around project savings and participation. Full project documentation (pre/post photos, documentation of all installations or actions such as invoices and/or photos of each measure, data collection reports, pre-and post blower door tests for all sites) to the evaluation team. By delivering all documentation, the evaluation team would not have to follow up with the utility to obtain output for models that could not be run but could still verify the output for models that can be run.

Outcome: Reduced burden on utility staff and reduced evaluation costs.

Utility Response: See the Utility response to recommendations SM1 and SM2.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via clarification and/or additional information. See also the Utility response to Exhibit I.IR.Staff.4.

SM4. Finding: Air sealing as a savings measure is present in a high percentage of single-family home retro-fit projects, over 90% of projects in some programs. With such a high percentage of projects relying on a single measure, it is more important to ensure the savings validity of that measure.

Recommendation A: If possible, the evaluation team should evaluate the before and after leakage area and attributable energy savings.

Outcome: Greater certainty around savings estimates.

Utility Response: This recommendation was not directed to the Utility. The Utility will continue to support evaluation discussions such as this one with the EAC.

Response to Exhibit I.SEC.2: The recommendation was not addressed to the Utility.

SM5. Finding: The energy savings from the home retrofit programs rely exclusively on the simulations provided by the delivery agents. Those simulations likely rely on a number of assumptions or standard modeling practices which may or may not follow industry standards. A detailed review of the models was outside the scope of the annual audit.

Recommendation A: Consider funding a study to verify the models produced by the utility agents to ensure they conform to standard industry practice.

Outcome: Greater certainty around savings estimates.

Utility Response: While this recommendation was not directed to the Utility, it should be clarified that the agents supporting the whole home offerings are expected to follow NRCan protocols. The Utility will continue to support evaluation discussions, such as this one, with the EAC.

Response to Exhibit I.SEC.2: The recommendation was not addressed to the Utility. See also Utility response to Exhibit I.IR.Staff.4.

SM6. Finding: Site-level documentation confirmed that an auditor was involved, it does not signal that the auditor was an approved Certified Energy Evaluator.

Recommendation A: Tracking certifications for all energy evaluators and/or auditors submitting records.

Outcome: Ensuring proper credentials for all auditors decreases risk to program.

Utility Response: This finding was not included in Table 2 where the EC indicated to whom the recommendation was directed. However, this recommendation was also made in previous years and directed to future third-party evaluation. The Utility understands this finding to mean that the EC should consider verifying certification for energy evaluators as a future verification activity.

Response to Exhibit I.SEC.2: The recommendation was not addressed to the Utility. See also Utility response to Exhibit I.IR.Staff.4.

SM7. Finding: Number of projects for residential retrofit programs remains very large. Other programs required a second data request to verify metrics.

Recommendation A: Increase sample to include more project files in following verification cycles.

Outcome: Increased sample, along with improved documentation recommended earlier, increases the accuracy of savings estimates for the applicable programs.

Utility Response: This finding was not included in Table 2 where the EC indicated to whom the recommendation was directed. However, this recommendation was also made in previous years and directed to future third-party evaluation. The Utility will continue to support evaluation discussions, such as this one, with the EAC

Response to Exhibit I.SEC.2: The recommendation was not addressed to the Utility.

2.3. Cost effectiveness

Table 3. Cost-effectiveness - summary of recommendations

#	Finding	Recommendation	Previously Recommended	Applies to			Primary Outcome		
				Union	Enbridge	Evaluation	Reduce Costs	Improve Accuracy	Decrease Risk
CE1	All overhead is still applied at the sector level rather than the program level.	A: Allocate "sector"-level administrative cost and overhead to each individual program.	✓	✓	✓			✓	✓
CE2	The utilities continue to use different discount rates.	A: Increase transparency around the inflation selected and why.	✓	✓	✓		✓		✓
CE3	The avoided costs provided by the utilities are not clearly labelled as being real or nominal dollars.	A: For all components of streams of avoided costs clearly identify whether they are real or nominal.		✓	✓			✓	
CE4	EUL is inconsistently applied for accelerated projects.	A: Include separate fields in the tracking data to explicitly communicate accelerated, annual and cumulative savings.			✓			✓	

CE1. Finding: For 2017, administrative and overhead costs are still being allocated differently by each utility. For example, Union identifies administration and evaluation costs at the scorecard level whereas Enbridge details spending as direct and indirect at the OEB-defined program level and then has an explicit 'overhead' spend at the scorecard level. In the absence of clear direction from the utilities, the EC apportioned costs based on the distribution of savings, but that is not likely accurate. To facilitate the analysis, ensure that program costs are properly allocated and cost-effectiveness results reflect the true costs of each program, the EC recommends that the utilities report spending in a consistent format and apportion all overhead costs to individual programs rather than the scorecard level. This issue was also identified in 2015 and 2016.

Recommendation A: Allocate "sector"-level administrative cost and overhead to each individual program and report program-level cost-effectiveness results. Explicit allocation of general administration and evaluation costs will allow for easier cost-effectiveness calculations at the program level and ensure that cost-effectiveness results properly reflect true program costs.

Utility Response: Union rate zones allocate administration and evaluation costs at the program level where appropriate, and at the portfolio level otherwise. Programs for the Union rate zones are defined as

Residential, Commercial/Industrial, Low-Income, Large Volume, Market Transformation and Performance-Based as per Union's 2015-2020 DSM Plan. The Utility submits that the EC and the Utility can appropriately calculate cost-effectives for the Union rate zones at the program level.

As outlined in EGD rate zone's 2015-2020 DSM Plan (EB-2015-0049), where possible, it allocates these costs at the program level – i.e. Resource Acquisition, Low Income and Market Transformation. In some instances, as acknowledged in the Board's framework where this is not possible, administration and overhead costs may be reflected at the portfolio level.

The Utility acknowledges that there are differences in way costs are categorized between the EGD rate zone and the Union rate zones. This is a product of the fact that the DSM Plans were developed in 2015 by separate organizations, prior to amalgamation. The Utility has explored alignment in this area, and will continue to align cost categorization where appropriate, however it should be noted that fundamental changes can have unintended consequences (such as how the Target Adjustment Mechanism is impacted). The Utility submits that it is not appropriate to make certain fundamental changes in the middle of the DSM Framework, and that full alignment should occur as part of the next DSM Framework and Plan.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via clarification and/or additional information.

CE2. Finding: Both utilities are using different inflation rates to calculate discount rates for 2017 with no explanation as to why these rates were selected. The table below compares inflation rates used by both utilities in 2017.

	Enbridge	Union
2017 Inflation Rate	1.98	1.68

While the Central Bank targets 2%, the EC recognizes that there could be sector specific inflation rates, however, it is unclear why the values would vary significantly in the same year for both utilities.

Recommendation A: Both utilities should increase transparency around the inflation rates selected and why.

Utility Response: In 2017 the inflation rate used for the EGD rate zone was based the five-year average Ontario Consumer Price Index. The inflation rate used for the Union rate zones is the Q2, four quarter moving inflation rate based on the Gross Domestic Product Implicit Price Index ("GDP IPI"). The Utility notes that the EC did not request clarification on this matter during the verification process, otherwise the information could have been provided.

Starting in the 2019 program year, all rate zones are using a Q2, four quarter moving inflation rate based on the Gross Domestic Product Implicit Price Index.

Response to Exhibit I.SEC.2: The Utility has implemented the recommendation per its response in time for the 2019 audit.

CE3. Finding: The avoided costs provided by the utilities are not clearly labelled as being real or nominal dollars. The rule in a cost-effectiveness analysis is that both costs and discount rates must either both be nominal, or both be real. By including nominal costs and real discount rates, the cost-effectiveness analysis will exaggerate benefits. Just the opposite (nominal discount rate, real costs) will underestimate benefits. For the cost-effectiveness analysis, the EC treated everything as nominal.

Recommendation A: For all streams of avoided costs, clearly state whether they are real or nominal.

Utility Response: The Utility confirms that all avoided costs are in nominal dollars, and the utility will clearly label the avoided costs starting in 2019. The Utility notes that the EC did not request clarification on this matter during the verification process, otherwise the information could have been provided.

Response to Exhibit I.SEC.2: The Utility has implemented the recommendation per its response in time for the 2019 audit.

CE4. Finding: In 2016 the EC found that the EUL and cumulative gross savings were not provided in a consistent manner in the Enbridge program tracking database. This occurred again in 2017. The EUL inconsistency is the result of a work-around for advanced (Accelerated) projects used by Enbridge to allow the LRAM first year savings and the CCM to align. To perform the cost-effectiveness analysis correctly, the EC requires the EUL of the upgrade measure, the RUL (Remaining Useful Life) of the equipment being replaced, as well as the differing savings amounts for the two differing baselines. Given the lack of data, the EC calculated the annualized saving by taking the full lifetime resource savings and spreading it equally across each year of the measure. The equipment EUL for Advancement measures was not provided, but it appears that all the Advanced measures are boilers. Thus, the EC assumed a boiler EUL of 25.

Recommendation A: Include separate fields in the program tracking database for EUL, RUL, gross first year annual savings, gross post-RUL annual savings, NTG, gross cumulative savings, net cumulative savings, and net first year savings.

Utility Response: Enbridge provided the EC with all requested data broken out into specific fields as requested, including those noted in this recommendation except for RUL data for EGD rate zone.

The Utility confirms that RUL data for EGD rate zone is being provided to the EC for 2019.

Response to Exhibit I.SEC.2: The Utility has implemented the recommendation per its response in time for the 2019 audit.

3. CPSV Recommendations

This section reproduces the tables, findings, recommendations, and outcomes from Section 5.2 of the Auditor Reports (CPSV Recommendations), as well at the Utility's responses to each recommendation, which includes the following sub-categories:

- Energy savings and program performance
- Verification process
- Documentation and Support
- Data management

3.1. Energy savings and program performance

Table 4. Energy savings and program performance recommendations

#	Energy Savings and Program Performance		Applies to			Primary Beneficial Outcome			
	Finding	**Recommendation**	**Union**	**Enbridge**	**Evaluation**	**Reduce Costs**	**Increase Savings**	**Customer Satisfaction**	**Decrease Risk**
ES1	Both utilities exhibit a strong commitment to accurate energy savings estimate	The utilities should continue in their commitment to accuracy.	✓	✓				✓	✓
ES2	The CPSV effort found realization rates for market segments that were between 90 and 125% and identified adjustments for most projects.	Continue performing custom savings verification on a regular basis.			✓				✓
ES3	Relative precision targets were not met for all programs, nor for all segments	Use error ratio assumptions from the results provided in this report in future evaluation years, possibly with more conservative bounding than performed this year.			✓	✓			✓
ES4	Some measures have difficult-to-define baseline technologies.	Establish a policy to define rules around energy savings calculation for fuel switching and district heating/cooling measures.	✓	✓	✓				✓

#	Energy Savings and Program Performance		Applies to			Primary Beneficial Outcome			
	Finding	**Recommendation**	**Union**	**Enbridge**	**Evaluation**	**Reduce Costs**	**Increase Savings**	**Customer Satisfaction**	**Decrease Risk**
ES5	Some measures in each utility program are routine maintenance, periodic repairs, or like for like replacements that are considered standard care in other jurisdictions.	Establish a clear policy regarding eligibility of maintenance repair and like for like replacement measures for the programs.	✓	✓	✓	✓			✓
ES6	Multiple heat sources and third-party purchases of heat require more documentation than typical measures	Document the gas demand in the pre-period that will be offset Document the volume of heat/steam/biogas available, the seasonality of supply and its alternative usage.	✓	✓					✓

ES1. Finding: Both utilities exhibit a strong commitment to accurate energy savings estimates. Each has made significant investments in developing calculation tools which model savings accurately. For example, Union's dock door seal calculator is well considered and designed, and Enbridge's Etools calculator is very thorough in attempting to model savings for key measures.

Both utilities chose to retain engineers with a strong understanding of their customers' building and process systems and showed a commitment to finding accurate savings estimates. On several occasions, both on the phone and in writing, the evaluation team suggested a value that would have increased savings in a way that the utility program engineer did not think was valid. When this happened, neither utility was shy in suggesting that we may want to make a more conservative choice.

Recommendation: The utilities should continue in their commitment to accuracy.

Outcome: Accurate energy savings.

Utility Response: The Utility appreciates the recognition that utility staff engineers are knowledgeable subject matter experts.

Response to Exhibit I.SEC.2: N/A.

ES2. Finding: The CPSV effort this year found realization rates between 90 and 125% for each market segment and identified adjustments for most projects. Across the programs, adjustments increased savings on for 41 measures and decreased savings on 56 measures. 57 measures had a large adjustment (verified savings more than 20% different from tracked), which was an increase from the 2016 verification.

Recommendation: Continue performing custom savings verification on a regular basis. Even a study that results in an adjustment of near 100% is still valuable because the programs know that their savings estimates will be reviewed. Knowing a review will be conducted improves the quality of pre-verification estimates. The review itself also results in information that improves future program savings estimates.

Outcome: Accurate energy savings.

Utility Response: This recommendation was not directed to the Utility. The Utility agrees that performing custom savings verification on a regular basis is a worthwhile exercise.

The Utility notes that the EC's Final 2017/2018 Natural Gas Demand Side Management Custom Savings Verification report states that Enbridge Gas "generally calculate sound claimed savings estimates, largely using engineering approaches…Much of the variation in gross realization rates is driven by factors that the utilities only partially control, such as changes in operating conditions, changes in operating hours and changes in production levels."[5]

Response to Exhibit I.SEC.2: The recommendation was not addressed to the Utility.

ES3. Finding: Relative precision targets were met or close to met for each program. The sample design incorporated the final 2016 error ratios (ERs) and averaged them with the assumption used in the 2016 sample design. ERs were further bounded (minimum ER was 0.25, maximum 0.60) to limit the risk of over- or under- collecting data. Several segments did not achieve the precision targets sought. In some cases, the precision target was not met due to lack of data from very large measures in the sample, while in others the variability in the gross realization rate for projects was simply greater than the error ratio assumption that was used.

Recommendation: In future years, continue the process used to develop error ratios assumptions from the results provided in this report, possibly with more conservative bounding (potentially increasing the maximum ER) to avoid under-collection of data for any segments.

Outcome: Realistic estimates of error ratios result in an appropriate amount of data collected to meet

[5] 2017-2018 Natural Gas Demand Side Management Custom Savings Verification. Pg 3. February 24, 2020

targets.

Utility Response: This recommendation was not directed to the Utility. However, the Utility highlights the importance of maintaining a balance between ensuring study results meet a suitable threshold of statistical significance and ensuring that customers are not overly burdened by over sampling.

Response to Exhibit I.SEC.2: The recommendation was not addressed to the Utility.

ES4. Finding: Some measures (e.g., geothermal heat pumps, combined heat and power, and those that save district heating energy) have difficult-to-define baseline technologies. Multiple different baselines are possible for these projects, depending on how one looks at the scope of the project. Two challenging aspects include how non-gas energy changes and offsite gas use are considered in savings estimates.

Recommendation: Consider establishing a policy to define rules around energy savings calculations and baselines for fuel switching and district heating/cooling measures.

Outcome: Less risk of adjustment and a better alignment between provincial energy efficiency goals and program implementation.

Utility Response: Enbridge Gas continues to adhere to DSM policies and guiding principles as defined in the OEB's 2015-2020 DSM Framework and Guidelines and as outlined in the Utility's 2015-2020 DSM Plans. Discussion regarding changes to policies or approaches are better suited for the development of the next OEB DSM Framework.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via clarification and/or additional information.

ES5. Finding: Some measures in each utility program are routine maintenance, periodic repairs or like for like replacements that are considered standard care in other jurisdictions.

Recommendation: Establish a clear policy regarding the eligibility of maintenance, repair and like for like replacement measures for the programs.

Outcome: Reduced free ridership risk.

Utility Response: In some cases, seemingly standard practices at an industry level may not be standard practice for a specific customer. Furthermore, especially for complex projects, there can be varying opinions on which projects are standard or not. For reasons such as this, the Utility requires flexibility in how it designs and implements its DSM programs.

Understanding industry practices that would have occurred without DSM programs, and not incenting such projects, is a key part of the Utility's approach to minimizing free ridership. The Utility continues to learn from the market and evolves program rules as needed. Net-to-gross evaluation will determine the Utility's success at influencing projects. Ultimately, the Utility is committed to minimizing free-ridership and will continue to

make best efforts to do so.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via clarification and/or additional information.

ES6. Finding: The technical estimates of potential savings from a measure need to match the achievable potential at the site. In 2017-2018, projects included measures that saved heat, but translating the heat savings into gas savings was challenging due to multiple heat sources and fuels. Other projects included the purchase of heat or landfill gas where the sufficiency and seasonality of supply affected the achievable gas savings. Also important in third-party purchase measures is to document whether and how the purchased product is and would be used in the absence of the purchase.

Recommendation: In situations with multiple heat sources, document the gas demand that is affected by the measure in order to establish whether gas is saved in all periods. For measures where heat, steam or biogas is purchased from a third-party where it is a by-product, document the sufficiency, seasonality and baseline use of the product without the purchase.

Outcome: Accurate energy savings.

Utility Response: The Utility identifies and documents relevant energy sources at customer sites (i.e. coal, bio-mass, landfill gas, waste heat from neighboring facilities, etc.), quantifies those that are relevant to the project, and takes them into account when calculating natural gas savings. While the project savings analysis always includes anticipated business changes (for example, future growth or contraction), customers will occasionally change their demand and/or supply of energy as part of unplanned business changes after the energy efficient project has been completed. In these cases, it is not practical for the Utility to continuously review all projects to monitor this occurrence after the project has been closed. Rather, this review is included as part of the EC's verification process.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via clarification and/or additional information.

3.2. Verification process

Table 5. Verification process recommendations

#	Verification Process		Applies to			Primary Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Customer Satisfaction	Decrease Risk
VP7	DNV GL was unable to obtain access to all the equipment at all the sites selected for verification.	Modify contracts to require participants to agree to comply with EM&V as part of the requirements for participation in the program.	✓	✓		✓			✓

VP7. Finding: DNV GL was unable to obtain access to all the equipment at all the sites selected for verification. Both Enbridge and Union have several large projects with industrial companies, including food processing, refineries, and other industries. In several cases, the customer refused to provide the necessary trend data to allow a reasonable verification of the project. This means we were unable to do more than a reasonableness check on the savings.

A review of the Enbridge contract shows that the customer is not required to provide the information that is necessary for EM&V. The most relevant sections are:

- Item 6: Payment of the Incentive Payment is subject to the completion of a satisfactory site inspection of the improvements, including the installed equipment by an authorized representative of Enbridge.
- Item 9: Upon request within eighteen months of the commissioning date of the Project, and with reasonable notice, the Customer agrees to provide authorized representatives of Enbridge with access to the Project, and with required information or data relating to the project for the purposes of the Application and these General Terms and Conditions.

Neither of these are sufficient for EM&V.

Recommendation: Modify contracts to require participants to agree to comply with EM&V as well as utility representatives as part of the requirements for participation in the program.

Outcome: Reduced evaluation costs and risks. Participant non-compliance requires evaluators to request documentation for a large backup sample, and to survey and/or visit additional sites to obtain sufficient data

for the evaluation. The process of contacting a site and getting a refusal costs time and money, as does the substitution of an additional site to make up for the unobtained data. In some cases, there might not be additional sites to sample, in which case the evaluation estimates will have lower precision than they would with full compliance.

Utility Response: Enbridge Gas encourages its customers to comply, cooperate and participate with all EM&V activities. At the same time Enbridge Gas recognizes it is important to be respectful that customers are busy running businesses and requests for customers' time should not be overly burdensome. Overburdening customers can have unintended consequences to energy efficiency in Ontario, as it could cause customers to withdraw from future programming.

Critically, the EC correctly states that the 2017/2018 CPSV participant response rate is consistent or slightly higher than what the EC has seen in comparable studies in North America.[6] Accordingly, any resulting response or change should be measured to ensure it strikes an appropriate balance between supporting EM&V activities and not causing undue burden to customers which could impact their future participation.

In recent verification efforts, in some cases, the Utility received feedback from customers that onerous time requirements and/or specific data requests made of customers may not have been considered reasonable and/or compromised customer privacy or safety policies. In addition, the lengthy delay between project completion and third-party evaluation can discourage customers from participating fully in the verification. Some data may no longer be available at all.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via clarification and/or additional information.

[6] 2017-2018 Natural Gas Demand Side Management Custom Savings Verification report. pg 36, 37 and 38.

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3.3. Documentation and Support

Table 6. Documentation and Support recommendations

#	Documentation and Support		Applies to			Primary Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Customer Satisfaction	Decrease Risk
DS8	Incremental improvement in project documentation by both utilities was again observed in the 2017-2018 CPSV. However, project documentation could still be improved.	Implement an electronic tracking system that archives all materials Include explicit sources for all inputs and assumptions in the project documentation. Store background studies and information sources with the project files and make them available to evaluators. Provide evaluators full access to customer data. Provide pre- and post-installation photos, where available. Institute a checklist as part of project closeout to ensure all relevant project documentation is assembled and ready for verification	✓	✓			✓		✓
DS9	Utility savings estimates based on annual energy consumption for industrial sites did not always include sufficient information documenting production.	Include site production totals in relevant years in the savings estimates based on annual energy consumption for industrial sites	✓	✓					✓
DS10	Enbridge Boilers use a 73% assumed thermal efficiency for in situ boilers that have been in place for more than 10 years.	Estimate boiler degradation from name plate efficiency to determine the baseline boiler efficiency rather than use a flat number	✓	✓					✓

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#	Documentation and Support		Applies to			Primary Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Customer Satisfaction	Decrease Risk
DS11	Pipe insulation is a significant source of savings for the Union programs. Documentation supporting the assumptions used in calculations, in situ conditions, and location of incentivized pipe insulation was not consistently provided.	Document baseline conditions of pipe insulation (and other measures) using photos and text descriptions to provide context. Explicitly tie the documentation of baseline condition to the heat loss assumption in the savings calculation. Documentation should clearly identify location of pipe insulation installed under the program, as well as associated equipment, especially in large facilities.	✓	✓					✓
DS12	Documentation did not always include explanation and supporting documentation for baseline types (ROB, ER) and remaining useful life (RUL).	Always provide a complete description of the base case. The description should reference included emails and photos to document in situ conditions and features that are carried over into the baseline system.		✓					✓
DS13	The utilities should use longer duration data in program savings estimates when possible.	Use longer duration data in program savings estimates. When time periods less than a year are used, utilities should document why the period used is applicable to a full year and why a full year was not able to be used.	✓	✓		✓			✓
DS14	In situ boiler name plate information, age and operating condition were not always recorded or described.	Document in situ boiler name plate information, age and operating condition for all projects where boiler efficiency affects savings.	✓	✓					✓
DS15	At large sites with multiple spaces containing similar equipment, program documentation did not always identify which space or piece of equipment was affected by the project.	Include additional descriptions of spaces and equipment affected to differentiate among similar spaces and equipment at the site.	✓	✓					✓

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#	Documentation and Support		Applies to			Primary Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Customer Satisfaction	Decrease Risk
DS16	Invoices were not always included with documentation, and sources for incremental costs were not always clear.	Ensure that incremental costs are supported by invoices or other documentation, especially for add-on and optimization measures where the total cost and incremental cost are likely to be the same.	✓	✓				✓	✓
DS17	Larger projects appeared to fall under the same documentation standards as smaller projects.	Increase the amount of documentation and source material for projects that have greater energy savings.	✓	✓					✓
DS18	Union's custom project summary workbook is a good approach to documentation. The workbook is not used in a consistent manner across all projects.	Consider providing more training or adding quality control steps to ensure the summary workbook front page is completed and stored in a consistent manner. Identify a common approach for common measures and, if applicable, document deviations and the reasons for the deviations in a clearly labelled field on the summary sheet.	✓			✓			✓
DS19	Enbridge Etools does not sufficiently document sources of inputs and assumptions.	Provide details used in Etools in the application along with supporting documentation.		✓		✓			✓

DS8. Finding: Incremental improvement in project documentation by both utilities was again observed in the 2017-2018 CPSV. However, project documentation could still be improved. Specific issues included:

- Project data or details missing
- Insufficient measure-level details to fully describe what was installed
- Descriptions that were difficult to understand
- Use of black box tools
- Hardcoded information in calculation spreadsheets
- Undocumented assumptions
- Input adjustments that approximate other effects, but are not explained

- Insufficient access to customer data (by customers).
- Adjustments to savings estimates for safety or influence that were not clearly marked, sourced, or carried out in a consistent fashion

Recommendation: Improve data quality. Possible steps include:

- Implement an electronic tracking system that archives all materials
- Include explicit sources for all inputs and assumptions in the project documentation.
- Store background studies and information sources with the project files and make them available to evaluators.
- Provide evaluators with full access to customer data.
- Provide pre- and post-installation photos, where available.
- Institute a checklist as part of project closeout to ensure all relevant project documentation is assembled as ready for verification

Outcome: Properly explaining and sourcing the savings calculation method and assumptions allows the evaluating engineer to more easily identify what needs to be verified. It also makes it easier to determine whether the methods and assumptions are reasonable and use program assumptions rather than seek documented values elsewhere.

Utility Response: Enbridge Gas is pleased that the EC has noted incremental improvements in project documentation in the 2017 and 2018 verification processes.

All custom projects are reviewed by an internal QA/QC team of professional engineers. This QA/QC team attempts to apply the same scrutiny to projects as the EC. Two independent assessments of project savings and the type of documentation needed will not always align. In some cases, the verifier might request additional clarification documentation. In other cases, the Utility's documentation might have additional information the verifier was not looking for. This speaks to the strength of the verification process; the verifier can request further documentation from the Utility, the customer or a third party and regularly does so when needed.

As with any large-scale IT initiative, trade-offs exist between complexity, functionality, and resources/costs. Enbridge considers each EC finding and recommendation but not all can or should be implemented. Enbridge Gas operates dozens of DSM offerings and initiatives, which rely on many internal groups and external organizations. Achieving a single-source storage for all required participation/eligibly information across all programs is challenging and most likely not efficient for program implementers.

As detailed in their respective 2015-2020 Multi-Year Plans, the utilities outlined the need for an improved DSM tracking and reporting system. The Board approved this request in its January 20th, 2016 Decision. This system was rolled out for the 2018 program year for the Union rate zones and for the 2019 program year for the EGD rate zone. These systems include many upgrades and make providing data simpler for

annual savings evaluation and verification.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via next steps; The Utility has addressed the recommendation via clarification and/or additional information.

DS9. Finding: Utility savings estimates based on annual energy consumption for industrial sites did not always include sufficient information to document production. The change in energy use pre- and post- measure is often sensitive to changes in production.

Recommendation: Savings estimates based on annual energy consumption for industrial sites should include information from the site on the amount of production in the years used. If detailed production data are not available, the utilities should get percentage differences year to year (e.g.: if year 1=100%; is year 2 exactly the same or is it 95% or 110% of production the previous year).

Outcome: Documenting production changes and using them in savings estimates will improve accuracy and reduce evaluation risk.

Utility Response: When production changes impact natural gas savings, the utility does include pre- and post-production data and calculates energy savings accordingly. If savings are being driven by base load rather than changes in production, weather/space heating or other factors, production data may or may not be included or necessary.

See also the Utility response to recommendation DS8.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via clarification and/or additional information.

DS10. Finding: Enbridge boiler calculations use a 73% assumed thermal efficiency for in situ boilers that have been in place for more than 10 years. This value likely overstates energy savings with a baseline boiler that is 20 years or less in age. The value is based on a 2% de-rate of a 2007 combustion efficiency study that found an average combustion efficiency of 74.6% for 39 boilers aged 12-38 years (average 24.5). The study, which Enbridge provided to the evaluation team, did not attempt to tie the degraded combustion efficiency to the original rated efficiency of the boilers. The study is also now more than 10 years old, so its findings are likely out of date and should only at most apply to 20-year-old or more boilers. For 2017-2018, the evaluation used the 73% value since a better option was unavailable at the time.

Recommendation: Use a degradation from name plate efficiency to determine the baseline boiler efficiency rather than use a flat number. The 2019 CPSV effort should include in the scope secondary research to determine a degradation factor or curve to be used for the 2019 CPSV and incorporated by the utilities for the 2020 program year until primary research is completed or a better approach is developed.

Outcome: Improving this key assumption will improve savings estimates for a significant portion of savings in the Enbridge portfolio and the process would also be applicable to Union sites where baseline boiler efficiencies are required and not based on site tests of boiler performance.

Utility Response: In 2017 and 2018, ETools defaulted to 73% thermal efficiency for in-situ boilers that are older than 20 years where no nameplate information was available. If nameplate information was available, the stated efficiency was used. For basecase boilers, ETools was updated during the 2019 program year to default basecase boiler thermal efficiencies to the stated minimums required by Ontario Regulation 404. This regulation states that any boiler used for space heating applications between 300 – 2,500 MBH installed in the province of Ontario after January 1, 2017 must have a minimum thermal efficiency of 83%. As this regulation does not cover boilers used in domestic hot water or combined heating applications, the program defaults to the original thermal efficiency of 80.5%.

Response to Exhibit I.SEC.2: The Utility has implemented the recommendation per its response in time for the 2019 audit.

DS11. Finding: Pipe insulation is a significant source of savings for the Union programs. Documentation supporting the assumptions used in the calculation and the condition of the existing pipe insulation (via photos and/or a description) was not consistently provided. In large facilities, it was often difficult to determine the location of the pipe insulation that was installed for the particular project being evaluated, especially if they had multiple similar incentivized projects installed through the facility.

Recommendation: Document baseline conditions using photos and text descriptions to provide context. Tie the documentation of the baseline condition to the heat loss assumption in a clear way. Include maps, drawings and/or descriptions that clearly identify the location of the installed pipe insulation for each measure and its associated equipment, especially in large facilities.

Outcome: Improving documentation of baseline conditions and clarity in calculations will reduce evaluation risk and improve consistency of approach among the Union engineering team.

Utility Response: As of 2019, both Union and EGD rate zones no longer use damaged insulation as a basecase assumption. The basecase is either bare or less thickness than what was incented. Enbridge Gas will continue to strive to improve savings claims and documentation based on specific feedback from the EC. See also the utility response to recommendation DS8.

Response to Exhibit I.SEC.2: The Utility has implemented the recommendation per its response in time for the 2019 audit; The Utility has addressed the recommendation via clarification and/or additional information.

DS12. Finding: Enbridge documentation did not always include an explanation and supporting documentation for baseline types (replace on burnout, early replacement) and remaining useful life (RUL). “See Etools for base case” is not sufficient: Etools[7] is not designed to provide context and sources to support the values included.

Recommendation: Always complete the “Base Case Overview” with a detailed description of the base case.

[7] Etools is a suite of energy savings calculators that Enbridge has developed to document projects and provide savings estimates to contractors and customers.

The description should reference included emails and photos to document in situ conditions and features that are carried over into the baseline system.

Outcome: Improved descriptions and documentation will reduce evaluation risk and help Enbridge ensure that accurate information has been entered into Etools.

Utility Response: In the 2019 program year, ETools boiler savings calculation require the boiler replacement decision (e.g. ROB, ER) and age of existing boiler (RUL) as mandatory fields. See also the utility response to recommendation DS8.

Response to Exhibit I.SEC.2: The Utility has implemented the recommendation per its response in time for the 2019 audit; The Utility has addressed the recommendation via clarification and/or additional information.

DS13. Finding: The duration of pre- and/or post-data (energy consumption, production output, raw material consumption, etc.) used by the utilities for savings estimates was too brief in several instances.

Recommendation: The utilities should use data that encompasses a longer period of time in savings estimates when possible. When time periods less than a year are used, the utilities should document why the period used is applicable to a full year and why a full year was not able to be used.

Outcome: Increased accuracy of savings estimates.

Utility Response: The Utility will make best efforts to include more information regarding pre- and post-data in future programming. It should be noted in the case of process load assessments, for example, where it can be established that energy consumption is consistent, data across shorter time periods may be sufficient.

See also the utility response to recommendations DS8 and DS9.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via next steps; The Utility has addressed the recommendation via clarification and/or additional information.

DS14. Finding: The utilities did not always gather boiler nameplate data for in situ systems. The age and operating condition were also not always recorded or described. This was a concern on boiler projects, but also for projects where boiler efficiency has an effect on savings, such as greenhouses, pipe insulation and heat recovery.

Recommendation: In situ boiler name plate information, age and operating condition are all helpful for determining the designed performance and reasonable range of actual efficiency for the system as well as providing context to better RUL.

Outcome: Improving documentation of the in situ boiler will reduce uncertainty in savings estimates and reduce evaluation risk.

Utility Response: Enbridge makes an effort to include boiler nameplate data for in situ systems where available and applicable unless testing data can support a different efficiency. Enbridge also continues to strive for greater documentation of the in-situ boiler as part of its commitment to continuous improvement.

See also the utility response to recommendation DS8.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via next steps; The Utility has addressed the recommendation via clarification and/or additional information.

DS15. Finding: At large sites with multiple spaces containing similar equipment, the utility documentation did not always identify which space or piece of equipment was affected by the project.

Recommendation: Include additional descriptions of spaces and the equipment affected by the measure to differentiate among similar spaces and equipment at the site.

Outcome: Reduced evaluation risk.

Utility Response: The Utility now requests satellite photos for greenhouse projects so that the Utility can better document to which greenhouse the project applies. The Utility will also strive to provide additional descriptions of equipment so they can be located easier and will consider any future specific feedback to improve the EC's efforts.

Response to Exhibit I.SEC.2: The Utility has implemented the recommendation per its response in time for the 2019 audit; The Utility has addressed the recommendation via next steps.

DS16. Finding: Invoices were not always included with measure documentation, and the sources for incremental costs were not always clear.

Recommendation: Ensure that incremental costs are supported by invoices or other documentation, especially for add-on and optimization measures where the total cost and incremental cost are likely to be the same. Equipment replacement measures may require an additional standard efficiency quote to produce incremental cost.

Outcome: Incremental cost is an important component of simple payback, which is often used to judge the economic benefit of energy efficiency projects. It is also an input to some benefit-cost tests.

Utility Response: The Utility does ensure that incremental costs are supported by invoices or other documentation. In some cases, project costs are bundled within invoices for larger work being completed in tandem at a customer site. In others, projects are implemented using internal customer resources and no formal invoice is generated. In such cases, the Utility uses best available information to estimate incremental costs and these estimates are subject to verification.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via clarification and/or additional information.

DS17. Finding: Larger projects appeared to fall under the same documentation standards as smaller projects.

Recommendation: Increase the amount of documentation and source material for projects that have greater energy savings.

Outcome: Projects that are better documented tend to have more accurate savings estimates and receive fewer evaluation adjustments than those that are less documented. Large projects have a greater effect on overall savings adjustment factors. Therefore, large projects with better documentation are more likely to result in program-level adjustment factors closer to 100%.

Utility Response: The Utility strives to capture all relevant information regardless of project size. The Utility does and will continue to more comprehensively review the amount of documentation provided for projects with greater energy savings. If the EC finds that a specific large project could benefit from greater documentation, the Utility requests that the EC provide specific feedback on that particular project, so it can be actioned or addressed directly by the Utility going forward.

See also the utility response to recommendation DS8.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via clarification and/or additional information.

DS18. Finding: Union custom projects utilized a project application summary workbook that summarizes the key project inputs, calculations, and most details. In general, this is a good approach that facilitates internal review and evaluation. One challenge was that different projects used the workbook in different ways:

- The notes section was sometimes used to identify and highlight specific unique approaches and features in projects, but not always.
- Calculations internal to the summary page were consistent for most projects, but not all; additional factors were sometimes added.
- Sub-methods critical to the calculation were sometimes contained in hidden sheets.
- Safety and influence adjustments were inserted in different locations and not always explained.

Recommendation: Consider providing more training or adding quality control steps to ensure the summary workbook front page is completed and stored in a consistent manner. Identify a common approach for common measures and, if necessary, document deviations and the reasons for the deviations in a clearly labelled field on the summary sheet.

Outcome: A consistent summary workbook aids both internal and external quality assurance, quality control, and measurement and verification.

Utility Response: The Utility is pleased by the acknowledgement that its custom project workbooks are a good approach that facilitates internal review and evaluation. The Utility agrees that these workbooks are effective tools for summarizing key project inputs and calculations and that different projects might use the

workbooks in different ways. Complete uniformity within these workbooks across hundreds of custom projects will take time and may not always be achievable or appropriate. The Utility will endeavour to include the specific items noted in the findings in a review of its custom project documentation process where appropriate.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via next steps.

DS19. Finding: Enbridge Etools is used as both a calculation tool and as a communication tool with customers. While it appears to serve the needs of the program, this form of communication is difficult for the evaluation efforts.

- Etools does not easily allow for assumptions to be sourced within the record.
- Some Etools selections may be site-specific and some may be defaults; the calculator does not clearly distinguish.
- Energy savings that are calculated outside of Etools are hard-entered in Etools but not always sourced.

Recommendation: Use a consistent summary workbook. Provide details used in Etools in the application along with supporting documentation.

Outcome: A consistent summary workbook aids both internal and external quality assurance, quality control, and measurement and verification.

Utility Response: For future Etools version updates, the Utility will make best efforts to list all assumptions used in the Etools calculator, provide back up sources, and provide visual indicators to which values are default assumptions versus actual site information. Best efforts will also be made to ensure energy savings calculated outside of Etools and hard entered into Etools are substantiated, properly documented and provided as backup.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via next steps.

3.4. Data management

Table 7. Data management recommendations

#	Data Management		Applies to			Primary Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Increase Customer Satisfaction	Decrease Risk

DM 20A	Neither Union nor Enbridge currently track participating customer or participating vendor contact information in their program tracking database. Providing the information to the evaluation puts significant burden on utility staff.	Track contacts associated with projects in the program tracking database.	✓	✓		✓		✓	✓
DM 20B		Strongly consider investing in relational program tracking databases.	✓	✓		✓	✓	✓	✓
DM 20C		Continue to use improved structure for data integrity in the evaluator request for contact information for the 2019 savings verification and evaluation.			✓	✓		✓	
DM 21	The extracts from the utility program tracking database do not include dates for key project milestones.	Track and provide to evaluators dates for key milestones in the project.	✓	✓		✓			✓
DM 22	EUL and cumulative gross savings were not provided in a consistent manner in the Enbridge program tracking database extract	Include separate fields in the program tracking database for all components of gross and net cumulative and first year savings.	✓	✓			✓		✓

DM20a. Finding: Neither Union nor Enbridge currently track participating customer or participating vendor contact information in their program tracking database. Providing the information to the evaluation puts significant burden on utility staff.

Recommendation A: Track contacts associated with projects in the program tracking database. At a minimum, the program tracking database should include:

- Project site address
- Customer mailing address
- Primary customer contact name
- Primary customer contact phone
- Primary customer contact email
- Primary customer contact mailing address
- Addresses are best tracked as multiple fields including:
    - Street address line 1
    - Street address line 2
    - City

- Province
- Postal code

Phone number fields should include data validation to enforce a consistent format and avoid missing or extra digit errors. Phone extensions should be tracked in a field separate from the ten-digit phone number and be restricted to numeric data only.

The best practice is to maintain contacts in a table separate from specific project or customer data. This allows for a single contact to be connected to multiple accounts and/or projects as necessary without creating duplication. This structure also makes it easier to associate multiple contacts with a single project and decreases quality control costs.

Vendor contact information should also be tracked in the database, in the same table as the participating customer contact information. With a relational database, the contact ID from the table can be added to a project record in the role consistent with the contact's participation (such as vendor, decision maker, or technical expert) with a separate table that allows a single vendor contact to be associated with multiple projects.

Outcome A: Reduced burden on utility staff to seek contact information for projects, whether for internal or evaluation use. Reduced evaluation costs and improved sample design expectations.

Utility Response: As detailed in the 2015-2020 DSM Plans, the Utility outlined the need for improved DSM tracking and reporting systems. The Board approved this request in its January 20th, 2016 Decision. This system was rolled out for the 2018 program year for the Union rate zones and for the 2019 program year for the EGD rate zone. These systems include many upgrades and make providing data simpler for annual savings evaluation and verification.

All the items identified in recommendation DM20a have been provided to the EC with few exceptions (e.g. a handful of customers that had not provided Enbridge Gas with email addresses). Enbridge Gas will continue to provide the EC with all available customer information noted in the recommendation.

Regarding the level of effort on utility staff to compile this information, much of that effort is in ensuring that the contact information is up to date. With up to two years of time between the project completion date and the time of verification, customer and vendor contacts can change. The Utility's preference is to take the time to ensure the information provided to the EC is correct up front rather than have the EC report back to the Utility in instances where contact information is no longer correct.

Response to Exhibit I.SEC.2: The Utility has implemented the recommendation per its response in time for the 2019 audit; The Utility has addressed the recommendation via clarification and/or additional information.

Recommendation B: The utilities should strongly consider investing in relational program tracking databases. Relational program tracking databases and customer relationship management (CRM) systems allow for multiple contacts to be associated with a single account and/or project. The incremental cost of

implementation is low if it is part of the initial database design, populated as projects are started, and updated once they are complete.

For the implementation team, a query-able one-stop shop for data provides a wealth of information that can improve delivery. For example, these databases can help programs understand how contractors work across projects, identify when projects have hit snags and need attention, and give the program team access to key customer context such as historical participation **and** different contacts that have worked with the program.

For evaluation, this allows programs to easily clarify aspects of projects during implementation and to provide accurate, timely, and usable contact information to evaluators and verifiers.

Outcome B: Improved customer satisfaction from better delivery, and a reduced burden on utility staff for tracking information. A relational database would also streamline aggregation of program data for scorecards and make providing data simpler for annual savings evaluation and verification.

Utility Response: As detailed in the 2015-2020 DSM Plans, the Utility outlined the need for improved DSM tracking and reporting systems. The Board approved this request in its January 20th, 2016 Decision. This system was rolled out for the 2018 program year for the Union rate zones and for the 2019 program year for the EGD rate zone. These systems include many upgrades including CRM components.

Response to Exhibit I.SEC.2: The Utility has implemented the recommendation per its response in time for the 2019 audit.

Recommendation C: Continue to use the improved structure for data integrity in the evaluator request for contact information for the 2019 savings verification and evaluation.

Outcome C: Reduced evaluation costs due to less data cleaning and research to fill missing information. Improved data collection with less returned advance letters and more accurate connection between projects and contacts.

Utility Response: This recommendation was not directed to the Utility.

Response to Exhibit I.SEC.2: The recommendation was not addressed to the Utility.

DM21. Finding: The extracts from the utility program tracking database do not include dates for key project milestones. Enbridge's data did not include any dates and Union's included only the "install date."

Recommendation: Track and provide to evaluators dates for key milestones in the project. Dates for project start, installation, and those that define the program year provide useful context for interviewers that is not always easy to find in project documentation

Outcome: Improved data collection through more informed interviewers and reduced evaluation costs through less need to search for dates in documentation.

Utility Response: The Union rate zones and EGD rate zone do track an installation date for custom projects. This date was included in their respective tracking workbooks. Regarding inclusion of other dates, these dates are captured as best as possible, but some projects get proposed, prioritized, deferred and changed over time. Not all projects will have a definitive start date. The program year is defined by the calendar year.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via clarification and/or additional information.

DM22. Finding: EUL and annual gross savings in the Enbridge program tracking database extract total to the correct cumulative savings but are a work around for advanced (accelerated) projects. The data structure provides accurate cumulative savings but does not store and report the underlying dual-baseline annual saving estimates, or the actual claimed RUL and the EUL for each measure.

Recommendation: Include separate fields in the program tracking database for:

- EUL
- RUL
- gross first year annual savings
- gross post-RUL annual savings
- net to gross (NTG)
- gross cumulative gross
- net cumulative savings
- net first year savings

Outcome: Improved data integrity results in less evaluation risk and more accurate savings totals. Providing each of the key savings types and their components allows evaluation to confirm that the savings provided are internally consistent.

Utility Response: The Utility provides the EC with all requested data broken out into specific fields as requested, including those noted in this recommendation with the exception of RUL data for the EGD rate zone. RUL data for EGD rate zone is being provided to the EC starting with the 2019 annual verification.

Response to Exhibit I.SEC.2: The Utility has implemented the recommendation per its response in time for the 2019 audit.

4. Free Ridership Based Attribution Report Recommendations

This section reproduces the tables, findings, recommendations, and outcomes from Section 5.3 of the Auditor Reports (Free Ridership Based Attribution Report Recommendations), as well at the Utility's responses to each recommendation.

Table 8. Free Ridership Based Attribution Report recommendations

#	Energy Savings and Program Performance		Applies to			Primary Beneficial Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Customer Satisfaction	Decrease Risk
FR1	FR based attribution in some segments of the utilities' programs is low and variable	Evaluate free ridership for the programs annually and couple the free ridership evaluation with process evaluation			✓		✓		
FR2	Relative precision targets were not met for some targeted segments.	Error ratios from this report should inform sample design for future evaluation. Response rates from this report should inform the size of the backup sample for future evaluation.			✓	✓			✓
FR3	FR based attribution for the programs came primarily through acceleration	Align the program design with cumulative net goals	✓	✓			✓		
FR4	Some customers receive funding from multiple third-party sources	Consider the potential effect of multiple third-party incentives on free ridership			✓				✓
FR5	Projects with very long and very short simple payback periods often have high free ridership.	Consider establishing a policy that defines an eligibility floor and cap based on simple payback period for energy efficiency projects.	✓	✓			✓		✓

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#	Energy Savings and Program Performance		Applies to			Primary Beneficial Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Customer Satisfaction	Decrease Risk
FR6	Union's Large Volume program has a very low FR based attribution.	Consider the high free ridership within the context of the cost effectiveness of the program. High free rider programs can still deliver meaningful cost-effective net savings.	✓				✓	✓	
		Conduct a process evaluation to improve Large Volume influence on customer projects	✓				✓	✓	✓
FR7	Vendor attribution increased program attribution significantly for the Enbridge Commercial and Multifamily Segments	Consider expanding approaches to market for other programs that leverage third-party vendors.	✓	✓		✓	✓		
FR8	Union Agriculture FR based attribution is the highest among the Union programs.	Continue the proactive approach to DSM marketing in this sector.	✓				✓	✓	✓
FR9	The assumption for "never would have implemented" has a significant effect on free ridership based attribution.	Consider studying the typical planning horizons for each of the customer segments.			✓				✓
FR10	The treatment of efficiency in the scoring has a relatively small effect free ridership based attribution.	Consider simplifying the efficiency question sequence in future research to reduce survey length.			✓			✓	
FR11	The current Lifecycle Net Savings method of free ridership based	Continue to use the Lifecycle Net Savings method as long as the			✓				✓

#	Energy Savings and Program Performance		Applies to			Primary Beneficial Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Customer Satisfaction	Decrease Risk
	attribution has a large effect on free ridership based attribution	primary metrics for the program are based on Cumulative gas savings.							

FR1. Finding: FR based attribution in some segments of the utilities' programs is low and variable.

Recommendation: Consistent annual evaluation of free ridership coupled with process evaluation will help identify specific ways for each program to manage and reduce free ridership. Consistent measurement of free ridership early in the next DSM framework can help Enbridge and stakeholders to understand what is working to drive net savings and provide lessons for continuous improvement.

Outcome: Effective free ridership management will allow the programs to increase their net savings significantly in future years.

Utility Response: Enbridge Gas is supportive of discussions at the EAC to determine the priority and frequency of free ridership studies. However, the decision to conduct a study and at what frequency does not lie with the Utility. Enbridge Gas completed process evaluations for the residential home retrofit offerings in recent years and is currently exploring a process evaluation for commercial offerings.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via clarification and/or additional information.

FR2. Finding: Relative precision targets were not met for some targeted segments. Error ratios from the evaluation were as high or higher than in the 2015 study and response rate was lower.

Recommendation 1: Error ratios from the results provided in this report should be used to inform sample design for future evaluation years.

Outcome 1: Better defined error ratios for the measures in the programs will allow more efficient sample design for future evaluations, improving precisions and reducing costs.

Recommendation 2: Response rates from this evaluation should be considered in planning the amount of backup sample required for future studies.

Outcome 2: A larger backup sample will provide more assurance of meeting sampling targets if response rates continue to be lower than in previous years. Approaches to increase response rates should be considered.

Utility Response: This recommendation was not directed to the Utility. For clarity, the Utility highlights the importance of maintaining a balance between ensuring study results meet a suitable threshold of statistical significance and ensuring that customers are not overly burdened by over sampling.

Response to Exhibit I.SEC.2: The recommendation was not addressed to the Utility.

FR3. Finding: FR based attribution for the programs came primarily through acceleration rather than changes in efficiency or quantity. Acceleration is less valuable to programs that are seeking to meet cumulative net goals, because savings often drop after the acceleration period is over. Acceleration periods tend to be considerably shorter than the estimated useful life (EUL) of a measure and thus the partial FR based attribution that results is low relative to cumulative gross savings.

Recommendation: To align the programs with cumulative net goals, the utilities should seek to:

- Continue promoting long life measures and consider discontinuing promotion of short-lived measures
- Proactively upsell equipment purchases from standard to efficient products
- Stop providing incentives for standard efficiency products even in non-replace on burnout situations
- Target hard to reach customers who have not participated in the past
- Continue to identify unique solutions that save energy at customer plants
- Expand promotion of energy efficiency measures with low market penetration (such as heat reflector panels)
- motivate customers to increase the scope of their projects. Some options include multi-measure bonuses or escalating incentive structures that pay more for doing more.
- Adopt lessons learned from the Enbridge Commercial and Multifamily approach to market, working proactively with vendors
- Increase focus on promoting novel energy saving solutions to industrial customer problems. Several customers indicated that the project would not have happened without the utility because Union or Enbridge identified a solution that they had not considered

Outcome 1: Focusing on proactive sales rather than reactive will help increase FR based attribution.

Outcome 2: Effective free ridership management will allow the program to increase net savings significantly in future years.

Utility Response: The Utility does focus its efforts on achieving cumulative gas savings and supports a wide range of eligible energy conservation projects to address the multiple key priorities set out by the

Board. The Utility continually improves and changes the design and focus of its programs. Many of the activities listed in the recommendation have already been adopted and others will be considered moving forward.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via next steps.

FR4. Finding: Some customers receive funding from multiple third-party sources (eg. IESO, municipalities, national and provincial carbon abatement programs/cap and trade), to complete the same energy efficiency measure. Both parties may claim the same changes in energy use, resulting in overlap when aggregated across fuels at the provincial level.

Recommendation: Develop policies to collaborate across electric and gas projects to avoid double-counting fuel savings and increases from energy efficiency measures.

Outcome: More accurate energy and carbon savings estimates across the province.

Utility Response: This recommendation was not addressed to the Utility. For clarity, the Utility was not made aware of any instances of double counting energy savings for projects that were reviewed through the course of the 2017/2018 verification and doesn't understand the basis for which the EC reached its finding.

Enbridge continues to work towards coordination of CDM and DSM programs as outlined in the 2015-2020 DSM Guidelines.

Response to Exhibit I.SEC.2: The recommendation was not addressed to the Utility.

FR5. Finding: Projects with very long and very short simple payback periods often have low FR based attribution. However, from a customer service standpoint, it may be difficult for utilities to deny incentives to customers unless they have pre-established rules to point to.

Recommendation: Consider establishing a policy that defines an eligibility floor and cap based on simple payback period for energy efficiency projects.

Outcome: The rule will give utilities a guideline to restrict the program to projects that are more likely to result in FR based attribution. It will also allow the utilities to reject potentially poor projects without a large effect on customer satisfaction.

Utility Response: Policies on payback periods have been discussed in recent years, with respect to free ridership mitigation. As set out in the Board's Decision and Order, Section 5.2.6 on the utilities' 2015-2020 Plans (EB-2015-0029 / EB-2015-0049), the OEB rejected the need to introduce a policy defining payback eligibility criteria for the commercial and industrial custom offerings. Enbridge Gas agrees with the Board that specific payback period policies should not be developed at this time.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via clarification and/or additional information.

FR6. Finding: Union's Large Volume program has a very low FR based attribution.

Recommendation 1: FR based attribution is one metric with which to judge a program, but low-cost programs with high savings totals and high free ridership can still deliver significant volumes of cost-effective savings. The Union Large Volume has low program costs relative to the net CCM saved. The program still provides cost effective net savings despite having low FR based attribution.

Recommendation 2: This evaluation did not include a process evaluation. Union should consider conducting a process evaluation focused on how to reduce the rate of free ridership. Three options that the Union might consider are:

- Consider the benefit-cost of eliminating maintenance and like-for-like measure replacements, as they are associated with high free ridership.
- Use an application process that includes a committee review that can reject free rider projects. This option has been successful for government run programs, but would likely prove hard for utilities to manage as it can negatively affect customer satisfaction
- Develop clear payback criteria such as "initial payback must be longer than X years and the incentive paid must reduce payback below Y years." This has the advantage of being a rule that account representatives can explain when talking to customers.
- Consider the non-energy benefits realized by the customer when approving projects under a FR based attribution criterion. The non-energy benefits of many projects in the large industrial segment often large compared to the energy saving benefits, so simple payback criteria will not eliminate all free rider projects. Promote awareness of this issue among the implementation team.

Outcome: Effective free ridership management may allow the program to increase its net savings significantly in future years.

Utility Response: Union rate zones' Large Volume program is a direct access offering where customers access their own money for eligible projects. If they do not use their money, it becomes available to other customers. This program design is largely incompatible with the application of a free rider rate. While the Utility can attempt to influence a customer by providing incentives and identifying/quantifying opportunities to save energy, the customer prioritizes projects depending on its own needs. If a project meets the eligibility criteria of the program, the Utility will not refuse a customer access to its own money.

The Utility disagrees with the EC that a process evaluation focused on how to reduce the rate of free ridership should be conducted. This type of study will not address the fundamental incompatibility between the Large Volume program design and the application of a free rider rate.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via clarification and/or additional information.

FR7. Finding: Vendor attribution increased attribution significantly for the Enbridge multifamily program and

moderately for the Enbridge commercial program. Participants of all programs indicated vendor involvement at key decision-making junctures, suggesting that if Enbridge and Union are able to influence vendor recommendations, there may be an opportunity to increase indirect influence on participants in all segments.

Recommendation: The utilities should consider what lessons can be learned from the Enbridge multifamily approach to market that is applicable to other segments. All segments may have opportunities to leverage third-party vendors. A process evaluation that includes vendor interviews might uncover specific opportunities and approaches that would help in transferring the Enbridge multifamily lessons to other segments.

Outcome: Effective leveraging of vendors could both increase FR based attribution and program uptake.

Utility Response: The Utility's current approach to market for many of its DSM programs fully leverages third parties. For many years, the two rate zones have extensively engaged third party partners including vendors, contractors, engineers and distributors to promote DSM programs and support customers in the decision-making process, propelling customers to implement energy efficiency improvements. Enbridge is also currently exploring a process evaluation for its custom commercial offerings.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via clarification and/or additional information.

FR8. Finding: Union Agriculture FR based attribution is the highest among the Union programs. Customers reported that Union account representatives recommended novel solutions for specific problems and appear to be a conduit for disseminating information on best practices.

Recommendation: Continue the proactive approach to DSM marketing in this sector. Union appears to be playing a role in reducing information barriers which is leading to increased uptake of energy efficiency measures in this growing sector.

Outcome: Effective leveraging of vendors could both increase FR based attribution and program uptake.

Utility Response: The utility will continue the proactive approach to DSM marketing in this sector.

Response to Exhibit I.SEC.2: N/A.

FR9. Finding: The sensitivity testing shows that the assumption for "never would have implemented" has a significant effect on free ridership based attribution.

Recommendation: Consider studying the typical planning horizons for each of the customer segments to verify if the 2 year or 4 year assumptions are consistent with participating Ontario businesses in each segment.

Outcome: More accuracy and confidence in free ridership based attribution results.

Utility Response: This recommendation was not directed to the Utility. However, the Utility supports refinement of NTG calculation methodologies.

Response to Exhibit I.SEC.2: The recommendation was not addressed to the Utility.

FR10. Finding: The sensitivity testing shows that the treatment of efficiency in the scoring has a relatively small effect free ridership-based attribution.

Recommendation: Consider simplifying the efficiency question sequence in future research to reduce survey length.

Outcome: Reduced customer burden during interviews.

Utility Response: This recommendation was not directed to the Utility. However, the Utility is supportive of efforts to update and improve the survey design.

Response to Exhibit I.SEC.2: The recommendation was not addressed to the Utility.

FR11. Finding: The sensitivity testing shows that the current Lifecycle Net Savings method of free ridership based attribution has a large effect on free ridership based attribution relative to the simpler Year 1 Net Savings method.

Recommendation: Continue to use the Lifecycle Net Savings method as long as the primary metrics for the program are based on Cumulative gas savings.

Outcome: More accurate estimates of cumulative net savings for the programs.

Utility Response: This recommendation was not directed to the Utility. However, it is the Utility's understanding that a significant reason why its free ridership rates appear to be more elevated than other jurisdictions is that the EC uses the Lifecycle Net Savings method whereas many others use the Year 1 Net Savings method.

Response to Exhibit I.SEC.2: The recommendation was not addressed to the Utility.

5. Commercial & Industrial Prescriptive Program NTG Verification Recommendations

This section reproduces the tables, findings, recommendations, and outcomes from Section 5.4 of the Auditor Reports (Commercial & Industrial Prescriptive Program NTG Verification Recommendations), as well at the Utility's responses to each recommendation.

Table 9. 2017 C&I Prescriptive Program Verification: Findings & Recommendations

Finding	Recommendation	Applicable Entity
Free-ridership levels for Enbridge ranged from 38% to 92% and from 50% to 93% for Union.	The utilities should consider evaluating free-ridership for the programs annually and consider coupling the free-ridership evaluation with process evaluation to better understand how the utilities are influencing the vendors and their outreach to the end-users.	Enbridge & Union
Both utilities had high ex-post gross realization rates, implying that the utilities are accurately estimating the ex-ante savings based on the measure sub-docs and/or the TRM.	GRRs were close to 100.00% for all evaluated Priority Measure Groups; ***no action recommended.***	Enbridge & Union
There was no participant spillover for either utility.	The utilities should work with the vendors to find out their protocol on recommending the installation of program measures at customers' facilities. This would enable the utilities to better understand the influence the programs have on the customers' behavior, especially in the context of spillover.	Enbridge & Union
	The utilities should also consider conducting a market study to quantify any nonparticipant spillover, contingent on EAC and EC consideration.	
Union could benefit from investing in a modern program tracking database with document storage capabilities as most of the participant and vendor contact information had to be extracted by the verification team.	Digitize and file project documentation for all projects as they are completed and paid during project closeout.	Union; however, it must be noted that Union has indicated the presence of an online tracking database for their 2018 programs
	Track contacts associated with projects in the program tracking database.	

Finding	Recommendation	Applicable Entity
	Strongly consider investing in relational program tracking databases.	
Vendor surveys had very low response rates	Incentives to complete survey	Enbridge & Union and Verification Team
	Recommendation for Utility to communicate with vendors regarding the importance of this evaluation step during future NTG studies	
Participants were generally receptive in responding to surveys. The response rate for participants was around 50% for the first few months. After the first wave of customers were contacted, the more difficult corporate customers and unresponsive customers were attempted to be reached. By the end, after many attempts and exhausting the sample, the overall response rate was about 30% overall for participants.	Incentives to complete survey	Enbridge & Union and Verification Team
	Recommendation for utilities to communicate with customers about the importance of this evaluation steps during future NTG studies	
Scoring methodology for participant's responses to efficiency questions "between standard and high" was sometimes not clear.	This item should be re-visited during subsequent NTG studies contingent on EAC and EC discussion. One alternative is that if a respondent indicates that they would have used an efficiency between standard and high without the program, but cannot answer the follow up question of the efficiency level they would use, instead of taking the average "between standard and high" responses for the measure, use the scoring for "standard efficiency" instead. The logic behind this is that if the customer does not know the efficiency level, it is likely that they may not have equipment at this efficiency.	Verification Team

CI1. Finding: Free-ridership levels for Enbridge ranged from 38% to 92% and from 50% to 93% for Union.

Recommendation: The utilities should consider evaluating free-ridership for the programs annually and consider coupling the free-ridership evaluation with process evaluation to better understand how the utilities are influencing the vendors and their outreach to the end users.

Utility Response: Enbridge is supportive of discussions at the EAC to determine the priority and frequency of free ridership studies. However, the decision to conduct a study and at what frequency does not lie with the utility. Process evaluations activities are part of the Utility's accountability, and the Utility is currently exploring a process evaluation for its commercial offerings.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via clarification and/or additional information.

CI2. Finding: Both utilities had high ex-post gross realization rates, implying that the utilities are accurately estimating the ex-ante savings based on the measure sub-docs and/or the TRM.

Recommendation A: GRRs were close to 100.00% for all evaluated Priority Measure Groups; no action recommended.

Utility Response: The Utility is pleased that its efforts to provide accurate ex-ante savings based on the measure sub-docs and/or the TRM are reflected in this finding.

Response to Exhibit I.SEC.2: N/A.

CI3. Finding: There was no participant spillover for either utility.

Recommendation A: The utilities should work with the vendors to find out their protocol on recommending the installation of program measures at customers' facilities. This would enable the utilities to better understand the influence the programs have on the customers' behavior, especially in the context of spillover.

Recommendation B: The utilities should also consider conducting a market study to quantify any nonparticipant spillover, contingent on EAC and EC consideration.

Utility Response: The Utility is supportive of discussions at the EAC to determine the priority and frequency of other evaluation studies and activities. However, the decision to conduct a spillover study does not lie with the utility.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via clarification and/or additional information.

CI4. Finding: Union could benefit from investing in a modern program tracking database with document storage capabilities as most of the participant and vendor contact information had to be extracted by the verification

team.

Recommendation A: Digitize and file project documentation for all projects as they are completed and paid during project closeout.

Recommendation B: Track contacts associated with projects in the program tracking database.

Recommendation C: Strongly consider investing in relational program tracking databases.

Utility Response: As detailed in the 2015-2020 DSM Plans, the Utility outlined the need for improved DSM tracking and reporting systems. The Board approved this request in its January 20th, 2016 Decision. This system was rolled out for the 2018 program year for the Union rate zones and for the 2019 program year for the EGD rate zone. These systems include many upgrades and make providing data simpler for annual savings evaluation and verification.

As with any large-scale IT initiative, trade-offs exist between complexity, functionality, and resources/costs. The Utility considers each EC finding and recommendation but not all can or should be implemented. The Utility operates dozens of DSM offerings and initiatives, which rely on many internal groups and external organizations. Achieving a single-source storage for all required participation/eligibly information across all programs is challenging and most likely not efficient for program implementers.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via clarification and/or additional information.

CI5. Finding: Vendor surveys had very low response rates

Recommendation A: Incentives to complete survey

Recommendation B: Recommendation for Utility to communicate with vendors regarding the importance of this evaluation step during future NTG studies.

Utility Response: The Utility is open to discussing the provision of incentives for a future survey with the EAC and is supportive of further communicating with vendors regarding the importance of this evaluation step.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via next steps.

CI6. Finding: Participants were generally receptive in responding to surveys. The response rate for participants was around 50% for the first few months. After the first wave of customers were contacted, the more difficult corporate customers and unresponsive customers were attempted to be reached. By the end, after many attempts and exhausting the sample, the overall response rate was about 30% overall for participants.

Recommendation A: Incentives to complete survey

Recommendation B: Recommendation for utilities to communicate with customers about the importance of

this evaluation steps during future NTG studies.

Utility Response: As part of this study, an advance letter was provided to the customer sample identifying the importance of participating in this study. The Utility is open to discussing customer communication for a future survey with the EAC. Details should be discussed with the EAC.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via clarification and/or additional information.

CI7. Finding: Scoring methodology for participant's responses to efficiency questions "between standard and high" was sometimes not clear.

Recommendation A: This item should be re-visited during subsequent NTG studies contingent on EAC and EC discussion. One alternative is that if a respondent indicates that they would have used an efficiency between standard and high without the program, but cannot answer the follow up question of the efficiency level they would use, instead of taking the average "between standard and high" responses for the measure, use the scoring for "standard efficiency" instead. The logic behind this is that if the customer does not know the efficiency level, its is likely that they may not have equipment at this efficiency

Utility Response: The Utility is supportive of this change. It is in line with concerns raised that the target population of survey recipients does not necessarily have the technical background to accurately respond to questions on alternative efficiencies.

Response to Exhibit I.SEC.2: The Utility has addressed the recommendation via next steps.

ENBRIDGE GAS INC.

Answer to Interrogatory from
School Energy Coalition ("SEC")

Interrogatory

Reference:

[Ex. B/3/1, p. 2]

Question(s):

Please extend Table 1 to include 2021, and to include 2022 assuming that, due to Covid-19 challenges, a new DSM Plan has not been approved for 2022 and the current plan is extended a further year.

Response:

Table 1 compares Enbridge Gas's OEB-approved budget to actual expenditures associated with the development of its upgraded Tracking and Reporting System from 2015 to 2022, assuming that the current 2021 DSM Plans are extended into 2022.

Table 1:
2015-2022 DSM IT Tracking & Reporting System Development Costs – EGD Rate Zone

($millions)	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**Total**
Approved Budget	$0.000	$1.000	$1.000	$1.000	$1.000	$1.000	$1.000	$1.000	**$7.000**
Actual Spend	$0.000	$0.100	$3.109	$2.535	$0.342	$0.000	$0.000	$0.000	**$6.087**
Variance[1]	$0.000	($0.900)	$2.109	$1.535	($0.658)	($1.000)	($1,000)	($1.000)	**($0.913)**

[1] Negative values indicate amounts being credited/reimbursed to ratepayers.

ENBRIDGE GAS INC.

Answer to Interrogatory from
School Energy Coalition ("SEC")

Interrogatory

Reference:

[Ex. B/3/1, p. 3]

Question(s):

Enbridge has reported cost overruns in the Tracking and Reporting System. Please provide the original business case for that project, and detailed justification for the overruns.

Response:

Please see the attached business case for the upgraded DSM tracking and reporting system entitled Project Plan – DSM IT Solution for the Multi-Year Plan (Attachment 1), which was created in 2015 and filed with the OEB as part of EGD's 2015-2020 DSM Plans proceeding (EB-2015-0049).[1] To the best of the Company's knowledge, the attached business case represents the earliest such document.

For detailed justification of the variances on spend in comparison to the original high-level estimate of $5 million, please see the response at Exhibit 1.EP.5 part a). Please also see the response at Exhibit 1.STAFF.3 for further discussion regarding Enbridge Gas's upgraded DSM tracking and reporting system project and the details of Enbridge Gas's efforts to manage related costs.

[1] EB-2015-0049, Exhibit I.T3.EGDI.BOMA.20, Attachment, June 23, 2015.

Filed: 2015-06-23
EB-2015-0049
Exhibit I.T3.EGDI.BOMA.20
Attachment
Page 1 of 7

Filed: 2020-10-07, EB-2020-0067, Exhibit I.SEC.4, Attachment 1, Page 1 of 7

Project Plan

DSM IT Solution for the Multi-Year Plan

Created By: Business Intelligence

June 23, 2015

Summary

The Information technology and tools utilized by Enbridge DSM serve several purposes that further conservation and benefit customers. The tool performs a relationship management function, a program development and delivery function and a tracking, reporting and verification function. The two main current applications (SRM and DARTS), were designed and built to meet the Company's business requirements over five years ago when the DSM business was largely built on a Resource Acquisition platform. Since their implementation, the main applications have been heavily customized and supplemented with shadow systems and manual workarounds to fit innovative and changing business needs. These challenges call increasingly on nimble systems in support of flexible approaches to conservation in a business that has undergone three framework changes since major DSM IT system decisions were last made. The Company has undertaken a review of its DSM IT infrastructure to determine if it is practical and cost effective to update and enhance them as well as a Request for Information ("RFI") process to investigate potential replacement solutions and high level costs.

The OEB's Demand Side Management Framework for Natural Gas Distributors (2015-2020) issued in December 2014 (the "new DSM Framework") requires fundamental changes in the types and variety of DSM programs that Enbridge will pursue in the future. This will result in material changes in both the nature and scope of the Company's conservation programs. The Company's IT systems are essential to the efficient and effective delivery of these programs. Internal reviews of the existing DSM IT applications have identified issues with their stability and practicality.

Current State

Challenges and limitations of current applications are as follows;

1. A large number of DSM business processes are performed outside the core DSM systems, within a large number of informal systems. Due to the limitation of existing systems to handle complex processes, the business relies upon many ad-hoc (mostly Excel based) tools to meet its needs and this has resulted in:
    a. Stranded information
    b. Large number of physical project files and documentation
    c. Duplicate systems of record
    d. A high reliance on manual processes

2. Inability of the applications to enable business to utilize multiple sales channels and explore new ways to extend the reach and increase DSM impact. Current technology utilized by DSM doesn't allow for advanced lead creations, third party information sharing and campaign management.

This leads to missed opportunities and limits the utility's ability to reach a wider customer base (e.g. small commercial, small industrial and residential sectors).

3. Inflexibility of core systems to change and scale up to meet evolving needs, particularly in sectors like residential, small commercial and small industrial.

4. The existing systems are outdated and need to be upgraded with significant effort and resources in order to meet Canadian Anti-SPAM Legislation ("CASL"), Privacy and other IT security standards and policies.

5. The current SRM System is currently not compatible with existing Company non-DSM IT systems. Upgrading SRM to operate with its limitations beyond 2016 is cost prohibitive.

Activity	Total $ (Approx.)
Overdue Point Upgrade	$1.0M
Upgrade to Current Internet Explorer	$800k
Integration with MS Outlook	$600k
TOTAL	**$2.4M***

*High level estimates based on preliminary analysis.

The current IT systems that support the Company's DSM business functions are not capable of meeting the requirements of the OEB's new DSM Framework without a considerable investment in the upgrading and enhancement of these systems. The extent to which manual workarounds and ad hoc data gathering and reporting tools will be required to meet the new Framework's objectives will be extensive, costly and limit the Company's ability to meet these objectives.

Future State

In order to prepare for the new DSM Framework, the company has undertaken a process to identify and document current and future DSM IT System requirements resulting from the implementation of this framework. This work has highlighted the critical and urgent need to upgrade or replace the Company's current DSM IT Systems. It was recognized that minor enhancements and further customization of the existing DSM applications would prove inadequate to support Enbridge's DSM requirements moving forward.

Requirements of the new DSM Framework and the limitations and challenges of current systems are the driving forces behind the need to replace the current DSM Systems as explained below;

1. The Company anticipates a significant increase in the number of DSM programs, projects and program participants. The Company's current technology has been determined to be insufficient to meet the needs of the business. During the RFI process it became evident that current and future needs of the Company's DSM programs will require a significant step change that takes advantage of IT technologies now available that are built specifically for energy conservation program management.

2. In order to meet the requirements of the new DSM Framework, the Company will need the capability to identify and reach segments of the market that have not participated in conservation programs in the past. To do this will require technology that will enable advance lead creation and campaign management functionalities. Technologies currently in use are aging with limited support as they reach the end of their lifecycle and their ability to meet business requirements are severely limited.

3. New requirements, rules and calculations around conservation measures such as TRC Plus, Enhanced PAC, multi-year budget and savings calculations cannot be readily achieved through the use of the DSM IT systems now used by the Company.

4. As IESO/LDC system upgrade decisions are made with respect to DSM/CDM collaboration and the Company's new DSM IT System starts to take shape, it is a desired outcome that we have the capability to exchange data with the IESO and LDC's and other third parties to build complete energy consumption profiles for customer segments. Current systems utilized by Enbridge don't have the capacity to meet these needs.

Currently there is limited integration between the Company's various DSM related systems. This results in significant manual effort to reconcile data across multiple sources. Not only this is very inefficient but this also leaves opportunity for inconsistencies in reporting. As the Board proposes to be more involved in the Evaluation, Monitoring and Verification ("EM&V") process and with an expected increase in stakeholder involvement in the review/ audit process, the new DSM IT System will provide for a significant increase in the detail and frequency of the reports produced. Current systems are not equipped to handle these requirements. In addition to resolving the aforementioned limitations and

issues of the current applications, a future state solution(s) is/are expected to have the following capabilities;

1. A solution that is built on DSM/ Energy conservation platform will provide the necessary fit in terms of the functionalities offered. A solution of this type will also be more easily configurable, flexible, adaptable and scalable to meet changing DSM related business requirements as new programs are rolled out or changes are made to existing programs.

2. An integrated solution that connects various sources of information and provides business the ability to automate data quality/ integrity tests. This not only enables the utility to better identify customer segmentation and market potential but also ensures EM&V process is simplified, efficient and more accurate. As the Board proposes to play a larger role in EM&V process, the utility will be required to provide more and more timely data/ information. The efficiency and the accuracy of meeting these demands will require the capabilities of the new DSM IT System.

3. Ability to support advanced level of analytics and reporting. As the company moves further towards data driven decision making and targeted marketing in order to increase customer participation, it is crucial to have systems that are advanced and integrated and have the ability to handle increased needs in this area. The Company's new DSM IT System will provide for the consolidation of data from multiple sources, advanced and automated reporting, ad hoc querying and a more complete and enhanced view of the customer and the Company's interactions with them.

4. The new DSM IT System will have sufficient flexibility and synergies that will help promote and support DSM/CDM collaboration. Both the Independent Electricity System Operator ("IESO") and Union Gas Ltd. ("Union") are currently undertaking similar IT evaluation exercises and are finalizing plans to implement similar solutions.

5. Enable business to be "technology-ready" to respond to changes in DSM requirements and offer the reliability and performance required to handle large volumes of data and multiple user access. The Company's new DSM IT System will be user-friendly and accessible to increase efficiency and productivity. The system will be able to accommodate the implementation of new or modified DSM programs without major redesign or reprogramming.

6. The Company's new DSM IT System will support compliance with security, privacy, corporate & external governance & control requirements.

The new IT solution will not only enable Enbridge to meet the guidelines of the new DSM Framework but it will also provide several benefits to various stakeholders as summarized below.

1. Utilizing targeted microsites and portals the company can further enhance its ability to educate customers on DSM programs. Customer data can be accessed and used through these portals to determine eligibility and potential of participating in different programs. The proposed future state will potentially enable customers to view the status of their DSM applications, incentives, and participation history.

2. The audit process will be enhanced and made more efficient by integrating the systems that track and report DSM program related data.

3. Automated interfaces, centralized data depository and enhanced analytics will result in significant improvement in data quality and integrity.

4. The Company will be able to enhance the support it provides to business partners and DSM delivery agents. Business partners like builders and energy auditors will be able to streamline the exchange of their DSM-related data with Enbridge through a convenient, secure portal where they can learn more about DSM programs and leverage pre-built calculators and other tools to create leads and follow-up on them.

Conclusion

The overall conclusion of the exercise the Company has undertaken to assess the capabilities of its current IT systems used to support its DSM programs is that it would not be practical or cost effective to attempt to update and enhance these systems to the point where they provide required functionalities.

The DSM systems review undertaken by the Company highlights not only the need but also the criticality and urgency of updated technology. As part of the system review, the Company investigated the following solution vendors and their products.

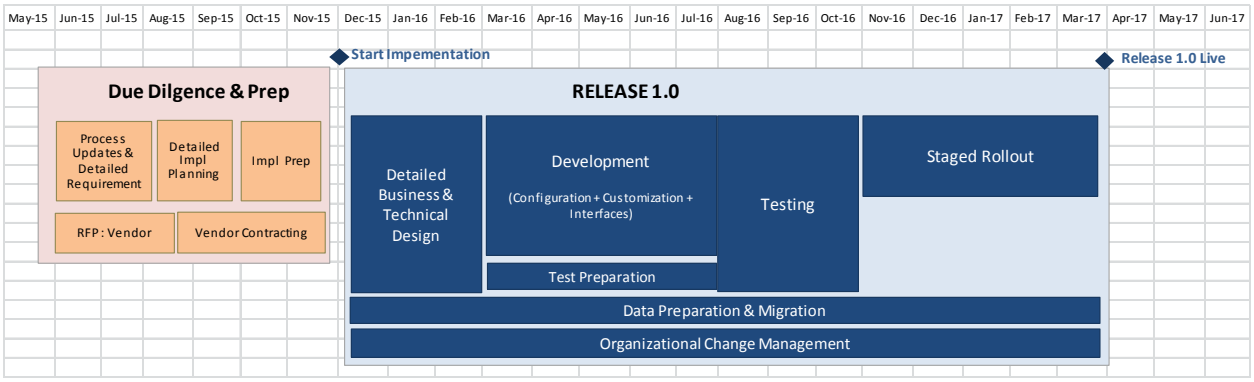
- Nexant Inc.
- Microsoft Dynamics
- Oracle Salescloud
- SalesForce
- Sugar CRM
- Energy Orbit
- ANB Systems
- CGI Technologies
- Energy Platforms
- SAP

Based on the timeline outlined in Chart 1, the Company should begin preparatory activities such as detailed system requirements gathering, design and the and vendor selection (RFP) process in 2015 in order to be in a position to utilize this new technology in early 2017. The proposed plan outlined below balances the multiple facets of a new system implementation, the need to maintain current technology in the interim, resource requirements and the preferred point in the calendar for the implementation of this system.

Filed: 2015-06-23
EB-2015-0049
Exhibit I.T3.EGDI.BOMA.20
Attachment
Page 6 of 7

Filed: 2020-10-07, EB-2020-0067, Exhibit I.SEC.4, Attachment 1, Page 6 of 7

Chart 1 – Release 1.0 Timeline



Currently, requirements and processes in Table 1 are in scope for the first release with the expected roll-out date of Q1 2017.

Table 1 – In-Scope – Release 1.0

DSM Program Research, Evaluation and Design
DSM Program Marketing
Account, Contact and Interaction Management
DSM Sales - Lead/Opportunity Management & Forecasting
Project Initiation & Program/Project Submission
Participant Validation
DSM Incentive Processing
DSM Tracking & Reporting (cost effectiveness screening and tests)
DSM Evaluation and Verification (support Audit process)
Market Segment Analysis and Prospecting

Detailed system requirements will be identified as the Company progresses through the “due-diligence” phase of Release 1.0. Also, as details of the new DSM Framework are finalized there will be additional functionalities required of the IT systems.

The implementation of Release 1.0 will provide the core platform to enable the Company to move forward with subsequent system releases that capture future business requirements as they become defined.

Table 2 - Out of Scope - Release 1.0

Collaboration Electric LDCs and CDM Programs
Green Button Initiative
Integrated Resource Planning Activities
Financing options such as On-Bill Financing
Fee for Service Model
Pay for Performance Model
Implementation of Behavioral Programs
External Audit Tool

Table 3 shows the high level budget estimate resulting from Enbridge's DSM System investigation for the implementation of Release 1.0. The Company expects to revisit the proposed budget of $5.2 million and the timeline as it embarks on the process of replacing its DSM IT Systems. At present Enbridge does not anticipate a significant increase in DSM O&M expenditures beyond those incurred today as a result of implementing a new system.

Table 3

Activity	Total $ (Approx.)
Due Diligence & Preparation	$600K
Release 1.0	$4.6M
TOTAL	**$5.2M***

* High level estimate. To be confirmed during the "Due-Diligence" phase and pending OEB decision.

Acronyms

CASL	Canadian Anti-Spam Legislation
CDM	Conservation and Demand Management
DARTS	Data Analysis Reporting and Tracking System
EM&V	Evaluation, Monitoring and Verification
LDC	Local Distribution Company
PAC	Participant Administration Cost
SRM	Stakeholder Relationship Management
TRC	Total Resource Cost

ENBRIDGE GAS INC.

Answer to Interrogatory from
School Energy Coalition ("SEC")

Interrogatory

Reference:

[Ex. B/3/1, p. 5 and C/3/1, p. 4]

Question(s):

Please confirm that the figures in Tables 2 and 3 in each case have not been audited or otherwise reviewed by any independent party.

Response:

Confirmed. In its Mid-Term Review Report, at section 5.3.2 the OEB stated that, "…the OEB will allow Enbridge Gas to use the DSMVA to track future financial commitments for programs with deferred customer incentives." As set out in its Application,[1]

> "Enbridge Gas has produced these tables consistent with section 5.3.2 of the OEB's Mid-Term Review Report and the OEB-approved DSMVA accounting orders as set out in the OEB's Decision and Order on Enbridge Gas's 2016 DSM Deferral and Variance Account Disposition Proceeding (EB-2018-0300/0301), Table 10.1 of the final 2017 DSM Annual Report and Table 4.8 of the final 2018 DSM Annual Report for the EGD rate zone include amounts for customer incentive spend deferred to future years for offerings where incentives are paid when future milestones/activities are reached."

Tables 2 (2017 DSM Deferred Incentives Schedule) and 3 (2018 DSM Deferred Incentives Schedule) were not reviewed by an independent party as there is no established obligation for such review. However, Enbridge Gas underwent an audit of its 2017 and 2018 DSM program years, wherein budget details included in the amounts

[1] Exhibit B, Tab 3, Schedule 1, pp. 4-5; Exhibit C, Tab 3, Schedule 1, pp. 3-4.

presented in the referenced tables was provided to the EC (an independent third-party). The total amounts for 2017 were also included in the draft 2017 Annual Report for the EGD rate zone, which the utility provided to OEB Staff and the independent Evaluation Contractor.

Enbridge Gas has identified an omission in the budget details originally provided to the EC for the 2018 DSM program year for the Union rate zones, in that they did not include the 2018 DSM Deferred Incentives.

ENBRIDGE GAS INC.

Answer to Interrogatory from
School Energy Coalition ("SEC")

Interrogatory

Reference:

[Ex. B/3/1, p. 7]

Question(s):

Please restate Tables 4 and 5 removing all impacts of the Home Energy Conservation Program in DSMIDA, DMSVA, and LRAMVA, including any budget transfers, incremental incentives, lost revenues, and increased costs.

Response:

Tables 4 and 5 have been restated below as Tables 1 and 2, respectively, removing all impacts of the Home Energy Conservation Program offer from 2017 and 2018 results and spend. No adjustment has been made to scorecard targets as a result of these adjustments as the Home Energy Conservation Program offer is part of an integrated scorecard and cannot simply be removed. Spend that was directly tracked as part of the Home Energy Conservation Program offer has been removed, however, spending that was not tracked at the program offer level, such as overheads, has been redistributed using the original methodology.

Table 1
2017 DSM Deferral and Variance Account Balances by Rate Class – EGD Rate Zone

Rate Class	DSMIDA	LRAMVA [1] [2]	DSMVA	TOTAL DEFERRAL/ VARIANCES
RATE 1	$0	N/A	($17,938,067)	($17,938,067)
RATE 6	$0	N/A	($705,585)	($705,585)
RATE 9	$0	$0	($454)	($454)
RATE 100	$0	$0	$0	$0
RATE 110	$0	($8,147)	$61,980	$53,832
RATE 115	$0	($990)	($625,171)	($626,162)
RATE 125	$0	$0	($17,031)	($17,031)
RATE 135	$0	$3,297	$231,122	$234,419
RATE 145	$0	($3,656)	($1,578,536)	($1,582,193)
RATE 170	$0	($880)	($2,093,066)	($2,093,946)
RATE 200	$0	$0	($5,904)	($5,904)
RATE 300	$0	$0	($1,135)	($1,135)
TOTAL	**$0**	**($10,377)**	**($22,671,849)**	**($22,682,226)**

1. Rate 1 and Rate 6 are not included in the LRAM amount as these rate classes are covered under the Average Use True-Up Variance Account (AUTUVA).

2. Rates 9, 125, 200 & 300 do not have any LRAM component in the rate allocation since customers in these rate classes are not eligible for DSM programs. These rate classes will however be subject to rate allocations for DSMVA and applicable DSMIDA related to Low Income Program.

Table 2
2018 DSM Deferral and Variance Account Balances by Rate Class – EGD Rate Zone

Rate Class	DSMIDA	LRAMVA [1] [2]	DSMVA	TOTAL DEFERRAL/ VARIANCES
RATE 1	$435,070	N/A	($19,920,099)	($19,485,029)
RATE 6	$516,762	N/A	($272,997)	$243,766
RATE 9	$66	$0	($63)	$4
RATE 100	$0	$0	$0	$0
RATE 110	$28,630	($13,513)	($638,057)	($622,939)
RATE 115	$8,157	($2,692)	($1,042,288)	($1,036,823)
RATE 125	$2,493	$0	($2,345)	$148
RATE 135	$13,199	$1,360	$282,983	$297,542
RATE 145	$17,000	$1,044	($965,504)	($947,460)
RATE 170	$5,029	($1,306)	($2,097,034)	($2,093,312)
RATE 200	$864	$0	($813)	$51
RATE 300	$166	$0	($156)	$10
TOTAL	**$1,027,437**	**($15,107)**	**($24,656,372)**	**($23,644,042)**

1. Rate 1 and Rate 6 are not included in the LRAM amount as these rate classes are covered under the Average Use True-Up Variance Account (AUTUVA).

2. Rates 9, 125, 200 & 300 do not have any LRAM component in the rate allocation since customers in these rate classes are not eligible for DSM programs. These rate classes will however be subject to rate allocations for DSMVA and applicable DSMIDA related to Low Income Program.

ENBRIDGE GAS INC.

Answer to Interrogatory from
School Energy Coalition ("SEC")

Interrogatory

Reference:

[Ex. B/3/1/A1, p. 1]

Question(s):

Please confirm that, for an average school with annual volume of 40,000 m^3, the one-time charge is expected to be $66. Please confirm that, for the approximately 3,000 schools in the Enbridge franchise area, the expected one-time charge is about $200,000. Please calculate how much is currently included in annual rates for the DSM programs for these 3,000 schools assuming that consumption level.

Response:

The one-time adjustment for a Rate 6 customer in the EGD rate zone consuming 40,000 m^3 of natural gas per year is a refund of approximately $66 (not a charge) related to the clearance of 2017/2018 DSM deferral and variance account balances.[1]

The expected one-time adjustment for approximately 3,000 schools, each consuming the annual volume of 40,000 m^3, in the EGD rate zone is a total refund of $198,117 (approximately $200,000).

For Rate 6, the current OEB-approved DSM unit rate for 2020 is 0.4351 cents/m^3. The DSM cost for a school using 40,000 m^3 per year is approximately $174.[2] The total DSM cost for 3,000 schools, each consuming the annual volume of 40,000 m^3, is approximately $522,120.[3]

[1] The calculation is based on the unit rate of (0.1651) cents/m^3 multiplied by 40,000 m^3.
[2] 0.4351 cents/m^3 x 40,000 m^3.
[3] 0.4351 cents/m^3 x 40,000 m^3 x 3,000.

ENBRIDGE GAS INC.

Answer to Interrogatory from
School Energy Coalition ("SEC")

Interrogatory

Reference:

[Ex. C/3/1. p. 3]

Question(s):

Please provide the case reference for the Applicant's Board authority to pay for the IRP study using a budget transfer. Please provide a detailed statement of the costs that are included in the claim, including a copy of the contract with, and invoice from, any consultant used in the study who billed more than $200,000. Please confirm that this claim has not been audited by the EC or any other independent party.

Response:

Enbridge Gas notes that the question is essentially the same as one posed by SEC in Enbridge Gas's 2016 DSM Deferral and Variance Account Clearance proceeding for the Union rate zones (EB-2018-0300).[1] The response provided by Enbridge Gas (Union) was:

> The OEB directed the utilities to undertake these studies in Sections 1.3 and 13.0 of its 2015-2020 Natural Gas DSM Framework (EB-2014-0134). Accordingly, Union's 2015-2020 DSM Plan application (EB-2015-0029) included "incremental budget" in 2015 for these studies.[2] The OEB subsequently approved Union's proposed 2015 DSM budget as filed.[3] While no costs were incurred for either study during 2015, Enbridge Gas is seeking recovery of the 2016 costs incurred through the DSMVA in this proceeding. In its decision on EB-2015-0029, Section 16, the OEB endorsed the DSMVA as the appropriate mechanism to track variances from budgeted expenditures for these types of costs.

[1] EB-2018-0300, Exhibit C.SEC.Union.27, February 19, 2019.
[2] EB-2015-0029, Exhibit A, Tab 2, pp. 6-7.
[3] EB-2015-0029/0049, Decision and Order, January 20, 2016, pp. 56-57.

As noted at Exhibit A, Tab 3, p. 8, spending continued on the IRP Study in 2017 and Enbridge Gas expects to seek recovery of these costs through the DSMVA as part of its 2017 Disposition of DSM Deferral and Variance Account Balances proceeding.

The background and references previously provided remain valid. The one deviation from what was previously stated was that instead of seeking to recover Integrated Resource Planning ("IRP") Study related costs through the DSMVA, a Budget Transfer from the Pilot budget was utilized to support IRP Study related costs.

Table 1 contains a detailed statement of costs associated with this claim for the Union rate zones.

Table 1:
2017-2018 IRP Study Costs: Union Rate Zones

	2017	**2018**
Consulting - ICF	$190,000.00	$22,763.85[4]
Advertising & Promotion[5]	$2,232.72	$50,724.67
Incentives[5]	-	$6,000.00
Market Research[5]	-	$2,975.00
	$192,232.72	$82,463.52

While not specifically requested by SEC as part of this interrogatory, Table 2 contains a detailed statement of costs associated with the IRP Study for the EGD rate zone. The costs set out in Table 2 for the EGD rate zone were paid from the OEB-approved 2017 and 2018 DSM Evaluation Budget.

[4] 2018 amount includes $2,618.85 of tax in error, which was corrected in 2019.
[5] In addition to the IRP Study being addressed in this claim, costs associated with supporting the Ingleside IRP Case study in the Union rate zones were also accounted for.

Table 2:
2017-2018 IRP Study Costs: EGD Rate Zone

	2017	2018
Consulting - ICF	$190,000.00	$20,145.00
	$190,000.00	$20,145.00

As the IRP Study and associated analysis completed by ICF for EGD and Union was the first of its kind for natural gas utilities in North America, ICF's original estimated cost for its services set out in Attachment 1 did not reflect all required analysis and coordination with EGD and Union staff. Final costs for ICF's work to complete all necessary aspects of the ICF Study are reflected in the totals set out in Tables 1 and 2 for 2017 and 2018, respectively.

To the best of Enbridge Gas's knowledge this claim has not been reviewed by an independent third-party as there is no established obligation for such review. However, the utility underwent an audit of its 2017 and 2018 DSM program years, wherein total spending amounts were provided to the Evaluation Contractor (an independent third-party).

Please find attached both the contract and invoices associated with the claim for the consultant that billed more than $200,000 over the period in question (ICF), as Attachments 1 and 2 respectively.[6]

[6] The names of specific parties to related agreements, personal signatures and banking information has been redacted.

CONSULTING AGREEMENT

THIS AGREEMENT made effective October 31, 2016.

B E T W E E N :

ENBRIDGE GAS DISTRIBUTION INC.
("Enbridge")

– and –

UNION GAS LIMITED
("Union")

(Enbridge and Union are each referred to herein as a "**Utility**", and collectively referred to herein as the "**Utilities**")

– and –

ICF CONSULTING CANADA, INC.
(the "Consultant")

WITNESSES THAT in consideration of the mutual covenants and agreements herein contained, the parties hereto covenant and agree as follows:

1. Scope of Services

(a) The Consultant is being retained jointly by the Utilities as an independent consultant to complete the scope of work as more particularly described in this Agreement.

(b) During the term hereof (as hereinafter defined), the Consultant shall provide consulting services to the Utilities, on the terms and conditions set out in this Agreement.

(c) The scope of work for specific projects to be undertaken by the Consultant will be described in separate schedules referencing this Agreement, each of which shall become effective, be incorporated by reference and form an integral part of this Agreement upon the execution of each such schedule by each of Enbridge, Union and the Consultant. The schedule for each project will specify the names of key individuals, scope of consulting services, deliverables, commencement and completion dates, rate of compensation and payment terms applicable to such project. Each schedule described above shall be prepared using a form similar to the attached Schedule "A".

(d) In addition to the consulting services to be performed as described in this Agreement, the Consultant may be required to perform additional services and/or participate in, or attend, meetings and committees arising from or in relation to, the Utilities' Integrated Resource Planning "IRP" activities before the OEB, including responding to information or other requests, as reasonably directed by the Utilities. The Consultant further agrees to provide written and/or oral testimony before the OEB, when requested by either or both of the Utilities, the OEB or as required at law. In the event that the Consultant is directed or required to participate in any meetings, committees or matters before the OEB (including testifying as a witness), at the request of the OEB, in consideration for same the Utilities shall reimburse the Consultant for its reasonable rates and costs arising from such participation, including all reasonable expenses. The Consultant shall, at the request of the Utilities, provide a budget for the anticipated costs of the Consultant's additional services.

2. Compensation & Cost Sharing

(a) In consideration of the consulting services and deliverables to be provided by the Consultant hereunder, and provided that the Consultant is not in default of its obligations hereunder, Enbridge and/or Union shall remit to the Consultant all amounts required to be paid in accordance with Schedule A and Attachment 1 to this Agreement which detail the tasks, deliverables and amounts payable in respect of each deliverable received from the Consultant All invoices issued by the Consultant in respect of the consulting services and deliverables contemplated herein shall be submitted to, and be in a form satisfactory to the Utilities.

(b) Responsibility for all compensation remitted to the Consultant, including for greater certainty, such compensation contemplated in Section 6, shall be borne equally jointly and severally between Enbridge and Union, unless the Utilities jointly consent by written agreement between same, that a different apportionment shall apply, and such written agreement is provided to the Consultant and included in the applicable schedule.

(c) Consultant shall be responsible for charging, collecting and remitting all applicable federal and provincial sales, use and value-added taxes in respect of the fees paid or payable to Consultant and, in particular, the goods and services tax ("GST") and harmonized sales tax ("HST") imposed under Part IX of the *Excise Tax Act* (the "ETA"), the Québec sales tax ("QST") imposed under an *Act respecting the Québec Sales Tax* (the "QSTA") and any provincial sales taxes ("PST"); and such taxes, if applicable, shall be shown separately on all invoices. Where Consultant is required to collect any GST/HST, QST or similar tax, Consultant shall provide the Utilities with the documentary evidence as prescribed pursuant to the ETA or QSTA, any successor provision thereto or any similar provision of any other taxing statute as is required to entitle each of the Utilities to claim an input tax credit, input tax refund, rebate, refund or any other form of relief in respect of such taxes.

(d) In the event Consultant is a non-resident of Canada and has not obtained and provided to the Utilities a non-resident withholding tax waiver at such time as any payment contemplated herein is made to Consultant for the services rendered by it to the Utilities in Canada, the Utilities shall each withhold such percentage of any payment made by it for the consulting services as is from time to time mandated under the *Income Tax Act* (Canada) (the "ITA") and shall each remit (as applicable) the withheld amount to Canada Revenue Agency in the manner and at the time required by the ITA. In the event that Enbridge or Union is assessed for any non-resident withholding taxes payable, Consultant agrees to forthwith reimburse Enbridge and Union for such amount together with applicable interest and penalties, if any.

(e) In recognition of the fact that Union is subject to certain United States tax reporting requirements for specified payments to specified persons, Consultant shall immediately (a) provide any information in this regard requested by Union including residency, legal status, and location of provision of goods or services, and (b) fill out and return to Union or Union's designated agent any applicable US tax form. Failure to provide information or to fill out and return any forms required hereunder may result in a withholding of applicable US taxes from any future payments made to Consultant and/or termination of this agreement without further notice. Notwithstanding Consultant's compliance with the foregoing, withholding will be applied to any invoice if Union is directed to make such withholding by Canadian or US tax authorities.

3. Term

Subject to earlier termination as provided for herein, the term of this Agreement shall commence on the day set forth above and expires on December 31, 2020 (hereinafter the "Term").

4. Termination

(a) The Utilities may terminate this Agreement or any schedule to this Agreement for convenience upon giving two (2) weeks written notice to the Consultant, with such notice being signed by a signatory from each of Enbridge and Union with such notice being signed by a signatory from each of Enbridge and Union.

(b) The Utilities or the Consultant may terminate this Agreement in case of a breach by the other party or parties of its obligations hereunder, provided that the breach is not cured within five (5) days of written notification by the non-defaulting party to the defaulting party setting out the particulars of the breach.

(c) Any party may terminate this Agreement upon written notice to the other parties, if: (i) another party is subject to proceedings in bankruptcy, or insolvency, whether voluntary or involuntary, (ii) a receiver is appointed in respect of all or a substantial portion of a party's assets; or (iii) a party assigns its property to its creditors or generally becomes unable to pay its debts as they become due.

Upon any termination of this Agreement, the Consultant shall deliver to the Utilities the results of all consulting services provided as of the date of termination, including completed or uncompleted deliverables for which payment has been received in accordance with the terms of this Agreement. In respect of partially completed tasks, the Utilities shall remit to Consultant that percentage of the amount payable for the completion of the task/deliverable as set out in Schedule A and Attachment 1 to this Agreement which equals the percentage demonstrably completed by the Consultant of the task/deliverable.

5. Reimbursement for Expenses

In addition to the payments to be made pursuant to Section 2 hereof, the Utilities shall reimburse the Consultant for all reasonable expenses properly incurred by the Consultant in connection with the consulting services provided hereunder and that have been pre-approved by both of the Utilities in writing, including, without limitation, reasonable travel and other costs and expenses in connection therewith. Concurrently with its delivery of invoices to the Utilities as contemplated by Section 2 hereof, the Consultant shall submit to both the Utilities invoices and statements setting out in reasonable detail the nature and amount of the expenses or costs incurred by the Consultant for which the Consultant claims reimbursement, and the Utilities shall within thirty (30) days of the receipt of such invoices and statements reimburse the Consultant for all approved invoiced expenses and costs. The Consultant shall provide to the Utilities copies of all documentation in support of invoiced expenses as may be requested from time to time during the Term hereof.

6. Independent Contractor

Notwithstanding anything to the contrary herein contained, the Consultant shall not, for any purpose, be or be deemed to be an employee of either Utility during the Term or at any time during which the consulting services described in Section 1 hereof are provided nor shall anything in this Agreement create or be construed for any purpose as creating any relationship between a Utility and the Consultant of employer and employee. Except as expressly provided herein, neither Utility shall be liable to contribute to any employee benefit or pension plan or pay premiums for any policy or form of insurance whatsoever on behalf of the Consultant nor to pay any amounts or premiums on its behalf in respect of the Canada Pension Plan, Ontario Health Insurance Plan, Workplace Safety and Insurance Board or Employment Insurance, nor to deduct or withhold from source any amount from amounts payable by the Utility to the Consultant hereunder in respect of any income tax obligation or liability payable by the Consultant to the Canada Revenue Agency. The Consultant agrees to indemnify and hold the Utilities harmless from and against any order, penalty, interest or tax that may be assessed or levied against a Utility as a result of the failure or delay of the Consultant to file any return or information required to be filed by the Consultant by any law, ordinance or regulation relating to the consulting services performed by the Consultant herein.

7. Confidential Information and Personal Information

(a) For the purposes of this Section 7, the following definitions will apply:

(i) "Confidential Information", means all information pertaining to the business and affairs of the Utilities, their respective affiliates and subsidiaries, whether oral or written, furnished by the Utilities to the Consultant, its employees and representatives, whether furnished or prepared before or after the date of this Agreement, and includes all analysis, compilations, data, studies, reports or other documents prepared by the Consultant based upon or including any of the information furnished by the Utilities, which shall include the Work Product, but does not include information which:

1. is at the time of disclosure or thereafter becomes generally available to the public other than as a result of disclosure by the Consultant or anyone to whom the Consultant transmits the information;

2. is at the time of disclosure or thereafter becomes known or available to the Consultant on a non-confidential basis and not in contravention of applicable law from a source other than a Utility that is entitled to disclose the information; or

3. is already in the possession of the Consultant or is lawfully acquired, provided that such information is not subject to another confidentiality agreement with, or obligations of secrecy to any one or both of the Utilities.

(ii) "Person" includes individuals, partnerships, firms and corporations.

(b) Each Utility is furnishing the Confidential Information to the Consultant solely for the purpose of assisting the Consultant in the performance of consulting services which the Consultant provides pursuant to this Agreement. The Consultant shall not use the Confidential Information for any purpose other than the performance of these consulting services.

(c) The Confidential Information is the property of the Person disclosing same, or that Person's employer or organization, as the case may be (the "Information Property-Holder"), whether such Confidential Information is solely furnished to the Consultant by the Utilities, whether individually or collectively. Any Confidential Information disclosed or furnished by a Utility to the Consultant may be shared and furnished to the non-furnishing Utility.

(d) The Consultant acknowledges that the Confidential Information is confidential and material to the interests, business and affairs of the Information Property-Holder and that disclosure thereof would be detrimental to the interests, business and affairs of the Information Property-Holder. Accordingly, each of the Utilities and the Consultant agrees that it shall maintain the confidentiality of the Confidential Information and that it shall not disclose the Confidential Information to any Person for any reason whatsoever except as expressly provided herein.

(e) The Consultant may disclose Confidential Information to the extent required by a court of competent jurisdiction or other governmental or regulatory authority or otherwise as required by applicable law, provided that the Consultant first gives the Information Property-Holder prompt written notice (except where the governmental or regulatory authority has expressly ordered that no notice be given) and co-operates with and assists the Information Property-Holder in responding to the request or demand for disclosure.

(f) Except with the prior written consent of the Information Property-Holder the Consultant shall not make or cause to be made any copies of the Confidential Information.

(g) The Consultant acknowledges and agrees that the Utilities may be irreparably harmed if any provision of this Agreement relating to Confidential Information is not performed by the Consultant in accordance with its terms. Accordingly, each of the Utilities shall be entitled to seek an injunction or injunctions to prevent breaches of any of the provisions of this

Agreement and may specifically enforce such provisions by an action instituted in a court having jurisdiction. These specific remedies are in addition to any other remedy to which any Utility may be entitled at law or equity.

(h) If in the course of performing consulting services hereunder, the Consultant obtains or accesses personal information about an individual, including without limitation, a customer, potential customer or employee or contractor of a Utility ("Personal Information") the Consultant agrees to treat such Personal Information in compliance with all applicable federal or provincial privacy or protection of personal information laws and to use such Personal Information only for purposes of providing the consulting services hereunder. Furthermore, the Consultant acknowledges and agrees that it will:

(i) not otherwise copy, retain, use, modify, manipulate, disclose or make available any Personal Information, except as required by applicable law;

(ii) establish or maintain in place appropriate policies and procedures to protect Personal Information from unauthorized collection, use or disclosure;

(iii) implement such policies and procedures thoroughly and effectively;

(iv) except as required for purposes of providing the consulting services hereunder, will not develop or derive, for any purpose whatsoever, any products in machine-readable form or otherwise, that incorporates, modifies, or uses in any manner whatsoever, any Personal Information; and

(v) upon completion of its consulting services for or on behalf of the Utilities, will at the direction of the Utilities: A. return; or B. destroy all Personal Information and all copies and records thereof in its possession not subject to routine data backups.

(i) The Consultant shall comply with confidentiality restrictions arising from the all relevant Rules, Codes and Directives issued by the OEB and pursuant to any applicable law (including, without limitation, the *Gas Distribution Access Rule)*, and the Consultant agrees to execute, and to require its employees and personnel to execute, any confidentiality or non-disclosure agreement(s) as may be requested in relation to the foregoing.

8. Indemnification

The Consultant hereby agrees to and shall:

(a) be liable to each of the Utilities, their affiliated and subsidiary companies and their respective directors, officers, agents, and employees (the "**Indemnitees**") for all claims, liabilities, damages, costs, losses and expenses whatsoever which the Indemnitees may suffer, sustain or incur; and

(b) indemnify and save harmless each of the Indemnitees from and against any and all liabilities, claims, demands, damages, loss, costs and expenses (including without limitation all applicable solicitors' fees, court costs and disbursements, investigation expenses, adjusters' fees and disbursements) to or which any third party may suffer, sustain or incur,

in respect of all matters or anything which may arise out of any act or omission directly or indirectly related to any breach of this Agreement by the Consultant, its employees or representatives.

9. Work Product

(a) For the purposes of this Agreement, "Work Product" shall include any of the following, which are developed in the course of or arise from the consulting services provided by

the Consultant hereunder throughout the Term: (i) any deliverables produced under any schedule to this Agreement together with any and all notes, reports, research information, compilations, data specifications, designs, programs, documentation, software (including object code and source materials), development tools, products and other materials or things; (ii) any and all knowledge, know-how, techniques, inventions, processes, trade secrets, methodologies, approaches and other intangible intellectual property rights; and (iii) all designs, patent applications, issued patents, industrial design registrations, design patents, trade-mark applications, registered trade-marks and copyright which may relate thereto.

(b) For the purposes of this Agreement, "Consultant Materials" comprises any of the following, which were developed by the Consultant, at its own cost and expense in advance of and independent of this Agreement and as proven by the Consultant to be the case in the event of a dispute concerning the same: (i) any and all notes, research, information, data, specifications, designs, programs, documentation, software (including object code and source materials), development tools, products and other materials or things; (ii) any and all knowledge, know-how, techniques, inventions, processes, trade secrets, methodologies, approaches and other intangible intellectual property rights; and (iii) all designs, patent applications, issued patents, industrial design registrations, design patents, trade-mark applications, registered trade-marks and copyright which may relate thereto.

(c) All right, title and interest in and to the Work Product shall be the joint property of Enbridge and Union. The Consultant shall ensure that any agent or employee of the Consultant shall have waived in writing all of his or her moral rights over any such Intellectual Property. During and after the Term of this Agreement, the Consultant shall from time to time as and when requested by the Utilities execute all papers and documents and perform other acts as necessary or appropriate to evidence or further document the Utilities' ownership of the Work Product and the intellectual property rights therein.

(d) The Consultant acknowledges that the Work Product and any related information or materials may be disclosed to the general public or to third parties, without any consent of, or prior notice to, the Consultant.

(e) The Consultant retains all right, title and interest in and to the Consultant Materials. The Consultant hereby grants to each of the Utilities a non-exclusive, perpetual, irrevocable, non-terminable, transferable, assignable and royalty-free license to copy, disclose, use, operate, maintain, repair, modify, enhance, make derivative works, license, sub-license and otherwise commercially exploit without limitation or restriction those Consultant Materials used in connection with the delivery of the consulting services or to the extent contained within any Work Product.

(f) The Consultant agrees to fully indemnify and hold harmless each of the Indemnitees from and against any and all: (i) claims, demands and actions; (ii) liabilities, damages or losses awarded by a court of competent jurisdiction or as agreed to as part of a settlement; and (iii) litigation costs and/or expenses (including reasonable legal fees and disbursements) reasonably incurred by any of the Indemnitiees in connection with any claim that the consulting services or Work Product provided hereunder infringe any patent, copyright, trade secret or other right of any third party.

10. Responsibility for Defects

The Consultant shall forthwith, at no cost to the Utilities, remedy any defect in the services caused by the negligent act or omission of the Consultant or by any failure on the part of the Consultant to carry out the services in accordance with the provisions of this Agreement. The Utilities each reserve the right to deduct that portion of fees for which the consulting services were deemed to not comply with the request to remedy.

11. Representations and Warranties

(a) The Consultant represents, warrants and covenants that: (i) it will perform all consulting services in a good and workmanlike manner using reasonable care (at a level that is at least consistent with industry standards for the provision of similar services) and in accordance with the terms of this Agreement; (ii) it possesses the knowledge, skill and experience necessary for the provision and completion of the consulting services in accordance with the terms of this Agreement; and (iii) any deliverables provided hereunder shall conform to their relevant specifications as described in the applicable schedule.

(b) The Consultant agrees that under no circumstances will it interface a computing device (including without limitation desktops, laptops, handheld device) with a Utility's intranet or internet without obtaining the prior written approval of the Utility. To the extent the deliverables produced hereunder involve the provision or development of any software application, interface or electronic data, the Consultant shall use commercially reasonable efforts to prevent the introduction of any virus to the hardware and computer systems upon which the application, interface or electronic data are to be installed. During the Term of this Agreement, the Consultant shall implement and run virus prevention and detection control procedures in accordance with industry standards.

(c) In addition to the policies described in Section 25, the Consultant shall ensure that it is familiar with and understands all of Enbridge's and Union's current policies, procedures and standards that are pertinent to the activities associated with the consulting services and which have been provided to the Consultant in advance of the execution of this Agreement.

12. Conflicts of Interest

The Consultant covenants and agrees that it is not aware of the existence of any relationship, family, business, contractual or otherwise, between themselves, their principals, officers or employees and Enbridge or Union, or the directors, officers or employees of Enbridge or Union; and it will not perform any services for or enter into any contract with others that may conflict with its contractual, professional, equitable or other obligations to the Utilities without first obtaining the written approval of both of Enbridge and Union.

13. Subcontractors

The Consultant shall not enter into any agreement with any other party to assist in the provision of the consulting services described in Section 1 hereof (hereinafter described as a "Subcontract") nor shall the Consultant allow any other party to perform such consulting services or any part thereof without first obtaining the consent in writing of the Utilities, which consent may be withheld by the Utilities, acting reasonably. Notwithstanding any approval or consent that may be provided by the Utilities in connection with any Subcontract, the Consultant shall not be relieved of any of its liabilities and responsibilities hereunder. Any party which enters into a Subcontract with the Consultant shall be required by the terms of such Subcontract to comply with and be bound by the obligations and responsibilities of the Consultant described hereunder and without restricting the generality of the foregoing, any Subcontract which has been entered into without the prior written consent of the Utilities shall be null and void and without force and effect.

14. Insurance

Save and except where the Utilities jointly specify otherwise in writing, the Consultant shall at its own expense maintain and keep in full force and effect during the Term hereof and for a period of two (2) years following the expiry of the Term or other termination of this Agreement:

(a) Commercial General Liability insurance having a minimum inclusive coverage limit, including personal injury and property damage, of at least Two Million Dollars ($2,000,000) per occurrence. Enbridge Gas Distribution Inc. and Union Gas Limited must each be listed as a certificate holder and be added as an additional insured in the insurance policy, which should be extended to cover contractual liability, products/completed operations liability, and must also contain a cross liability clause;

(b) Non-Owned Automobile Liability insurance and such insurance shall have a limit of at least Two Million Dollars ($2,000,000) in respect of bodily injury (including passenger hazard) and property damage, inclusive in any one accident;

(c) Professional Liability or Errors and Omissions insurance and such insurance shall have a limit of at least Two Million Dollars ($2,000,000); and

(d) such other insurance as the Utilities may in their discretion jointly determine to be necessary and agreed to by Consultant.

All of the above policies provided should be primary for all purposes, without right of contribution from any other insurance available to the Utilities. The Consultant shall forthwith after entering into this Agreement, and from time to time thereafter at the request of the Utilities, furnish to each of the Utilities a memorandum of insurance or an insurance certificate setting out each policy type of insurance, policy period, and limits (all such policies of insurance being hereinafter described as the "Insurance Policies") maintained by the Consultant in order to satisfy the requirements of this section. At any time and from time to time at the request of the Utilities, the Consultant shall furnish the Utilities with one or more duly completed insurance certificates in the form requested by the Utilities to evidence the details of all the Insurance Policies. The Insurance Policies shall be arranged with insurers acceptable to the Utilities, acting reasonably, and shall contain such terms and conditions as are reasonably acceptable to the Utilities. The Consultant shall not cancel, terminate or materially alter the terms of any of the Insurance Policies without giving prior notice in writing to the Utilities. The Consultant provide in writing to Enbridge and Union fifteen (15) days prior notice in writing before cancelling, terminating or materially altering the Insurance Policies under which it is an insurer.

15. Compliance with Law

The Consultant agrees to comply with the *Occupational Health and Safety Act* (Ontario) and the *Workplace Safety and Insurance Act* (Ontario), the *Gas Distribution Access Rule* and with all other prevailing federal, provincial and municipal laws and regulations or any other laws or regulations in force in any jurisdiction where the consulting services are performed (the "Laws") and which are applicable to the Consultant, its subcontractors and the consulting services provided hereunder, and the Consultant shall familiarize itself and procure all required permits and licenses and pay all charges and fees necessary or incidental to the due and lawful prosecution of this Agreement and shall indemnify and save harmless the Utilities and their directors, officers, agents and employees thereof against any claim or liability from or based on the violation of any Laws, whether by the Consultant, its officers, employees, subcontractors, representatives or agents. The Consultant shall, from time to time, if requested by a Utility, furnish the Utility with evidence of such compliance, and in particular, evidence from the Workplace Safety and Insurance Board, or the equivalent thereof in any jurisdiction where the consulting services provided hereunder are carried out, that the Consultant and any party with which it has entered into a Subcontract are in compliance with and have paid all assessments and other amounts owing pursuant to the workers' compensation legislation of such jurisdiction.

The Utilities are committed to compliance with the *Accessibility for Ontarians with Disabilities Act, 2005* and O.Reg. 429/07, the Accessibility Standards for Customer Service (collectively the "AODA"). In its delivery of services on behalf of the Utilities, the Consultant shall comply with the AODA. The Consultant shall satisfy each of the Utilities as to its compliance with the AODA and shall permit the Utilties to monitor its compliance. If requested to so, the Consultant shall provide the Utilities with copies of its policies, practices and procedures, training materials and dates of training, and confirmation the Consultant has reported its compliance to the Ministry of Community and Social Services.

16. Waiver

Any party may, in writing, extend the time for performance by the other and waive non-compliance or non-performance by the another party of any of the other's obligations, covenants and agreements under this Agreement and any compliance therewith or performance thereof. However, no such extension or waiver shall operate so as to waive, diminish or reduce the scope of or otherwise affect any obligation, covenant or agreement of such other which is not the subject matter of such extension or waiver or, except to the extent of such extension or waiver, of the obligation, covenant and agreement which is the subject matter of such waiver. No act or failure to act of a party shall be or be deemed to be an extension or waiver of timely or strict performance by the other of the other's obligations, covenants and agreements under this Agreement except to the extent notice thereof is given to the other.

17. Notice

Any notice or other communication to be given under or pursuant to the provisions hereof or in any way concerning this Agreement shall be sufficiently given if reduced to writing and delivered to the person to whom such communication is to be given or sent by facsimile or electronic internet communication, addressed to such person at the address set forth below:

If to Enbridge:

ENBRIDGE GAS DISTRIBUTION INC.
Suite 410, 2255 Sheppard Avenue East
North York, ON M2J 4Y1
Attention: [redacted], Integrated Planning Lead
Phone: [redacted]
[redacted]@enbridge.com

With a copy to: Law Department
Facsimile: [redacted]

If to Union:

UNION GAS LIMITED
777 Bay Street, Unit 2901, Box 153
Toronto, Ont. M5G 2C8
Attention: [redacted] Senior Advisor, DSM Strategy
Phone: [redacted]
[redacted]@uniongas.com

If to the Consultant:

ICF CONSULTING CANADA, INC.
277 Wellington Street West, Suite 808
Toronto, ON M5V 3E4
Attention: [redacted], Vice President
Phone: [redacted]
[redacted]@icfi.com

or at such other address as may be specified therefor by proper notice hereunder. A notice or communication shall be deemed to have been sent and received on the day it is delivered personally or by courier or by facsimile or by electronic internet communication. If such day is not a business day or if the notice or communication is received after 5:00 PM (at the place of receipt) on any business day, the notice or communication shall be deemed to have been sent and received on the immediately following business day.

18. Interpretation

This Agreement shall be governed by and construed in accordance with the laws of the Province of Ontario and the laws of Canada applicable therein. Headings used herein are for the convenience of reference only and shall not be considered in construing or interpreting this Agreement. The words "herein", "hereunder", "hereof" and other similar words refer to this Agreement as a whole and not to any particular paragraph. Any provision herein prohibited by law shall to the extent prohibited be ineffective without invalidating any other provisions hereof. All references to amounts of money in this Agreement and any schedule shall mean lawful currency of Canada.

19. Assignment

The Consultant may not assign this Agreement in whole or in part without the express prior consent in writing of both of Enbridge and Union. Enbridge or Union may assign this agreement with the express prior written consent of the other party, and by providing notice to the Consultant. This Agreement shall be binding upon and endure to the benefit of the successors and assigns of Enbridge and Union.

20. Use of Enbridge or Union Name and Logo

The Consultant shall not use or display a Utility's name or any symbols, signs, trademarks and other marks denoting and identifying the Utility in any manner whatsoever without the prior written authorization of the Utility.

21. Time of Essence

Subject to a Force Majeure Event (as defined in Section 28), time shall be of the essence in the performance of the consulting services in this Agreement.

22. Survival

All warranties and indemnities contained in this Agreement, and the obligations contained in Section 8, shall survive the termination of this Agreement irrespective of the time of or party responsible for such termination, and such warranties, indemnities and obligations shall remain in full force and effect and be binding on the Contractor notwithstanding such termination.

23. Further Assurances

Each of the parties shall, from the time of the written request of the other party, do all such further acts and execute and deliver or cause to be done, executed or delivered all such further acts, deeds, documents, assurances and things as may be required, acting reasonably, in order to fully perform and to more effectively implement and carry out the terms of this Agreement.

24. Entire Agreement

This Agreement, including any schedules attached hereto, constitutes the entire agreement between the parties with respect to the subject matter set out herein and replaces any prior understandings or agreements, whether written or oral, regarding such subject matter. No change or modification of this Agreement is valid unless it is in writing and signed by both parties. No disclaimers, purchase order documents, invoices or other documents of the Consultant shall be binding upon the Utilities.

25. Audit

The Consultant shall, following no less than seven (7) business days advance notice in writing, provide to such auditors (including external auditors and the internal audit staff or agents of the Utilities or the OEB) as the Utilities may jointly designate in writing, or the OEB may order, supervised access to the data, records and supporting documentation maintained by the Consultant with respect to the Consulting Services solely for the purpose of: (i) performing audits and inspections to enable Enbridge, Union or the OEB to satisfy applicable regulatory requirements or certify compliance with applicable laws; and (ii) to confirm that the consulting services are being provided in accordance with the terms of this Agreement. The Utilities and their auditors shall use commercially reasonable efforts to conduct such audits in a manner that will result in a minimum of inconvenience and disruption to the Consultant's business operations.

26. Enbridge and Union Policies

The Consultant acknowledges receipt of a copy of each of Enbridge Inc.'s Statement on Business Conduct for Enbridge Inc. and its Subsidiaries and Lifesaving Rules, each as amended from time to time (the "Enbridge Policies"). The Consultant hereby acknowledges receipt of the Spectra Energy Code of Business Ethics (the "Union Policies"). The Consultant agrees to comply with each of the Enbridge Policies and the Union Policies and any other workplace rules of both Union and Enbridge in connection with its delivery of the consulting services described in this Agreement, and agrees that, if requested by Enbridge, it will ensure all personnel delivering the consulting services herein attend training on the Lifesaving Rules.

27. ISNetworld Requirement

If required by Enbridge, the Consultant shall be a registered and subscribing member of ISNetworld (www.isnetworld.com) or any successor service (the "ISNetworld Requirement") and shall: (a) upon request, promptly provide documentation and evidence substantiating compliance with the ISNetworld

Requirement; and (b) maintain compliance with the ISNetworld Requirement during the Term of this Agreement.

28. Force Majeure

(a) Neither the Utilities nor Consultant shall be liable for any failure or delay in the performance of its obligations under this Agreement to the extent such failure or delay both:

(i) is caused, directly or indirectly, without fault by the Utilities or Consultant, by: fire, flood, earthquake, elements of nature or acts of God; third party labour disruptions, acts of war, terrorism, riots, civil disorders, rebellions or revolutions; quarantines, embargoes and other similar governmental action; or any other similar cause beyond the reasonable control of the Utilities or Consultant; and

(ii) could not have been prevented by reasonable precautions and cannot reasonably be circumvented by the non-performing party through the use of alternate sources, workaround plans or other means.

Events meeting both of the criteria set forth in clauses (i) and (ii) above are referred to collectively as "Force Majeure Events".

(b) Upon the occurrence of a Force Majeure Event, the non-performing party shall be excused from any further performance or observance of the affected obligation(s) for as long as such circumstances prevail and such party continues to attempt to recommence performance or observance whenever and to whatever extent possible without delay. Utilities or Consultant so delayed in its performance will immediately notify the other by telephone or by the most timely means otherwise available (to be confirmed in writing within two (2) business days of the inception of such delay) and describe in reasonable detail the circumstances causing such delay.

(c) In the event that a Force Majeure Event lasts longer than ninety (90) days, a party that is not delayed in performance by the Force Majeure Event may terminate this Agreement on five (5) days' written notice to the non-performing party and any other party that is not providing the notice.

29. Counterparts

This Agreement may be executed by the parties in separate counterparts, each of which when so executed and delivered will be deemed to be an original, and all such counterparts will together constitute one and the same instrument. Delivery of signed counterparts of this Agreement by fax or other electronic means shall constitute valid and effective delivery.

[Remainder of page intentionally left blank; signature page to follow]

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the date first written above.

ENBRIDGE GAS DISTRIBUTION INC.

By: [redacted]
Name: [redacted]
Title: [redacted]

By: [redacted]
Name: [redacted]
Title: Manager, Carbon Strategy

[redacted]

ICF CONSULTING CANADA, INC.

By: [redacted]
Name: [redacted]
Title: Vice President

By: _____
Name:
Title:
(Please print name and title of Signing Officer)

UNION GAS LIMITED

By: _____
Name:
Title:

By: [redacted]
Name: [redacted]
Title: [redacted]
VICE PRESIDENT
INFRANCHISE SALES AND MARKETING & CUSTOMER CARE
(Please print name and title of Signing Officer)

SCHEDULE A

TO THE CONSULTING AGREEMENT BETWEEN
ENBRIDGE GAS DISTRIBUTION INC., UNION GAS LIMITED AND ICF CONSULTING CANADA, INC.
DATED October 31, 2016

This Schedule is made under the above referenced consulting agreement (the "Agreement") between ENBRIDGE GAS DISTRIBUTION INC. ("Enbridge"), UNION GAS LIMITED ("Union") (each, a "**Utility**", and collectively, the "**Utilities**") and ICF CONSULTING CANADA, INC. (the "**Consultant**").

1. SCOPE OF SERVICES

The Consultant will undertake the consulting services described herein to support the Integrated Resource Planning study. On July 13, 2016 the Utilities issued a request for proposals for integrated resource planning study services (the "RFP"), and the Consultant provided a proposal in response to the RFP.

A description of consulting services and key personnel to be provided by the Consultant is set forth in (i) Appendix 1 – Background and Scope of Services, and (ii) Appendix 2 - excerpts from the proposal dated August 5, 2016 prepared by the Consultant, which are attached to this Schedule (the "**Proposal**") and incorporated by reference herein. In the event of a conflict between the terms and conditions set out in the Proposal and those set out in this Agreement, the terms and conditions in this Agreement (including this Schedule) will govern and take precedence.

2. DELIVERABLES

The Consultant will provide the following deliverables:

As set out on page 51 of the Proposal.

3. TERM AND COMMENCEMENT AND COMPLETION DATES

This Schedule shall be effective as of October 31, 2016 and expire December 31, 2017, or such other date as the parties may mutually agree in writing.

4. RULE 13A OF THE BOARD RULES AND STATUTORY DECLARATION

The Consultant acknowledges that pursuant to this Schedule it will provide the Utilities with an independent written evaluation (the "**Independent Evaluation**") of the subject-matter set out in Appendix 3 attached hereto that can be included with the Utilities' regulatory filing submission in the DSM mid-term review as set out in the Ontario Energy Board's Decision and Order in respect of the Utilities' 2015-2020 demand side management plans (EB–2015-2029 / EB-2015-0049).

The Consultant acknowledges and agrees that, for the purpose of the Utilities submitting the Independent Evaluation to the Board as a form of expert evidence to support an application before the Ontario Energy Board, the requirements of Rule 13A of the Ontario Energy Board Rules of Practice and Procedure (last revision, April 24, 2014) (the "**Board Rules**") must be complied with, including the disclosure by the Consultant of the instructions provided to the Consultant in relation to the proceeding and, where applicable, to each issue in the proceeding to which the Consultant's evidence relates.

The Consultant acknowledges that it has been made aware of and agrees that: (i) the Independent Evaluation will be prepared for the purpose of providing expert evidence before the Ontario Energy Board, and (ii) the Independent Evaluation, and any other oral or written testimony it may provide in relation to same, shall be prepared impartially, be fair and be objective, and shall comply with the Board Rules (including, without limitation, Rule 13A of the Board Rules). Owing to the importance this requirement to the Utilities, the Consultant will execute the Acknowledgement of Expert's duty attached to the Schedule at Appendix 3, in order to solemnly affirm the foregoing. An executive or senior manager of the Consultant shall swear the statutory declaration on behalf of the Consultant.

5. KEY PERSONNEL

The individuals set out in the table below under the heading "Name" are deemed to be key personnel ("Key Personnel"). Unless an individual Key Personnel resigns for reasons beyond the control of the Consultant, the Consultant will ensure that each Key Personnel: (i) maintains his or her designated role set forth in the column under the heading "Project Role / Title"; and (ii) remains a Key Personnel until the services set out in this Schedule are completed.

Name	Project Role / Title
[redacted]	Project Manager & Senior Technical Lead, Avoided Cost & Economic Analysis
	Executive Sponsor
	Senior Technical Lead, DSM and Conservation Program
	Senior Technical Lead, Infrastructure Planning and Analysis
	External Review Technical Lead
	Commercial and Residential Consultant, DSM and Conservation Program
	Management Support, Senior Analyst, Avoided Cost & Economic Analysis
	Industrial Consultant, DSM and Conservation Program
	Technical Consultant, Avoided Cost & Economic Analysis
	Technical Consultant, Infrastructure Planning & Analysis
	Senior Analyst, Climate Policy & Analysis
	Senior Consultant, Climate Policy & Analysis
[redacted]	Technical Consultant, Infrastructure Planning and Analysis

6. FEES AND PAYMENT TERMS

Fees: As per the attached Proposal. Any additional services will be provided in accordance with the attached Rate Card.

Expenses: As per the attached Proposal

The above fees and expenses cannot be exceeded without prior written approval from the Utilities. For certainty, the Consultant will invoice each Utility at a rate of fifty (50) percent of the fees and expenses upon completion of each milestone set out on page 7 of Attachment 2 – Scope of Services, under Appendix 1 attached to this Schedule.

Fees are payable by Enbridge within thirty (30) days of receipt of an appropriate invoice setting out in reasonable detail the nature of the services provided by the Consultant.

[Remainder of page intentionally left blank; signature page to follow]

Dated as of October 31, 2016.

ENBRIDGE GAS DISTRIBUTION INC.

By: [redacted]
Name:
Title:

By: [redacted]
Name:
Title: Manager, Carbon Strategy

[redacted]

ICF CONSULTING CANADA, INC.

By: [redacted]
Name:
Title: Vice President

By: _____
Name:
Title:
(Please print name and title of Signing Officer)

UNION GAS LIMITED

By: _____
Name:
Title:

By: [redacted]
Name:
Title: VICE PRESIDENT
INFRANCHISE SALES AND MARKETING & CUSTOMER CARE
(Please print name and title of Signing Officer)

Appendices 1-3, attached at the following pages.

APPENDIX 1
BACKGROUND AND SCOPE OF SERVICES

There are two components to Appendix 1:

Attachment 1: Background
Attachment 2: Scope of Work

ATTACHMENT 1: BACKGROUND

Overview:
Integrated Resource Planning ("IRP"), has been considered in the regulatory environment in Ontario since the early 1990s.

In 1991, the Ontario Energy Board ("the Board") issued a Discussion Paper[1] prior to commencing a generic proceeding into Least Cost Planning (later renamed Integrated Resource Planning). In 1993, after consultation with stakeholders and utilities, the Board issued EBO 169-III.[2] As an outcome of this proceeding, the Board found that:

> Once the utilities' DSM plans are implemented and sufficient experience is gained, the Board stated that it expects to proceed with a review of the utilities' supply-side policies, activities and expenditures, as well as the current policies on system expansion, to confirm that these are consistent with least-cost planning principles. Once the supply-side assessment is completed, the Board can proceed with the final phase of the IRP proceedings, i.e., the combination of DSM and supply-side management into an integrated resource plan.[3]

Between 1995 and the present, the gas utilities in Ontario have engaged in DSM activities, generating significant natural gas savings across all rate classes. During this period, the gas utilities have experienced changes to the regulatory environment which included the utilities working with stakeholders to establish budgets and targets to realize broad-based DSM savings. While not a "formal" IRP approach, the Ontario model for the gas utilities is, in effect, comparable to the Energy Efficiency Resource Standards ("EERS") for utilities used in several U.S. jurisdictions following deregulation in the electricity sector. The main difference is that in Ontario, natural gas DSM activity is determined through a proceeding which includes all stakeholders rather than being mandated by a regulator. In recent Board-issued Guidelines, the Board has influenced the extent of DSM activity by providing guidance for the determination of budgets, including budget maximums and allocations, such as for the low income sector.

Recently, attention in Ontario has turned to DSM in the context of infrastructure planning. During the EB-2012-0451 proceeding which involved the GTA Reinforcement Project, aspects of IRP and the role of DSM in infrastructure planning were raised. The Board found in that Decision that:

> In light of the evidence presented, the Board concludes that further examination of integrated resource planning for gas utilities is warranted. ... this review is particularly timely given the recent provincial Long Term Energy plan. Further information on how the Board will examine gas integrated resource planning will be released in due course.[4]

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[1] EBO-169-1 *Report on Gas Integrated Resource Planning, Prepared for the Ontario Energy Board,* September 16, 1991
[2] EBO 169-III *A Report on the Demand-Side Management aspects of Gas Integrated Resource Planning,* July 23, 1993
[3] Ibid., p. 4

[4] EB-2012-0451 Decision, January 30, 2014, pp. 46/47

In December 2013, the Minister of Energy issued a Long Term Energy Plan for Ontario, stating that:

> The Ministry will also work with the Ontario Energy Board (OEB) to incorporate the policy of Conservation first into distributor planning processes for both electricity and natural gas utilities.[5]

The Minister's Directive to the Board in March 2014 with respect to the DSM Guidelines indicated that:

> By January 1, 2015, the Board shall have considered and taken such steps as considered appropriate by the Board towards implementing the Government's policy of putting conservation first in Distributor and Gas Distributor infrastructure planning processes at the regional and local levels, where cost-effective and consistent with maintaining appropriate levels of reliability.[6]

The 2015-2020 DSM Framework issued by the Board on December 22, 2014 directs the gas utilities to each conduct a study, completed as soon as possible and no later than in time to inform the mid-term review of the 2015-2020 DSM Framework expected to take place by June 1, 2018.[7] Further, the Board stated that it, "expects the gas utilities to consider the role of DSM in reducing and/or or deferring future infrastructure investments far enough in advance of the infrastructure replacement or upgrade so that DSM can reasonably be considered as a possible alternative."[8]

The Framework required the utilities to file, as part of their 2015-2020 Multi-Year DSM Plan, a document which included a preliminary scope of the study it plans to conduct and a preliminary transition plan that outlines how the gas utility plans to include DSM as part of its future infrastructure planning efforts.[9] In response to these requirements, Enbridge submitted an earlier draft of the scope of work in EB-2015-0049 Exhibit C-1-3. Attached as Attachment 2 to this Schedule 4 to the RFP is a revised scope of work reflecting the Boards decision in that proceeding.

The study will be completed prior to the mid-term review which, under the Framework, is anticipated to be completed by June 1, 2018. The expected delivery date of this study is December 15, 2017, which will allow sufficient time to inform the mid-term review process.

Purpose:

The Utilities areundertaking this study in an effort to understand the relationship between Demand Side Management ("DSM") and infrastructure planning. It is anticipated that the study will examine the three areas where DSM could potentially impact infrastructure planning:

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[5] Ontario Ministry of Energy, Long Term Energy Plan, p. 4

[6] Minister's Directive to the Ontario Energy Board, 467/2014, March 26, 2014, s. 5, p. 3

[7] EB-2014-0134 *Report of the Board: Demand Side Framework for Natural Gas Distributors (2015- 2020)*, p. 36

[8] Ibid.

[9] Ibid.

- Broad-based DSM impacts and planning forecasts of infrastructure investment (Passive Deferral)
- Potential direct impact of DSM on subdivision planning through an expanded role by the utility in municipal planning (New System Design)
- Potential direct impact through targeted DSM to achieve deferral of reinforcement projects (Active Deferral)

This review should consider the costs and benefits of the decision making processes to the business, customers and the environment.

Another key focus of the IRP study will be to examine the impacts of Demand Side Management on peak hour demand on the natural gas distribution system.

A transition plan will also be a requirement for the final Report, the Framework stipulates that "As part of the multi-year DSM plan applications, the gas utilities should ... propose a preliminary transition plan that outlines how the gas utility plans to begin to include DSM as part of its future infrastructure planning efforts."

Enbridge and Union plans to begin to include DSM as part of its future infrastructure planning efforts" by developing and testing transition activities as part of the study of DSM and Infrastructure Planning.

ATTACHMENT 2: SCOPE OF SERVICES

Enbridge Gas Distribution Inc.
Union Gas Limited

Integrated Resource Planning Study

Scope of Work

July, 2016

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STUDY SCOPE

The primary focus of this study is on the relationship between Demand Side Management ("DSM") and infrastructure planning. The study will examine the three areas where DSM could potentially impact infrastructure planning:

- Broad-based DSM impacts and planning forecasts of infrastructure investment (Passive Deferral)
- Potential direct impact of DSM on subdivision planning through an expanded role by the utility in municipal planning (New System Design)
- Potential direct impact through targeted DSM to achieve deferral of reinforcement projects (Active Deferral)

It is important to note that broad-based DSM and Distribution Planning operate from different viewpoints. The primary objective of broad-based DSM is to obtain participant and societal savings through a reduction in annual consumption of natural gas across the Enbridge Gas Distribution Inc. ("Enbridge") and Union Gas Limited ("Union") franchise areas. In the process the DSM programs will have an indirect impact on the need for distribution infrastructure. This effect is sometimes referred to as "passive deferral of infrastructure" and will be captured starting in 2015 as a benefit in the Avoided Cost calculation used in the Total Resource Cost ("TRC") test to screen DSM programs offered by Enbridge. Union Gas will be reviewing the impact of Avoided Distribution costs at a later date. In contrast, Distribution Planning is concerned with maintaining the safety and integrity of the distribution system under all conditions, including a situation of maximum use. Distribution Planning looks at peak hour requirements in each network and sub network of the distribution system, based on the history of individual customer usage in that network and design day conditions. The objective of targeted DSM is "active deferral" of specific infrastructure projects.

For gas utilities, infrastructure planning is distinct from planning to meet gas supply needs. While gas supply planning is focused on sourcing sufficient gas to meet peak day needs across the franchise, distribution planning is focused on maintaining a distribution system which can meet peak hour needs in each and every network under a design conditions scenario. An important factor in the planning and design of pipe networks is the quantification of demand in terms of peak hour flow (m3/h). This is the metric by which the utility describes the hourly demand of any network or subset of customers on the system.

A key task of the study will be to examine the impacts of DSM on peak hour demand in the distribution system. Currently broad-based DSM efforts are known to impact average consumption of natural gas. However, the impacts of broad-based DSM on peak hour demand are not clear or proven. As well, there is only limited information (from the electricity sector) of the impacts of targeted DSM on peak hour demand in specific network areas.

STUDY APPROACH

The study will use the following steps to explore issues relating to each of the areas where DSM could potentially impact infrastructure planning:

- Identify key questions for each area to provide a framework for research and analysis,
- Develop and implement research methods and tools appropriate to addressing the questions,
- Analyze and synthesize the research results.

Research methods are expected to include:

- A review of internal Enbridge and Union (the "utilities") data on customers and DSM efforts,
- Primary research such as load research and market research based on industry best practices from both Electric IRP programs as well as Natural Gas IRP,
- Secondary research such as a review of existing literature and prior study on the subject of IRP as well as jurisdictional scans of other relevant efforts across North America,
- Preliminary data from case studies in the utilities' franchise area to synthesize and potentially test research findings.

An aspect of the study approach will be the use of preliminary data from ongoing case studies in each of the utilities' franchise areas (case studies will be conducted by each utility with input from the consultant) with respect to potential impacts on subdivision planning and deferral of reinforcement projects. It is anticipated that working with preliminary data available from real case study examples in combination with IRP theoretical modelling will:

- Minimize lost opportunities by working directly with identified projects,
- Facilitate testing of analytical methods by using real data and situations,
- Maximize available resources,
- Build directly towards a transition plan, and
- Inform changes to the utility's long term system planning processes and analysis based on tested experience.

METHOD

This section will outline the research methods that could be used to "determine the appropriate role that DSM may be able to serve in future system planning efforts."[1] As noted in the discussion of Scope this study will focus on the three potential intersections of DSM and infrastructure planning:

1. Broad-based DSM and potential passive deferral of distribution infrastructure,
2. DSM opportunities in new subdivisions and potential alternative infrastructure plans,
3. Targeted DSM to achieve active deferral of infrastructure reinforcement projects.

[1] EB-2014-0134 Report of the Board Demand Side Management Framework for Natural Gas Distributors (2015 – 2020) December 22, 2014. Page 36

Intersection #1: Broad-based DSM and Distribution Infrastructure planning

In considering the role that broad-based DSM might play in Distribution Planning, the key questions are:

- What information from broad-based DSM programs would be helpful to Distribution Planning?
- Could metering for DSM purposes also provide useful information for Distribution Planning?
- What are the implications of advanced DSM initiatives such as CHP for Distribution Planning?
- What changes would be needed to better integrate relevant broad-based DSM information into the Distribution Planning process?

Research Method – It is anticipated that these questions could be addressed through:

- A Jurisdictional Scan and Literature Review,
- An Internal Review of the gas utilities Distribution Planning process and DSM program planning process,
- Primary Research – interviews with gas utilities with established broad-based DSM programs.

Intersection #2: Subdivision Planning

In the current municipal planning process, the utilities are brought in towards the end of the design process and tasked with servicing the development as designed. This represents a lost opportunity in terms of potential gas savings and optimum use of the resource at the level of the individual building or dwelling and also at the level of the neighbourhood or community.

Earlier participation by the builder / developer and their trades in the utilities' new construction programs[2] lead to large reductions in natural gas usage per building as well as water and electricity savings. Similarly, early participation in the municipal planning process by all utilities could lead to collaborative design that may result in an overall increase in energy efficiency and potential changes to infrastructure design.

It should be noted that the need for distribution infrastructure in a new development cannot be deferred; a potential role for DSM in subdivision planning is more likely to result in fewer lost opportunities and a reduction in annual natural gas use with associated TRC benefits. It may also result in a more efficient configuration of energy infrastructure.

The key questions to be asked are:

- What is the current process of infrastructure planning for new subdivisions?
- Is a different, more proactive role for the utility in subdivision planning feasible?
- What is the role that new construction programs, both residential and commercial and industrial, can play in addressing infrastructure needs?
- What would be the impact on infrastructure planning?

[2] Enbridge's Residential and C/I Savings by Design program, as well as Union's residential Optimum Home program and C/I Savings by Design program.

- What would be the impact on natural gas usage?

Research Method – It is anticipated that these questions could be addressed through:

- An Internal Review of the Distribution Planning process for new developments,
- A Jurisdictional Scan / Literature Review re: alternate subdivision planning process,
- Primary Research re: current developments in community energy planning in Ontario,
- A possible Case Study or Pilot with a willing host municipality to test alternate approaches.

Intersection #3: Targeted DSM and Reinforcement Projects

With respect to targeted DSM and deferral of reinforcement projects, the key questions to be asked are:

1. Is it Technically Feasible? Can targeted DSM make a significant impact on peak hour?
2. Is it Possible?
    a. Could DSM programs be designed to achieve the necessary impact?
    b. How would this approach be integrated with the utilities' planning and regulatory processes?
    c. What are the implications for metering?
3. What about Risk? As an alternative to reinforcement, could energy efficiency savings ensure system reliability?
4. Is it Cost Effective? Would targeted DSM to defer infrastructure reinforcement result in savings for ratepayers?

Addressing each of these questions will involve a combination of various research methods. To provide an overarching research focus, the issue of targeted DSM and reinforcement projects could be informed through one or two case studies, and the preliminary data resulting from these studies. All the individual research questions will be focused on data and the potential modelling relating to the case study area(s).

Topic #1 - Is it Technically Feasible?

Can targeted DSM make a significant impact on peak hour?

The central task of this portion of the research is to determine:

- the required load reduction necessary to defer the reinforcement project,
- the technical potential of eligible measures, i.e., their impact on peak hour.

Primary research will use data from Distribution Planning to determine the necessary load reduction in the utilities identified case study area(s). The study team will develop a list of eligible DSM measures, including both energy efficient and demand response technologies and their impact on peak hour. This will also incorporate the results from the EB-2015-0117 Natural Gas Conservation Potential Study's technology assessment, and those measures that achieve base load or peak gas savings / increases, and other pertinent load characteristics, where available. If necessary primary research could provide market penetration data of eligible measures for the ongoing case study area(s) and this data could be

used to develop the technical potential if all eligible measures were installed. The resulting reduction in peak hour consumption will be compared with the required load reduction.

Method Summary: Primary Research and Analysis of preliminary data if available from the Case Study area(s)

Topic #2 - Is it Possible?

a. Could DSM programs be designed to achieve the necessary impact?
b. How would this approach be integrated with the utilities' planning and regulatory processes?
c. What are the implications for metering?

This section will provide the technical achievable potential and discuss implementation issues relating to the regulatory process and metering. Primary and secondary market research for the case study area(s) could be used to estimate customer acceptance and required incentive levels. A review of the utilities' existing DSM programs and interruptible rates will provide additional insight into customer acceptance and incentives. This research and analysis will result in a sample targeted DSM portfolio for the area(s) showing anticipated peak load reduction – the technical achievable potential. As a final step, the technical achievable potential will be compared to the required load reduction.

This analysis will also include costs and timelines to implementation. (The cost estimates will include any additional costs for customer incentives and for EM&V). Using the technical achievable potential, the study will then discuss the impact of this approach on the utilities' planning and regulatory processes and metering program.

Method Summary: Primary and Secondary Market Research, a Review of the utilities' programs, and Analysis

Topic #3 - What about Risk?

As an alternative to reinforcement, could energy efficiency savings ensure system reliability?

This portion of the research will determine whether the projected DSM peak load reductions meet the system reliability requirements of Distribution Planning in the current context of increasingly volatile consumption patterns. This will be accomplished through review of the regulatory and other requirements relating to the safety and integrity of the Distribution system and analysis to determine whether the potential peak load reductions achieved through DSM could meet those requirements. As well, this section will also consider escalation of reinforcement projects should planned DSM peak load reductions fail to materialize.

Method Summary: Secondary Research of risk requirements and Analysis

Topic #4 - Is it Cost Effective?

Would targeted DSM to defer infrastructure reinforcement result in savings for ratepayers?

The first step in this section of the Study will be to develop the appropriate avoided costs required to analyze and compare the cost benefit of the demand and supply options using the information from the case study area(s).

This will also involve a jurisdictional review to discover the practices of other utilities that engage in targeted DSM for the purpose of infrastructure deferral and the type of cost benefit analysis that is utilized i.e. TRC, SCT, PCT etc... This section of the study will also include a review of the Ontario Energy Board (the "Board") requirements regarding cost benefit testing of infrastructure projects and a review of the standard cost effectiveness tests used for broad-based DSM programs. Once the appropriate test is determined it will be applied to compare the demand and supply options of the case study or case studies.

Research Method Summary: Jurisdictional Review, Review of Board requirements, Apply the appropriate Cost Benefit Test to the Case Study area(s)

TIMELINE

As recommended by the Board in the Framework document, the Study results will be available in advance of the Mid-term Review of the Multi-Year plan, expected to be concluded by June 1, 2018. The major activities and milestones in the course of the study are listed below.

Schedule:

Project Start-up (Kick-off Meeting)	August 17, 2016
Bi weekly Status Update Meetings and deliverable touchpoints	(TBD)
Draft Report: Intersection #1: Broad-based DSM and Distribution Infrastructure planning	November 7, 2016
Draft Report: Intersection #2: Subdivision Planning	January 13, 2017
Draft Report: Transition Plan	March 8, 2017
Draft Report: Intersection #3: Targeted DSM and Reinforcement Projects – Topic #1	April 7, 2017
Draft Report: Intersection #3: Targeted DSM and Reinforcement Projects – Topic #2	May 19, 2017
Draft Report: Intersection #3: Targeted DSM and Reinforcement Projects – Topic #3	June 30, 2017
Draft Report: Intersection #3: Targeted DSM and Reinforcement Projects – Topic #4	September 28, 2017
Draft Report: Intersection #3: Targeted DSM and Reinforcement Projects	November15, 2017
Final Report (Including all Intersections, Topic Areas, and Transition Plan)	December 15, 2017

EXTERNAL REVIEW and STAKEHOLDER CONSULTATION

The utilities will convene a Technical Working Group drawn from a wider cross section of North American gas utilities, and the DSM community. In this way, the utilities will be able to access the experience of staff in other organizations such as gas utilities which have undertaken system-wide Integrated Resource Planning, possible electric utilities and organizations which have or are undertaking targeted DSM/CDM for the purpose of infrastructure deferral, and in other agencies which provide support to the North American DSM community.

The external review will bring a broad perspective to the study and help to ensure the quality of the study across the several specialized fields involved.

PRELIMINARY TRANSITION PLAN

In addition to the requirement for the Study, the Framework stipulates that "As part of the multi-year DSM plan applications, the gas utilities should ... propose a preliminary transition plan that outlines how the gas utility plans to begin to include DSM as part of its future infrastructure planning efforts."[3]

The utilities "plan to begin to include DSM as part of its future infrastructure planning efforts" by developing and testing transition activities as part of the study of DSM and Infrastructure Planning. In parallel with the IRP Study, the utilities will undertake case studies in their respective franchise areas to test draft recommendations and theories and inform the development of the preliminary transition plan to be included in the Final Report. This will be done by the utilities using identified infrastructure projects as case studies in the research. The case study examples will be used to develop and test the method(s) by which the DSM alternative to infrastructure development will be assessed.

One to three projects may be selected as the case studies. One or more other existing case studies may be selected to support data acquisition and analysis. Feasibility analysis for the DSM alternative in each area would be conducted using methods developed through the Study. For example, in a case study that targets a specific infrastructure project, Distribution Planning would provide the theoretically reduction in peak required in each case study area in order to defer the planned infrastructure investments for a set period of time.

The IRP Study would include a review of DSM measures and programs to determine those with significant impact on peak. The resulting "peak eligible" measures would then be assessed for their potential technical impact on peak in the selected case study areas. Similarly, DSM programs would be reviewed in relation to their suitability for the specific case study areas and changes needed to achieve the necessary market penetration to meet the required reduction in peak.

Benefits of incorporating the real case study examples from the utilities' franchise area will:

- Minimize lost opportunities by working directly with identified projects,
- Facilitate testing of analytical methods by using real data and situations,
- Maximize available resources,
- Build directly towards a transition plan, and
- Inform changes to the utility's long term system planning processes and analysis based on tested experience.
- The case study areas will be selected by the utilities from their respective list of potential / prospective infrastructure projects and potentially other specific areas that will support data acquisition and analysis.

[3] EB-2014-0134 Report of the Board Demand Side Management Framework for Natural Gas Distributors (2015 – 2020) December 22, 2014, Page 36

APPENDIX 2

EXCERPTS FROM PROPOSAL 'INTEGRATED RESOURCE PLANNING STUDY' DATED AUGUST 5, 2016

(PAGES 1-60)



Integrated Resource Planning Study

Enbridge Gas Distribution, Inc. & Union Gas Limited

August 5, 2016

Submitted to:

[redacted]
Contract Manager
Enbridge Gas Distribution, Inc.
500 Consumers Rd.
North York, Ontario, Canada
M2J 1P8

Submitted by:

[redacted]
Vice President
ICF Consulting Canada, Inc.
(an ICF International company)
[redacted]
277 Wellington Street West
Suite 808
Toronto, Ontario, CA
M5V 3E4

This proposal includes data that shall not be disclosed outside Enbridge or Union and shall not be duplicated, used, or disclosed—in whole or in part—for any purpose other than to evaluate this proposal. If, however, a contract is awarded to this offeror as a result of—or in conjunction with—the submission of these data, Enbridge and Union shall have the right to duplicate, use, or disclose the data to the extent provided in the resulting contract. This restriction does not limit Enbridge or Union's right to use information contained in these data if it is obtained from another source without restriction. The data subject to this restriction are contained in this volume and its appendices and attachments.

8/5/2016

[redacted]
Enbridge Gas Distribution Inc.
[redacted]
Ontario, Canada

SUBJECT: ICF's Response to Enbridge Gas Distribution Inc. and Union Gas Limited's Request for Proposal for Integrated Resource Planning Study Services issued on July 12, 2016

Dear [redacted]

In response to an Ontario Energy Board (OEB) directive related to the 2015-2020 DSM Framework, Enbridge Gas Distribution Inc. (Enbridge) and Union Gas Limited (Union) are undertaking an Integrated Resource Planning study (IRP) to assess whether Demand-Side Management (DSM) can defer or avoid gas infrastructure investment. Achieving this vision successfully requires in-depth understanding of the DSM potential in Ontario, of the natural gas pipeline and distribution infrastructure, and of capital expenditure planning under the Ontario regulated natural gas market framework. This study must be completed by late 2017 to allow sufficient time to inform the mid-term review process (June 1, 2018).

ICF has the unique, relevant precedent experience and expertise to work alongside Enbridge and Union to determine whether it is technically feasible to avoid or defer infrastructure investment from both broad-based DSM programs and from targeted DSM. The ICF team offers the following key advantages:

- **A unique understanding of the interplay between natural gas markets and infrastructure, DSM programs and targets, the potential impact of Ontario's climate policy on natural gas demand and the role of the natural gas utility.** ICF brings a deep understanding of all technical elements required to complete this work. Our recent work with the OEB CPR and projects for each of Enbridge and Union means we will bring efficiency to our approach and a deep understanding of each utility's specific issues, leading to cost effective and timely completion. We recognize the implications of bringing a singular program for both Enbridge and Union and we are able to bring forward nuances of the each company and create tailored solutions.
- **Our proposed team's expertise and experience in Ontario with Enbridge and Union will allow ICF to work efficiently and effectively with both utilities and stakeholders to complete the IRP study in a timely manner and avoid typical delays and pitfalls.** ICF is a recognized leader in Ontario, with extensive expertise in all areas called for to carry out this work including; energy efficiency, natural gas markets and pricing, and climate policy modelling and analysis. The proposed ICF team for this project, have all supported relevant projects for the utilities over the last 24 months and include professionals with more than a century of combined experience. [redacted] has over 30 years of experience related to Ontario energy markets and policy, including a decade of experience as an OEB Board Member. Our Project Manager, [redacted] brings more than 30 years of experience with natural gas market analysis and more than 20 years of experience supporting Canadian natural gas utilities with regulatory issues, asset valuation, and avoided costs. While not explicitly called out in this RFP nor defined for inclusion by the OEB, we feel it is relevant to include the potential impact of the recently released Climate Change Action Plan on natural gas demand and infrastructure investment. Thus we offer to

include the impact of climate policy in tandem with DSM. [redacted], Vice President of ICF International's Canadian operations, has 20 years of experience in assessing, designing and evaluating climate policy, carbon markets, and regulations, particularly in Ontario.

- **Unmatched experience delivering end-to-end energy efficiency services, including conservation potential studies.** Over the last 30 years, ICF has successfully completed conservation potential studies, updates, and reviews for dozens of utilities across Canada and the United States. The ICF team proposed for this project recently completed the conservation potential study for the OEB. This team also has successfully performed more than a dozen individual energy efficiency potential studies for clients including Union Gas, Enbridge Gas Distribution, the Independent Electricity System Operator, FortisBC, Newfoundland Power, and Newfoundland Labrador Hydro, and Terasen Gas. Our conservation potential studies are informed by our expertise in DSM program design and delivery - ICF also implements energy efficiency programs for 42 utilities in 26 states and provinces. This experience makes ICF keenly aware of the practicalities of program design and uniquely attuned to the realities of market adoption.
- **Transparent conservation potential stock and flow models designed for Ontario.** Enbridge and Union will benefit from our recently updated and integrated suite of modeling tools, combining the best of models developed for conservation potential studies across Canada and the U.S. These include ICF's Energy Efficiency Potential Model, Beacon™ building simulation tools, our Gas Markets Model, and DSM Optimizer. ICF has also developed a proprietary model of Ontario's historic, current and forecast fuel use, emissions, and abatement profiles along with emissions caps through 2050 to inform forward price of carbon (allowance) under a cap and trade system. Understand natural gas pricing, fuel use and emissions is important in being able to understand and quantify DSM impacts.

We believe that we represent the only service provider that can bring forward relevant local precedent (with the utilities, OEB, and stakeholders), a reputation for unbiased deep analytics, and a broad-spectrum team of technical experts to carry out this work in a high value manner on time and on budget. ICF's success is a result of our ability to skillfully pair the right tools with the right experts to help our clients address critical issues and unprecedented challenges.

ICF would welcome an opportunity to come and present our proposal to your team in person. Should questions arise regarding our qualifications, please feel free to contact myself [redacted] or [redacted] for questions of a technical nature, and [redacted], Senior Contracts Manager, [redacted] for questions of a contractual nature. If ICF is selected as the successful bidder, we request to negotiate some of the sample contract terms and conditions, we have existing contracts in place with both utilities so this should be straight forward.

We look forward to working with Union and Enbridge on this important initiative.

Sincerely,

[redacted]

Vice President [redacted]

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1. PROPOSAL SUBMISSION ACKNOWLEDGEMENT FORM

Complete the form attached at Schedule 3.

SCHEDULE 3
PROPOSAL SUBMISSION ACKNOWLEDGEMENT FORM

Proposal for Integrated Resource Planning Study Services; RFP Reference: IRP Study

Closing Date: **August 5, 2016**

RFP Proposal Submission

The terms and conditions of the RFP are hereby acknowledged and agreed to. The Proponent hereby represents and warrants to Enbridge that it has carefully and thoroughly examined the documents described in the Request for Proposal (RFP), has received, carefully examined and incorporated all Addenda issued by Enbridge in its response and has the resources, skills and ability to perform the Services in accordance with the RFP documents.

ICF Consulting Canada, Inc.

Legal Name of Company

[redacted]

Authorized Signature

August5th,2016

Date

[redacted]

Name (Print)

Vice President

Title:

2. ICF'S RESPONSE TO QUESTIONS IN RFP SECTION 4.0

Include a point by point response to each question listed in the remainder of Section 4.0 – Proposal Instructions. The Proponent's response should consider the scope of work (Attachment 2). There is no page limit on this section, however, Proponents are strongly recommended to be concise.

Proposal Overview

1. *The first section of the Proposal will be a Proposal overview. The Proponent should summarize its Proposal, the overall approach and the value provided by the Proponent*

ICF is pleased to submit this proposal to Enbridge Gas Distribution (Enbridge) and Union Gas Limited (Union) in response to the Request for Proposal (RFP) entitled Integrated Resource Planning Study Services; RFP Reference: Integrated Resource Planning Study.

Union and Enbridge have been directed by the Ontario Energy Board (OEB), who was directed by the Minister of Energy, to conduct an Integrated Resource Planning (IRP) study to examine whether DSM can be leveraged by Enbridge and Union to avoid gas infrastructure investment, for the benefit of Ontario's ratepayers.

This study is intended to evaluate the potential benefits of integrating infrastructure and DSM planning efforts to reduce the need for incremental investments in natural gas distribution system infrastructure and also to more accurately incorporate the potential benefits of DSM programs in the DSM program evaluation and planning process.

In addition, the gas utilities and Ontario ratepayers find themselves in an interesting conundrum. With the new Cap and Trade policy being adopted and a floor price of carbon set to increase by 5% per year, there is additional uncertainty related to the long term need for and value of new gas infrastructure investment. The situation increases the potential value to deferral of capital projects, as delaying investments by a few years may allow the utilities and planners to see a change in the growth pattern due to technological innovation and changing prices of electricity and carbon – but only if targeted conservation is able to reliably delay the need for new investment.

The scope of this work includes:

- A detailed review of Union and Enbridge's capital expenditure planning, working with Union and Enbridge staff to determine what cost may be avoided or deferred, as well as what the financial impacts are to the ratepayers, society, and utilities.
- An inventory of potential conservation measures and programs, both province-wide (broad-based) or targeted, that could be relied on to alter the capital expenditure plan while maintaining reliability of gas supply. The analysis should allow the Utilities to assess the effect of DSM on the provincial infrastructure reinforcement projects, as well as on future new projects that may arise as new housing and commercial subdivisions are planned and added to Ontario communities.
- An integration of the results of both analyses is to be achieved to find the optimal combination of infrastructure and DSM outlays that will minimize the use of ratepayers' monies in the short and in the long run while maintaining supply reliability and minimizing risk.

To integrate this wealth of information effectively into the development of the forecasts will take strong yet collaborative leadership, coordination, and organizational skills. ICF has a proven track record demonstrating excellence in this skill set and looks forward to the opportunity to work with the Utilities and other Ontario Stakeholders on this important effort.

2. *The Utilities will rely upon representations made in the Proposal. The Proponent must therefore identify key assumptions and dependencies on which it has based its Proposal. The impact on price, schedule or functionality (including any service levels) of any of the Proponent's assumptions (including any change in any such assumptions) must be clearly specified. If no impacts are specified, the Utilities shall be entitled to assume there are none. The Proponents are encouraged to limit or eliminate assumptions in their Proposal. The Utilities consider assumptions to reduce the value and certainty associated with the Proposal, and will view assumptions and other qualifications in the Proponent's Proposal unfavourably during the evaluation process.*

Because ICF has just completed the OEB's Conservation Potential Study (CPS), we possess most of the data that was used to make estimates of DSM achievable potential, and most importantly we have the calibrated CPS model and are proficient with that model. We also have extensive experience with natural gas avoided costs in Ontario and a detailed understanding of Ontario natural gas markets as well as Ontario carbon policy and potential carbon markets. We are in a better position than anyone else to estimate the level of effort, pricing, and scheduling. Selecting ICF to conducts its IRP is the safe choice for Enbridge and Union.

The only assumptions or dependencies that we take in this proposal include:

1) The degree of interaction with the technical working group, which may change based on the number and identify of the members to be included in the TWG (Technical Working Group).
2) The availability of Utility DSM and infrastructure planning staff to work with ICF staff during the course of this project.

We believe both of these issues can be defined and mitigated at the Kickoff Meeting and through the ongoing management of the TWG.

We look forward to the opportunity to work with Enbridge and Union on this important initiative.

Qualifications

Provide information describing the Proponent's background, services, experience, and qualifications. In addition to the information requested below, Proponent should also indicate any additional information that will be helpful to the Utilities' evaluation.

The ICF team brings detailed knowledge of the Ontario natural gas, energy efficiency and greenhouse gas markets, end-to-end experience in energy efficiency including CPS, infrastructure planning expertise, and the passion, expertise, tools, and capacity to meet the Utilities' needs on this important project. Our experience in and knowledge of Ontario will result in a utility-specific, sector-focused potential study that is defensible and usable by the Utilities. We bring:



The most up-to-date and detailed assessment of Ontario natural gas conservation potential available. ICF recently completed a detailed assessment of natural gas conservation potential for the Ontario Energy Board. This assessment required in-depth coordination with Union Gas and Enbridge Gas DSM planning departments, as well as extensive interactions with major Ontario stakeholders. The detailed analysis completed for this study, and the modeling and analysis tools developed for this study provide ICF with a significant head start on the work needed to complete the current study.



A deep understanding of the conservation potential study process. We have proposed a team comprised of DSM industry leaders and professionals to deliver credible and innovative results that the OEB and utilities can rely on. ICF is the leader in conducting potential studies in Canada. We refine our approach with each CPS we conduct by improving our model and continually developing insight into the data and tools necessary for advanced decision-making. Our knowledge of energy-saving measures is unparalleled because it has been developed through our experience studying, designing, and implementing DSM programs. Our close monitoring of the Ontario economy and energy future contextualizes ICF's work.



A detailed understanding of avoided cost methodology for Ontario's natural gas distribution companies. ICF has evaluated the avoided cost estimates developed by both Union Gas and Enbridge, including an independent review of the Union Gas avoided cost methodology for Union Gas, as well as an assessment of the overall avoided costs for Ontario utilities for the OEB natural gas conservation potential study. ICF also has extensive experience with facility expansion costs and economics in Ontario based on our work for Union Gas on facilities expansion analysis, and for the Ontario Energy Board and the Ontario Ministry Energy assessment of the TransCanada Energy East project on Ontario natural gas markets.



A detailed understanding of Ontario natural gas markets. ICF is a leading North American natural gas market consultant and has experience with the full range of natural gas market issues facing Ontario. ICF has also demonstrated the ability to provide unbiased analytical support for a variety of different clients with different perspectives and needs, including multiple projects with the OEB, Union Gas and Enbridge. In addition, the ICF staff proposed for this study have also estimated avoided costs for a number of natural gas utilities including Washington Gas Light, Wisconsin Natural Gas, and Union Gas during the 1990s, and have conducted a wide range of cost analyses for natural gas utilities and pipelines on

topics such as natural gas commodity costs, storage costs, and pipeline costs that form the core of the avoided cost analysis.

An experienced team of consultants led by industry leaders. The ICF team proposed for this project includes seasoned professionals with more than a century of combined experience. The executive director [redacted] has over 30 years of experience related to Ontario energy markets and policy, including a decade of experience as an OEB Board Member. [redacted] our technical director, has more than two decades of experience completing conservation potential reviews and analysis for clients across Canada. Our natural gas markets exper[redacted] brings more than 30 years of experience supporting Canadian natural gas utilities with regulatory issues, asset valuation and avoided costs. Our greenhouse gas markets expert [redacted] has 20 years of experience in assessing, designing, and evaluating greenhouse gas policy, markets, and regulations, particularly in Ontario.

Experienced local staff with established relationships with the OEB, utilities, and DSM TWG. The utility and ICF teams have a history of working well together. We are invested in our relationship with the Utilities and therefore they can be assured we will continue to communicate well and devote the resources necessary to ensuring the study is completed on time without risk of going over budget. Our relationships with the OEB and stakeholders will also give us an advantage as buy-in early in the process will serve as the foundation for understanding of load growth, plans, usage, and energy savings approaches. Without this knowledge and these relationships, the Utilities risk receiving a superficial analysis resulting in an unstable foundation for DSM planning leading to problems for the Utilities in the future, such as timeline delays or opposition to the results of the study.

Transparent conservation potential stock and flow models designed for Ontario. Enbridge and Union will benefit from our integrated modeling suite, combining the best of models developed for conservation potential studies across Canada and the U.S. To ensure consistency across sectors and reports, ICF has developed systems and protocols to integrate the results from our respective models into one consistent "Data Manager." We continually invest in our models, incorporating efficiencies and improvements developed through CPS we have performed across North America and internationally. The models used for this project will include ICF's Energy Efficiency Potential Model suite as well as the Beacon™ building models, ICF's Industrial Energy Efficiency Model, and our Gas Markets Model. The latest ICF model add-on is the DSM Optimizer, used in determining achievable potential and further described in section 3.2. We have customized our approach for Ontario, accounting for numerous CPS- and province-specific factors including size, complexity, purpose, and objectives.

Real-world DSM program experience. To succeed in developing this type of comprehensive, sub-sector analysis, Union and Enbridge need to retain a firm that brings unusually strong methodological expertise in constructing similar energy and technology models. An *ad hoc* analytic process that does not benefit from extensive prior implementation and refinement will not deliver the level of accuracy, granularity, and reliability the Utilities require. The ICF team brings a unique combination of perspectives, and experience:

- Real-world expertise in energy use and process operations across multiple sectors, industries, home types, and businesses
- Robust data and analytics that have been validated in over 125 DSM programs for utilities across North America
- Familiarity with new and existing natural gas energy efficiency technologies across residential, commercial and industrial sectors
- Credible experts who have helped many other utilities with energy efficiency potential and program planning efforts, and who have given expert testimony in regulatory proceedings
- A perspective that encompasses that of our utility clients, their customers across all sectors, and the regulators and such other stakeholders as energy efficiency service and product providers



Unmatched expertise in greenhouse gas markets and modeling. The ICF team includes consultants with significant experience in greenhouse gas markets and modeling. In particular, ICF has a comprehensive understanding of Ontario's greenhouse gas policies, their interaction with natural gas and energy efficiency. We have already completed detailed analysis including carbon price projections on behalf of Enbridge and Union, and have a fully populated carbon supply demand model with detailed documentation of key assumptions.



Well-developed skills in stakeholder engagement and reporting. The ICF team knows that external input can strengthen a potential study and a carefully managed process can provide important strategic value. ICF will engage the Stakeholder and Outside Review Group through an open-minded, focused, and interactive format. We will show respect for the Stakeholders input through responding to their suggestions in a comprehensive and timely manner. ICF's regular use of stakeholder engagement in potential studies is a foundational mechanism to ensure that the study is approached from a whole systems perspective and provides a basis and legitimacy for the study results.

The ICF team is proud to submit our proposal for this important study. We are confident that our experience with natural gas, natural gas infrastructure, energy efficiency and greenhouse gas policy in Ontario, combined with our robust models and tools are the best match for the Utilities' needs. We have built a dependable approach to potential studies based on the quality and timeliness needs defined in the RFP as well as our appreciation of the Utilities' quality and collaboration expectations. We took a detailed approach to building our budget, carefully considering each task. We conducted a thorough review of our offering to ensure that the Utilities' information, time, and quality needs are met with the best value. The ICF team welcomes the opportunity to discuss our proposal with the Utilities and negotiate scope and price.

Conflicts of Interest

Declare any potential conflicts pursuant to Section 2.11 of this RFP. If a Proponent has no conflicts of interest, a statement to that effect shall be included in the Proposal.

No potential conflicts of interest were identified for the work contained in this RFP.

Project Descriptions and Client References

Project Name	OEB Conservation Potential Study
Client Organization	OEB (Ontario Energy Board)
Project Duration	2015
Contact Information	[redacted] Project Advisor–Conservation and Operational Policies 2300 Yonge St. Toronto, Ontario M4P 1E4 [redacted]

Project Description

ICF performed a comprehensive natural gas conservation potential study for the Ontario Energy Board. The study covers the period 2015 to 2030, and included an assessment of the residential, commercial and industrial energy efficiency measures in the residential, commercial and industrial sectors. ICF's scope of work included:

- Assessment of avoided costs for natural gas in Ontario, including the price of greenhouse gas emissions under a proposed cap and trade system, and the natural gas price suppression effect.
- Modification and tuning of an Excel-based conservation potential model with Ontario-specific data.
- Developed a list of energy efficiency measures and their characteristics based on the most recent data available.
- Extensive stakeholder engagement with the Demand Side Management Technical Working Group, made up of utility representatives (Enbridge and Union), government (Ministry of Energy) and non-governmental experts.
- Interviews with key stakeholders to inform the development of the achievable potential.

Project Name	Impact of NEXUS Pipeline
Client Organization	DTE Gas (Detroit Edison)
Project Duration	2014-2016
Contact Information	[redacted] Director, Gas Supply One Energy Plaza, Room 1600WCB, Detroit, MI 48226 [redacted]dtenergy.com

Project Description

Utilizing ICF's proprietary GMM model, ICF is projecting the long-term impacts of the NEXUS Pipeline project on Michigan natural gas and electricity consumers, and on DTE Gas-gas supply portfolio costs. The NEXUS Pipeline represents a major investment in new natural gas transmission infrastructure serving Michigan and Ontario markets. As part of this project, ICF has developed several reports on the impact of the NEXUS Pipeline that have been filed with the Michigan Public Utility Board. Mr. Sloan has testified before the MPUB in both gas supply and electric supply proceedings supporting DTE Gas and DTE Electric decision to contract for incremental capacity on the NEXUS Pipeline.

Project Name	New Mexico Gas DSM Conservation Program
Client Organization	New Mexico Gas Company (NMGC)
Project Duration	2012 – Present
Contact Information	[redacted] Manager, Energy Efficiency Programs 1625 Rio Bravo SW Suite 27 Albuquerque, NM 87109 [redacted] [redacted]@nmgco.com

Project Description

New Mexico Gas Company (NGMC) sought out ICF's expertise to develop, manage, and implement its residential energy efficiency programs. The programs include the Residential Insulation Rebate Program, the Low-Flow Showerhead Program, the ENERGY STAR® Rebate Program, and the ENERGY STAR® Tankless Water Heater Program.

ICF has been supporting these programs for NGMC since 2012.Three of the four programs (Insulation, Furnace, and Tankless Water Heater programs) pay rebates for the installation of eligible measures. For the fourth, the Low-Low Showerhead Program, New Mexico Gas Company offers free low-flow showerhead kits to eligible customers.

As a part of this contract, ICF develops all program materials and marketing collateral, as well as promotes the program to New Mexico Gas Company customers and participating contractors through media and outreach tools. ICF also designed and developed New Mexico Gas Company's new Energy Effiency Program website, www.nmgcgetrebates.com.

Project Name	Gas Storage Requirements and Operational Parameters Evaluation
Client Organization	Enbridge Gas Distribution Inc.
Project Duration	2016 – Present
Contact Information	[redacted] Manager, Gas Supply & Strategy 500 Consumers Road North York Ontario M2J 1P8 [redacted] [redacted]@enbridge.com

Project Description

ICF is currently engaged by Enbridge to perform an evaluation of the company's gas storage requirements and operational parameters. ICF is performing this assessment using multiple proprietary models that highlight the breadth and depth of ICF's experience and understanding of key gas market issues, particularly those impacting utilities in the Ontario market. To perform the assessment of Enbridge's gas storage assets, ICF is utilized the Gas Market Model (GMM), Gas Storage Valuation Model (GSVM), and Storage Portfolio Cost Model that was developed to evaluate the impact of alternative levels of storage capacity and operational parameters on utility supply portfolio costs under a variety of different weather scenarios.

Project Name	Evaluation of Union Gas Avoided Costs
Client Organization	Union Gas Limited
Project Duration	2014 – 2015
Contact Information	[redacted] Director, Energy Conservation Strategy 50 Keil Dr. N Chatham, Ontario N7M 5J5 [redacted]@uniongas.com

Project Description

Union Gas engaged ICF to evaluate the existing methodology used to estimate the avoided costs used to evaluate Union Gas DSM programs, and to develop and implement a more comprehensive approach to determining Union Gas avoided costs to be used in the 2015-2020 DSM plan. This analysis follows prior work by ICF for Union Gas DSM planning.

ICF used the results of the study to make recommendations to improve the current methodology. Based on ICF's recommendations, Union Gas adopted several revisions to their avoided cost estimates. This project resulted in additional testimony by ICF before the OEB, supporting Union Gas' position and presenting the results of the avoided cost analysis.

In **Appendix B**, we've also included supplemental project descriptions that relate to this scope of work.

Corporate Information

Proponent should provide a narrative describing its background, history, services, and corporate organization. A general overview of the corporate organization is appropriate. If Proponent is subsidiary to or a division of a larger company, this section should concentrate on the operating history of the subsidiary or division providing the Services.

Founded in 1969 as the Inner City Fund (ICF) to support urban renewal in Washington, DC, ICF International has expanded over the last 43 years to provide a range of consulting services to government and private clients worldwide.

Our work addresses today's most complex management, technology, and policy challenges in four key markets: (1) energy and climate change; (2) environment and infrastructure; (3) health, human services, and social programs; and (4) homeland security and defense. Today, we have revenues approaching $1 Billion and over 5,000 employees in more than 65 offices around the world. Our employees combine their passion for their work with an integrated, end-to-end approach while applying their industry and technical expertise to protect and improve the quality of life.

ICF has been a leading provider of energy efficiency services for decades. For instance, we helped develop and evolve the U.S. national ENERGY STAR and Clean Energy initiatives (as well as several important precursors) from their inception. Our diverse energy efficiency services include end-to-end program delivery that ranges from program concept to design and cost-effectiveness analysis; market analysis and achievable potential studies; innovative technology assessments and engineering services; program filing regulatory support; program roll-out or transition; and program marketing and communications, administration, tracking and reporting, and evaluation.

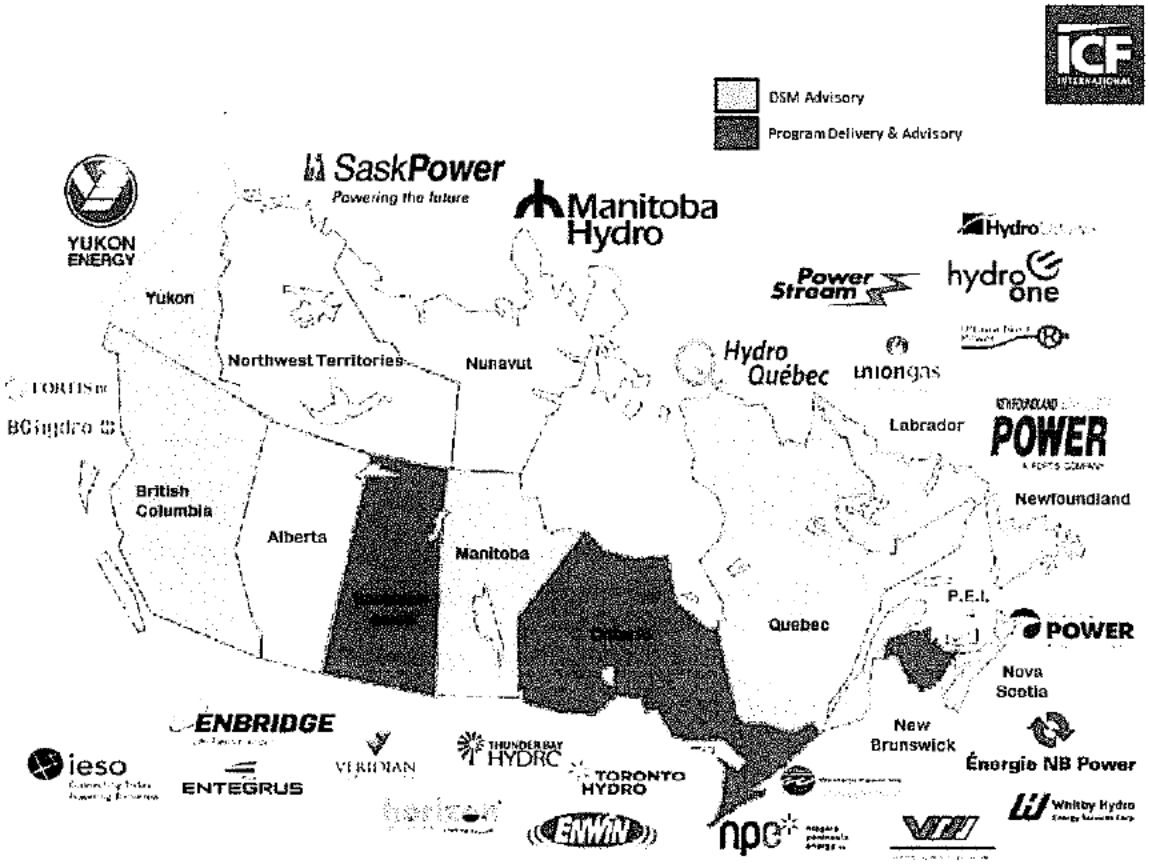
Furthermore, ICF has earned an international reputation in the field of climate change for our analytical rigour, in-depth expertise, and technical integrity through scores of carbon market-related assignments. Our clients are drawn from both public and private sectors, including nearly 60 companies among the FT Global 500; multilateral institutions such as the Organization for Economic Cooperation and Development, International Energy Agency, World Bank, and United Nations agencies; and national, regional and local governments in more than 50 countries including Canada, the United States, the United Kingdom, Ireland, Australia, Russia, and Ukraine.

ICF in Canada

ICF serves clients across Canada, in mature energy efficiency markets such as Ontario, high-load growth jurisdictions such as Saskatchewan, developing energy efficiency markets such as the Yukon, and those with pressing infrastructure challenges such as British Columbia. In 2011, ICF expanded its Canadian operations with the acquisition of Marbek Resource Consultants, a highly respected energy and environment advisory services firm, to provide policy, program, technical, and management advisory services energy efficiency and greenhouse gases. Paired with ICF's expert qualifications, we offer a robust portfolio of services in energy efficiency and greenhouse gases. With more than 30 years of experience in Canada in support of utilities, businesses and government, our Canadian team of over 40 professionals now operates from offices in Toronto, Ottawa, Montreal, Regina, and Calgary to best serve our clients' needs.

Exhibit 1 below presents some of our Canadian utility clients.

Exhibit 1. ICF Brings Expertise in DSM Advisory, and Program Design and Advisory Throughout the Canadian Market.



ICF in Ontario

ICF has been active in the Ontario energy and greenhouse gas markets for decades, serving clients from both our Ottawa and Toronto offices. Over this time, ICF has stayed at the forefront of utility and government advisory services by maintaining a broad set of Ontario-specific offerings that reinforce our staff learning and expertise across customer and market analysis and modelling, program design and delivery, technology and engineering assessment. Our Ontario clients need not look far to see ICF's analytics and advice at play in influencing and guiding decision-making in the Ontario CDM, DSM, and greenhouse gas landscapes and in helping our clients meet their needs.

Our work in Ontario is supported by expert consultants having amassed impressive experience in energy efficiency and greenhouse gas sectors, including [redacted] and [redacted]. Under their leadership and guidance, our Ontario staff complement of over 30 energy efficiency and greenhouse gas professionals have completed an impressive array of important investigations in Ontario.

Litigation

Provide a summary of all litigation, broken down by jurisdiction, involving the Proponent within the last seven (7) years, where the Proponent has been or is a defendant or plaintiff in a lawsuit related to the Proponent's services.

Various lawsuits and claims and contingent liabilities arise in the ordinary course of the Company's business. The ultimate disposition of certain of these contingencies is not determinable at this time. The Company's management currently believes there are no current outstanding matters that will materially affect the Company's financial position or results of operations.

Health, Safety, and Environmental Compliance

Describe the health, safety, and environmental compliance programs of the Proponent. List any violations, infractions, ongoing investigations or penalties associated with health, safety or the environment. Please provide details about any charges, convictions summons', tickets or fines served or imposed by the Ontario Ministries of the Environment and Labor or similar bodies (collectively referred to herein as the "MOE" and "MOL") or any Court or tribunal, as well as the Company's current status with the applicable MOE or MOL Regulations.

ICF has a strong safety culture, especially within the Commercial Energy (CE) division that will lead this work. Safety is a core value at ICF. As evidence of this, while we have a company-wide Injury and Illness Prevention Program, CE divisional leadership has implemented a more focused program specifically for their staff. The CE Division also maintains a Division-specific safety and health committee to address the risks and hazards associated with their work amongst their four regions—of which, Canada is one. An outcome of these programs are the Division's two "field guides" that outline staff expectations and requirements. While these field guides provide a Division-level foundation, it is up to the project staff—and ultimately the project manager—to determine what additional actions and controls are needed and ensure the staff—including our subcontractors—are trained on and correctly implement them. These actions and controls are developed—often using a job hazard analysis process—in concert with our field teams and any subcontractors used.

Another example of how ICF's leadership supports and encourages our safety culture is how it has invested in safety and health. One striking example of this is the presence of our corporate director of safety and health, who is a certified industrial hygienist (CIH) and safety professional (CSP); this level of support and technical expertise is not seen among many of our peers. As an engineering consulting company (NAICS code 5416) some regulatory requirements may not technically apply or only apply tangentially to our work. Corporate Safety & Health understands the regulatory requirements, the purpose behind the regulations and that they are minimal expectations. While we have fully compliant programs to address the work we do, he continually works with our staff—especially those doing field work like the CE staff—to understand and manage the risks they face and help them tailor and implement appropriate controls and tracks status indicators (e.g., our incident reporting and analysis program) to identify and act on trends. To date, ICF has not had any charges, conviction summons, tickets/fines, violations, infractions, ongoing investigations or penalties associated with health, safety or the environment at the regional, division, or corporate levels by any regulatory entity including the Ontario Ministries of the Environment and Labor.

Technical Response

Service Provider's (ICF's) Personnel

The ICF Project Manager [redacted] is an experienced project manager with 34 years of experience in energy market analysis, and more than 25 years of experience with Ontario natural gas markets. He has a deep appreciation for the potential challenges, issues and/or threats. Working closely with the ICF team and the Utilities, he will foster an environment of open, honest, regular and early communication of potential challenges, issues and/or threats [redacted] will be assisted by [redacted] in the Toronto office [redacted] n the Fairfax office and [redacted] in the Ottawa office to make sure that we have multiple points of contact and coordination. In addition, seasoned CPS veterans [redacted] and [redacted] are guiding the ICF team. Providing strategic insight to the ICF Project Manager we will, as a team, successfully anticipate and navigate project challenges, issues and/or threats.

The ICF Project Manager employs a proactive, thoughtful, structured and complete approach to planning, processes, and procedures. We invest time during project launch to ensure that all the systems are set up and the team is bought into the approach. The client will note that communications are timely and consistent, those completing the tasks are well-informed and aware of interdependencies, and potential project issues are highlighted early, allowing for mitigation.

Our approach to project management and communications ensures that the project is completed in an efficient and effective manner, and the Utilities are kept up to date regarding progress and issues. Our experience has clearly demonstrated that the study results will ultimately be most useful and meaningful to Utilities only if key client personnel are involved throughout the entire study and are collaborating closely with our team in its development. In short, a successful study is as much about process as it is about the numbers and reports generated.

ICF prides itself on quality and delivers it by closely following generally accepted best project management practice.

a) *Proponents shall provide a list of all personnel assigned to perform the Services, an organization chart and include resumes that briefly outline the following information for all personnel that will be assigned to the Services*
   - *qualifications,*
   - *experience, including any natural gas distribution planning system experience*
   - *number of years they have worked for the Proponent, and*
   - *Similar projects in which they have worked on.*

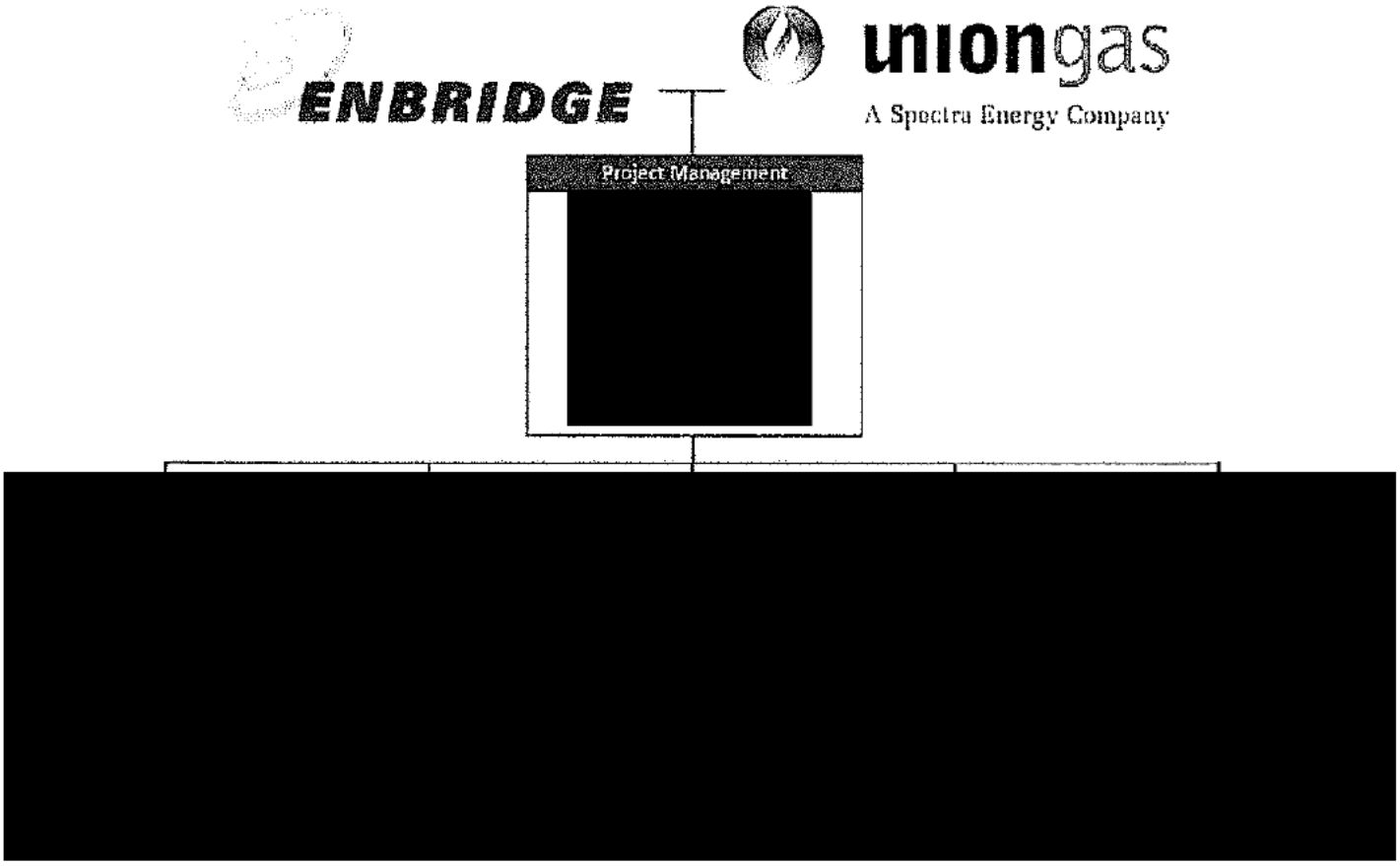
b) *Proponents shall identify the primary contact person that will work with the Utilities throughout the term of engagement.*

c) *Proponents agree that, to the greatest extent possible, the Proponent's team members assigned to the Services will remain constant throughout the term of the engagement. Proponents agree not to assign personnel providing the Services to other projects if doing so would have an adverse impact on the individual's availability to perform the Services in a timely manner.*

This section of our proposal presents the structure of the ICF team for this study and their responsibilities, their individual experience and combined years of relevant experience, and a list of resources that may be allocated to the project, if necessary.

Our proposed study team personnel and organization is presented in **Exhibit 2.** We have organized our team into several streamlined segments, including DSM and Conservation Programs, Infrastructure Planning and Analysis, Avoided Cost and Economic Analysis, External Review, and Climate Policy and Analysis.

Exhibit 2 Study Team Personnel and Organization



The next table provides a biography for each ICF team member, along with their location and years of relevant experience. Combined, our proposed team brings more than **200 years** of combined experience. Complete resumes for the following key staff are included in **Appendix A.**

Team Member and Role	Qualifications and Expertise	# of Years
[redacted] Project Manager and Avoided Costs Lead Fairfax, Virginia	[redacted] is a Principal and Senior Economist in ICF's Fuels and Technology Advisory Services Group. His primary work areas include analytical and regulatory support for gas utilities, natural gas storage valuation and assessment, natural gas and propane asset valuation, analysis of propane and natural gas liquids markets and demand, and market due diligence for asset sales, acquisitions, and financing. He has worked extensively on Canadian natural gas market and regulatory issues. [redacted] assisted in the development of the original Union Gas Avoided Cost methodology in the 1990's, and reviewed the Union Gas avoided cost methodology in 2014. [redacted] also helped develop avoided cost methodologies for several other natural gas distribution companies, and conducted a review of the Union Gas avoided cost methodology as part of the most recent Union DSM filing. [redacted] also provides in-depth analytical and regulatory support for natural gas utilities on issues related to natural gas storage, transmission, and distribution. His responsibilities include economic analyses of facility expansion projects, market assessments for corporate acquisitions, estimation of economic damages in litigation cases, and strategic analysis of regulatory issues. Areas of expertise include natural gas price volatility and liquidity, analysis of natural gas price determination, natural gas storage issues, and natural gas avoided costs and evaluation of long-term economic impacts of major transmission pipeline expansion projects.	32
[redacted] Executive Sponsor and Climate Policy & Analysis Lead Toronto, Ontario	[redacted] is a Vice President and Managing Director of ICF International's Canadian operations. [redacted] has spent his 20 year career working across industry, utilities, and public sector organizations in the planning, design and implementation of energy and environment and management systems. [redacted] has worked on the forefront of energy and environmental markets as well as sustainability for the past 12 years leading work for utilities (Enbridge, Union Gas, Ontario Power Generation, SaskPower, Manitoba Hydro, ATCO, EPCOR, TransAlta), financial services companies (Blackstone, Goldman Sachs, JPM Morgan, CIBC, RBC, Merrill Lynch, Bank of America, First Reserve, and SwissRe), government (Transport Canada, Environment Canada, NRCan, the Provinces of B.C., Alberta, Saskatchewan, Ontario, Nova Scotia, Newfoundland and Labrador, the US EPA, and NASA) and Industry (Suncor, Shell, Enbridge, TransCanada, BP, Alcan, DuPont, Tembec, CAPP, FPAC, Conoco Phillips, etc...) where he has supported the development of sustainability strategies, target setting and compliance/risk management tools.	20

Team Member and Role	Qualifications and Expertise	# of Years
[redacted] DSM and Conservation Program Lead Toronto, Ontario	[redacted] has over 30 years of experience related to Ontario conservation frameworks, policy, programming and markets. This has included work on preparing CDM plans, designing and delivering CDM programs, and work on carrying out achievable potential studies to assist the OPA and LDCs to set CDM targets and plan CDM portfolios. [redacted] also has extensive experience in Ontario natural gas DSM frameworks, policy, programming and markets. She was involved in the design of the first natural gas DSM framework as a Board Member of the Ontario Energy Board (1992-2002, part-time), which included the determination of which cost-effectiveness tests to use and the approach to calculating associated avoided costs; this framework became the basis for subsequent electricity CDM frameworks in Ontario. She also has extensive experience dealing with the adjudication of natural gas infrastructure approvals. [redacted] was a senior advisor to the OPA on the development of the first generation CDM framework, and has advised more than 40 Ontario LDCs in the design of their CDM programs and plans. Most recently [redacted] was the project manager for the Achievable Potential Study for the Ontario Power Authority, which included the generation of achievable potential by sector, market segment and end-use. It also included calculations of Total Resource Cost Test (TRC), Program Administrator Cost Test (PAC), and levelized unit energy costs, and the development of supply curves.	30
[redacted] Infrastructure Planning and Analysis Fairfax VA	[redacted] is a recognized authority on oil, gas and other supply; carbon sequestration; and energy markets. He has managed several studies related to public policy questions surrounding energy infrastructure including energy price impacts, general economic impacts, improvements is energy assurance, and social cost-benefit analyses. He supervised economic modeling work for the Canadian Gas Association study on the merits of expanding natural gas distribution systems taking into account the costs and benefits for new gas customers, as well as the impacts on the broader Canadian economy. Also supervised a similar study for CGA related to serving remote Canadian communities with LNG. To support the National Energy Technology Laboratory's R&D planning, supervised a study of long-term needs for natural gas infrastructure by estimating seasonal, daily and hourly demand for natural gas and developing least-cost estimates for future needs of pipeline capacity, conventional underground storage, high-deliverability underground storage and peak shaving plants. He also performed market analysis for NETL of combined heat and power applications in the residential and commercial sectors, analyzed gas loads and gas LDC system operations under high-CHP-market-penetration scenarios. This included creating a hydraulic model of a gas LDC system, determining peak-demand-period steady-state pressures on the system for a high-CHP-market-penetration scenario and then determining the cost of reinforcing the gas LDC system to avoid violating minimum pressure criteria. He holds an MA, International Relations and Economics from the Johns Hopkins University School for Advanced International Studies and a BA in History and Economics from Dartmouth College.	37

Team Member and Role	Qualifications and Expertise	# of Years
[redacted] External Review Lead Rockville, MD	[redacted] is a Vice President and Senior Technical Director at ICF International with more than 20 years of experience in energy efficiency, demand side management and pollution prevention for the residential sector. His professional skills include: design and implementation of strategic energy efficiency and demand reduction programs; market and technology assessments of energy efficient products and systems; and information technology development. Having previously served as ICF's Residential Sector Lead, [redacted] now focuses on helping utilities develop solutions for their rapidly changing landscape including distributed energy resources, customer energagement and grid modernization [redacted] has innovated residential programs and solutions that leverage the Internet of Things and mobile technologies, including overseeing development of Power Rebate™ – the industry's first mobile rebate app. [redacted] holds a B.S. in Architectural Engineering from Pennsylvania State University and an M.S. in Engineering Management from George Washington University.	24
[redacted] Project Management Support, and Avoided Cost & Economic Analysis Senior Analyst Fairfax, Virginia	[redacted] is a manager with ICF's Energy Advisory Group who works on projects related to NGL and Natural Gas Markets. He has over 8 years of experience in energy related research and consulting and most recently worked at Halliburton's Production Enhancement group in strategy and planning before joining ICF in 2016. [redacted] brings with him expertise covering the forecasting of natural gas and natural gas liquids markets, infrastructure assessments, regulatory impacts on Upstream developments, and strategic analysis of investments. He holds a BS in Management Science from UCSD and a MBA in Global Finance from Thunderbird School of Global Management.	8
[redacted] Project Management Support, and Industrial DSM and Conservation Consultant Ottawa, Ontario	[redacted] is a consultant with both technical and policy experience in the fields of energy and the environment. Since joining ICF in 2011, his work has focused on demand side management (DSM) programs, industrial energy efficiency, and strategic planning. He has contributed to a wide variety of projects, including: energy audits, benchmarking, market characterization studies, conservation potential analyses, the development of industrial energy efficiency measure databases, and various other work supporting DSM. [redacted] has been involved in several conservation potential studies, including recently leading the industrial sector analysis for a conservation and demand management (CDM) study for Newfoundland and Labrador. He also led the analysis for a recent assessment of potential savings in a remote northern grid of Saskatchewan, where the utility was interested in getting a reliable understanding of how CDM efforts could offset projections for potential future generation shortfalls [redacted] also has significant experience in the field, having audited more than 25 industrial facilities and provided technical support to auditors of 40+ more plants (remote support from off-site). [redacted] has a B.A.Sc. in Mechanical Engineering, is a Certified Energy Manager, and is registered in Ontario's Engineering Intern Training (EIT) program as he applies to become a Professional Engineer.	6

Team Member and Role	Qualifications and Expertise	# of Years
[redacted] Commercial and Residential DSM and Conservation Consultant Ottawa, Ontario	[redacted] is a Professional Engineer with 10 years of experience with energy conservation and sustainable energy systems and extensive experience with technology assessment, program design, and carrying out conservation potential reviews for several electric and natural gas utilities. He has led and worked on various CPS across Canada, including for Ontario Power Authority, SaskPower, NB Power, Enbridge Gas, Union Gas, and Toronto Hydro. Given his experience in the commercial field, he is an ideal choice for this role. [redacted] has carried out various types of analyses to determine the viability and long-term savings potential of energy efficient technologies for previous similar studies. For example, he has assessed various commercial lighting measures and upgrades to HVAC equipment and used HOT2000 to investigate the impacts of residential building envelope upgrades, such as ENERGY STAR windows, improved air sealing, and additional attic and foundation insulation. [redacted] also has extensive experience with market studies and technology characterization, including assessing the state of the BC market for condensing unit heaters, IR radiant tube heaters, and retrofits to existing decorative fireplaces, and studying the market potential of smart thermostats.	10
[redacted] Infrastructure Planning and Analysis Consultant , Fairfax VA	[redacted] has over seventeen years of experience in the areas of energy modeling, engineering economic evaluation, reservoir engineering and pipeline modeling. He is the lead analyst on projects related to hydrocarbon supply curves, oil and gas drilling and production, gas pipeline-supply-demand modeling, midstream infrastructure analysis, economic impact analysis, and issues related to reservoir simulation, multi-phase flow in pipeline, and fluid PVT. He has also built various Monte Carlo analysis and optimization models. He holds M.S. and Ph.D. in Petroleum and Natural Gas Engineering from The Pennsylvania State University and a B.S. in Gas and Petrochemical Engineering from University of Indonesia.	26
[redacted] Infrastructure Planning and Analysis Consultant Fairfax, VA	[redacted] is an Associate in ICF International's Emission Management group. Since joining ICF International in 2012 [redacted] has worked on supporting the U.S. Environmental Protection Agency (EPA) reduce methane emissions worldwide through the Natural Gas STAR Initiative, the Global Methane Initiative and the U.S. Methane Inventory for the Natural Gas and Petroleum Systems [redacted] has collaborated with partners globally to identify methane reduction opportunities, by leading field measurement studies at production wells, offshore production facilities, and floating storage and offloading facility in Indonesia and Thailand. Furthermore [redacted] worked with the Massachusetts Department of Public Utility where he evaluated the economics and methodologies for reporting of lost and unaccounted for gas (LAUF) from two participating companies. [redacted] has also performed an audit verification of an oil sands upgrader [redacted] has an academic background in both chemical engineering and economics from the University of Virginia.	6

Team Member and Role	Qualifications and Expertise	# of Years
[redacted] Senior Consultant, Climate Policy & Analysis Toronto, ON	[redacted] is a Senior Manager in ICF International's Air & Climate practice, providing a wide range of services to public and private sector clients. [redacted] has spent the past decade working at the nexus of energy and the environment, through a wide range of projects and studies. [redacted] has extensive expertise in greenhouse gas (GHG) accounting in both the development and verification of GHG emissions inventories, as well as provision of consultative services related to market-based carbon reduction programs. In 2012 [redacted] led and managed the development of ICF's ANSI-accredited ISO 14065 Verification Management System (VMS). [redacted] is the VMS Manager and is a lead verifier in ICF's Verification Body. [redacted] is recognized for her extensive experience interpreting climate-related policies/regulations in the Canadian context and subsequently administering and managing complex projects to study their impacts. For the past year, [redacted] has led several studies assessing how the cap-and-trade program under development in the province of Ontario might impact businesses using a purpose-built supply and demand model of the provincial economy. From 2007 to 2009 [redacted] led development and research teams that completed two multi-client outlook studies of the impacts of emerging Canadian GHG emissions regulations on regulated sectors. Throughout these studies [redacted] worked with several oil and gas and power sector clients to inform them of the potential ramifications of carbon policy.	27
[redacted] Climate Policy & Analysis Senior Analyst Toronto, ON	[redacted] is an Associate in ICF's Energy, Environment and Transportation Division, and has a strong academic background in global energy systems, combining technical, economic and policy subjects [redacted] spans both the Energy and Carbon Markets, and the Energy Efficiency divisions in ICF's Toronto office. [redacted] primary focus for the past six months has been on climate policy advisory and analytical services, following major policy announcements in the provinces of Ontario and Alberta. She is ICF's technical lead on Ontario cap and trade, including allowance supply and demand modeling, and has an in-depth understanding of the impacts of policy design options on natural gas demand. She has considerable experience quantifying greenhouse gases (GHGs) through her work developing GHG inventories using ICF's GHG: ID quantification tool, and has expertise in emission factor best practices. As an Associate Verifier at ICF [redacted] has also worked on both voluntary and compliance GHG emissions verifications within the jurisdictions of British Columbia, Alberta, Ontario, Quebec, Brazil, and international reporting to The Climate Registry. [redacted] work within the Energy Efficiency team is focused on conducting site energy assessments and supporting project development at industrial and commercial facilities. She is also skilled in regional energy modeling, and holds an NRCan certificate in Advanced Building Recommissioning (RCx).	7

Quality and Service Levels

The Proponent should provide details of its approach to measuring and maintaining high quality Services. The Proponent should provide details of any industry-recognized quality standard to which it is, or will become, compliant (including a timeframe for compliance, if not already achieved), as well as any awards received over the last 18 months.

ICF is committed at every level of the organization to providing the highest quality service to our clients. The ICF team's quality assurance methodologies, experienced managers, and knowledge of aspects of the Utilities' quality requirements ensure consistent, high-quality work throughout project and

deliverables meet the Utilities' quality requirements.

ICF ensures quality through a number of approaches and pre-determined checks and balances. These checks and balances include:

A single point of contact for decisions and resource assignments. ICF's project manager, [redacted] is directly responsible and accountable for project task and resource coordination. This single point-of-contact provides clarity to the OEB on all projects decisions and presents authority to the ICF team on roles, responsibilities, and assignments.

Executive oversight of all project deliverables to ensure high quality. [redacted] is an experienced consultant and former OEB Board Member, and will maintain executive oversight responsibilities of all DSM related project deliverables. [redacted] is a widely known and respected natural gas infrastructure analyst, and will maintain executive oversight responsibilities for the infrastructure planning components of the study. Together with [redacted] this leadership team will ensure the Utilities receives a usable and defensible study and can confidently meet achievement potentials.

Open and transparent communication to avoid surprises. Our team regularly communicates with project staff (internally and with our clients) on progress and deliverable expectations to ensure there are no surprises for our clients and that our clients can expect to receive project deliverables that meet its quality standards.

Internal reviews of all deliverables by an experienced ICF expert prior to final delivery to the Utilities. The Utilities will be able to focus their reviews on content. ICF will have a senior project editor with knowledge of DSM strategy, planning and regulatory experience act as an internal reviewer for deliverables on this project.

Having supported DSM activities in Ontario since the 1990's and with our understanding of the Utilities goals, ICF brings a thorough understanding of the need for high-level quality control and assurance under this contract. This study requires us to look at high-profile, complex issues that will be used to inform decisions by high-level management at each of the utilities. In addition, these analyses are used across the region by a range of interested parties and stakeholders. The Utilities must be certain that the information it delivers to the regulator will stand the test of intense scrutiny. The ICF team has the proven track record with regulators, providing services based on sound science and methods, are well documented, and meet the highest quality requirements, whether prepared as part of a longer term task or under quick-response conditions.

ICF is consistently recognized for the quality and impact of our services. Our solutions often are associated with the most important policy decisions of our time. The prestigious awards we have received are testament to our commitment to excellence and the enduring contributions of our engagements. In 2016, ICF has been named to Forbes Magazine's "America's Best Midsize Employers" and "America's Best Management Consulting Firms" lists. More information about ICF's awards and recognition can be found on our website: http://www.icfi.com/about/awards-and-recognition

Subcontractors

a) Identify any subcontractors, including any affiliates of the Proponent, to be used in performing the Services. Subcontractors cannot be changed without written approval of the Utility, or Utilities, that have signed the Services Agreement. Where no list of subcontractors is submitted, the Proponent will only use its own forces to perform the Services.

b) Subcontractors' company name, address, contact name, relationship to the Proponent, and work to be contracted to subcontractor must be provided as part of the Proposal.

c) Detailed description of the roles and responsibilities of the Proponent and any subcontractor if a subcontractor is to be used.

d) The Proponent shall provide the same financial information for each subcontractor as required for Section 4.3(4) in the RFP Data Sheet.

ICF will provide 100% of the services for the Integrated Resource Planning Study, no subcontractors are being proposed at this time.

Insurance

The successful Proponent will be required to provide the insurance requested in the RFP Data Sheet.

Please find ICF's sample Certificate of Insurance attached in **Appendix C.** ICF will provide a named Certificate of Insurance upon award of this contract.

Workplace Safety and Insurance Board (WSIB)

Provide the confirmation of Proponent's registration with the WSIB as requested in the RFP Data Sheet. Provide confirmation that the Proponent is registered and in good standing with the WSIB and any jurisdictional equivalent if the Services will be performed outside the Province of Ontario as required in the Services Agreement

Please find ICF's registration with the WSIB attached in **Appendix D.**

Methodology Suitability

Note: "Integrated Resource Planning" and other defined terms used in the sections below are defined in Schedule 4 to this RFP.

Please describe in detail:

a) the Proponent's standard methodology in performing integrated resource planning studies that are similar to the Integrated Resource Planning Study described in this RFP (if there is not a 'standard' Proponent methodology, please detail the general/preferred methodology that would be utilized by the Proponent in similar circumstances);

b) how the Proponent's 'standard' methodology (or, alternatively, the general/preferred methodology) can be adapted to meet the requirements of the Integrated Resource Planning Study;

c) any 'normalisation' processes that the Proponent anticipates will be undertaken in accordance with the Integrated Resource Planning Study requirements; and

d) The types of market data used by the Proponent, how such data is collected, the sources of such data, and how the data is validated.

There is not a single standard comprehensive methodology for assessing the potential for DSM to impact facilities planning and investment for natural gas utilities. Instead, this study will integrate several different IRP methodologies in order to achieve the study objectives. ICF has extensive experience with DSM and IRP implementation, and has developed the best available methodology for assessing DSM impacts for Ontario natural gas distribution companies as part of the recently completed

Ontario natural gas Conservation Potential Study (CPS). ICF also has extensive experience with the methodologies used to estimate avoided natural gas costs in Ontario.

ICF's methodology for assessing DSM impacts will be an important part of the overall project. This methodology was developed to estimate conservation potential as part of the Ontario CPS. The ICF CPS methodology includes a model already loaded with the utilities' sales data, calibrated to map with the highest degree of accuracy that market data currently available can give. The ICF team has characterized the load by segment and sub-segment, building types, usage, and by weather regions – six regions, four for Enbridge and two for Union. We have made baseline load growth projections given the most recent economic and demographic indications. Energy usage breakdown relies on archetype buildings for each segment and relies on energy modeling of typical annual energy usage in each segment – we have existing building archetypes as well as new building archetypes. Our archetypes are developed using industry-standard building energy modeling platforms. We are familiar with all the measures in the utility TRMs, and have made a scan of other available measures in the market. The marginal modeling work that needs to be done to map the broad-based DSM potential on an hourly basis on a design day (needed to assess impact on infrastructure planning) is manageable, and we can do this work faster than others due to our familiarity with the CPS data.

Understanding the Intersection between Facilities Planning and DSM Planning

Enbridge recently completed the Greater Toronto Area (GTA) project, with the investment of over $900 million to reinforce and expand service to the Greater Toronto Area. Union Gas has proposed a major system expansion in the Ontario Panhandle to serve recent and expected growth in natural gas demand in this region. In addition, both utilities also regularly expand the existing infrastructure to serve new subdivisions within the existing utility service territories. As these new subdivisions are added to the system, new infrastructure must be extended into the subdivision, and the utility must also ensure that existing infrastructure is sufficient to meet the increase in load created by the new subdivisions.

Going forward, Enbridge plans to spend more the $400 million per year between 2016 and 2019 on infrastructure projects, and Union plans to spend more than $1,400 million per between 2016 and 2017. Union also regularly invests in new facilities to meet growth in capacity requirements on the Dawn Parkway system resulting from growth in Union demand, Enbridge demand, and growth in demand in other jurisdictions.

The magnitude of these investments has raised questions about whether or not DSM programs that reduce peak hour demand might be able to avoid, or defer or otherwise minimize future infrastructure investments. If DSM programs are capable of reducing or delaying infrastructure investments, the incremental savings associated with the reduction in required facilities investment would increase the amount of cost-effective DSM in the utilities' service territories. This IRP planning study is intended to evaluate the potential for DSM programs to impact facilities investment requirements and to address barriers and identify approaches to integrating the planning process for DSM programs and the planning processes for infrastructure investment. The utilities have identified three broad areas of intersection between utility facilities planning and DSM programs and DSM planning that need to be addressed in this study. These include:

1) The impact of broad-based DSM programs and planning on distribution infrastructure planning
2) The impact of targeted DSM programs and DSM planning on infrastructure planning for new subdivisions and new communities

3) The impact of targeted DSM programs and DSM planning on infrastructure planning and investments related to serving system growth and reducing system reinforcement expenses.

In addition, the intersection between Ontario climate policy, natural gas demand, and infrastructure planning will also play a critical role in assessing the ability for DSM programs to impact infrastructure planning.

ICF will address each of these areas in detail as part of this project. For each area of intersection, ICF has summarized the key elements below, as well as identified and discussed some of the key challenges that will need to be addressed before the utility DSM programs can be integrated with the facilities planning process.

Intersection 1: Broad Based DSM and Distribution Infrastructure Planning

The utility infrastructure planning process considers the impact of changes in natural gas demand based on forecasts of demand incorporating DSM activity as well as other factors influencing demand. However, typically, the impact of DSM activity on the infrastructure planning process is passive, based on changes in forecasts of demand, rather than active planning between the two different branches of the utilities.

As the utilities point out in the RFP:

> *"It is important to note that broad-based DSM and Distribution Planning operate from different viewpoints. The primary objective of broad-based DSM is to obtain participant and societal savings through a reduction in annual consumption of natural gas across the Enbridge Gas Distribution Inc. ("Enbridge") and Union Gas Limited ("Union") franchise areas. In the process the DSM programs will have an indirect impact on the need for distribution infrastructure. This effect is sometimes referred to as "passive deferral of infrastructure" and will be captured starting in 2015 as a benefit in the Avoided Cost calculation used in the Total Resource Cost ("TRC") test to screen DSM programs offered by Enbridge. Union Gas will be reviewing the impact of Avoided Distribution costs at a later date. In contrast, Distribution Planning is concerned with maintaining the safety and integrity of the distribution system under all conditions, including a situation of maximum use. Distribution Planning looks at peak hour requirements in each network and sub network of the distribution system, based on the history of individual customer usage in that network and design day conditions. The objective of targeted DSM is "active deferral" of specific infrastructure projects"*

The intersection between broad-based DSM and distribution infrastructure planning typically has been addressed by including an estimate of avoided infrastructure costs in the evaluation of the cost-effectiveness of the utility's DSM programs. The avoided infrastructure cost is generally a rather small component of the total avoided costs since most infrastructure investment in mature natural gas distribution companies is driven by the need to maintain and upgrade existing facilities where incremental savings from a reduction in demand resulting from a DSM program are generally limited.

As part of this project, ICF will review the facilities planning process and the DSM planning processes for both utilities to determine if a more active relationship between DSM planning and infrastructure planning would be effective in maximizing the cost-effectiveness of the investments in both infrastructure planning and DSM planning. Specific issues to be addressed include:

- Potential use of available metering data to evaluate the impact of DSM programs on facility requirements.
- Implications of advanced DSM initiatives such as CHP for Distribution system facility planning.
- Expected impacts of climate change policy on DSM and broad-based facility planning
- Changes needed to better integrate relevant broad-based DSM information into the Distribution Planning process.

Relationship between Proposed Project Tasks and Intersection 1

The project proposed by ICF includes 11 specific tasks. The results of several of these tasks will be used to address intersection #1. These tasks include:

- The Literature Review and Best Practices Review, including interviews with gas utilities with established broad-based DSM programs to be conducted in Task 2, will evaluate how other leading utilities address issues related to broad based DSM and Distribution Infrastructure Planning.
- The internal review of the gas utilities Distribution Planning process and DSM program planning process in Task 4 will be used to evaluate how the Utilities' current DSM and infrastructure planning processes incorporate the broad based impacts of DSM programs.
- Task 7 will include the development of avoided facility costs associated with broad-based DSM planning efforts for each utility.
- The Draft Transition Plan completed in Task 5 will develop recommendations for integrating the broad-based impacts of DSM planning efforts into the facilities planning process.
- The final report (Task 11) will include a chapter specifically addressing Intersection #1.

Intersection 2: Subdivision and New Community Planning

Within the Union Gas service territory, there are potentially 30 +/- communities with more than 500 homes/businesses that Union could potentially expand its system to serve and more than 100 communities with more than 100 homes/businesses. Potentially, Union Gas expansion could reach up to 140,000 new customers. However, the costs associated with serving these communities often exceed economic construction criteria. Union is currently considering 29 projects to connect 33 new communities with 18,000 potential customers to the Union Gas system, at an average cost of about $7,500 per potential customer.

The OEB has also encouraged Enbridge to expand natural gas service to new communities not currently receiving natural gas service.

Both utilities also regularly expand the existing infrastructure to serve new subdivisions within the existing utility service territories. As these new subdivisions are added to the system, new infrastructure must be extended into the subdivision, and the utility must also ensure that existing infrastructure is sufficient to meet the increase in load created by the new subdivisions.

A targeted DSM program that could reduce peak hour demand in these communities and subdivisions could potentially allow the Utilities to reduce the infrastructure requirements needed to serve these communities, resulting in a reduction in infrastructure costs as well as reducing energy costs to the consumers in the new communities and subdivisions.

This project will assess the potential savings in infrastructure investment needed to develop new community expansions that could be achieved through targeted DSM programs that reduce the need for new infrastructure in these communities. A major difference of such targeted DSM programs is that there is often a wider range of options available when new buildings are being constructed or even when existing buildings are being retrofitted with gas-burning appliances and equipment. These additional options include more flexibility regarding insulation and other improvements to building envelopes, enhanced energy management systems, solar and passive solar design, combined heat and power and district heating, energy storage, and so on. These options can reduce gas and electricity annual and peak loads and shift loads among natural gas, electricity and renewables. ICF will address this objective by implementing the following work plan:

Review of Existing Subdivision Planning Process. ICF will interview key personnel at Enbridge and Union Gas to learn what programs are currently being implemented (e.g. residential new construction programs), the key interactions the utilities have with local municipal subdivision planning and approvals (e.g. municipal planning staff, developers), including current opportunities for influence, and what plans and ideas exist for enhancements to those programs. ICF will also collect information from ICF personnel who are currently implementing gas and electric DSM programs in the U.S. and Canada to better understand what is happening in other jurisdictions with regard to such targeted DSM programs. This will include reviewing interactions with developers, architects, HVAC vendors and contractors, lighting vendors and contractors, and so on. ICF will then develop a realistic list of options that could be undertaken to fashion a more proactive role for Ontario gas utilities in subdivision planning and new customer interactions.

Assessment of Impacts of DSM Programs on New Community Requirements. ICF will use methods similar to those described herein for broad-based DSM programs in assessing the potential impacts of targeted DSM programs to reduce annual and peak gas loads and, thereby, the need for and present value cost of new utility infrastructure. This methodology begins by assessing the impacts of each DSM option and a selected combined set of DSM options on targeted customer loads using engineering calculations and models that account for differences among buildings and equipment characteristics, customer behavior, interactions among the DSM programs, and weather to arrive at a utility sub-network area hourly load profile for the design peak day, with and without the set of DSM programs. The impact on utility system design and costs will then be assessed using the existing infrastructure design tools used by the utilities for such purposes. Looking at a new subdivision, it might be possible to reduce peak day and peak hour gas load enough that a high-pressure line that will connect to the subdivision can be of a smaller diameter or operate at lower pressures. It is also conceivable that mains, regulators, service lines, and meters in the subdivision could also be downsized if peak hour demand could be reliably reduced with a targeted DSM program. If such peak hour demand changes could be achieved from a set of DSM programs, then their cost impacts on both infrastructure and DSM program costs could be estimated using the utilities' standard cost and financial planning assumptions and methods.

Identify and scope out potential case studies for each utility: The case studies would serve to provide real-world examples of what is to be expected in terms of infrastructure cost savings from DSM programs targeted to specific new infrastructure, such as that planned to service a new subdivision and how those infrastructure savings compare to the targeted DSM costs. The case study could be for a system expansion to a new community that has already occurred or one that is being planned now. The criteria for selection would be that the case study be representative of similar expansions expected in

Ontario, that data related to the customers and their energy use be readily available, and that there be pre-exiting or easily produced full hydraulic model simulation of the infrastructure buildout and a related infrastructure cost estimate. It would also be useful if the case studies as a group encompass a range of residential, commercial and industrial customer types and expansion topologies.

Relationship between Proposed Project Tasks and Intersection 2

The project proposed by ICF includes 11 specific tasks. The results of several of these tasks will be used to address intersection #2. These tasks include:

- The Literature Review and Best Practices Review to be conducted in Task 2 will evaluate how other leading utilities address issues related to DSM programs impact to sub-division and new community planning.
- The internal review of the gas utilities Distribution Planning process and DSM program planning process in Task 4 will be used to evaluate how the utilities' current DSM and infrastructure planning processes incorporate the potential impacts of targeted DSM programs on subdivision and new community facility planning.
- Task 6 will include the development of illustrative avoided facility costs associated with DSM planning efforts targeted at specific subdivision and new community expansion projects for each utility.
- The Draft Transition Plan completed in Task 5 will develop recommendations for integrating the broad-based impacts of DSM planning efforts into the facilities planning process.
- The final report (Task 11) will include a chapter specifically addressing Intersection #2.

Intersection 3: Targeted DSM and Reinforcement Projects

Both Enbridge and Union are investing in significant infrastructure reinforcement projects to serve growing load in certain portions of their service territory. Union also regularly invests in new facilities to meet growth in capacity requirements on the Dawn Parkway system resulting from growth in Union demand, Enbridge demand, and growth in demand in other jurisdictions. Targeted DSM programs that could reduce the amount of new capacity required or delay the need for new capacity could reduce the level of investment in new utility infrastructure, lowering rates for utility costs and avoiding the potential to overbuild utility systems.

As an example, Union has proposed the Panhandle Pipeline project to serve incremental load in the Ontario Panhandle region (and to meet other objectives). This project will cost about $260 million to serve about 120,000 GJ/d of incremental load, which is expected to be sufficient to meet demand in the region for the next five years. While targeted DSM would not be expected to impact the need for this specific project due to the time frame needed to implement a targeted DSM program, targeted DSM might be able to extend the period before additional expansion is needed in the future, or potentially defer the need for additional expansion in the area indefinitely. A delay of even one year in an investment of this size would reduce the utility's future cost of service on a Net Present Value Basis by several million dollars, providing a significant potential economic incentive to consider the potential.

However, the targeted DSM programs that would be needed to delay or avoid future investments of this type face a variety of challenges that need to be addressed. These include:

1) Identifying specific customers and loads that could be influenced by DSM programs in the locations that would be needed to delay the infrastructure investment.

2) Estimating the potential utility infrastructure cost savings associated with individual customers, which may differ widely depending on their location on the system.

3) Determining potential project areas sufficiently in advance of the need for new capacity to enable DSM programs to be developed and implemented prior to the need for the incremental capacity.

ICF will address each of the challenges as part of our assessment of Intersection 3: Targeted DSM and Reinforcement Projects.

ICF will also work with utility staff to identify potential areas where future growth may require significant investments in new infrastructure, and will make recommendations on potential pilot projects to assess the ability to impact future investments in these areas.

Relationship between Proposed Project Tasks and Intersection 3

The project proposed by ICF includes 11 specific tasks. The results of several of these tasks will be used to address intersection #3. These tasks include:

- The Literature Review and Best Practices Review, including interviews with gas utilities with established broad-based DSM programs to be conducted in Task 2 will evaluate how other leading utilities address these issues.
- The internal review of the gas utilities Distribution Planning process and DSM program planning process in Task 4 will be used to evaluate how the utilities' current DSM and infrastructure planning processes incorporate the broad-based impacts of DSM programs.
- While the potential benefits of deferring infrastructure investment in system reinforcement projects is by its nature project-specific, ICF will develop illustrative avoided costs associated with typical facility investment projects as part of the avoided cost analysis in Task 6.
- Using the model framework from the recently completed Ontario Conservation Potential Study (CPS) completed for the Ontario Energy Board, ICF will develop an hourly profile in Task 7 for the analysis of potential DSM impacts to infrastructure planning on an hourly basis.
- Task 8 will build upon the results from Task 2 to identify and assess actual opportunities for a reduction in major infrastructure investments.
- The Draft Transition Plan completed in Task 5 will develop recommendations for integrating the impacts of targeted DSM planning efforts into the facilities planning process.
- The final report (Task 11) will include a chapter specifically addressing Intersection #3.

The Intersection between Infrastructure Investment and Climate Policy

Canada and many of the provinces have committed to significant greenhouse gas (GHG) abatement targets in 2020, 2030 and beyond aimed at keeping global temperatures below 2.0°C above pre-industrial times. The federal government has initiated the Pan-Canadian Framework (PCF) for Clean Growth and Climate Change, committed to national leadership and establishing a national emissions

reduction target, developing a Canadian Energy Strategy, providing access to federal funding and enabling provincial level flexibility to design local carbon pricing policies. Further the federal government has made it clear that thy government expects a price of carbon to be imposed by the provinces as a means to driving reductions in emissions of GHGs.

A price of carbon has not yet been imposed on the economy of Ontario (as it has in Quebec and British Columbia) nor the on the large emitters (as it has in Alberta). However with recently passed legislation and regulation, a price of carbon will be imposed starting in 2017. The provincial government has moved very quickly to establish this policy;

- In April 2015, the government of Ontario announced that it would establish a cap-and-trade system in Ontario, and entered into an agreement with Quebec to link the new Ontario system with Quebec's system under the auspices of the Western Climate Initiative (WCI). Together with California (also a party to the WCI), Ontario and Quebec will form the largest carbon market in North America.
- In May 2015, the province announced a 2030 target of 37% below 1990 levels and therein defined a linear path to 80% reduction in emissions by 2050.

It is important to note that:

- Ontario's own forecast 2020 emissions are 15 million tonnes (Mt), or 10% greater than its 2020 target.
- Ontario recently released a 2030 target of 37% below 1990 levels – essentially eliminating the option for any new industrial or fossil fired electricity generating emission sources over the next 15 years without very significant (50%) reductions in residential and commercial natural gas consumption and transportation fuel usage.
- The 2050 target (35 Mt) is actually an 88% reduction from BAU (290 Mt).

On May 19, 2016, the Ontario government released Ontario Regulation 144/16 - The Cap and Trade Program (Cap and Trade Regulation) under the Climate Change Mitigation and Low-Carbon Economy Act, 2016 and the Methodology for Distribution of Ontario Emission Allowances Free of Charge. The Cap and Trade Regulation takes effect July 1, 2016, and will impose a carbon price on over 80% of emission sources in the province starting January 1, 2017.

On June 8, 2016 the government released their Climate Change Action Plan (CCAP), laying out the fundamentals of a five year plan aimed at deploying $6B to $8B from the proceeds of sale of allowance to reduce emissions in Ontario in the short and long term. The proceeds will be deployed on a number of measures including public transportation, electric vehicles and measures that will impact forward demand for natural gas including;

- Renewable natural gas development,
- Natural gas vehicles,
- Natural conservation including the OEB-regulated demand side management (DSM) and beyond (building codes and net zero carbon buildings), and
- Considerable funding towards measures aimed at providing homeowners non-emitting options for energy (including air source and ground source heat pumps).

Given the velocity of the policy development and lack of detail in the CCAP there is considerable uncertainty in how all this will manifest on forward demand for natural gas in the short (2016-2020), mid

(2021-2030), and long term. This uncertainty has already appeared in Union's Panhandle expansion application, which addresses some of the concerns around carbon policy uncertainty and its resulting impact on infrastructure investment. Specifically, the reduced depreciation period from the Board-approved depreciation rates for this type of infrastructure project of 50 years (typically used to calculate revenue requirements and resulting customer rate impacts) to a proposed 20-year useful life of the project better aligning the cost with the timing of the reported restrictions and potential elimination of natural gas heating in homes and businesses.

The OEB's latest conservation potential review (CPR) was tasked with quantifying the impact of a price of carbon delivered via cap and trade on conservation potential. Conservation measures often have additional and demonstrable benefits beyond energy savings, potentially including improved comfort, health, convenience, aesthetics (National Action Plan for Energy Efficiency, 2008), including carbon (greenhouse gas) emission reductions. The appropriateness of inclusion of non-energy benefits in the avoided costs are typically based on provincial policy decisions. For the latest CPR, the OEB requested that the relevant non-energy benefits include the value and quantity of carbon reductions. In the previous DSM framework, the OEB had directed that avoided costs used in the Total Resource Cost (TRC) include a 15 percent adder to account for these costs. The recently completed study did not include the impact of the price of carbon but adopted the simplified approach employed in previous studies. As such the market based price forecast was not employed.

Recognizing the challenges uncertainty facing the gas distribution companies in forward planning, the OEB released a Staff Discussion Paper on a Cap and Trade Regulatory Framework for Natural Gas Utilities – EB-2015-0363. With an understanding that under the Climate Change Act, natural gas distributors (both rate-regulated and non-rate-regulated) will have the compliance obligations regarding their facility-related GHG emissions and the emissions of most of their customers, the OEB is providing guidance on required compliance plans (describing how the utilities will meet their customer-related and facility-related compliance obligations). The framework outlines the OEB's approach for assessing the cost consequences of the utilities' plans for complying with the Cap and Trade program and establishing a mechanism for recovery of these costs in rates. This process is underway now and it is likely the utilities will not have final guidance prior to initiation of this project.

It is clear that any assessment of forward demand for natural gas in the province of Ontario will need to include an appreciation for:

- The price of carbon that will be imposed via regulation,
- The impact of price of carbon on existing residential, commercial, and industrial customers' demand
- The impact of price of carbon on and conservation initiatives,
- The impact of the measures defined within the Climate Change Action Plan on natural gas demand,
- The impact of for natural gas demand within the electricity generating sector, and
- The impact on natural gas as a source of energy for new communities in a carbon constrained economy.

ICF is in a unique position to bring to bear our 25 years of experience in greenhouse gas markets, policy, analysis, modelling, and assurance. We review and monitor all carbon markets (European Union Emissions Trading System, WCI, the Regional Greenhouse Gas Initiative, Alberta) and policy (Canada / province, U.S. / state) on an ongoing basis. For instance, ICF has participated in all stakeholder sessions

hosted by Ministry of Environment and Climate Change and the IESO aimed at defining the design and functionality of the regulation.

As a result, we have a comprehensive understanding of Ontario's greenhouse gas policies, their interaction with natural gas and energy efficiency. We have already completed detailed analysis including carbon price projections on behalf of Enbridge Gas Distribution and Union Gas, and have a fully populated carbon supply demand model with detailed documentation of key assumptions. We are therefore able to bring well-informed timely estimates and context to Ontario carbon price projections.

A cap-and-trade system imposes a limit on total emissions of GHGs for a given period. The forward cap is set equal to the emissions level defined by the policy/target and allowances are made available equal to the cap for each compliance period. Emitters are required to remit one allowance for every tonne of CO_2e emitted and emitters can acquire allowances (via auction or trade) or be granted allowance by the regulator. As we discuss below, the price of carbon in Ontario will be compared to both today's and forecast prices for natural gas in North America, and will be an important consideration in assessing the economic conservation potential. The proposed cap and trade commitments will drive new provincial policies aimed at incenting a reduction in the carbon intensity as well as improvement to the efficiency with which we employ energy.

ICF brings the research and tools in hand, understanding of existing carbon markets precedent and forward carbon market analytics (e.g. WCI, Regional Greenhouse Gas Initiative, the Environmental Protection Agency's Clean Power Plan), Ontario's emissions commitments, opportunities and challenges. The price of carbon ($/tCO$_2$e) will be driven by the stringency of the targets (2020, 2030, 2050 regulated emitters' ability to abate their greenhouse gas emissions). Bearing in mind Ontario's cap and trade system is in "implementation mode", in our view, the price of allowance ($/tCO$_2$) will likely solve in the $18-$25 range in the 2017-2020 period, $30-$100 in the 2020-2025 range and $100+ in the post 2025 range.

ICF will incorporate consideration of the impacts of climate change and climate change policies on the intersection of DSM planning and facilities planning throughout the scope of this project. However, a detailed analysis of the impacts of climate change and climate change policy is beyond the scope of the current RFP. ICF is proposing to conduct a more detailed and utility-specific analysis of the intersection between climate change, climate change policy, and infrastructure planning policy as an optional task specific to each utility if requested to do so. The scope of work, budget, and schedule for the optional task would be integrated with the broader project in order to increase the efficiency and completeness of the primary project, as well as maximizing the value and usefulness of the more detailed climate change assessment for each utility. If requested, ICF will develop a more detailed proposal for each utility for this optional task.

Approach and Methodology to Scope of Work

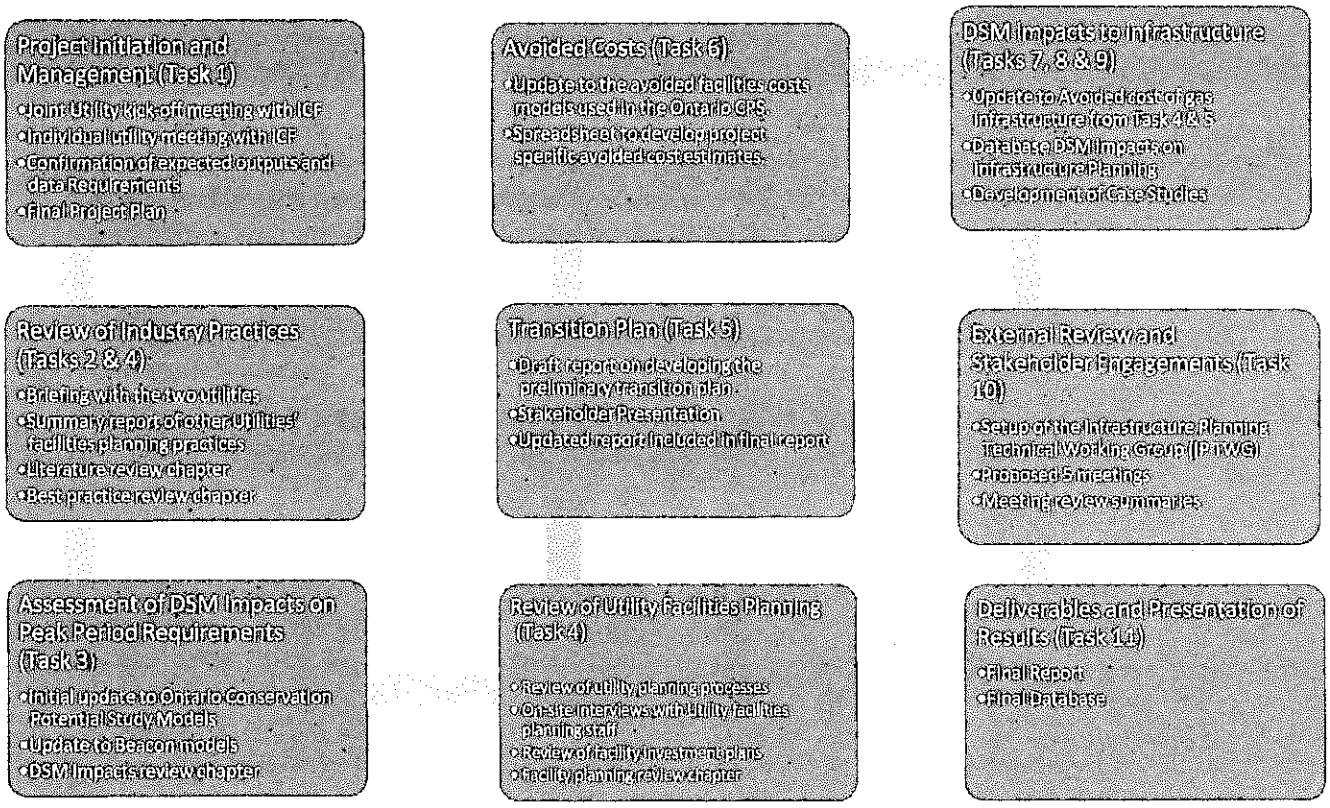
The Utilities have requested a study that examines:

> *"The three areas where DSM could potentially impact infrastructure planning:*
> - *Broad-based DSM impacts and planning forecasts of infrastructure investment (Passive Deferral)*
> - *Potential direct impact of DSM on subdivision planning through an expanded role by the utility in municipal planning (New System Design)*

- *Potential direct impact through targeted DSM to achieve deferral of reinforcement projects (Active Deferral)*

This section of our proposal describes our approach and methodology to accomplishing these objectives. Our approach is structured in eleven distinct subsections or tasks as shown in Exhibit 3 below. Each box represents a subsection. The tasks identified in the RFP covered by the subsection are indicated in brackets. Final deliverables are identified within each box, along with key meetings between ICF and the Utilities.

Exhibit 3 Project Approach to Each Task



ICF will employ an integrated suite of modeling tools for this project, combining the best aspects of the modeling packages available. We continually invest in our models, incorporating efficiencies and improvements. The models used for this project will include ICF's Energy Efficiency Potential Model suite as well as the Beacon™ building models, ICF's Industrial Energy Efficiency Model, and our Gas Markets Model. The latest ICF model add-on is the DSM Optimizer, used in determining achievable potential. Data generated by the modeling suite is input into two custom-designed Excel models: Data Manager and the TRM Module:

- Data Manager is a custom-designed Excel workbook with query protocols that enable the user to search and report the study results in a virtually infinite number of combinations and

is designed to support the most detailed level of DSM activity, such as program design, and the preparation of regulatory submissions.

- The TRM Module is a custom designed application that provides comprehensive profiles of the DSM measures assessed within the study. The TRM Module is designed to accommodate changes to the economic, financial or performance data.

Additional information on ICF's suite of models is included in **Section 3** of this proposal.

Task 1: Project Initiation and Project Management

Task 1 will include the project initiation (Task 1a) and project management (Task 1b).

Task 1a: Project Initiation

We propose to begin this phase with an initial project teleconference meeting. This teleconference meeting will enable senior members of the Union and Enbridge project team and the ICF team to plan the orderly start-up of the study, including introducing project team members and their roles, establishing a standing bi-weekly meeting, reviewing the draft work plan and confirmation that our proposed approach meets the Union and Enbridge's goals and objectives.

Subject to the outcome of the initial project teleconference meeting, we propose to continue this initial phase with an in-person kick-off meeting in Toronto. The purpose of the meeting will be to introduce the ICF team to the Utility staff that will be overseeing and assisting with the project, ensure that all parties have a shared understanding of the infrastructure planning process, the potential for DSM to impact infrastructure planning, the study methodology, expected outputs, data needs, roles and responsibilities, and the draft work plan.

Following the joint Utility kick-off meeting, we also propose a working meeting involving the ICF team and utility staff for each Utility independently. These meetings will provide an opportunity for detailed discussions related to specific elements of the study that are utility-specific as well as provide an opportunity to define data sources and management procedures. The discussions will need to include both DSM planning staff as well as facilities planning staff for each utility.

Below, we have provided an initial list of data requirements that we will need from each utility; we will refine this list during the initial teleconference kick off call, prior to discussion with the utilities as described.

Data Description
▪ Previous DSM studies, avoided cost studies, (including the utilities' and intervenors' 2015-2020 DSM plan filings and avoided cost studies, and related Board orders), gas supply plans, gas commodity price forecasts, and underlying databases, to the extent proprietary restrictions allow (Note: ICF already has most, if not all, of these studies and underlying databases for both utilities)
▪ Utility energy end use energy surveys by load type, including residential, commercial, industrial, and power generation, if any

Data Description
are available
▪ Gas consumption and number of customers by utility, utility region, and sector for 2015. ▪ Any available data on hourly customer gas requirements
▪ Natural gas sales forecasts at the greatest level of disaggregation the utilities normally produce by load class and region.
▪ Daily and hourly sendout data by utility, by region as available ▪ Facility planning process documentation.
▪ Access to Utility Uniform System of Accounts data on infrastructure investment for 2012-2015 ▪ Historical data on facilities project expenditures and planning efforts for representative projects completed between 2012 and 2016
▪ Facility investment plans by project for each project with a cost of more than $1 million. (floor value subject to revision based on discussions with the utilities) ((2016-2019)

Based on the results of the kick-off meeting and detailed working meetings with the utilities, we will prepare a final work plan for approval.

Task 1b: Project Management

ICF project management will include internal oversight of project schedule and deliverables, as well as communications with the Utilities. Internal project management will ensure that the different components of the project remain on schedule and can be integrated at the appropriate points during the project. The ICF project management team also will meet with Utility project staff on a regularly scheduled basis in order to ensure the project remains on schedule and on track. Project status meetings will generally be scheduled on a bi-weekly basis, with weekly meetings scheduled if necessary during critical periods. The meetings generally will be conducted by scheduled conference call, or in conjunction with other in-person meetings.

Task 2: Review of Industry Practices

The first step in the general review of the relationship between DSM and Infrastructure planning will include an in-depth review of current industry practices related to the intersection between utility DSM planning and infrastructure planning. The review of industry practices will include a literature review, as well as a "Best Practices" review based on interviews with leading edge utilities. The review of industry practices will also include a review of Ontario Energy Board requirements related to infrastructure and DSM planning and investments (e.g. E.B.O 134, E.B.O 188 and related policy decisions, Environmental Guidelines for Hydrocarbon Pipelines and Facilities in Ontario).

The literature review will focus on natural gas distribution system DSM and IRP practices focusing on hourly load impacts, as well as facilities planning practices, and the intersection between facilities planning and DSM. The literature review will focus on:

- Impact of DSM programs on peak hour and peak day demand on individual natural gas applications and customer types
- The relationship between peak hourly demand for individual customers and the peak hourly system demand
- Role of peak hour demand on LDC infrastructure requirements
- Potential and measured impacts of DSM programs in LDC infrastructure requirements

The literature review will include a focus on targeted DSM both for existing areas of high constraints – to defer infrastructure reinforcement – or in new subdivisions to avoid builds. The purpose of the literature review will be to uncover potential targeted DSM concepts, including but not limited to:

- Any new measures or program delivery approaches used for targeted DSM – for both new construction (new division development) or existing buildings to alleviate infrastructure reinforcement
- Any potential incentive funding that could be used to top up existing DSM incentive programs that may be justified due to the locational value of DSM in areas of constraints
- Any special marketing or program enrollment approaches that were used – for example, hands-on program implementation led by energy service companies, doing direct install, and perhaps using a pay-for-performance approach, or technical support services that include identifying opportunities for peak savings
- Approach and timing of utilities involvement in new subdivision planning, as well as new-construction incentives or training programs targeting builders directly to influence the housing supply

The Best Practices Review of LDC DSM programs in other jurisdictions will be based on detailed interviews with at least five LDC's with recognized DSM programs to evaluate the impacts of DSM and IRP programs on infrastructure requirements and infrastructure development planning processes, as well as with interviews of ICF staff involved with DSM planning and implementation for natural gas DSM programs.

The review of the Ontario Energy Board (the "Board") requirements regarding cost benefit testing of infrastructure projects and a review of the standard cost effectiveness tests used for broad-based DSM programs will identify existing Board practices and cost benefit guidelines for infrastructure and DSM programs, in order to develop a recommendation on the appropriate test(s) to be used to compare the demand and supply options of the case study or case studies.

The results of the review of industry practices will be documented initially in a briefing for the two utilities, and will represent a chapter in the final project report. The literature review documentation will also include a detailed bibliography and the development of an electronic reference library for the documents that are in the public domain.

Task 3: Assessment of DSM Impacts on Peak Period Requirements

As requested in the RFP, the IRP Study proposed by ICF will:

> *"Include a review of DSM measures and programs to determine those with significant impact on peak. The resulting "peak eligible" measures would then be assessed for their potential technical impact on peak in the selected case study areas. Similarly, DSM programs would be reviewed in relation to their suitability for the specific case study areas and changes needed to achieve the necessary market penetration to meet the required reduction in peak."*

Infrastructure planning relies on forecasts of peak natural gas demand, including the peak hourly demand that the system will be expected to transport. As a result, an assessment of the impacts of DSM programs on peak hourly load is a critical step in the evaluation of the potential savings in infrastructure investment available from DSM.

As part of this project, ICF will develop a comprehensive assessment of the potential DSM impacts on natural gas infrastructure requirements, including potential impacts on peak day and peak hour system requirements. The assessment will be based on the technical savings potential associated with each DSM measure, adjusted to reflect the timing and diversity of timing of the impacts when the savings are spread across multiple customers.

ICF has already completed much of the work required for this task as part of the recently finished Ontario Conservation Potential Study (CPS) completed by ICF for the Ontario Energy Board. ICF has already generated a comprehensive DSM measure list identifying conservation potential in Ontario as part of the CPS. For each measure, ICF has an initial assessment of the hour impacts of the measure.

DSM requirements identified as part of the literature review and best practices review completed as part of Task 2 will be combined with an assessment of utility throughput data on the relationship between peak hour and peak day demands in order to provide a measure-by-measure assessment of the likely impact of DSM activity on peak hour demand.

To start with, as part of the CPS, we have characterized the load by segment and sub-segment, building types, usage, and by weather regions – six regions; two for Union and four for Enbridge. We have made baseline load growth projections given the most recent economic and demographic indications. Energy usage breakdown relies on *archetype buildings* for each segment and relies on energy modeling of typical annual energy usage in each segment – we have existing building archetypes as well as new building archetypes. Our archetypes are developed using an industry-standard building energy modeling platforms.

As part of the CPS, ICF started from the measure list developed for Enbridge and Union in previous CPS, updated the measures per the new Technical Resource Manual (TRM), and then expanded the list to include custom measures and emerging technology measures, as well as operations/maintenance /controls measures. The measure data includes incremental costs, natural gas savings (m^3), other resource savings (other fuels and water), effective useful life, measure applicability, and classification into measure types. The measure data is mapped to specific sectors, sub-sectors and end uses. The measure list includes the calculation of measure cost-effectiveness tests, including the simple payback and return on investment from the customer's viewpoint, and the Total Resource Cost-plus test used to screen the measures.

Typically in a CPS, the ICF models use "hours-use" factors for each combination of energy end use, building type, and region, to convert annual energy consumption values into average demand during a peak period of interest. These hours-use factors give a sufficient level of accuracy in most regular CPS, but in this particular instance we would recommend an approach that will deliver a greater degree of accuracy. We plan on actually developing an hourly profile of the technical potential for each DSM measure and programs (24 x cubic meters per hour, for a 24-hours design day), both in isolation, in aggregation, and then all of the different measures combined.

Hourly profiles are critical to understanding the contribution of DSM to deferring or avoiding capital upgrade projects in gas transmission and distribution infrastructure because DSM measures have different levels of contribution to alleviating the system peak demand depending on whether the savings is coincident with the peak hour or not. For instance:

- Building envelope DSM measures will generate more peak load abatement than the average annual load abatement for two reasons: first because heating is causing the peak, and second because the savings are directly proportional with the gradient in temperature
- Thermostat set-back measures will actually add to the peak rather than alleviate it because of the rebound effect prior to workers coming back home in the late afternoon
- Web-enabled thermostat and direct load control (similar to demand response) could be used precisely to remotely trigger load curtailment during the system peak. Leveraging the load control component of the adaptable thermostat program included in Enbridge's gas DSM program, for example, could be considered
- Domestic hot water measures such as pipe wrap insulation and hot water tank blankets will generate gas use abatement that is relatively constant through the entire year. Savings will accrue during the peak as for any other hour of the year and thereby coincident abatement will not be higher nor lower than average saving.
- Industrial-process measures are typically considered base load, and thereby they will generate some average abatement similar to domestic hot water measures
- Industrial interruptible rates, however, may have the opportunity to generate significant and peak-coincident gas use abatement

On the first hand, we already have most of the measures that were included in the CPS, and on the second hand we gathered most necessary inputs for energy modeling of building archetypes. Those archetype were used to characterize the baseline gas demand profile. We now propose to use building energy modeling (i.e. the same building archetype), in our building modeling platform Beacon™ to create an hourly profile for the gas abatement measures, with a focus on modeling the coincidence of the gas abatement potential for each measure with the system peak gas demand.

The Beacon models can be used to develop hourly impact profile, by end use, dwelling type, and region. We anticipate focusing on a sub-set of a standard 8760-hour modeling run: a 24-hour design-day run. In collaboration with the utilities, we would select a design day –a cold peak winter day that comes at a frequency of once-in-10 or 20 years. The frequency is to be decided with the utilities based on the reliability criteria being used for capital expenditure planning. It will also be important to draw on the expertise of the peak demand analysts at Enbridge and Union to calibrate the parameters (such as weather data, for instance), so that the total peak demand estimates produced for the base year match those observed on the utilities' systems.

The Beacon Residential model, which will be used for DSM measure load shape analysis, is part of a suite of modeling tools designed to develop annual hourly building energy load shapes by end-use. Beacon Residential has standard reference models for archetype buildings. The Beacon Commercial model is powered by U.S. DOE's cutting-edge hourly/sub-hourly building energy modeling software EnergyPlus. We will use Beacon to develop design-day hourly building energy load shapes by end-use. For the commercial sector, Beacon also includes commercial building standard reference archetypes models. The ICF team will develop the design-day hourly load shapes that are representative of the sub-sectors through a bottom-up analysis approach. This entails running building energy simulations using the commercial archetype models.

Estimating peak demand for the industrial sector poses a different set of challenges. Because the industrial sub-sectors each tend to be dominated by a small number of large plants, the most effective way to estimate peak gas demand is to study the load shapes of those large plants. Our working assumption is that the two gas utilities have data on the peak gas demand of their largest customers and how coincident their peak demand is with the peak periods of interest to the utilities. The relationship between the coincident peak demand of these large plants with their annual consumption will provide the best way to estimate that relationship for each industrial sub-sector as a whole. In general, we will not be attempting to disaggregate the industrial peak demand relationship to the end use level, but will instead assume the load shapes for all end uses within a given sub-sector are the same. The possible exception to this approach will be for the natural gas used for HVAC purposes in the industrial sector. Where it makes sense to do so, we will draw on typical operating hour data by NAICS code and the commercial space heating load shape information to adjust the load shape for industrial HVAC.

The detailed approach is as follows. We will:

- Start with using the same archetype buildings that were used in the CPS, as well as the measures from the Utilities' technical resource manual (TRM).
- Set up the building energy model for residential and commercial buildings that was used to run a 24-hour simulation (i.e. the design peak day).
- Integrate large industrial plant profiles
- We will load the building energy models in Beacon with 24-hour weather data (with 15-minute data interval) for one cold winter day. We will be selecting the representative weather day with cold temperatures coincident with the daily peak from 4 to 8 pm.
- Run multiple measure hourly simulations – thousands of parametric runs, as needed – using our platform Beacon with randomly-generated domestic hot water usage, and thermostat setbacks timing, for instance, to generate diversified usage curves, as well as diversified measure impact profiles.
- The 24-hour design peak day simulation should be repeated once for each one of the six weather regions in the model, and then once for an Ontario-wide design peak day.
- We will input the measure hourly load profiles into the model to generate the province-wide achievable DSM potential, in cubic meters per hour. We will be able to provide breakdowns by measure, usage, region, and each one of the 24 hours.

The main outcome of Task 3, Assessment of DSM Impacts on Peak Period Requirements, is the Technical Potential on an hourly basis for the design day, i.e. reductions in peak load for all three sectors at the level of individual measures, at the same level of granularity as the rest of the model. This will provide the flexibility to roll the peak demand reduction values up to whatever level of summarization Union

and Enbridge requires. Task 3 will be running in parallel with Task 4, 5 and 6. The results of Task 3, as well as that of Task 4 and 6 (respectively: Review of Facilities Planning; and Determination of Avoided Cost), will then feed into Task 7 (Analysis of DSM Impact on Infrastructure), in which we will model the broad-based economic potential and the achievable potential. In Task 8, we propose to drill down to the *targeted* achievable potential for certain areas of high constraints, and in need of capital investments.

Task 4: Review of Utility Facilities Planning Practices

One of the key elements of this project will be a detailed review of the utilities' facilities planning practices, focusing on the potential impacts of reducing peak hour and peak day demand on future utility investments in infrastructure. As noted in the RFP:

> *"For gas utilities, infrastructure planning is distinct from planning to meet gas supply needs. While gas supply planning is focused on sourcing sufficient gas to meet peak day needs across the franchise, distribution planning is focused on maintaining a distribution system which can meet peak hour needs in each and every network under a design conditions scenario. An important factor in the planning and design of pipe networks is the quantification of demand in terms of peak hour flow (m3/h). This is the metric by which the utility describes the hourly demand of any network or subset of customers on the system."*

The reviews will draw on the specific expertise of the utility facility planning staff, combined with ICF's understanding of facility investment requirements and processes. The review will include in on-site interviews with utility planning staff and review of utility project planning. Specifics of the review will be held confidential to each utility.

1) ICF will conduct independent reviews of Enbridge Gas and Union Gas facilities planning practices, focusing on the potential impacts of reducing peak hour and peak day demand on future utility investments in infrastructure. The reviews will include standard infrastructure planning practices, as well as a review of the planning process for specific facility projects.
2) The review will include development of generic facility investment cost algorithms for new communities, reinforcement projects, and other facility investment projects.
    a. Identify types of facilities investments that are expected in the foreseeable future
    b. Describe engineering and economic criteria for making investment decisions and methodology and data used for evaluating each investment
    c. Identify situations where reductions in peak hour and peak day demand could reduce facility investments
    d. Identify the types of investments where reductions in peak hour and peak day demand should not be expected to lead to reductions in facility investments
3) ICF will prepare a summary report documenting the results of the review without the use of confidential utility planning data.

Infrastructure Planning for Natural Gas Systems

Natural gas LDCs will plan their systems based on:

- The existing system configuration and condition and ongoing changes to that system,
- Expectations for future seasonal, daily and hourly loads for firm customers by geographic sub-network area,

- Safety, reliability and performance criteria for sound engineering design, and
- Principals of economic efficiency, environmental stewardship and future flexibility.

The existing system configuration and ongoing changes provide a baseline from which additions to LDC infrastructure will be planned to maintain system integrity and accommodate changes to demand within the current system footprint and expansion of that footprint as new communities and businesses are added to the customer base.

These system changes need to be made so as to satisfy safety, reliability, and performance design criteria that will include items such as:

- Maximum allowed operating pressures or MAOPs for each existing and new pipeline segment (based on pipe wall thickness and diameter; pipeline material and strength; pipeline age, condition and operating history; surrounding population and building density; and safety regulations).
- Minimum pressures needed at various point in the system for good LDC system function and customer equipment operation.
- Maximum desired gas velocity (to avoid dust scouring or other damage).
- Acceptable levels of natural gas use and losses.
- Maintenance of a resilient and robust system with redundant flow pathways that will allow firm customers (or at least human needs customers) to be served when LDC component failures occur or when citygate supplies are interrupted during pipeline maintenance/construction activities and force majeure events.

An economically sound LDC system plan will avoid unnecessary or oversized additions to infrastructure and will promote system flexibility to more efficiently attach new supplies and accommodate new customer demands in the future.

Expected Effect of DSM Program on Infrastructure Planning for Natural Gas Systems

DSM programs can change the annual gas consumption for a given application (that is, a category of customer and type of appliance/equipment) and/or the daily or hourly profile of that consumption. The overall effect of a set of DSM programs then would be to reduce annual gas consumption and possibly peak day and peak hour consumption. A reduction in peak hour consumption has the potential to allow for planned infrastructure additions to be downsized, delayed or avoided altogether (within the planning horizon), thus, reducing the present value of system capital and operating costs.

Many LDC systems now have excess delivery capacity due to losses of industrial loads and reduced demand per customer. For such systems with excess delivery capacity, infrastructure cost savings from DSM programs are not likely to be significant. On the other hand, natural gas LDC systems (or geographic sub-networks thereof) with growing demand within their footprint might see reduced infrastructure costs from a well-designed set of DSM programs that reduce peak hour demand or slow the growth of peak hour demand. Likewise, natural gas LDCs that are expected to have an expanding footprint due to connections to new communities and industrial customers might be able to reduce the present value of infrastructure costs through DSM programs that can reliably reduce peak hour loads.

Task 5: Transition Plan

The OEB Demand Side Management Framework for Natural Gas Distributors states that

> *"As part of the multi-year DSM plan applications, the gas utilities should ... propose a preliminary transition plan that outlines how the gas utility plans to begin to include DSM as part of its future infrastructure planning efforts."*[1]

The Utilities have requested the consultant to prepare a draft report developing the preliminary transition plan as part of this IRP Study.

ICF expects the draft report on transition planning to:

1) Identify the issues, challenges, and benefits associated with linking infrastructure planning and DSM planning
2) Address the research needed to determine the potential benefits of directly linking infrastructure planning and DSM planning, and
3) Recommend potential changes in the infrastructure planning process that would be needed to integrate DSM planning

Currently the utility DSM planning process considers the impact of avoidable facilities investments through the inclusion of an estimate of facility costs potentially avoidable due to DSM. However, the estimates of avoidable facility costs used by the utilities have not been widely accepted by other stakeholders. In addition, the estimates of avoidable facility costs have been generic to the entire utility system, and have not differentiated between general impacts on facility investment that are applicable to DSM programs across the entire utility service territory from the potential to target DSM programs to areas where major facility investments are expected to occur. As a result, the current linkage between infrastructure planning and DSM planning is static, and does not have any provisions for infrastructure requirements to influence DSM programs, or for DSM programs to impact infrastructure planning.

One of the key challenges to be resolved in the transition plans is the coordination of planning schedules. It is likely to require multiple years for DSM programs to have a sufficiently large impact to delay or eliminate the need for a specific facility reinforcement project. As a result, ICF expects that the identification of future expansion projects likely will need to be accelerated from the current schedule to allow sufficient time for DSM programs to be targeted.

Task 6: Avoided Costs

Avoided costs are one of the key components of the cost-effectiveness tests that are used to evaluate energy efficiency investments. Cost-effectiveness represents whether an investment's benefits exceed its costs and determine whether programs should be implemented or not implemented.

This project is designed to assess the avoided costs associated with delayed or reduced infrastructure investment resulting from DSM programs. Most distribution system costs are related to the development and maintenance of the utility distribution systems, and are dependent on the number of

[1] EB-2014-0134 Report of the Board Demand Side Management Framework For Natural Gas Distributors (2015-2020) December 22, 2014, Page 36.

customers connected to the system rather than throughput volume. As a result, most of the distribution system costs are not avoidable. However, avoided local distribution system infrastructure costs can be achieved when reduced natural gas demand enables delays in the timing of new projects, or reductions in the size of these projects. The avoided transmission and distribution costs vary by utility service territory, but are typically driven by the level of peak hour and peak day gas demand.

ICF is not proposing to conduct a full scale independent projection of natural gas avoided costs as part of this project. Instead, ICF will use the basic avoided costs developed for the recently completed CPS as the starting point, using the results of the facility planning review conducted as part of this study to update the avoided facilities costs used in the CPS.

We anticipate that the estimates of avoided costs will differ based on utility, location, customer type, and load impacts. Costs are typically established separately for residential, commercial, and industrial customers, since these sectors can have different load profiles. In addition, the different regions within each utility will have potentially different supply and infrastructure costs. In order to address these differences, the ICF avoided cost estimates will differentiate the avoided cost components for four different regions, including two regions in the Union Gas service territory and two regions in the Enbridge service territory.

ICF will estimate the avoided facility costs associated with a reduction in peak hour demand for DSM measures for three sets of customers:

1) Broad-based DSM programs that effectively target the entire utility service territory
2) DSM programs that target new communities or subdivisions
3) DSM programs that target specific regions with the utility service territories that could lead to deferral of utility investments in reinforcement projects.

The avoided facilities costs for each category of DSM program will be developed based on a detailed review of infrastructure investment requirements, combined with the potential for DSM programs to avoid facility investments. The review will be based in part on a detailed review of the Uniform System of Accounts for Gas Utilities (Gas USOA) operating account data on facility and plant investments between 2012 and 2015. Each investment category will be reviewed with utility staff to determine which types of investment could be reduced by a reduction in peak hour demand resulting from DSM program activity.

Each of these areas is discussed in greater detail below:

Broad-Based DSM Program Impacts on Distribution Infrastructure Planning

Outside of subdivision and new community expansion projects and reinforcement projects designed to serve new load, most of the infrastructure investments by mature natural gas distribution companies, including Union and Enbridge, are related to maintenance of existing infrastructure and replacement of aging infrastructure that no longer meets current standards. Average natural gas use per customer has dropped substantially since most of the natural gas distribution system in Ontario was originally installed. As a result, much of the facility investment in areas without significant growth is unlikely to be reduced by additional reductions in peak hour demand.

However, broad-based DSM programs can be expected to have modest impacts on facilities investments, particularly in areas where system growth puts additional stress on system requirements. ICF will develop avoided facilities costs based on a detailed review of infrastructure investment

requirements, combined with the potential for DSM programs to avoid facility investments. The review will be based in part on a detailed review of Gas USOA account data on facility and plant investments between 2012 and 2015. Each category of facility investment in the Gas USAO will be reviewed with utility staff to determine which types of investment could be reduced by a reduction in peak hour demand resulting from DSM program activity.

DSM programs targeted at subdivisions and new communities as well as areas where system growth is requiring additional system reinforcement are more likely to avoid facilities costs than DSM programs impacting customers in existing service territories without significant growth. Hence, if avoided facilities costs are developed for targeted groups of customers in areas with growth, it is important to avoid double counting the avoidable facilities costs for these customers in the broad-based DSM programs.

Subdivision and New Community Planning

The investment needed to expand the natural gas system to serve new subdivisions and new communities depends to a large degree on the long-term load growth expected in the new areas, as well as the number and type of customers expected to be served. DSM programs specifically targeted at these communities can effectively reduce the long-term system requirements needed to serve these systems. Potential cost savings include:

- Smaller transmission pipe into the subdivision or new community.
- Reductions in gas control equipment including valves and regulators.
- Potentially lower distribution and metering costs to serve specific customers.

However, most of the cost associated with the expansion to serve new customers is expected to be due to laying the pipe, including the costs of tearing up and replacing streets and sidewalks. The reduction in costs due to a reduction in the size of pipe serving the community or subdivision generally will be relatively modest. For example, typical industry rules of thumb regarding pipeline costs would suggest that reducing the size of a transmission pipe to a new community from 10 inches in diameter to 8 inches in diameter would reduce the system capacity by 36 percent, but would only reduce the cost by 20 percent. In addition, the reduction in size reduces system operational flexibility to respond to unexpected changes in demand and supply and reduces overall system resiliency, as well as reducing the potential to serve unexpected future demand growth. As a result, the savings associated with system downsizing may be partially or fully offset by other factors. However, in situations where the new subdivision or community will stress the existing system, reductions in demand in the new community/subdivision may be significant. As a result, the potential avoided costs associated with DSM programs targeted at new subdivisions and new communities will be highly project-specific.

ICF will review recent projects of this nature with the utility infrastructure planning staff to evaluate the potential range of avoided facilities costs for these projects.

As a partial deliverable for this task, ICF will develop a spreadsheet specifying the critical assumptions and equations needed to evaluate the avoided cost appropriate for a targeted DSM program associated with a specific facility investment project. The spreadsheet will be used to develop project-specific avoided cost estimates.

Targeted DSM and Reinforcement Projects

While we retain an open mind pending the outcome of this study, ICF anticipates the targeted DSM programs that have the capability to delay a system reinforcement project required to serve incremental

system growth will have greater potential benefits than DSM programs targeted at other types of facilities investments. The ability to defer a major investment by one or more years based on a targeted DSM program would result in significant and measureable savings. However, the potential savings will be highly project specific. In addition, the timing of DSM programs targeted at delaying facilities investments of this type also plays a significant role in determining the avoided costs. The DSM programs will need to incur potentially significant expenses prior to the investment in the infrastructure, generally over a period of two to four years prior to the facilities investment. The carrying costs of the earlier investment in targeted DSM efforts will partially offset the savings associated with the delayed/deferred facility investment.

ICF will review recent facilities projects with utility staff to determine the potential cost savings associated with the deferral of the project, accounting for the up-front investment in DSM required as well as expected changes in facility costs from year to year, and reductions in system reliability and service associated with the delay in facility installation in order to develop a representative range of avoided facility costs for these types of projects. ICF will also review planned projects to assess the potential avoided costs for the range of future projects.

As a partial deliverable for this task, ICF will develop a spreadsheet specifying the critical assumptions and equations needed to evaluate the avoided cost appropriate for a targeted DSM program associated with a specific project. The spreadsheet will be used to develop project specific avoided cost estimates.

Task 7: Analysis of Potential DSM Impacts on Infrastructure Planning

In June 2016, the ICF team in Ottawa and Toronto completed the OEB Conservation Potential Study. The model used during the CPS has been loaded with all of the utilities' sales data, calibrated to map with the fairer degree of accuracy that market data currently available can give. We have characterized the load by segment and sub-segment, building types, usage, and by weather regions – six regions; two for Union and four for Enbridge. We have made baseline load growth projections given the most recent economic and demographic indications. Energy usage breakdown relies on archetype buildings for each segment and relies on energy modeling of typical annual energy usage in each segment – we have *existing building* archetypes as well as *new building* archetypes both in the residential and commercial sectors.

As part of Task 4, we will have converted the annual achievable potential DSM impact into an hourly impact profile for the 24-hour design day used by the utilities, and have identified the peak-coincident abatement potential. Peak is mostly weather-dependent in Ontario, as space heating is the main driver of province-wide fluctuations. The design peak day will happen on an extreme cold snap. That is why, as part of Task 4, we will have characterized 24-hour hourly load curves for design-winter-days. The technical potential can be broken down by sector, usage, measure, and weather region.

The remainder of the work, for the purpose of estimating the potential DSM impact on infrastructure planning, is to isolate the economic and the achievable potential from the technical potential.

The modeling steps include:

- As part of Task 3, we will have determined the **baseline design peak day**, coldest-day load curve, in cubic meter per hour, for the same milestone years as those used in the CPS.
- As part of Task 3, we will have determined **technical potential** for the design peak day, hourly, based on a design-day 24-hour interval, again for same milestones years

- Then, as part of Task 7, we will zero in on the **economic potential** for the design peak day, the potential that is cost effective to achieve when compared with a supply-side solution.
- Finally, as part if Task 7, we will isolate **Upper- and lower-scenario achievable potential** for the design peak day from the economic potential, the potential that is achievable considering existing market barriers and program design considerations

Technical, economic and achievable potential are standard output of conservation potential studies. Just like the technical potential, the economic and achievable will be broken down by market segment, by the six base region[2], and by the building types, usage, and measures.

Determining the economic potential will require comparing DSM cost with the avoided cost of gas infrastructure which is the outcome of Task 6. We typically screen the measures using the cost of conserving energy (i.e. the total resource cost test without the transaction cost of delivering DSM) against an avoided cost maximum threshold. The updated broad-based avoided cost of infrastructure (updated as part of Task 6) will become the new threshold that determine whether DSM measures is more cost effective. Both avoided cost energy and infrastructure will be used to make this determination. The work toward the determination of the economic potential has already been done as part of the CPS, only that the IPR work in Task 4 and 5 will result in different avoided cost number, and thereby we will simply update the CPS modeling, then again provide hourly results rather than annual results.

Similar to the economic potential, we propose to update the province-wide achievable potential results based on the sets of new avoided cost. Revised level of avoided cost are expected to alter the DSM funding level (i.e. the budget), thereby different incentive levels, different technical assistance and education and in turn different level of penetration of DSM. Recognizing the uncertainty surrounding the modeling exercise, we typically produce an upper and lower scenario to set the boundary of the achievable potential.

The main outcome of Task 7, Analysis of Potential DSM Impacts on Infrastructure Planning, will be a broad-based DSM impact. The result of our work will also be a calibrated model that will then be used to drill down to the local-level DSM potential using local-level infrastructure avoided cost, which is necessary to assess opportunities target certain area and reduce major infrastructure investments.

Task 8 Assess Opportunities to Reduce Major Infrastructure Investments (Targeted DSM)

ICF will work with Utility staff to identify and assess actual opportunities to reduce infrastructure investments through targeted DSM programs. This task will rely in part on the results of the Task 2 Literature Review, which will include a review of DSM programs in other jurisdictions that have targeted reductions in infrastructure investment, as well as an evaluation of existing projects to develop utility specific case studies to evaluate opportunities to reduce major infrastructure investments.

Our research, during Task 2, will focus on existing programs, proven concepts and have a particular focus on actual pilot and measured impact. Then, we propose to be developing an approach to modeling

[2] The industrial sector was not broken down by weather segment, considering that it is less weather-dependent than the commercial-institutional and residential segments.

the achievable potential of targeted DSM in cubic meters per hours and in annual cubic meters. We suggest working on example real-world new subdivisions and areas of infrastructure constraints in Union and Enbridge franchise areas.

We will also incorporate preliminary data from ongoing case studies. As part of this project, the Utilities have requested that the study approach include:

> *"...the use of preliminary data from ongoing case studies in each of the utilities' franchise areas (case studies will be conducted by each utility with input from the consultant) with respect to potential impacts on subdivision planning and deferral of reinforcement projects. It is anticipated that working with preliminary data available from real case study examples in combination with IRP theoretical modelling will:*
> - *Minimize lost opportunities by working directly with identified projects,*
> - *Facilitate testing of analytical methods by using real data and situations,*
> - *Maximize available resources,*
> - *Build directly towards a transition plan, and*
> - *Inform changes to the utility's long term system planning processes and analysis based on tested experience.*

ICF will work with the Utilities to evaluate preliminary data from ongoing case studies. ICF also expects to supplement the preliminary case study data by working with the Utilities to develop hydrolic modeling assessments of the impact of reductions in demand on specific infrastructure projects.

Targeted DSM for New Divisions (New Building DSM)

The model used for the CPS was divided into six weather regions. For the purpose of supporting Enbridge and Union in the planning of new subdivisions, we propose to perform the following analysis:

- For each new subdivision, the model would be split into one additional region, carved out of one of the existing six weather regions.
- The building composition of the new subdivision (the new model region) would be simply adjusted based on an understanding of the new homes being built, as well new commercial and institutional buildings.
- We would model penetration scenarios of the most common measures, especially new-building building envelope measures, which are characteristically higher among new buildings. For planning purposes, the utilities would be allowed to play with these to model impact on the peak hourly gas consumption on the design day. We would also be using weather data from the nearest weather station.

In order to do this, we will work with the utilities to map the investment plans, and identified new planned subdivisions. In consultation with the respective utility, we propose to be picking four test-subdivisions (two for Enbridge and two for Union) as part of the study to test the process that could then be adopted. We will utilize the data available to the utilities to characterize the utility customer base. Then we will use the CPS model to develop region-specific estimates of DSM potential. The recommendations coming out of our analysis will be in terms of new construction measures, which are typically building standards used such as ENERGY STAR® or R-2000 that are above the standard building code, whether they are cost-effective, and a quantification of the value of increasing the standard build. The recommendations will also consist of a portfolio of targeted programs – including a number of

programs that are modeled after the current existing gas DSM program (assuming they include additional funding for larger incentives and marketing), and a few additional programs that could be specific to targeted DSM in new subdivisions.

Targeted DSM for Alleviating Infrastructure Reinforcement in Existing Areas (Existing-Building or Retrofit DSM)

We propose to tackle DSM in existing areas of high infrastructure constraints based on a similar approach to the approach described above for new subdivisions. In consultation with the respective utility, we would select two example areas for Enbridge, and then two example areas for Union.

We would create separate sub-regions, built into the model, which we will populate with the building-stock (residential, commercial and industrial), the specific weather, and the load growth that is characteristic in the selected areas. Based on the results of the literature review, we would then develop portfolios of programs that are amenable to targeted DSM, bolstering both existing programs for existing building and new, targeted-DSM specific programs. We would then compute area-specific achievable potential, as well as conduct the valuation of the portfolios of programs, which would include the locational value of DSM, as well as cost-effectiveness testing of the proposed targeted program portfolio.

Task 9: Case Study Identification and Monitoring

As part of this project, the Utilities have requested that the Consultant assist in the identification and monitoring of case studies designed to assist the Utilities with the integration of DSM and facilities planning. As discussed by the Utilities in the RFP:

> *"The utilities "plan to begin to include DSM as part of its future infrastructure planning efforts" by developing and testing transition activities as part of the study of DSM and Infrastructure Planning. In parallel with the IRP Study, the utilities will undertake case studies in their respective franchise areas to test draft recommendations and theories and inform the development of the preliminary transition plan to be included in the Final Report. This will be done by the utilities using identified infrastructure projects as case studies in the research. The case study examples will be used to develop and test the method(s) by which the DSM alternative to infrastructure development will be assessed.*
>
> *One to three projects may be selected as the case studies. One or more other existing case studies may be selected to support data acquisition and analysis. Feasibility analysis for the DSM alternative in each area would be conducted using methods developed through the Study. For example, in a case study that targets a specific infrastructure project, Distribution Planning would provide the theoretically reduction in peak required in each case study area in order to defer the planned infrastructure investments for a set period of time.*

During our review of the current utility DSM planning and infrastructure planning processes, ICF will identify a series of potential infrastructure and DSM case studies and potential pilot projects to evaluate the potential for DSM to impact infrastructure investment. These case studies will address a combination of facilities' reinforcement projects to meet growing load in existing service areas, expansions to serve new communities and new subdivisions, as well as other facilities projects that might be influenced by DSM programs. As part of the review, ICF will identify the common touchpoints and scheduling issues for both infrastructure planning and DSM.

Task 10: Participate in External Review and Stakeholder Consultation

In order to maximize the value experience in other jurisdictions, and to incorporate the knowledge and experience of DSM experts and stakeholder perspectives, as part of this project the utilities plan to:

> *"Convene a Technical Working Group drawn from a wider cross section of North American gas utilities, and the DSM community. In this way, the utilities will be able to access the experience of staff in other organizations such as gas utilities which have undertaken system-wide Integrated Resource Planning, possible electric utilities and organizations which have or are undertaking targeted DSM/CDM for the purpose of infrastructure deferral, and in other agencies which provide support to the North American DSM community."*

ICF has extensive experience working with DSM Technical Working Groups in Ontario and in other jurisdictions. Due to the depth of ICF's experience in these issues, as well as the breadth of ICF's work for utilities like Union Gas and Enbridge Gas, regulators and governmental agencies, including the OEB and the Ontario Ministry of Energy, and for environmental and public interest clients, ICF will bring unmatched respect and credibility to the Technical Working Group external review and stakeholder consultation process.

ICF will assist the Utilities in identifying potential participants for the Infrastructure Planning Technical Working Group (IP TWG). Once the group is formed, we suggest meetings with the IP TWG at key points in the project where input from the IP TWG can be effectively integrated into the project delivery. We have suggested a schedule of about five meetings. These meetings link to the project kick-off and to the presentation of the final report as well as to when draft reports are available for review. We have included an optional meeting in November 2017 when the full Integration Report 3 is available. This meeting may not be necessary as IP TWG members will have already provided insights on each of the four topics covered by that report.

Approach to External Review and Stakeholder Consultation

The ICF team knows that external input can strengthen a study and a carefully managed process can provide important strategic value. The ICF team's approach to the IP TWG meetings is open-minded and facilitated in a directed, focused, and interactive format. Dialogue is expected to be positive, iterative and with an underlying intent to ensure that all participants can provide constructive contributions and high-level of technical advice, based on relevant experience. We will structure this process to be highly engaging and focused on direction and high-level advice on study inputs, methodologies, and results. However, we will be very open to receiving any input, data, reports, and insights that members would like to share with us. We view the IP TWG as a brain trust with a broad base of experience and interests.

While we are not expecting to obtain full consensus from the members, we will structure the process for respectful open debates and will welcome different opinions and supporting research as these will ensure that the end product is solid, comprehensive, and well socialized.

To ensure the best use of participants' time in the IP TWG meetings, we will provide the draft materials to review in advance of the meeting. Wherever possible, we will provide at least one week in advance for members to review the material. We will take notes at each meeting, record the issues raised and track how we have responded to them. We will circulate the meeting notes after each meeting. We will work closely with the Utilities in preparing an agenda for each meeting and in the finalization of the meeting notes. Draft materials will not be sent to IP TWG members without the Utilities' approval.

Task 11: Final Report and Deliverables

The assessment of the potential for DSM to impact utility infrastructure investment involves the compilation and analysis of market and technology data, and there are nearly an infinite number of ways of organizing and presenting the results. It is recognized that readers will have differing needs with respect to the level of detail that is provided. Consequently, we propose to present the results of this study at three levels of detail, including a detailed report, an executive summary, and an executive briefing on project results.

The main body of the report will include all report chapters identified in the deliverables section of this proposal, and provide a summary of each study task together with a concise summary of results, including comments and interpretation of key findings. The report chapters will be combined into a standard report format. The report chapters may include database or written appendices that provide more details regarding the methodology employed, such as assumptions or sample calculations. Appendices are typically designed for DSM analysts and managers looking for a more thorough understanding of the study results.

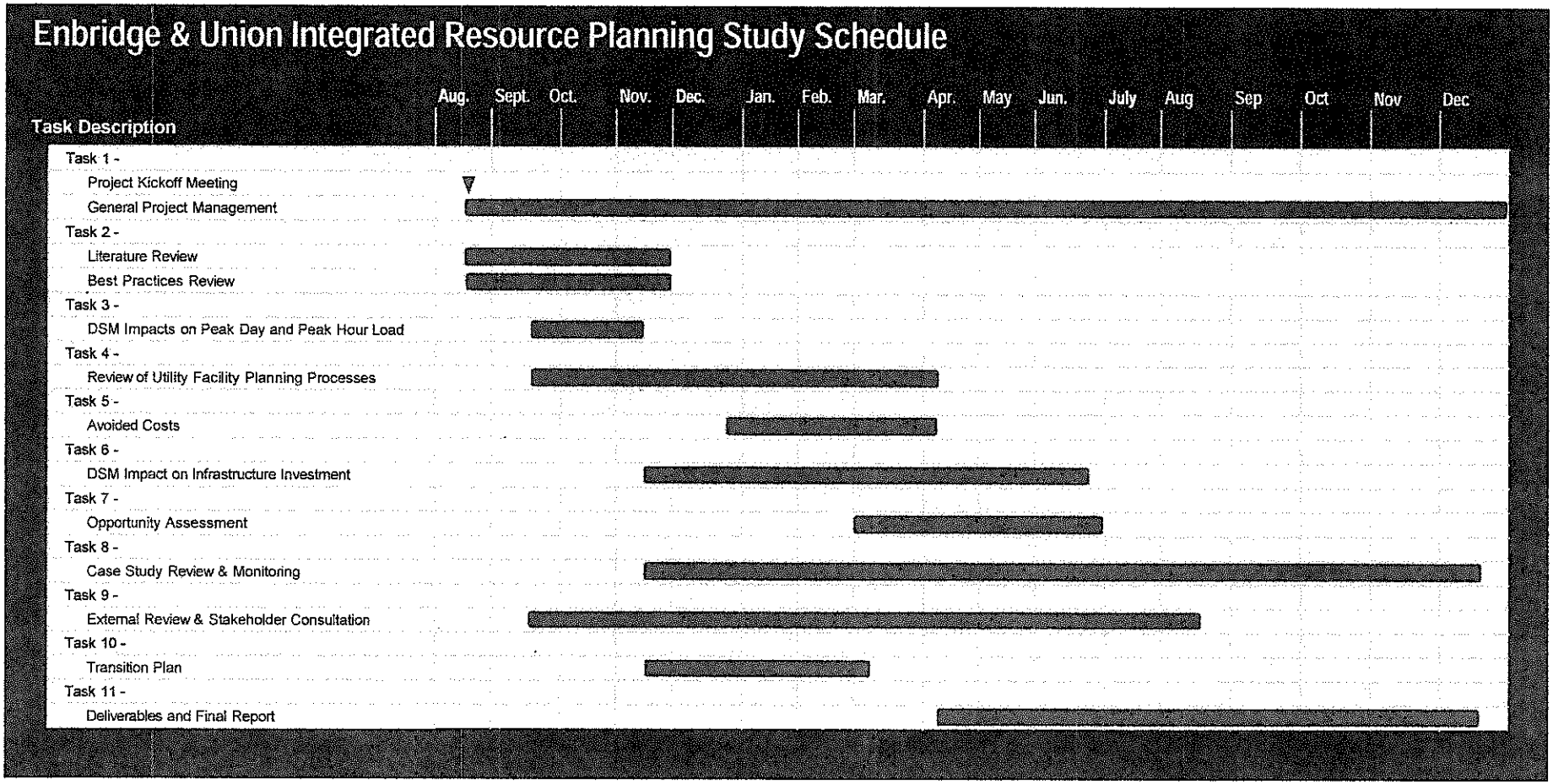
The report will explicitly address the following topics:

a. Relationship between DSM and facilities requirements
b. Potential for DSM to reduce infrastructure requirements
c. Potential for targeted DSM to reduce infrastructure requirements
d. Integration of DSM and facilities planning processes
    i. Timing/scheduling issues
        1. (DSM programs likely to require multiple years of offset sufficient demand to delay infrastructure investments, hence integration is likely to require longer lead time for facilities planning.
e. Preliminary Transition Plan
f. Development of Case Studies
    ii. Review infrastructure projects to identify potential case studies
    iii. Recommend approaches to implementing case studies
    iv. Developing evaluation plans for the case studies

Timelines and Work Plan

Please detail how the Proponent's Integrated Resource Planning Study timelines will align with the Integrated Resource Planning Study timeline requirements described in Schedule 4 of this RFP. Provide a draft work plan that reflects the Integrated Resource Planning Study timeline requirements.

ICF is committed to completing the project on the schedule laid out in the request for proposals. In this section, we have included a high level draft schedule of the study plan for your reference. For the initial kick off meeting with the Utilities, ICF will share a detailed draft project schedule for review and discussion. Our high level draft schedule is shown in the timeline on the following page.



Filed: 2020-10-07, EB-2020-0067, Exhibit I.SEC.8, Attachment 1, Page 85 of 100REDACTED

Deliverables

The Proponent will suggest interim deliverables prior to the final report that will allow for review of key decision points throughout the duration of the project. The final project report will address all the issues outlined in the Scope of Work and any comments on the draft report.

Proposed Deliverables Schedule		Deliverable Start Date
Project Kickoff		August 2016
Bi-weekly Status Update Meetings and Deliverable Touchpoints		TBD
Draft Report – Intersection #1: Broad-based DSM and Distribution Infrastructure Planning		November 2016
Draft Report – Intersection #2: Subdivision Planning		January 2017
Draft Transition Plan		March 2017
Draft Report – Intersection #3: Targeted DSM and Reinforcement Projects	Topic #1: Is it Technically Feasible?	April 2017
	Topic #2: Is it Possible?	May 2017
	Topic #3: What about Risk?	June 2017
	Topic #4: Is it Cost Effective?	September 2017
	Full Draft Report on Intersection #3	November 2017
Identification of Potential Case Studies		May 2017
Stakeholder Consultation and External Review		*Please see Note Below
Final Report (Including all Intersections, Topic Areas, and Transition Plan)		December 2017

*Stakeholder Consultations and External Review Deliverables Schedule will be determined during the Stakeholder Kickoff Meeting.

Service Agreement Mark-Up

Services Agreement Mark-Up

Provide a mark-up of Schedule 5 – Services Agreement. The Utilities require each Proponent's mark-up of the Services Agreement to be complete and to reflect a position that has been escalated to the extent required to obtain the full approval and support of the Proponent's organization. The Proponent's positions should be stated in the form of drafted language and changes to the applicable provisions of the Services Agreement, not in the form of comments or draft notes (other than supplementary explanatory notes to explain drafting changes), so that the Proponent's positions can be fully understood by each of the Utilities. The nature and extent of the changes made in a Proponent's mark-up of the Services

Agreement will be a significant factor in the Utilities' selection process. The Proponent's mark-up must clearly and accurately highlight the differences between the electronic copy of the Services Agreement provided as part of this RFP and the electronic mark-up submitted by the Proponent as part of its Proposal.

If ICF is the successful bidder, we respectfully request to perform the work pursuant to the terms and conditions as set forth in the agreement negotiated between and executed by the parties dated April 13, 2016.

Our redlined mark-up of Schedule 5 – Services Agreement can be found in **Appendix E.**

Financial Response

The scope of this project is designed to bring together a number of different areas of expertise to provide an integrated assessment of the potential for DSM to influence utility facility planning, and for potential savings in utility facility investments in infrastructure to increase the value of DMS activities. In addition, this project is intended to address two major utilities with different service territories, infrastructure and DSM planning processes. As a result, the scope of the project is extensive, and will require significant investment by the two utilities to achieve the desired results. The investment required by the Utilities includes time, the project is expected to continue for at least sixteen months before the final report is available, a commitment of utility staff time, including a significant commitment of time by the utility facility and DSM planning staffs, as well as the cost for the consultants engag ed to complete the process. ICF is proposing a fixed fee of $399,090 plus an estimate of $13,200 in travel and other ODC's (to be billed at cost + 10%), for a total investment in consulting services of $412,290 for the two utilities. ICF also expects the project to require an investment of more than 240 hours of effort from the infrastructure and DSM planning staff from each utility over the course of the 16 month engagement.

ICF's project cost breakdown is shown by task on the following page:

ICF Project Investment by Task (C$)				
		Labor	ODC's	Total Project
	Project Management, Deliverables, and Stakeholder Consultation			
Task 1a	Project Kickoff Meeting			
Task 1b	General Project Management			
Task 10	External Review/ Stakeholder Consultation			
Task 11	Deliverables and Final Report			
	Industry Review			
Task 2a	Literature Review			
Task 2b	Best Practices Review			
	Facilities Review and Avoided Costs			
Task 4	Review of Utility Facility Planning Processes			
Task 6	Avoided Costs			
	DSM Impact Analysis			
Task 3	DSM Impacts on Peak Day and Peak Hour Load			
Task 7	DSM Impact on Infrastructure Investment			
Task 8	Opportunity Assessment			
	Infrastructure and DSM Planning Integration			
Task 5	Transition Plan			
Task 9	Case Study Review/ Monitoring			
	Total Fixed Price Project Cost			
	Total Other Direct Costs (As Incurred + 10%)			
	Total Project Cost (Fixed Price + ODC's)			
	Optional Tasks			
	Implications of Ontario Carbon Policy			

Schedule 6 – Pricing Form

Please see Schedule 6 – Pricing Form on the following page:

SCHEDULE 6 - PRICING FORM

Proponent	ICF Consulting Canada, Inc.
Address	277 Wellington Street West Suite 808 Toronto, Ontario M5V 3E4
Tel. #	[redacted]
Contact Person	[redacted]
Signature	[redacted]
Date	August 5, 2016

Please complete the following fee table and per hour/diem rates schedule accordingly.

SERVICES	**FEE**
Fixed Fee for Integrated Resource Planning Study Services	[redacted]
Expenses	
Subtotal:	
HST	
Total Fixed Fee Proposal:	

Rate Card

For additional services not included in the fixed fee, the following rates will be charged:

Role/Title	Hourly Rate ($/Hr)
Managing Director	[redacted]
Director	
Principal	
Senior Manager	
Manager	
Senior Consultant	
Consultant	
Analyst	
Researcher	
Administrator	
Assistant	

3. ADDITIONAL INFORMATION

Any additional information the Proponent deems to be useful to the evaluation should be submitted under an "Additional Information" tab. The Proponent is cautioned against including an excessive quantity of materials, or sales oriented materials that may not add value in the evaluation of the Proposal.

The ICF Suite of Models

ICF will employ an integrated suite of modeling tools for this project, combining the best aspects of the modeling packages that have been developed by two formerly separate analytical teams. In modeling energy consumption in a utility service territory, ICF divides the customers into three sectors: residential, commercial, and industrial. This division is based on the differences in key energy end uses in the three sectors. Natural gas consumption in the residential sector is concentrated in space heating and domestic hot water (DHW), with several smaller but important end uses such as cooking, clothes dryers, swimming pools, and gas fireplaces. End uses such as gas barbecues and patio lights are usually included under "miscellaneous". Energy consumption in the commercial sector is concentrated in space heating, DHW, and commercial cooking, with other end uses usually included in miscellaneous. Energy consumption in the industrial sector is much more concentrated in loads related to the industrial processes, such as hot water systems, boilers and steam systems, process direct heat, and other process loads. Space heating loads are a much smaller fraction of overall loads in industrial facilities than they are in commercial buildings.

ICF then employs a suite of models for the different roles required in a large-scale conservation potential review, including:

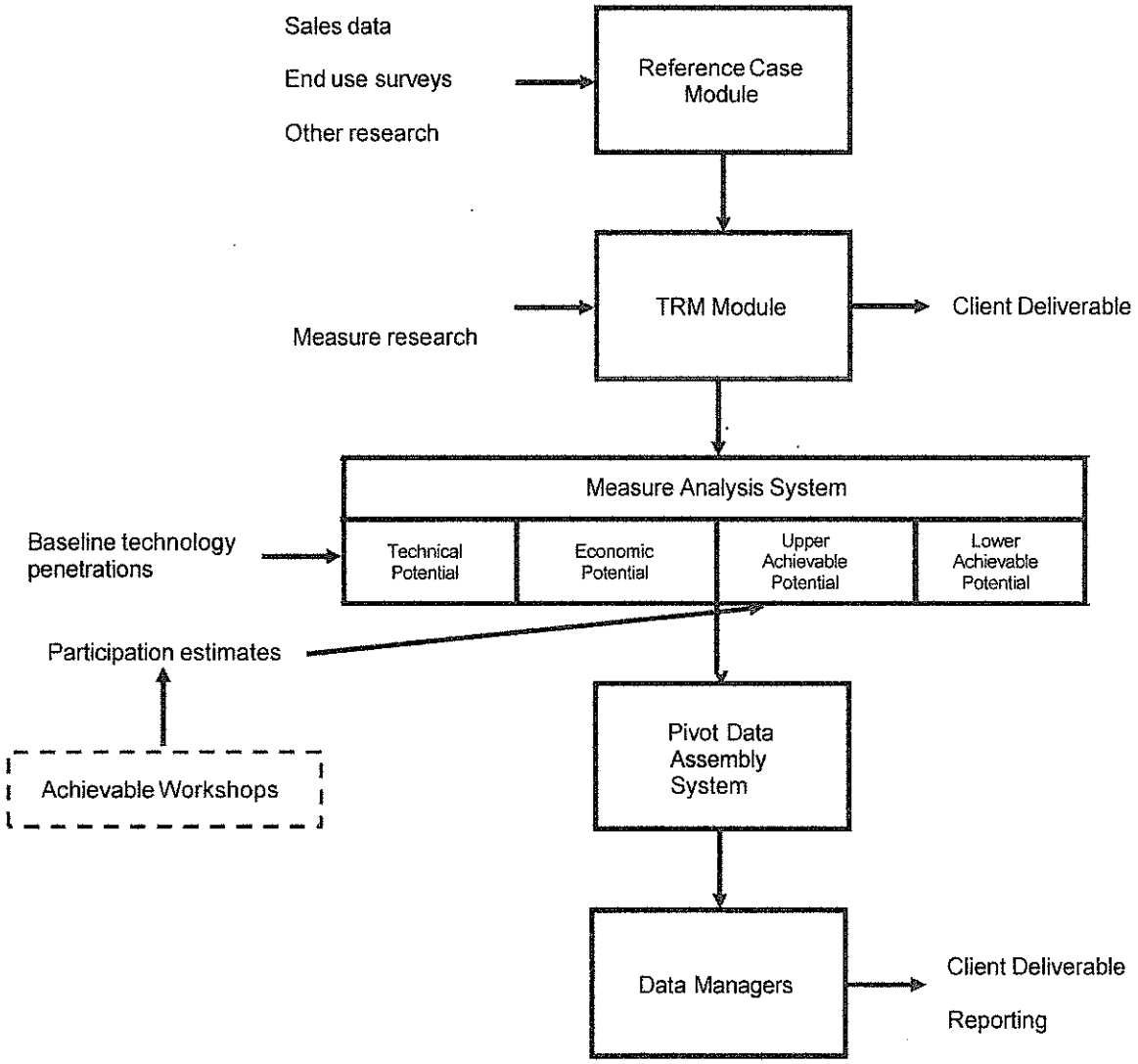
- Energy Efficiency Potential Model (EEPM)
- Beacon™ building models
- Gas Markets Model (GMM)
- DSM Optimizer
- Industrial Energy Efficiency Model (IEEM)

Energy Efficiency Potential Model (EEPM)

The EEPM models have previously been tailored for both Enbridge and Union, and have been used successfully for utilities across North America, which means the OEB will benefit from efficiencies, best practices and continuous investments. This section of the proposal describes the architecture of the models used to estimate potential at the sector and regional level. This model structure has been refined through its application to numerous conservation potential studies, and more recently has been adapted to use in load forecasting as well.

Exhibit 4 is a brief illustration of the model architecture. The core of the model, represented by the components in blue boxes, is common to the three sectors. Each of the blue boxes corresponds to a module within the model. The common architecture makes extensive use of parallel structure, where different modules will typically have the same fields (some of which may be unused in some scenarios), so that comparisons between scenarios are efficient.

Exhibit 4 EEPM Model Architecture



Typical inputs to the model are shown on the left. Model developers typically organize the inputs in Excel workbooks, customized by sector and unique to each project, depending on the availability and format of data for the jurisdiction. Excel is then used to build up the baseline consumption values in the base year and reference case. ICF also uses Excel to code the assumptions and equations for the efficiency measures. ICF has extensive experience coding the assumptions from Technical Resource Manuals used in other jurisdictions.

The Measure Analysis System includes input tables that capture the planned measure cascading sequence. Drawing together the information in the Reference Case and TRM modules, as well as inputs on estimates of measure penetrations, the Measure Analysis System generates a new set of consumption estimates under each scenario. Savings are reported at the level of the individual measure.

The Pivot Data Assembly System draws together the results data from the modules above and builds Data Managers that may include results for only one scenario or sector, or can be constructed to include all the results data for the whole project. The Data Managers are Excel workbooks the provide facilities for generating charts and tables. They make use of Excel's native pivot table system, but provide a user-friendly front end for that system.

Typical outputs from the model are shown on the right. Both the TRM Module and the Data Managers have traditionally been client deliverables in other conservation potential studies. Using the two in combination, it is possible to approximate the impacts of changes in certain assumptions. For example, avoided costs are an input to the TRM Module. If revised information on avoided costs becomes available indicating that they are likely to fall in future, that information can be entered in the TRM Modules. Some measures that were narrowly passing the economic screen will now fail. The Data Manager can then be opened, and the user can generate a table of results that is filtered to include only the savings for the measures that now pass. This permits a quick estimate of impact without re-running the entire model.

Beacon™

Beacon is a suite of building simulation tools developed and maintained by ICF. Beacon is powered by U.S. rtment of Energy (DOE)'s cutting-edge hourly/sub-hourly building energy modeling software EnergyPlus. We will use Beacon to develop annual hourly building energy load shapes by end-use. For the commercial sector, Beacon includes 16 commercial 16 commercial building standard reference archetypes models. For the residential sector, Beacon uses 24 residential building standard reference archetypes models.

In order to optimize project resources, ICF will use the Beacon suite of building models for three project tasks:

- Estimating energy savings for measures that affect space heating by improving the building shell and whose savings are not already prescriptively defined by equations in the Ontario TRM
- Estimating the interaction between measures that reduce the internal building loads and the space heating system of a building
- Developing the hours-use factors based on 8760 analysis.

DSM Optimizer

ICF's DSM Optimizer will be employed as an add-on to our models. DSM Optimizer facilitates scenario analysis by allowing the analyst to conduct risk and uncertainty analysis, as well as optimize EE program forecasts for cost-effectiveness, net benefits, m^3 savings, peak demand reductions, and other factors.

Gas Market Model (GMM)

ICF's Gas Market Model (GMM) is an internationally recognized modeling and market analysis system for the North American gas market. The GMM was developed in the mid-1990s to provide forecasts of the U.S. and Canada natural gas market under different assumptions. In its infancy, the model was used to simulate changes in the gas market that occur when major new sources of gas supply are delivered into the marketplace. Subsequently, GMM has been used to complete strategic planning studies for many private sector companies. The different studies include:

- Analyses of different pipeline expansions
- Measuring the impact of gas-fired power generation growth
- Assessing the impact of low and high gas supply
- Assessing the impact of different regulatory environments

In addition to its use for strategic planning studies, the model has been widely used by a number of institutional clients and advisory councils, including Interstate Natural Gas Association of America (INGAA), which has relied on the GMM for multiple studies over the past ten years. The model was also the primary tool used to complete the widely referenced study on the North American Gas market for the National Petroleum Council in 2003, and the 2010 Natural Gas Market Review for the Ontario Energy Board.

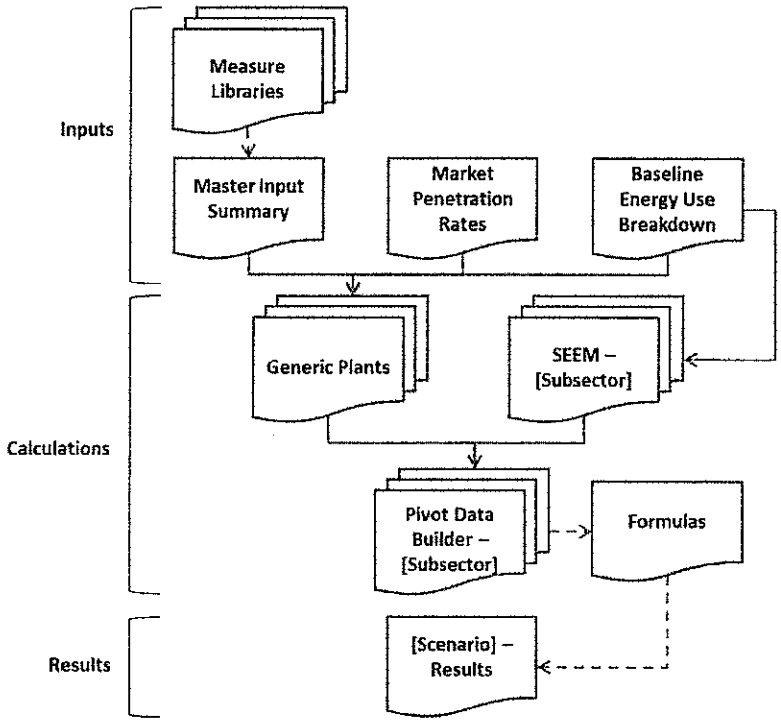
GMM is a full supply/demand equilibrium model of the North American gas market. The model solves for monthly natural gas prices throughout North America, given different supply/demand conditions, the assumptions for which are specified by scenario. Overall, the model solves for monthly market clearing prices by considering the interaction between supply and demand curves at each of the model's nodes. On the supply-side of the equation, prices are determined by production and storage price curves that reflect prices as a function of production and storage utilization. Prices are also influenced by "pipeline discount" curves, which reflect the change in basis or the marginal value of gas transmission as a function of load factor. On the demand-side of the equation, prices are represented by a curve that captures the fuel-switching behavior of end-users at different price levels. The model balances supply and demand at all nodes in the model at the market clearing prices determined by the shape of the supply and curves.

Industrial Energy Efficiency Model (IEEM)

ICF's Industrial Energy Efficiency Model (IEEM) is a proprietary spreadsheet-based macro model that is used to determine the macro level potential for reduction in energy consumption as a result of energy efficiency project implementation in the industrial sector.

The IEEM is organized by major industrial sub-sector, fuel type, and major end use. Each sub-sector is modelled by creating a "generic plant" (GP) for the sub-sector, as a whole. The GP is used to define an energy consumption profile that is representative of an average plant within a given industry sub-sector (or a specific type of plant within a given sub-sector, if there are substantial process differences). The GP is a composite of energy use patterns, end uses, and consumption levels within the particular target sub-sector; it reflects our detailed understanding of the industrial sub-sectors while at the same time being grounded in the actual average customer energy use. The candidate energy efficiency measures are applied to the GP to model energy savings potential. The overall IEEM structure is shown in Exhibit 5.

Exhibit 5 IEEM Structure



Generic DSM / IRP Proceeding related to

Integrated Resource Planning Study

ACKNOWLEDGMENT OF EXPERT'S DUTY

1. My name is [redacted] I live at Toronto, in the Province of Ontario.

2. I have been engaged by or on behalf of **Enbridge Gas Distribution Inc. and Union Gas Limited** to provide evidence in relation to the above-noted proceeding before the Ontario Energy Board.

3. I acknowledge that it is my duty to provide evidence in relation to this proceeding as follows:
(a) to provide opinion evidence that is fair, objective and non-partisan;
(b) to provide opinion evidence that is related only to matters that are within my area of expertise; and
(c) to provide such additional assistance as the Board may reasonably require, to determine a matter in issue.

4. I acknowledge that the duty referred to above prevails over any obligation which I may owe to any party by whom or on whose behalf I am engaged.

Date: March 8, 2017

[redacted]

Signature

Generic DSM / IRP Proceeding related to

Integrated Resource Planning Study

ACKNOWLEDGMENT OF EXPERT'S DUTY

1. My name is [redacted] I live in the town of Great Falls, in the state of Virginia.

2. I have been engaged by or on behalf of **Enbridge Gas Distribution Inc. and Union Gas Limited** to provide evidence in relation to the above-noted proceeding before the Ontario Energy Board.

3. I acknowledge that it is my duty to provide evidence in relation to this proceeding as follows:
(a) to provide opinion evidence that is fair, objective and non-partisan;
(b) to provide opinion evidence that is related only to matters that are within my area of expertise; and
(c) to provide such additional assistance as the Board may reasonably require, to determine a matter in issue.

4. I acknowledge that the duty referred to above prevails over any obligation which I may owe to any party by whom or on whose behalf I am engaged.

Date: March 8, 2017

[redacted]

Signature

Generic DSM / IRP Proceeding related to

Integrated Resource Planning Study

ACKNOWLEDGMENT OF EXPERT'S DUTY

1. My name is ..... [redacted] *name)*. I live at ..... Toronto..... (*city)*, in the

.....province..... (*province/state*) of ...Ontario..... .

2. I have been engaged by or on behalf of **Enbridge Gas Distribution Inc. and Union Gas Limited** to provide evidence in relation to the above-noted proceeding before the Ontario Energy Board.

3. I acknowledge that it is my duty to provide evidence in relation to this proceeding as follows:

(a) to provide opinion evidence that is fair, objective and non-partisan;

(b) to provide opinion evidence that is related only to matters that are within my area of expertise; and

(c) to provide such additional assistance as the Board may reasonably require, to determine a matter in issue.

4. I acknowledge that the duty referred to above prevails over any obligation which I may owe to any party by whom or on whose behalf I am engaged.

Date .March 8, 2017.....

[redacted]

Signature

Generic DSM Proceeding related to

Hydronic Boilers System Baseline Study

ACKNOWLEDGMENT OF EXPERT'S DUTY

1. My name is ... [redacted] .. I live at ....Ottawa...., in the province of ....Ontario....

2. I have been engaged by or on behalf of **Enbridge Gas Distribution Inc. and Union Gas Limited** to provide evidence in relation to the above-noted proceeding before the Ontario Energy Board.

3. I acknowledge that it is my duty to provide evidence in relation to this proceeding as follows:
(a) to provide opinion evidence that is fair, objective and non-partisan;
(b) to provide opinion evidence that is related only to matters that are within my area of expertise; and
(c) to provide such additional assistance as the Board may reasonably require, to determine a matter in issue.

4. I acknowledge that the duty referred to above prevails over any obligation which I may owe to any party by whom or on whose behalf I am engaged.

Date ....March 3, 2017....

[redacted]

Signature

INVOICE

Bill To: Union Gas
[redacted]
PO Box 2005
Chatham, ON
N7M 0J9, Canada

Invoice Date: 06/12/2017
Invoice Number: 2017C-001921
Invoice Total: $56,500.00
Currency: CAD
Due Date: 07/12/2017
Terms: NET 30

Remit To:
ICF Consulting Canada Inc.
C/O ICF Olson Canada Inc.
400 University Ave

Toronto, ON
CAN M5G 1S5

Customer Number CAD000226
PO Number:
Project Number: C40224.0.001
Billing Number: Integrated Resource Planning (IRP) Study

Description	Quantity	Price Per Unit	Subtotal	Transaction Sales Tax	Sales Tax Desc	Transaction Total Price
Union Gas Ltd. Invoice #2b	1.00	50,000.00	50,000.00	6,500.00	HST - Canada (Toronto)	56,500.00
Total Invoice	1.00		50,000.00	6,500.00		56,500.00

Notes HST #[redacted]

Please make cheque payable to ICF Consulting Canada Inc. Note that all items are listed exclusive of HST/GST which is added to the total.

[redacted]

Invoice Number: 2018C-002876
Invoice Date: 07/23/18

Bill To:
Union Gas Limited
[redacted]
PO Box 2005
Chatham, ON
N7M 0J9, Canada

Remit To:
ICF Consulting Canada Inc.
400 University Ave, 17th Floor
Toronto, ON
M5G 1S5, Canada

Terms: NET 30
Due Date: 08/22/18
VAT/Tax ID Number: [redacted]
Project Number: C40224.0 001
Project Name: Integrated Resource Planning (IRP) Study

Prime Contract:
Customer PO:
Bill Number: 001
Invoice Total: $22,763.85
Currency: CAD

Description:	AUTHORIZED VALUE	CURRENT AMOUNT DUE	CUMULATIVE INVOICE AMOUNT	PREVIOUS AMOUNT BILLED
Union Gas, Invoice # 6a (Final)	$20,145.00	$20,145.00	$20,145.00	$0.00
Subtotal:	**$20,145.00**	**$20,145.00**	**$20,145.00**	**$0.00**

CUMULATIVE INVOICE AMOUNT	$20,145.00
Less PREVIOUS AMOUNT BILLED	0.00
CURRENT AMOUNT DUE	20,145.00
Total Tax	2,618.85
Invoice Total	**$22,763.85**

Checks Payable to:
ICF Consulting Canada Inc
400 University Ave, 17th Floor
Toronto, Ontario, M5G 1S5

GST Registration No.: [redacted]

PLEASE REFERENCE INVOICE NUMBER ON REMITTANCE

Payments Electronic Funds Transfer or Wire, Please Direct to:
Bank Name: [redacted]
Account Name: [redacted]
Account #: [redacted]
Transit #: [redacted]
Bank #: [redacted]
Swift Code: [redacted]

PLEASE REFERENCE INVOICE NUMBER ON REMITTANCE

INVOICE

Bill To: Union Gas
Attn: [redacted]
PO Box 2005
Chatham, Ontario
N7M 0J9, Canada

Invoice Date: 08/15/2017
Invoice Number: 2017C-003738
Invoice Total: $56,500.00
Currency: CAD
Due Date: 09/14/2017
Terms: NET 30

Remit To:
ICF Consulting Canada Inc.
C/O ICF Olson Canada Inc.
400 University Ave

Toronto, ON
CAN M5G 1S5

Customer Number: CAD000226
PO Number:
Project Number: C40224.0.001
Project Name: Integrated Resource Planning (IRP) Study

Description	Quantity	Price Per Unit	Subtotal	Transaction Sales Tax	Sales Tax Desc	Transaction Total Price
Union Gas Ltd., Invoice #3b	1.00	50,000.00	50,000.00	6,500.00	HST Ontario (13%)	56,500.00
Total Invoice	**1.00**		**50,000.00**	**6,500.00**		**56,500.00**

Notes: HST #[redacted]

Please make cheque payable to ICF Consulting Canada Inc. Note that all items are listed exclusive of HST/GST which is added to the total.

INVOICE

Bill To: Union Gas
[redacted]
PO Box 2005
Chatham, Ontario
N7M 0J9, Canada

Invoice Date: 10/11/2017
Invoice Number: 2017C 004115
Invoice Total: $39,550.00
Currency: CAD
Due Date: 11/10/2017
Terms: NET 30

Remit To:
ICF Consulting Canada Inc.
C/O ICF Olson Canada Inc.
400 University Ave

Toronto, ON
CAN M5G 1S5

Customer Number: CAD000226
PO Number:
Project Number: C40224.0.001
Project Name: Integrated Resource Planning (IRP) Study

Description	Quantity	Price Per Unit	Subtotal	Transaction Sales Tax	Sales Tax Desc	Transaction Total Price
Union Gas Ltd Invoice #4b	1 00	35 000 00	35 000 00	4 550 00	HST Ontario (13%)	39 550 00
Total Invoice	**1.00**		**35,000.00**	**4,550.00**		**39,550.00**

Notes HST # [redacted]

Please make cheque payable to ICF Consulting Canada Inc Note that all items are listed exclusive of HST/GST which is added to the total

INVOICE

Bill To: Union Gas
[redacted]
PO Box 2005
Chatham, Ontario
N7M 0J9, Canada

Invoice Date: 12/06/2017
Invoice Number: 2017C-005005
Invoice Total: $62,150.00
Currency: CAD
Due Date: 01/05/2018
Terms: NET 30

Remit To:
ICF Consulting Canada Inc.
C/O ICF Olson Canada Inc.
400 University Ave
Toronto, ON
CAN M5G 1S5

Customer Number: CAD000226
Project Number: C40224.0.001
Project Name: Integrated Resource Planning (IRP) Study

Description	Quantity	Price Per Unit	Subtotal	Transaction Sales Tax	Sales Tax Desc	Transaction Total Price
Invoice #5b (2017 LOE)	1.00	55,000.00	55,000.00	7,150.00	HST Canada (Toronto)	62,150.00
Total Invoice	**1.00**		**55,000.00**	**7,150.00**		**62,150.00**

Notes: HST #: [redacted]

Please make cheque payable to ICF Consulting Canada Inc. Note that all items are listed exclusive of HST/GST which is added to the total.

INVOICE

Bill To: Enbridge Gas Distribution
[redacted]
500 Consumers Road
Toronto, ON
M2J 1P8

Invoice Date: 06/12/2017
Invoice Number: 2017C-001920
Invoice Total: $56,500.00
Currency: CAD
Due Date: 07/12/2017
Terms: NET 30

Remit To:
ICF Consulting Canada Inc.
C/O ICF Olson Canada Inc.
400 University Ave

Toronto, ON
CAN M5G 1S5

Customer Number: CAD000087
PO Number:
Project Number: C40224.0.001
Project Name: Integrated Resource Planning (IRP) Study

Description	Quantity	Price Per Unit	Subtotal	Transaction Sales Tax	Sales Tax Desc	Transaction Total Price
Enbridge Gas Distribution Inc., Invoice #2a	1.00	50,000.00	50,000.00	6,500.00	HST - Canada (Toronto)	56,500.00
Total Invoice	**1.00**		**50,000.00**	**6,500.00**		**56,500.00**

Notes: HST # [redacted]

Please make cheque payable to ICF Consulting Canada Inc. Note that all items are listed exclusive of HST/GST which is added to the total.

[redacted]

Invoice Number: 2018C-002732

Invoice Date: 07/03/18

Bill To:
Enbridge Gas Distribution Inc.
[redacted]
500 Consumers Road

Toronto, ON M2J 1P8
Canada

Remit To:
ICF Consulting Canada Inc.
400 University Ave, 17th Floor
Toronto, ON
M5G 1S5, Canada

Terms:	NET 30	**Prime Contract:**	
Due Date:	08/02/18	**Customer PO:**	
VAT/Tax ID Number:	[redacted]	**Bill Number:**	001
Project Number:	C40224.0.001	**Invoice Total:**	$22,763.85
Project Name:	Integrated Resource Planning (IRP) Study	**Currency:**	CAD

Description:	AUTHORIZED VALUE	CURRENT AMOUNT DUE	CUMULATIVE INVOICE AMOUNT	PREVIOUS AMOUNT BILLED
Enbridge, Invoice # 6a (Final)	$20,145.00	$20,145.00	$20,145.00	$0.00
Subtotal:	**$20,145.00**	**$20,145.00**	**$20,145.00**	**$0.00**

CUMULATIVE INVOICE AMOUNT	$20,145.00
Less PREVIOUS AMOUNT BILLED	0.00
CURRENT AMOUNT DUE	20,145.00
Total Tax	2,618.85
Invoice Total	**$22,763.85**

Checks Payable to:
ICF Consulting Canada Inc
400 University Ave, 17th Floor
Toronto, Ontario, M5G 1S5

GST Registration No.: [redacted]

PLEASE REFERENCE INVOICE NUMBER ON REMITTANCE

Payments Electronic Funds Transfer or Wire, Please Direct to:
Bank Name:
Account Name:
Account #:
Transit #:
Bank #:
Swift Code:
[redacted]

PLEASE REFERENCE INVOICE NUMBER ON REMITTANCE

INVOICE

Bill To: Enbridge Gas Distribution
[redacted]
500 Consumers Road
Toronto, Ontario
M2J 1 P8

Project Number: C40224.0.001
Billing Number:

Customer Number: CAD000087
PO Number:
Project Number: C40224.0.001
Project Name: Integrated Resource Planning (IRP) Study

Invoice Date: 08/15/2017
Invoice Number: 2017C-003737
Invoice Total: $56,500.00
Currency: CAD
Due Date: 09/14/2017
Terms: NET 30

Remit To:
ICF Consulting Canada Inc.
C/O ICF Olson Canada Inc.
400 University Ave

Toronto, ON
CAN M5G 1S5

Description	Quantity	Price Per Unit	Subtotal	Transaction Sales Tax	Sales Tax Desc	Transaction Total Price
Enbridge Gas Distribution Inc., Invoice #3a	1.00	50,000.00	50,000.00	6,500.00	HST - Canada (Toronto)	56,500.00
Total Invoice	**1.00**		**50,000.00**	**6,500.00**		**56,500.00**

Notes: HST #[redacted]

Please make cheque payable to ICF Consulting Canada Inc. Note that all items are listed exclusive of HST/GST which is added to the total.



INVOICE

Bill To: Enbridge Gas Distribution
[redacted]
500 Consumers Road
Toronto, Ontario
M2J 1 P8

Invoice Date: 10/11/2017
Invoice Number: 2017C-004114
Invoice Total: $39,550.00
Currency: CAD
Due Date: 11/10/2017
Terms: NET 30

Remit To:
ICF Consulting Canada Inc.
C/O ICF Olson Canada Inc.
400 University Ave

Toronto, ON
CAN M5G 1S5

Customer Number: CAD000087
PO Number:
Project Number: C40224.0.001
Project Name: Integrated Resource Planning (IRP) Study

Description	Quantity	Price Per Unit	Subtotal	Transaction Sales Tax	Sales Tax Desc	Transaction Total Price
Enbridge Gas Distribution Inc., Invoice #4a	1.00	35,000.00	35,000.00	4,550.00	HST - Canada (Toronto)	39,550.00
Total Invoice	**1.00**		**35,000.00**	**4,550.00**		**39,550.00**

Notes: HST #[redacted]

Please make cheque payable to ICF Consulting Canada Inc. Note that all items are listed exclusive of HST/GST which is added to the total.

INVOICE

Bill To: Enbridge Gas Distribution
[redacted]
500 Consumers Road
Toronto, Ontario
M2J 1 P8

Invoice Date:	12/06/2017
Invoice Number:	2017C-005004
Invoice Total:	$62,150.00
Currency:	CAD
Due Date:	01/05/2018
Terms:	NET 30

Remit To:
ICF Consulting Canada Inc.
C/O ICF Olson Canada Inc.
400 University Ave

Toronto, ON
CAN M5G 1S5

Customer Number:	CAD000087
Project Number:	C40224.0.001
Project Name:	Integrated Resource Planning (IRP) Study

Description	Quantity	Price Per Unit	Subtotal	Transaction Sales Tax	Sales Tax Desc	Transaction Total Price
Invoice #5a (2017 LOE)	1.00	55,000.00	55,000.00	7,150.00	HST Ontario (13%)	62,150.00
Total Invoice	**1.00**		**55,000.00**	**7,150.00**		**62,150.00**

Notes: HST # [redacted]

Please make cheque payable to ICF Consulting Canada Inc. Note that all items are listed exclusive of HST/GST which is added to the total.

ENBRIDGE GAS INC.

Answer to Interrogatory from
School Energy Coalition ("SEC")

Interrogatory

Reference:

[Ex. C/3/1. p. 3]

Question(s):

Please provide the case reference for the Applicant's Board authority to pay for the Open Bill Access program using a budget transfer. Please provide a detailed statement of the costs that are included in the claim, including a copy of the contract with, and invoice from, any consultant used who billed more than $200,000. Please confirm that this claim has not been audited by the EC or any other independent party.

Response:

In its Decision and Order on Enbridge Gas's 2015-2020 DSM Plans for the EGD and Union rate zones, the Board stated:[1]

> The OEB directs Enbridge to expand access to third parties to use the utility bill for conservation related services. Further, the OEB directs Union to work with Enbridge to establish the same capability on its bills. The OEB does not anticipate that significant incremental funding will be required to implement this direction and the utilities have the ability to redirect approved program funding which should be sufficient. As part of the mid-term review, the OEB expects that an examination of the status of this initiative and any earned revenues will be undertaken.

[1] EB-2015-0029/0049, Decision and Order dated January 20, 2016, p 55.

Accordingly, Enbridge Gas utilized under-spent OEB-approved program budgets to fund the Open Bill Access ("OBA") Program in 2018. Enbridge Gas advised the OEB of its actions in this regard as part of its submissions in the Mid-Term Review of the 2015-2020 DSM Framework for Natural Gas Distributors, for the Union rate zones.[2] The OEB subsequently acknowledged Enbridge Gas's actions to fund the OBA program in this manner and encouraged it to continue its development:[3]

> The OEB appreciates Union Gas' efforts in creating an Open Bill Access program. The OEB agrees that if the investment to provide access to this program has largely been made or committed, Union Gas should proceed in order to allow customers to have access to this financing opportunity as soon as possible. While it is expected that the natural gas utilities will eventually share the same billing system, this may take some time to implement. In the interim, Union Gas is encouraged to ensure consistency with Enbridge Gas' program, as this would simplify participation by contractors and other service providers in the province by having programs that are harmonized.

Table 1 contains a detailed statement of costs associated with this claim.

[2] EB-2017-0127, Union DSM Mid-Term Review – Part Two Requirement Two Submission, January 15, 2018, p. 13.
[3] EB-2017-0127/0128, Report of the OEB – Mid-Term Review of the Demand Side Management (DSM) Framework for Natural Gas Distributors (2015-2020), November 29, 2018, p. 26.

Table 1:
2017-2018 OBA Costs

	2017	2018
Salaries		37,216.97
Employee Expenses		2,127.83
Contract Services - Vertex		782,050.00
		821,394.80

To the best of Enbridge Gas's knowledge this claim has not been reviewed by an independent third-party as there is no established obligation for such review. However, the utility underwent an audit of its 2017 and 2018 DSM program years, wherein total spending amounts was provided to the EC (an independent third-party).

Please find attached both the contract and invoices associated with claim for the consultant that billed more than $200,000 over the period in question (Vertex), as Attachments 1 and 2 respectively.[4]

[4] The names of specific parties to related agreements, personal signatures and banking information has been redacted.

vertex

Statement of Work (SOW)

FINAL

PROJECT NAME: OPEN BILL PROJECT

CLIENT: Union Gas
WORK REQUEST #: CM 29375
DOCUMENT VERSION: 1.6
AUTHOR: [redacted]
DATE: 27-Nov-2017

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Change Log

Date	Version	Description	Author
27-Nov-2017	1.0	Initial Version	[redacted]
11-Jan-2018	1.1	Updated as per client's feedback	
12-Feb-2018	1.2	Key risks updated	
23-Mar-2018	1.3	Updated the cost table with the ongoing charges	
09-May-2018	1.4	Updated Sections 2.1.11, 2.1.12, 9 based on the new requirements for Open Bill Charges Bulk Load Process and new CSV report.	
28-May-2018	1.5	Updated the cost table due to the new requirements	
13-Jun-2018	1.6	The cost table was updated due to the new requirements and one assumption was added	

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2.1 Enlogix CIS Modifications 1
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1 Project Request

The Union Gas Open Bill Project aims to develop functionality allowing access for billers, those that are not owned by or affiliated with Union Gas, to apply third-party charges to a Union Gas customer through their utility bill.

The following process will take place:

- Billers will be verified by Union Gas manually and will be added to the Open Bill billers pool.
- Approved Open Bill billers will be able to submit charges for one-time or recurring programs to be added to Union Gas utility bills.
- Union Gas will process and include Open Bill biller charges on customers' utility bills.

1.1 Project Objectives

The project endeavors to complete development of a lightweight mechanism allowing billers to benefit from Union Gas' administrative infrastructure while creating economic opportunities for customers to use programs aimed at energy efficiency and modernization.

2 Scope

The scope of this project includes modifications to Enlogix CIS and OCS required to achieve the project's objectives.

2.1 Enlogix CIS Modifications

2.1.1 Enabling maintenance of the Open Bill program type codes

New functionality enabling creation and maintenance of the Open Bill program type codes and descriptions that will be used when creating Open Bill program rules.

2.1.2 Enabling maintenance of the Open Bill program rules

New functionality enabling creation and maintenance of the Open Bill program rules to define programs, program category, association and eligibility criteria.

- Open Bill program definitions will contain minimum and maximum allowed charge amounts that the Biller will need to conform to when sending charges.
- Open Bill program association will indicate recurring programs assigned to customers' accounts or premises, or one-time program charges to an account.
    - The reoccurring charges of the premises level programs will be carried forward to the new customer during moves.
    - The reoccurring charges of the account level programs will not be valid after the account holder moves out.

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2.1.3 Enabling association of the Open Bill programs

New functionality enabling association of the reoccurring Open Bill programs to individual accounts or premises.

- Reoccurring Open Bill programs will be linked to customers' accounts or premises depending on the program definition.
- The association of an account or premises to the Open Bill program will be initiated by a biller via the Biller Portal.
- The dollar value of charges will be set individually for each account/premises per program.

2.1.4 Enabling maintenance of billers and supported programs

New functionality enabling creation and maintenance of the previously approved billers and the supported Open Bill programs by that biller.

- The following functions will be available on the page:
    - Approved Open Bill programs can be added to the Biller's supported list of programs.
        - Open Bill program at the biller level will be linked to a rate code; however, the dollar value of charge amount will be defined at the account/premises level. That would allow the same program to be charged different amounts for different customers using the same Rate Code (G/L Class Code).
    - Billers could be inactivated:
        - the date and reason for the status change will be captured in the system, and the history of changes will be available.
        - neither new charges submissions for any of the biller's programs nor reoccurring charges processing for any of the biller's programs will be allowed.
    - Billers could be activated (reactivated):
        - the date and reason for the status change will be captured in the system, and the history of changes will be available.
        - upon reactivation, the charges for reoccurring programs will be calculated on a going-forward basis, and no calculations/adjustments will be performed for the period, in which the biller was Inactive.

2.1.5 Enabling suspension and resumption of the Open Bill programs

New functionality enabling suspension and resumption of the Open Bill programs at the account/premises level or at the biller level.

- The Open Bill programs at the account/premises level or the associated Open Bill programs at the biller level could be suspended or resumed.

- the date and reason for the status change will be captured in the system, and the history of status changes will be available.
- No charge will bill to the account associated with the suspended program, either one-time or reoccurring (neither new charges submission nor the processing of the reoccurring charges)

- The suspended Open Bill program could be resumed by an agent with a necessary permissions level.
- Upon resumption, the charges for re-occurring programs will be calculated on a going-forward basis, and no calculations/adjustments will be performed for the suspended period.

2.1.6 Enabling cancellation of the Open Bill programs

New functionality enabling cancellation of the Open Bill programs at the account/premises level or at the biller level.

- The Open Bill programs at the account/premises level or the associated Open Bill programs at the biller level could be cancelled.
  - the date and reason for the status change will be captured in the system, and the history of status changes will be available.
  - No charge will bill to the account associated with the cancelled program, either one-time or reoccurring (neither new charges submission nor the processing of the reoccurring charges)
- The cancelled program at the biller level can be reinstated. The charges for reoccurring programs will be calculated on a going-forward basis, and no calculations/adjustments will be performed for the cancelled period.
- The cancelled program at the account/premises level cannot be reinstated. The biller will not be able to resubmit the reoccurring charge (enrolment request) via the Biller Portal to restart the same program for that account.

2.1.7 Enabling different privileges and security access levels

New functionality enabling two different security groups to have different privileges and being able to perform different actions towards the Open Bill programs at the account/premises level.

- The first group will have access only to view or suspend Open Bill programs and modify the suspension comments.
- The second group will have additional privileges also to resume and/or cancel Open Bill programs for a specific account and to add/update any comments.

2.1.8 Enabling CSR indication about existing Open Bill program

New functionality informing the agent navigating to CSR Screen that the account is associated with at least one Open Bill Program.

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- The light bulb will be lit if any of the Open Bill programs is or was ever associated with the selected account regardless of the current program status or expiry date.
- The light bulb will include navigation link to the Open Bill programs maintenance page.

2.1.9 Enabling billers' charges validations

New functionality enabling validation of the submitted by the biller charges.

- The charges for all types of programs will be validated upon submission.
- The validation will be applicable when submitting a new charge for the one-time or reoccurring program as well as when processing a charge for the already enrolled reoccurring program.
- The validation will include Account Number, Account status, Account arrears balance, Program status, Program Min/Max Amount, Gas service status and other necessary checks.
    - If the transaction is processed successfully, a message informing the biller of a successful submission will be displayed.
    - If the validation fails, an appropriate exception will be displayed to the biller with error specifics.

2.1.10 Enabling transfers of the premises level Open Bill programs

New functionality moving the premises level Open Bill programs to the new customer during the moves.

- Premises level reoccurring Open Bill charges will automatically be calculated when a (moved-in) new customer is Active and is being billed for the service.
- The program end date will not change (the system will keep the original program end date of the old customer).
- Program charge will not go to Unknown Customer (i.e. if the Customer Code value equals 10, 20, 30, 40, 50, 60 or 70).
- The Open Bill programs defined at the account level will be set to 'Completed' status when the customer moves out.

2.1.11 Enabling one-time and reoccurring charge processing

New functionality enabling processing of the submitted by the biller one-time or reoccurring charges in Enlogix CIS to include the Open Bill charges in the bills of existing Union Gas customers accounts.

- One-time charges must be submitted by billers every month to be charged to the customer's account.
- Reoccurring charges are submitted once and get validated and processed monthly when billing active accounts.
    - The charges will not be prorated.

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- There will be an option to load multiple charges for a specific biller via the on-demand batch process.

2.1.12 Enabling monthly statistics reporting

New functionality enabling reporting from Enlogix CIS to Union Gas. The reporting will include monthly statistics reports containing volumes and amounts for the program by the biller and by the program.

- Open Bill Programs Statistics reports will list Open Bill programs associated with at least one biller, containing billed and unbilled amounts.
  - Report #1 will list Open Bill programs by the biller
  - Report #2 will list billers by the Open Bill program
- Open Bill Monthly Charges report will download details of every individual (printed/unprinted) open bill charge created in a given billing period, in CSV format.

2.2 MyAccount OCS Enhancements

2.2.1 Enabling biller self-service

Biller self-service functionality will be available through a new authenticated portal that will allow active billers to:

- view biller details (name, contact details, status)
- view the biller's associated program details
- add one-time active program charges to customer accounts
- enroll customer accounts in active programs for recurring monthly charges
- modify program end dates and amounts for active customer programs
- complete active programs on customer accounts
- query customer accounts enrolled in active and inactive programs or query active and inactive programs associated with a customer account

Billers will have the ability to have multiple user profiles to login to the biller self-service portal.

A new CIS / OCS interface will be created to provide biller information, program details, and validation of customer account eligibility.

A test instance of the biller portal will be created for Union Gas.

2.2.2 Enabling biller profile management

New functionality will be available through a management portal that will allow Union Gas to create, disable, and manage biller profiles for the new authenticated portal.

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2.2.3 Enabling biller communication

New functionality will be available for event-triggered or ad-hoc communications to be sent to billers or customers:

- Biller inactivation
- Biller activation
- Program suspension at the account level due to a dispute
- Program suspension at the account level due to balance arrears
- Program suspension at the biller level
- Program cancellation at the account level
- Program cancellation at the biller level
- Program resumption at the account level
- Program resumption at the biller level
- Program reactivation at the biller level
- Program natural ending
- Move-Out Service Order closure
- Move-In Service Order closure
- Program's end date modification via Biller Portal
- Program completion via Biller Portal

2.2.4 Enabling OCS Reporting of Open Bill Charges

Modified functionality will allow the inclusion of Open Bill charges in the OCS Download All Data, Annual Bill Summary, and the Bill History (BHST) web method for Bill History Statements. New message content will be added to MyAccount to communicate Open Bill related content.

2.3 Out of Scope

- Inventory Management of the biller's inventory.
- No promotions or discounts for Open Bill programs will be maintained in CIS. This functionality will be addressed by Biller if needed.
- It is Biller's responsibility to provide the bill-ready charge amount including any applicable taxes. Tax calculations are out of scope for this project.

3 Assumptions

- UG will be responsible for creating and maintaining the applicable Open Bill Program Rules and the respective Rate Codes.

- The Application and Approval process of billers will be handled outside of Vertex, and no changes are needed in CIS/OCS to support this.
- The Bad Debt process functionality will not be modified to handle Open Bill charges.
- The Cancel Rebill process will not cancel or rebill the reoccurring charges of the Open Bill programs.
- An account can only be enrolled in one active program of the same type for a given period (start/end dates). No overlapping of dates for the same program is allowed for a biller. It will be a Biller's responsibility to manage scenario in which this setup is necessary manually.
- The behavior of the Open Bill program charges will be similar to ones created in Enlogix CIS as Miscellaneous charges.
    - Any adjustments to the Open Bill Charges will follow the same procedures as applying an adjustment to the Account Level/Miscellaneous charges.
- No proration will be applied to the program charges.
- The number of installments/charges will be driven by the billing cycles and effective dates of the program. A communication will be sent to Biller notifying him that the program has ended, but the biller will be responsible to reconcile the underpayments or overpayments.
- If the Communications application (CM 17194) is not available prior to the Open Bill project completion, an interim interface will be developed to address open bill communication needs. More changes will be required for the Open Bill to adapt to the Communication Application functionality.
- Union Gas will provide the URL and SSL certificates for the biller portal and biller portal test instance.
- The biller portal test instance will be accessible to Union Gas in the same manner as existing Customer Advantage test instances.
- Enlogix CIS will be the system of record for the biller management (biller status, supported programs and program status) and customer account eligibility for Open Bill biller portal functionality.
- The biller management portal will be the system of record for biller profile information.
- It is expected to have 2,500 Open Bill generated charges within 4 years.

4 Constraints / Risks

4.1 Key Constraints

N/A

4.2 Key Risks

- The Communications application (CM 17194) may not be available during the development, testing and deployment of the Open Bill Project. It is therefore assumed that the Open Bill project will develop and use an interim interface to initiate communications that may provide only limited (minimalistic) communication functionality. When the Communication Application is available for Open Bill communications, additional work will be required to convert from the interim interface to the Communications Application.
- Open Bill charges will be processed during daily batch processing. Any additions to batch processing will impact batch processing time. It is Union Gas's responsibility to review and adjust batch process scheduling windows to ensure all processes have adequate time to complete.

5 Roles and Responsibilities

5.1 Vertex Data LP (Vertex) – Roles

5.1.1 Project Manager

The project manager is responsible for project management to ensure final delivery of project deliverables. The project manager is also responsible for planning, managing project tasks, interfacing with the client, preparing status reports, maintaining an open issues list, maintaining the project plan, managing the project and acceptance of deliverables.

5.1.2 Senior Analyst and Business Analyst

The business analysts are responsible for working on deliverables such as the development of business requirements, and performance of implementation support as directed by the project manager.

5.1.3 Technical Analyst

The technical analyst is responsible for the development of business requirements as they pertain to the technical infrastructure and system configuration requirements.

5.2 Client Roles

5.2.1 Project Sponsor

The project sponsor is responsible for prioritizing and resolving issues between Vertex and departments at the client's site.

5.2.2 Project Manager

The project manager is responsible for coordinating client resources and developing business requirements. The project manager is responsible for establishing the work

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plan and for maintaining effective client relations.

5.2.3 Subject matter experts

The subject matter experts are responsible for providing subject expertise, including regulatory environment and other business expertise.

5.2.4 IT Technical Support

The IT technical support is responsible for the acquisition and set-up of the various computing environments required to access the new application through the Internet per the client's requirements.

5.2.5 Business Area Team members

Responsible for developing system requirements, use case scenarios, test plans, and business rules (based on regulatory and business process expertise). The team is also responsible for securing approval of these requirements and plans.

6 Change Request Management

Any changes to deliverables submitted after the sign-off will be treated as a change of scope and will result in a change request. This section defines the procedures for handling changes that fall outside the scope of the project and changes to deliverables once the client has signed off. Changes may be classified as being a design change (opportunity to improve the system), a non-compliance change (lost time), or a statutory change (lost time, but PSC required) that is outside the scope of the project. If incurred, lost time will be posted to the project plan and reported in status reports and meetings.

6.1 Change Request Procedure

Change requests will be forwarded to the Vertex Client Manager or the Vertex Project Manager. The Vertex Project Manager will be responsible for evaluating the request and estimating schedule and cost adjustments. The change request will state the benefit of the change for the business if the change is implemented and the impact to the business if the change is not implemented. The request (impacts noted) will be forwarded to the project manager for the client who is a single point of contact regarding the change control process at the client's site. A response is expected within 1 business day; otherwise, it will be logged as an issue for resolution at weekly status meetings. Approved changes will be included in the project plan. Change requests will be logged, tracked, and reported in the status report and at meetings.

6.2 Criteria for Change

The following identifies the criteria for change:

1. If decisions regarding change or acceptance for the deliverables encounter delays that affect the project schedule, causing the critical path to be extended, the Vertex project manager will issue a change notice for the extension in terms of costs and schedule.
2. If the requirements for the deliverables exceed those stated in this document, the

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Vertex project manager will issue a change notice for the extension in terms of costs and schedule.

3. A violation of any of the assumptions listed in earlier sections of this document can be the basis for a change request.
4. If the client's functional requirements change significantly after sign-off on the business requirements, the Vertex project manager will issue a change notice for the extension in terms of costs and schedule.
5. If any of the risks listed in the key risk summary occur, then a change request may be needed.

7 Deliverables List

Client: (Documents 1 & 2 noted below require Client Signoff)

Details of change request will be included in the following documents:

1. Statement of Work (SOW) – single document for all the phases
2. High-Level Design (HLD) – specific document for each phase

Internal:

1. Source Code
2. Detail Design Document
3. System Test Cases
4. System Test Results

8 Acceptance of Deliverables List

Client: (Documents 1 & 2 noted below require Client Signoff)

Details of change request will be included in the following documents:

1. Statement of Work (SOW)
2. High-Level Design (HLD)

Internal:

1. Detail Design Document (DDD) - Vertex Development Manager
2. Source Code

9 Effort and Cost Estimate

Phase	Analyst hours	Confidence (+ or - %)	Cost
Development, Testing and Documentation			$778,900.00
Totals*			**$778,900.00**
Ongoing Monthly Charges			
Biller Portal Production and one test instance			$1,500

*** This amount does not include applicable taxes.**

9.1 Date estimate expires

20-Jun-2018

10 Approval signature

By signing this SOW, you are authorizing Vertex to proceed with the work outlined in this document and guaranteeing full payment to Vertex for the work performed on *Open Bill Project, CM 29375.*

[redacted]	**Date:** 25 June 2018	**Date:** 2018-6-15	
Project or Development Manager Vertex Data LP			
[redacted]	**Date:** June 22, 2018	[redacted]	
Client Manager Vertex Data LP		Project Manager or Lead Requestor *(Client)*	

20 Approval signature

By signing this document, I approve the High-Level Design Solution for *Open Bill Project, CM 29375* contained in this document.

[redacted]	Date: 25 June 2018	Date: 2018-6-15
Project or Development Manager Vertex Data LP		
[redacted]	Date: June 22, 2018	[redacted]
Client Manager Vertex Data LP		Project Manager or Lead Requestor *(Client)*

vertex

High-Level Design Document (HLD)
Addendum A

FINAL

PROJECT NAME: OPEN BILL PROJECT – UPDATES

CLIENT: Union Gas
WORK REQUEST #: CM 29375
Document Version: 3.0
Author: [redacted]
Date: 14-Nov-2018

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Change Log

Date	Version	Description	Author
14-Nov-2018	1.0	Initial Version	[redacted]
27-Nov-2018	2.0	Updates based on revised requirements and mock-up content	
05-Dec-2018	3.0	Section 4.2.5 was added, Section 4.1.4.4 was amended	

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1 Project objectives

This addendum provides greater detail and clarification of the CustomerAdvantage Open Bill Portal and the associated Management Portal detailed in the original HLD v.1.7, Section 8.2 and replaces that section in its entirety.

In addition, this addendum provides an Enlogix CIS solution to allow billers to post one-time Open Bill charges to the 'New' accounts as well as some revisions to the mockups of the original HLD v1.7.

2 Project scope

This addendum replaces HLD v. 1.7 section 8.2 in its entirety and provides additional changes to other applications as noted below.

3 Solution summary

The solution includes modifications in Enlogix CIS and creation of the Biller Portal in OCS. For more details, please refer to Section 4.0 - Product Features.

DISCLAIMER: *The web form mock-ups, including styles, images, layout (field positions, attributes, labelling), etc. are for reference only and are subject to change and, as such, may not depict the final appearance of the solution. Union Gas and Vertex will layout the screens with the information provided. Functional changes to the screens will be handled as an addendum. If during development stage a change is required to the layout, Vertex will provide Union gas the new screen layouts for approval.*

4 Product features

4.1 CustomerAdvantage Biller Portal

A new CustomerAdvantage Biller Portal will be created that will allow billers to submit and modify Open Bill charges. Profile enrollment for billers will be done through the CustomerAdvantage Management Portal by Union Gas staff.

Union Gas will provide all final page content and error messages.

4.1.1 Screen examples

See *Summary of changes to existing programs* and *Summary of new programs* below.

4.1.2 Expected data/transaction volumes

Initial uptake of the Biller Portal is expected to be low. The estimated usage of the Open Bill portal will be up to 250,000 program enrollments over five (5) years.

4.1.3 Summary of changes to existing programs

4.1.3.1 Open Bill Profile Management

The CustomerAdvantage Management Portal will be extended to allow Union Gas to create new biller portal profiles and manage existing biller portal profiles. The management portal

will be able to assign multiple user profiles to a biller, all of which will have the same permissions and functionality.

Union Gas will have the ability to create biller profiles which will trigger a registration completion email that provides a link for billers to set the password for their new profile.

Union Gas will be able to search existing biller profiles by User ID, Last Name, First Name, Email Address, and Biller.

Profile management functionality will allow Union Gas to:

- Deactivate profiles.
- Modifying a profile's email address, First Name, and Last Name.
- Send a registration completion email to the profile's email address (resend functionality for profiles pending completion)

Validation for entering or modifying User Name or Email Address will require that the user name or email address are not currently being used by another profile. The validation is required to enforce a one-to-one relationship between user name and email address.

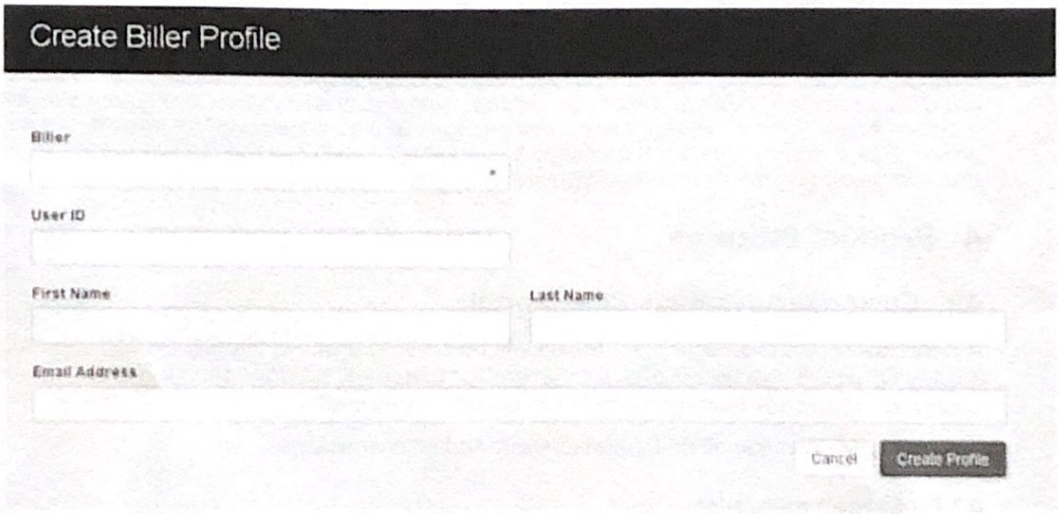


Figure 1. Create Biller Profile

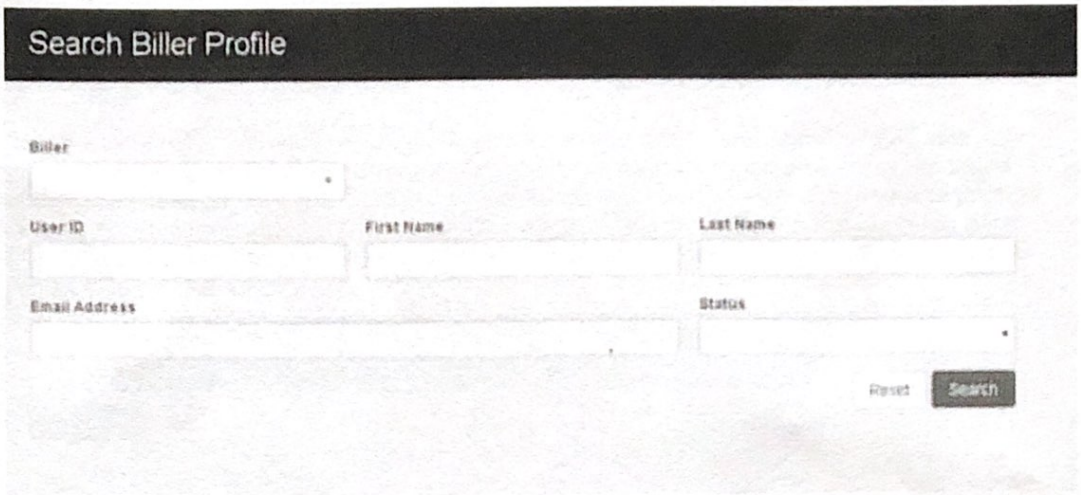


Figure 2. Search Biller Profiles

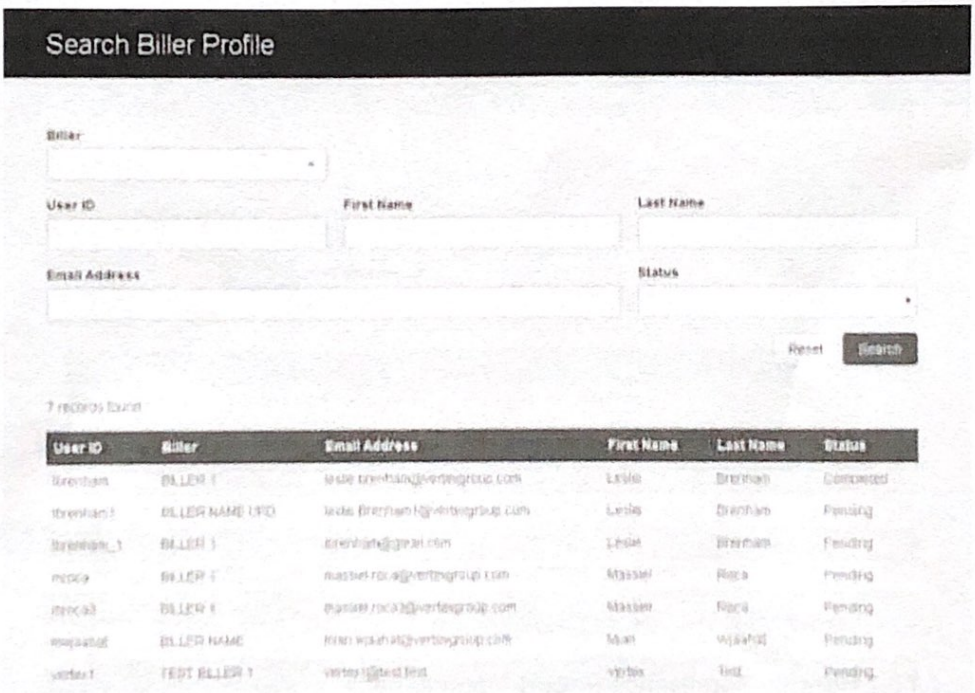


Figure 3. Search Biller Profile with results

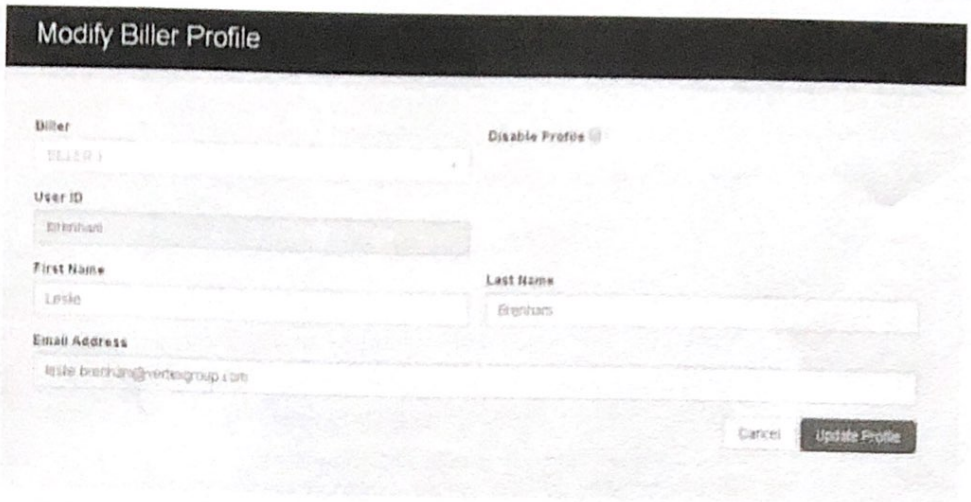


Figure 4. Modify Biller Profile

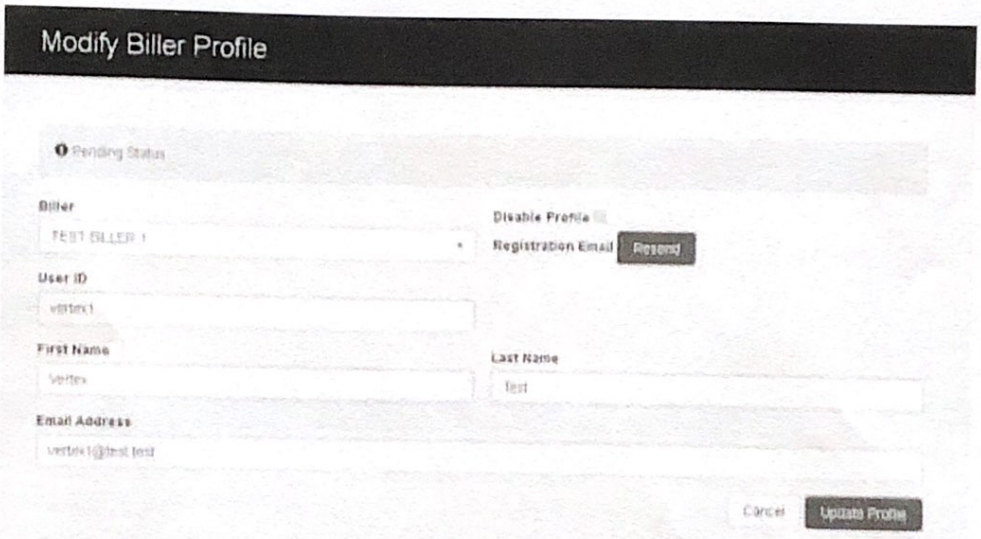


Figure 5. Modify Biller Program for pending profile

4.1.3.2 Monthly Remittance Report Management

Remittance report management functionality will allow Union Gas to:

- Upload Monthly Remittance Reports to a Biller by providing the Biller, Date of the report, and selected file for upload.
- The most recent uploaded files for each report month will be displayed in the list of

biller Remittance Reports and viewable from the list.

- Disable Remittance Reports. Disabled reports cannot be viewed by billers in the Biller portal and will be deleted at the next archive clean-up.

Functionality for remittance report management will be added that enforces only one report can be Active for a given year and month combination. When a report is uploaded and the selected date for the report to be uploaded matches the year and month of another Active report, a message will be displayed to the user that by selecting the provided date the already archived report will be disabled and the new uploaded report will be the active report displayed to Billers.

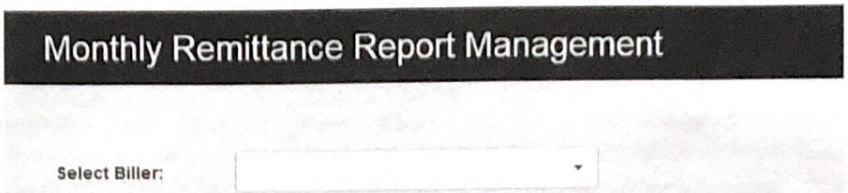


Figure 6. Monthly Remittance Report Management page, default screen

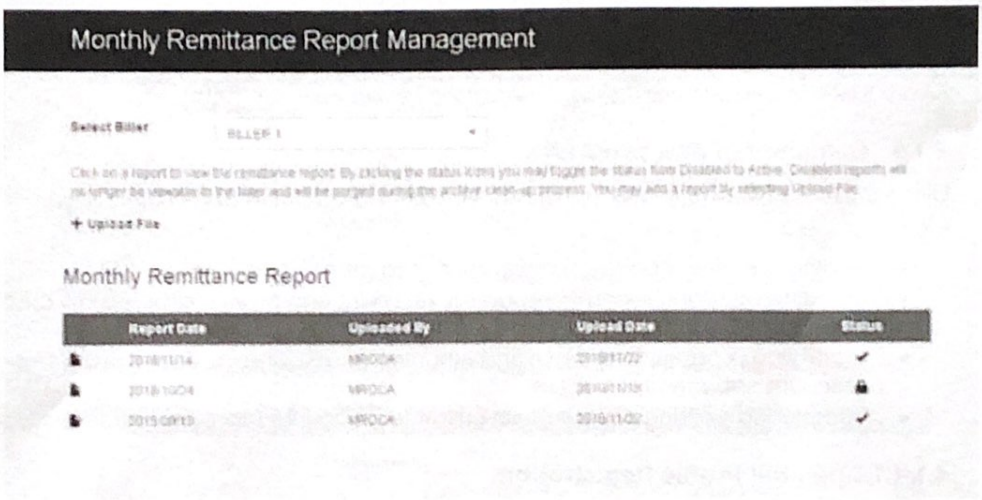


Figure 7. Monthly Remittance Report Management, biller selected

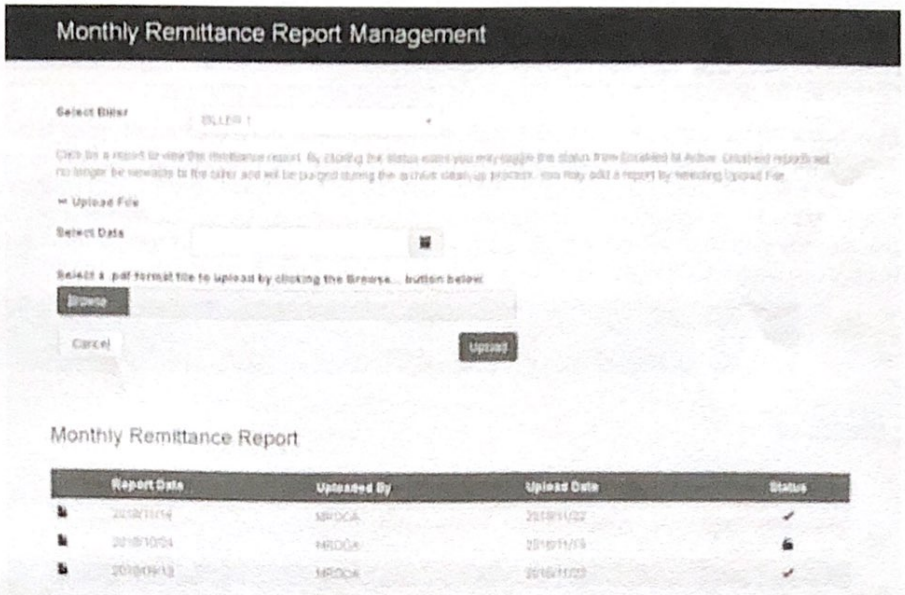


Figure 8. Monthly Remittance Report Management, upload selected

4.1.4 Summary of new programs

Using a new self-management portal, active billers will be able to manage Open Bill charges by:

- adding one-time charges to customer accounts
- enrolling recurring monthly programs (account and premises-based) to customer accounts
- modifying program end dates and amounts for existing customer programs (account and premises-based)
- completing existing programs on customer accounts (account and premises-based)

4.1.4.1 Open Bill Profile Registration

Billers will receive a welcome email containing their profile's User ID and a link to complete their profile registration when their profile has been created by Union Gas. The link will provide access to the authenticated Registration page which requires the user to select a password for their profile.

Validation using the standard UG password validation values will occur when the user submits their password. The existing password validation rules are:

- Password and Confirm Password values are identical; and
- Password must be between 8 and 15 characters; and
- Password must contain at least one of each of the following:
  - Uppercase letter

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- Lowercase letter
- Number

Error messages will be displayed when:

- Required fields have not been provided (i.e. Password and Confirm Password)
- Password does not the minimum requirements
- Password and Confirm Password are not identical

After successfully providing the password, the user will be presented with a pop-up modal that includes the terms of use for the Biller Portal with an 'Agree to Terms' button and a Cancel button at the end of the terms of use content. The user must scroll to the bottom of the terms of use and agree to the terms of use to set the profile password and complete the profile completion step by selecting 'Agree to Terms'. If the user does not agree to terms, a confirmation message will be provided to the user stating that their profile will not be created if they do not agree to the terms of use.

Successful submission of the Registration completion page will encrypt the password and assign it to the user's profile information and the user will be placed on the Login page.

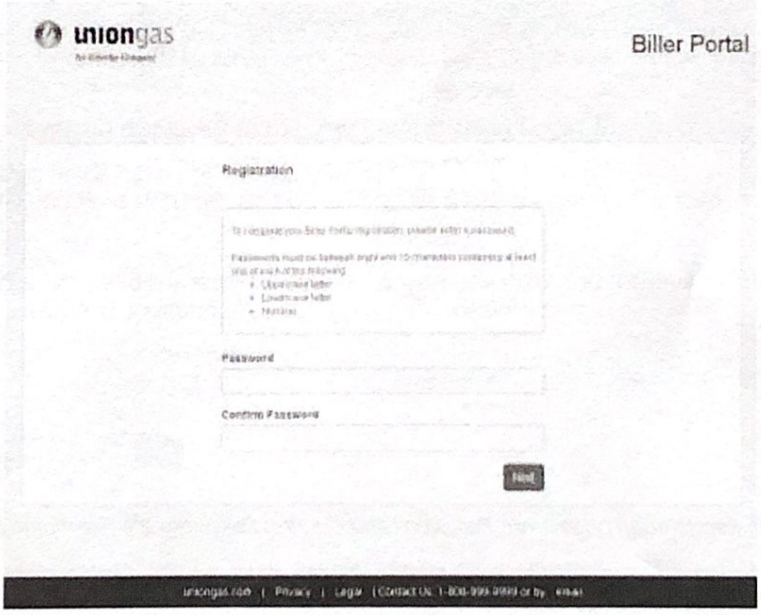


Figure 9. Open Bill Registration Completion Page

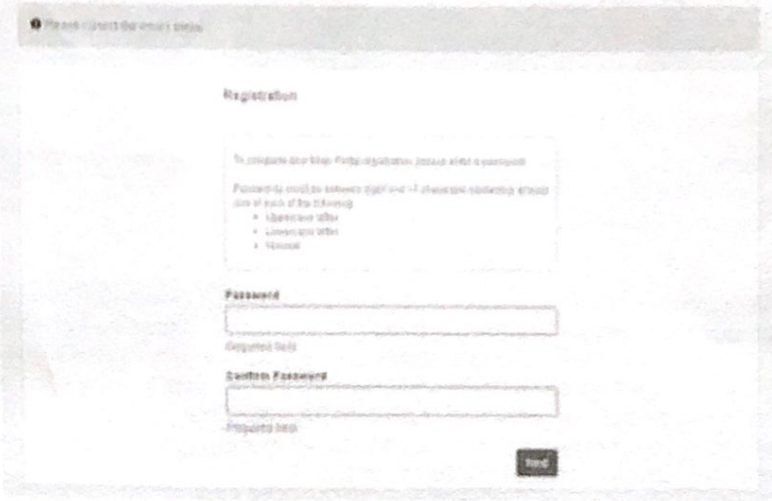


Figure 10. Registration page error, required fields not provided

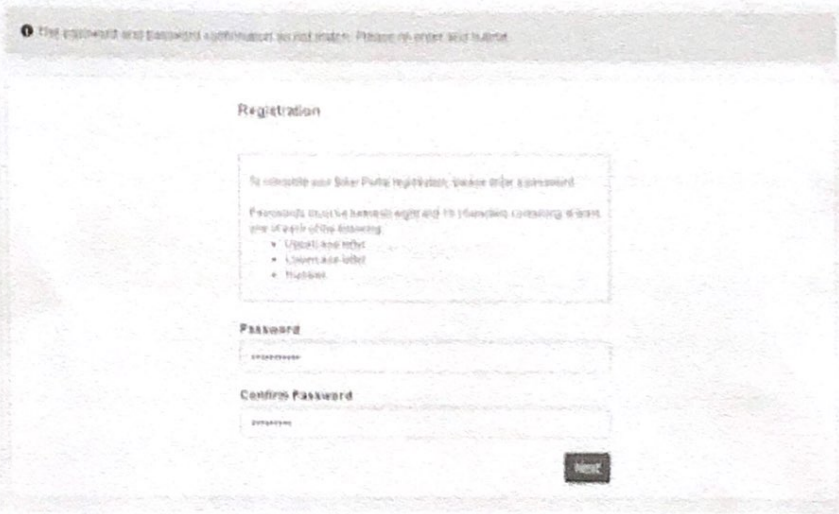


Figure 11. Registration page error, Password and Confirm Password are not identical

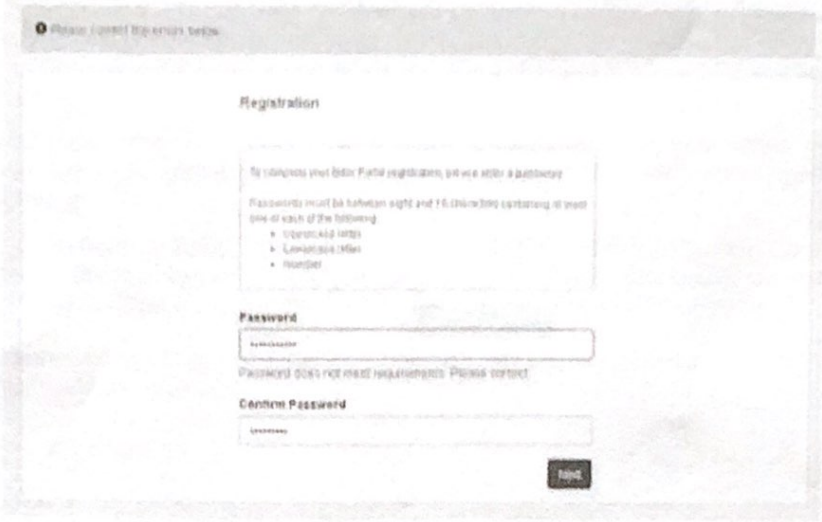


Figure 12. Registration page error, Password does not meet minimum requirements

4.1.4.2 Login / Forgot Username / Forgot Password

Entry to the biller portal will be through the login page. Users must submit a valid User ID and Password combination. Successfully logging in will put the user on the Submit Charges page.

Error messages will be displayed to the user upon clicking Login, if:

- Required fields have not been provided
- User ID and Password do not correspond to an active profile (i.e. invalid credentials)

The biller portal will have the functionality to reset passwords and retrieve forgotten user IDs accessible from the login page.

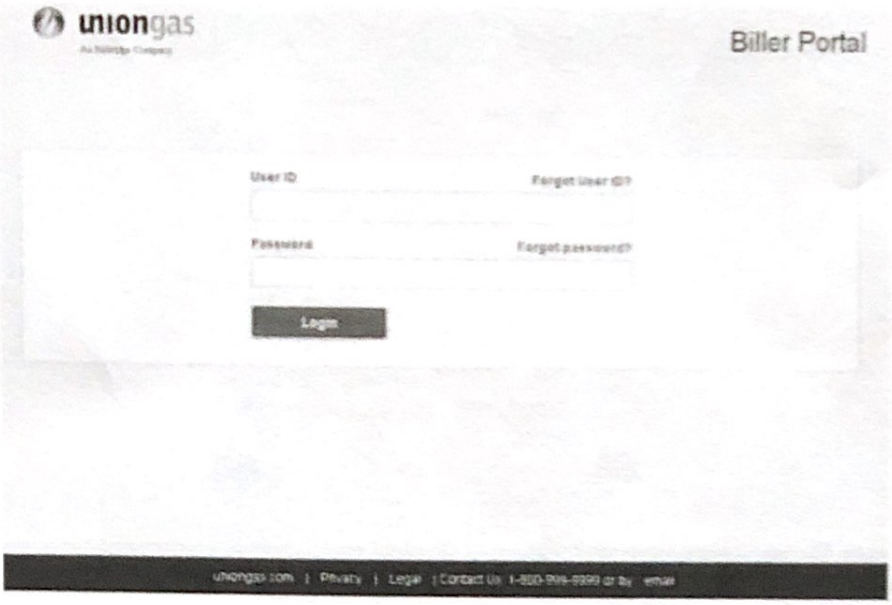


Figure 13. Open Bill Portal Login Page

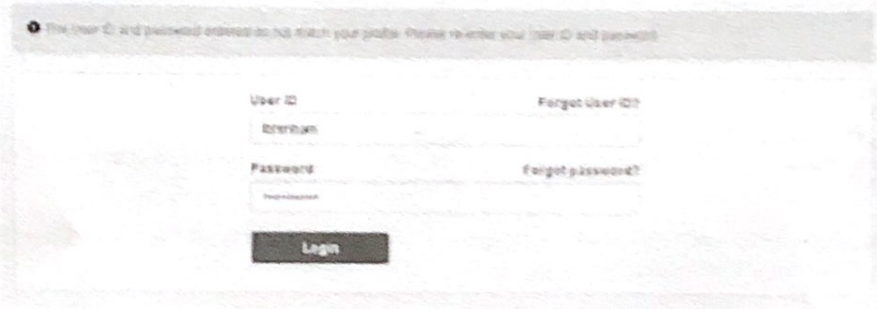


Figure 14. Login page error, invalid credentials

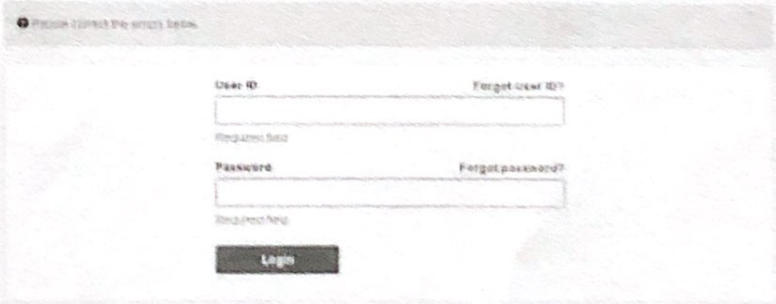


Figure 15. Login page error, required fields

When the biller selects "Forgot User ID" they will be prompted to provide the email address for their biller portal profile and complete a CAPTCHA. After completing the prompted information, the user will receive an email with a list of the user IDs associated with the email address.

Validation on the Forgot User ID page will use the standard email address regex used across Union Gas applications. Error messages will display to the user after the user has clicked Submit, if:

- Required fields are not provided (i.e. Email Address, Enter Verification Code)
- Email Address does not pass regex validation (check for standard email format)
- Verification Code does not match CAPTCHA (CAPTCHA will be updated)

Successful submission of the Forgot User ID request will display a message to the user that a communication has been sent.



Figure 16. Forgot User ID

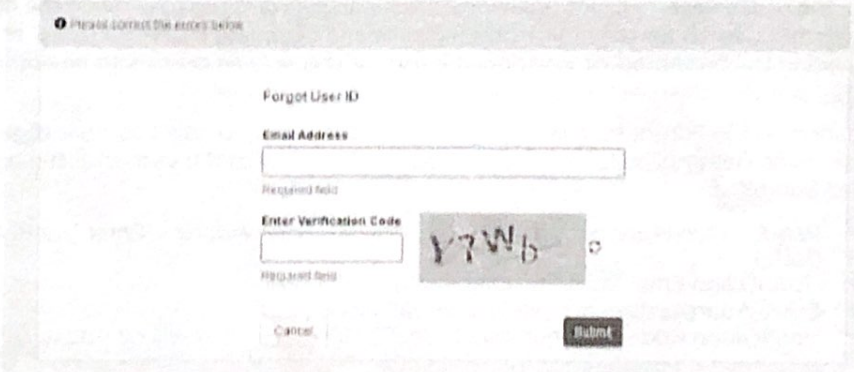


Figure 17. Forgot User ID error, required fields



Figure 18. Forgot User ID error, invalid email

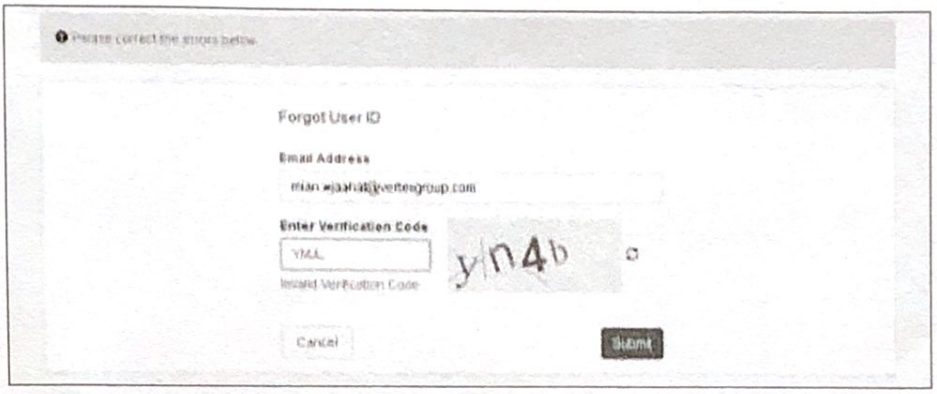


Figure 19. Forgot User ID error, incorrect validation code

When the user selects "Forgot password" they will be prompted to provide the email address and User ID for their biller portal profile and complete a CAPTCHA. After completing the prompted information, the user will receive an email with an authenticated link that will take the user to a page that will reset their password.

Validation on the Forgot Password page will use the standard email address regex used across Union Gas applications. Error messages will display to the user after the user has clicked Submit, if:

- Required fields are not provided (i.e. User ID, Email Address, Enter Verification Code)
- User ID and Email Address combination not found
- Email Address does not pass regex validation
- Verification Code does not match CAPTCHA (CAPTCHA will be updated)

Successful submission of the Forgot User ID request will display a message to the user that a communication has been sent.

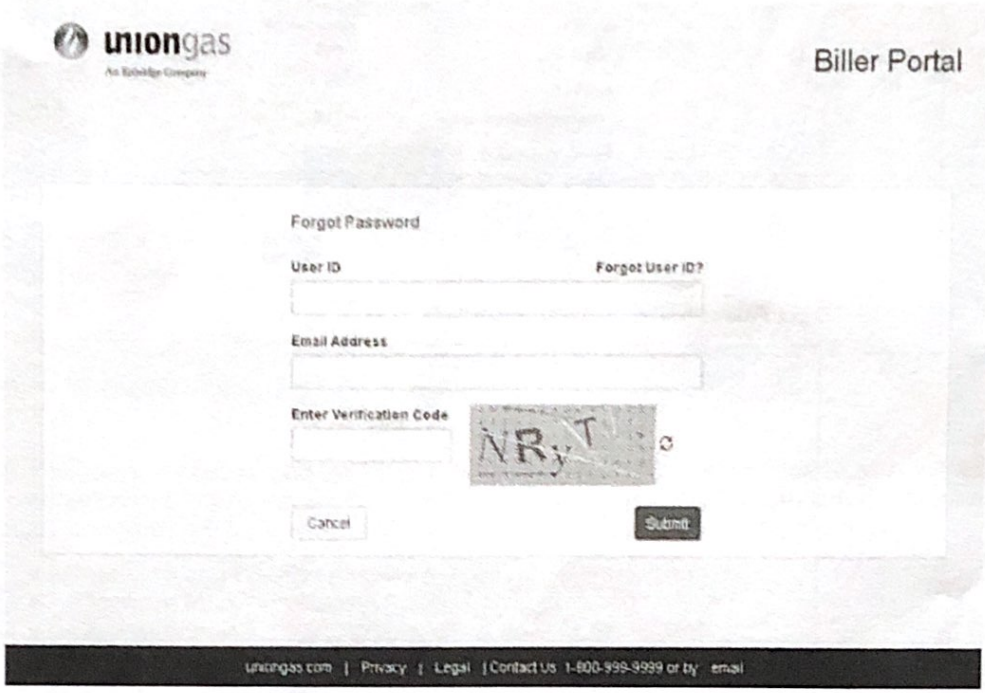


Figure 20. Forgot Password

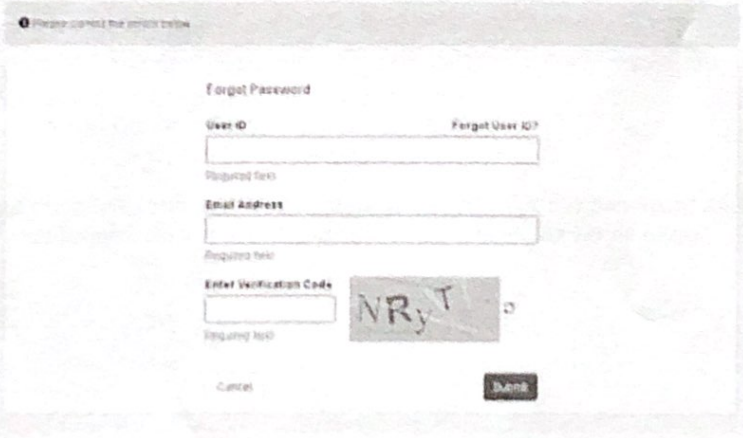


Figure 21. Forgot Password error, required fields



Figure 22. Forgot Password error, invalid credentials

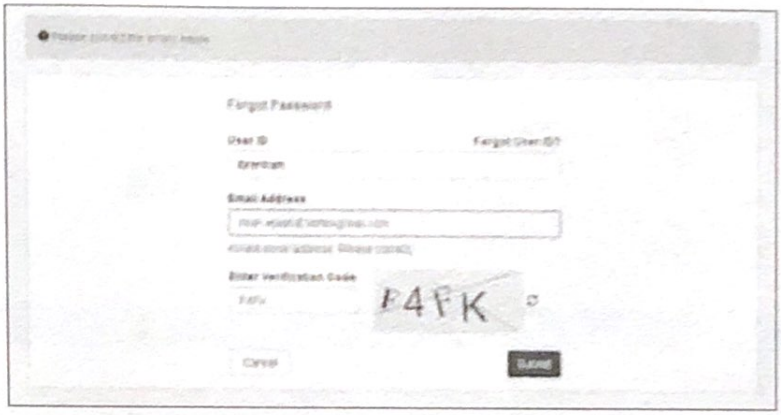


Figure 23. Forgot Password error, invalid email address

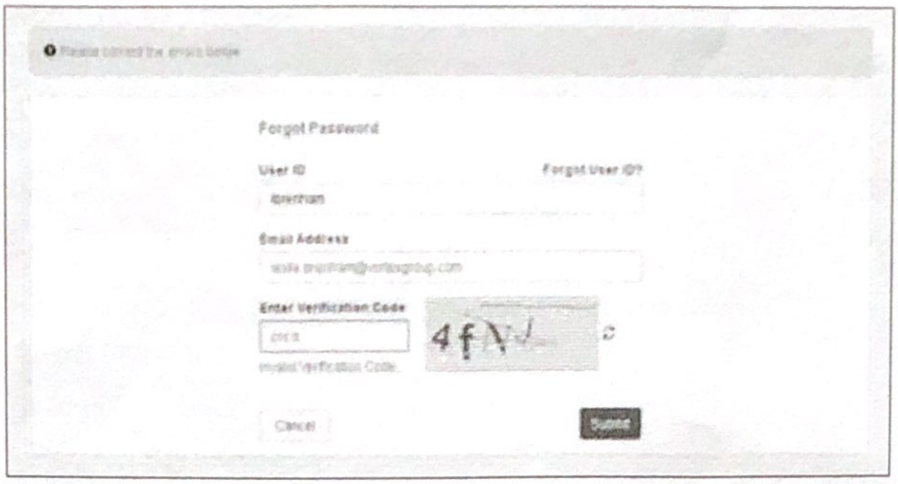


Figure 24. Forgot Password error, invalid verification code

After successfully submitting the Forgot Password page, the user will receive an email with an authenticated link to the Set Password page. Validation using the standard UG password validation values will occur when the user submits their password, as follows:

- Password and Confirm Password values are identical; and
- Password must be between 8 and 15 characters; and
- Password must contain at least one of each of the following:
  - Uppercase letter
  - Lowercase letter
  - Number

Error messages will be displayed when (see Registration completion page above):

- Required fields have not been provided (i.e. Password and Confirm Password)
- Password does not the minimum requirements
- Password and Confirm Password are not identical

Successful submission of the Set Password page will encrypt the password and assign it to the user's profile information and the user will be placed on the Login page.

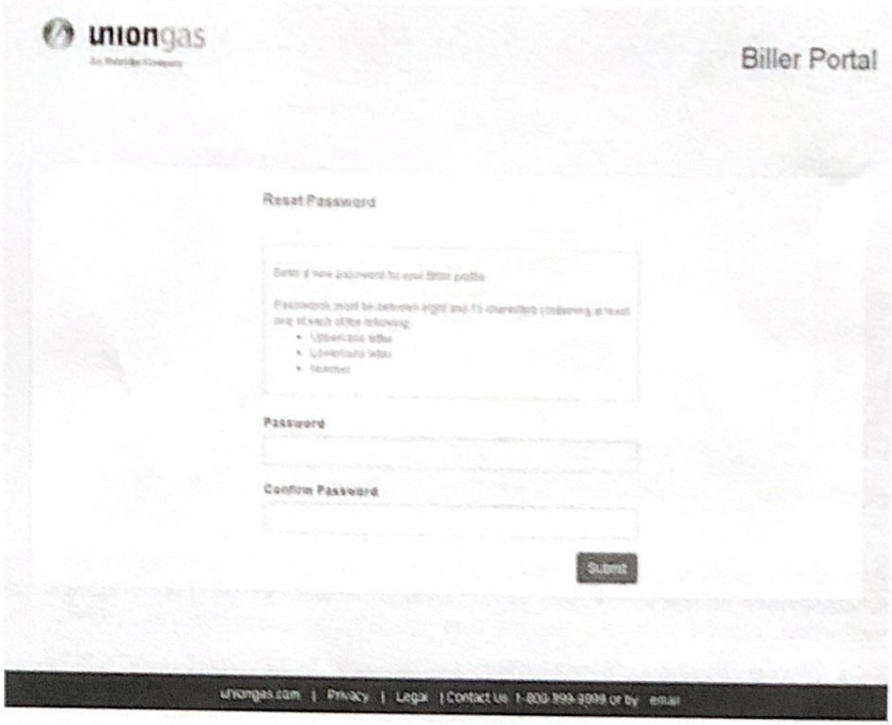


Figure 25. Set Password Page

4.1.4.3 Open Bill Portal Page Footer

Each page of the Open Bill application will have a footer that includes links provided by Union Gas. The footer will include a Contact Us selection that will use the client's native email client to create an email to Union Gas, or telephone settings (mobile) to trigger a telephone call to Union Gas.

Union Gas will provide the Contact Us values, links, and content during the development phase.



Figure 26. Footer

4.1.4.4 Authenticated Header

Authenticated pages (those displayed only for user's who have logged in) will display a header that contains:

- Union Gas logo
- Application: "Biller Portal"
- User welcome: "Welcome {Biller Name}"
- Navigation menu

The navigation menu will contain the following page navigation options:

- Submit Charges
- Submission History
- Reports (sub-menu)
  - Billed Charges
  - Monthly Remittance
- Biller Profile
- Biller Manual
- Logout (ends user session and places user on Login page)

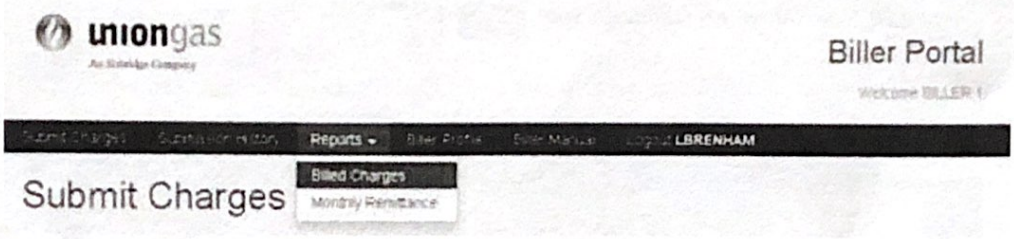


Figure 27. Authenticated page header

4.1.4.5 Submit Customer Charges

Billers submitting new customer recurring program enrollment must provide the customer account number, a valid active program, an amount to be charged, a start date and optionally may provide an end date. One-time charges being submitted must have customer account number, a valid active program, and the amount charged for submission. The charge or enrollment request will be submitted to Enlogix CIS for validation, and the appropriate success or failure result will be displayed to the user.

Users will submit the customer account number either as numbers only or using the format provided on Union Gas bills (i.e. ###-####-###-####). If the account status is New, Active, or Final, the confirmation screen will appear showing the account number, customer name, and street/city address as it appears on Union Gas bills. If the account status is not New, Active, or Final, a message will be displayed indicating the selected account number is not a valid account.

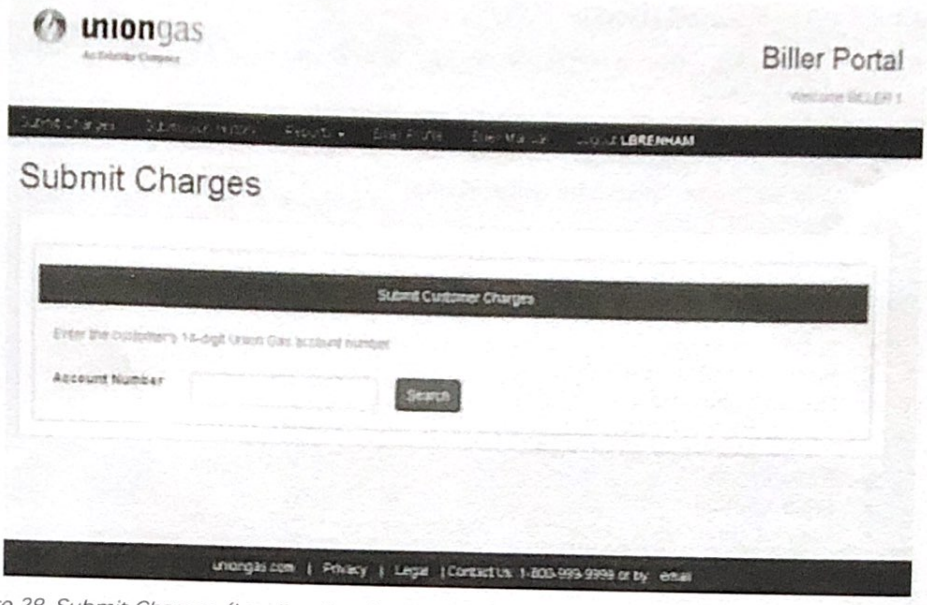


Figure 28. Submit Charges (Landing Page)

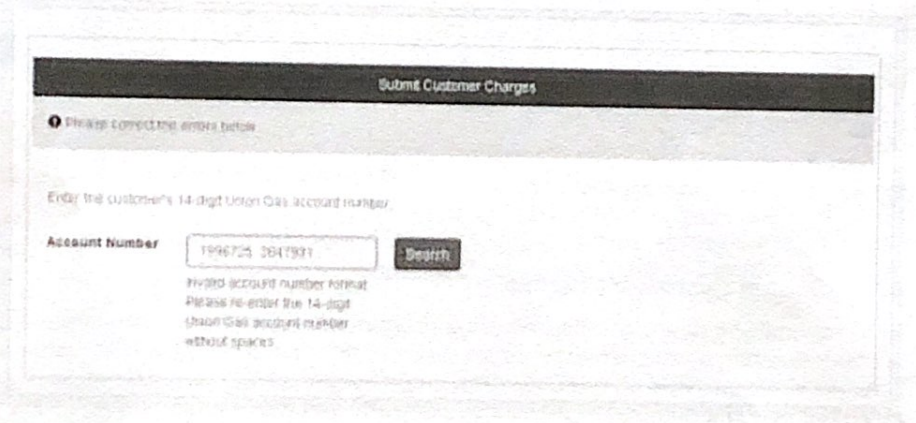


Figure 29. Submit Charges error, invalid account number format

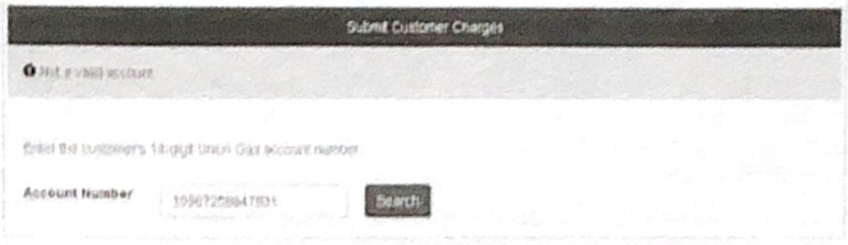


Figure 30. Submit Charges error, invalid account

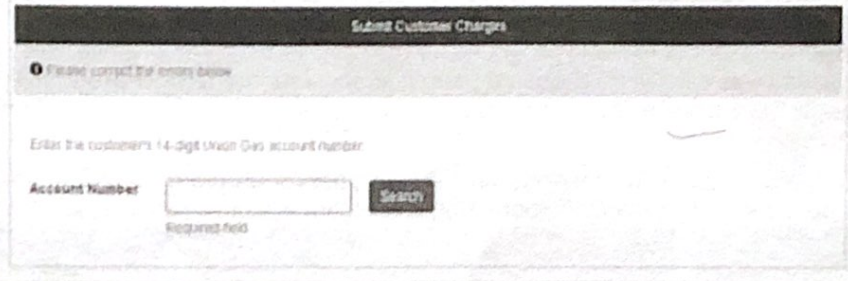


Figure 31. Submit Charges error, required field

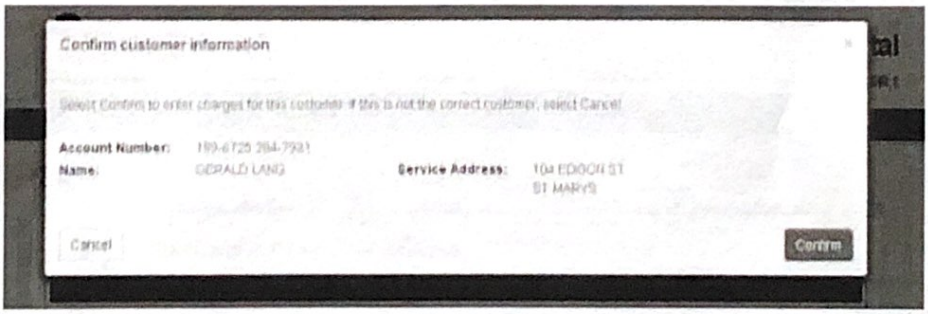


Figure 32. Submit Charges Validate Customer modal

After confirming the customer account, users will be required to input the Program and Amount. If a recurring program is selected, the user must provide a Start Date and may provide an optional End Date. The program input will provide options only for the biller's active programs. The amount will be validated against the selected program's minimum and maximum entry values before submitting to Enlogix CIS. Date inputs will:

- Only allow present or future dates
- Will not allow Sunday dates to be selected

- Have no default values.
- Require Start Date, End Date is optional.

When users submit one-time charges on a Sunday, the date submitted to Enlogix CIS will be for the Monday immediately following. The Monday date will be displayed as the charge's Start Date, End Date, and as the date included in the Status provided by Enlogix CIS throughout the portal. Notification of the submission date change will be provided on the confirmation screen.

When users are at the confirmation step for a submission, they will be provided with the option to continue entering programs for the same account number regardless of the result status of the current submission. Selecting the option to continue with the same account number will pre-populate the previously validated account and the user may select the program, amount, and date values as normal. If the current program selection is for a recurring program, the Program field will be pre-populated with the currently selected recurring account.

When users submit multiple programs for the same customer (e.g. a five-year program with different rates each year) these are treated as separate five distinct programs within Enlogix CIS and each program must be maintained separately by the biller if changes are required.

NOTE: Validations can only occur on current values for program status and amounts, and account status. For example, submitting an account with an Open status MDNP service order, locked service, or arrears will invalidate all requests, regardless of the future date provided. Conversely, a future dated submission that is successful will not become invalidated if an MDNP service order or lock is submitted on the account prior to its Start Date or the charge rate is outside the minimum/maximum range at the time it is applied to the account.

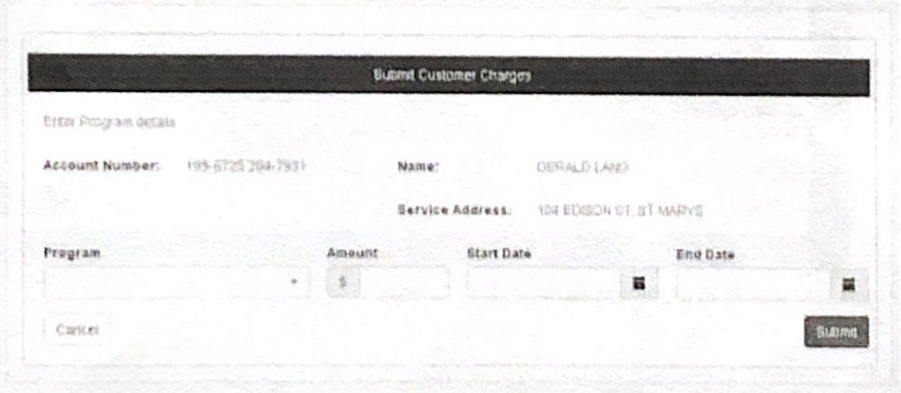


Figure 33. Submit Charges Enter Charge Details (default view)

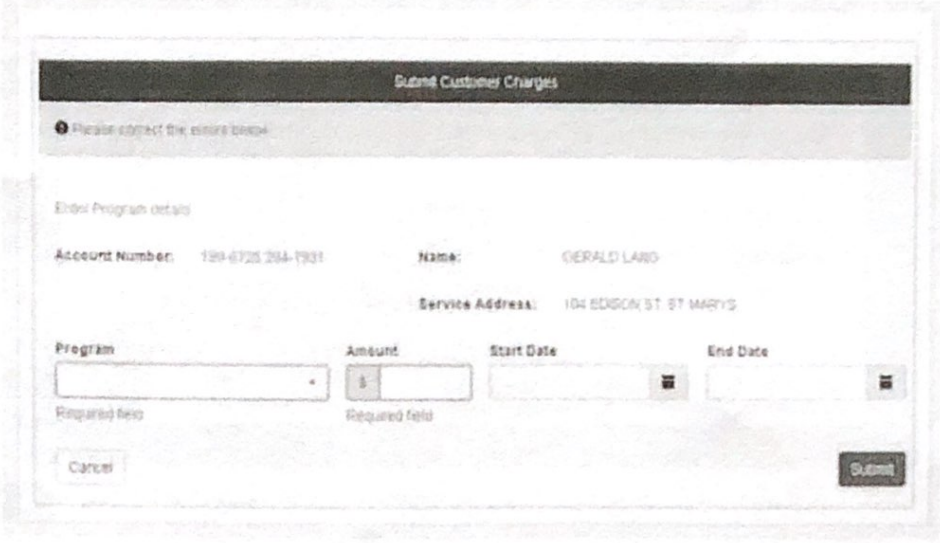


Figure 34. Submit Charges error, required fields

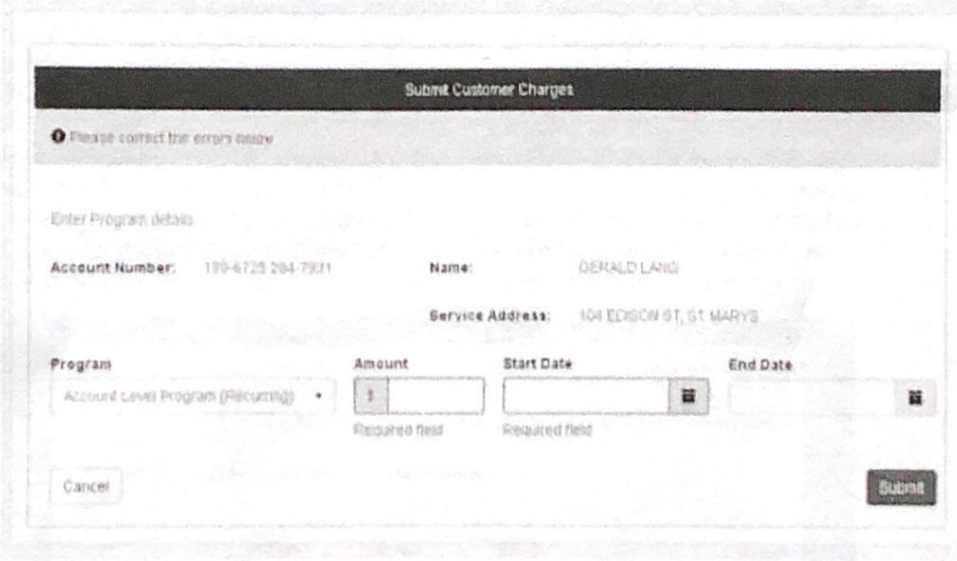


Figure 35. Submit Charges error recurring program required fields

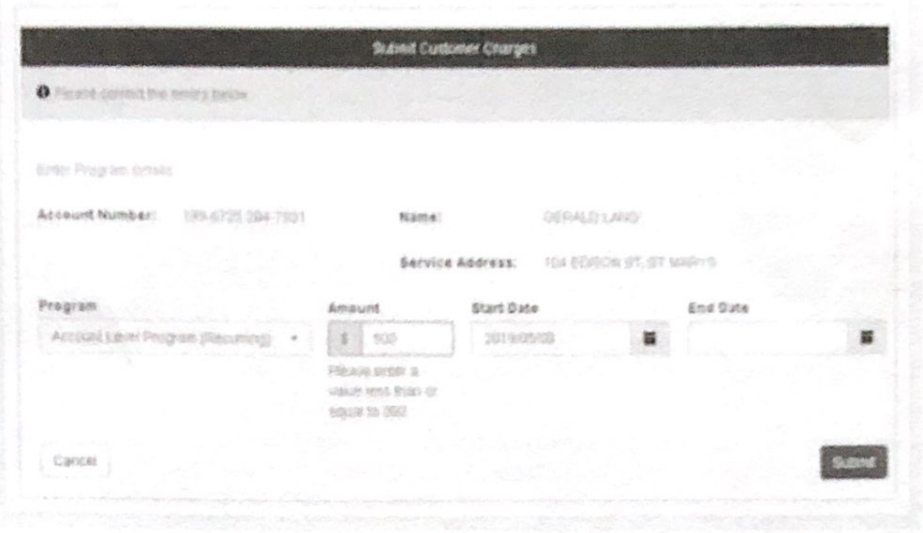


Figure 36. Submit Charges error, amount not in minimum/maximum program range

The user must provide confirmation of the charges to be submitted before the request is sent to Enlogix CIS.

Whenever a one-time charge is submitted, message content will be displayed to the user that one-time charges cannot be reversed except by Union Gas. When a one-time charge is submitted on a Sunday, notification of the Monday submission date will be provided on the confirmation page within the "IMPORTANT" message section displayed below.

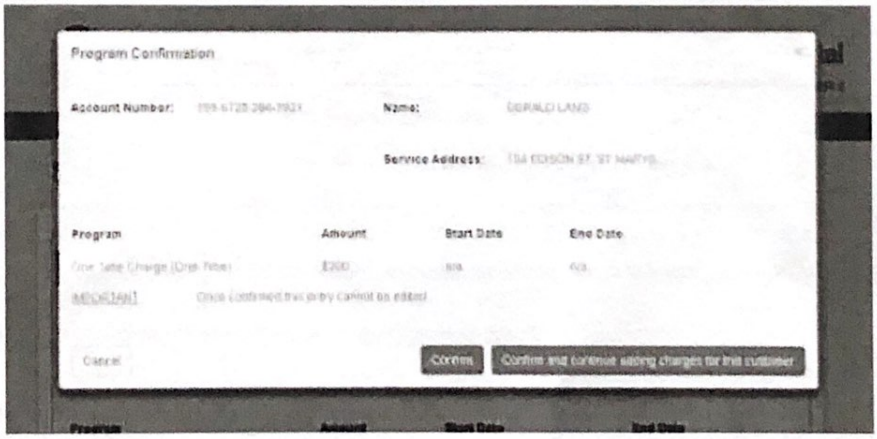


Figure 37. Confirm Submission modal (one-time charge)

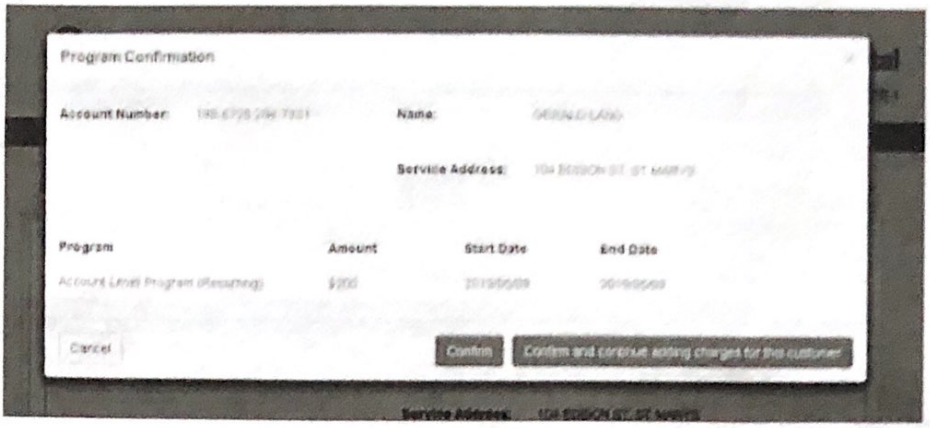


Figure 38. Confirm Submission modal (recurring charge)

Once the submission is confirmed by the user, the portal will close the confirmation modal, submit the program submission to Enlogix CIS, and will evaluate the result provided by Enlogix CIS. The final status of the submission(s) will be displayed in the Your Recent Submissions section of the Submit Charges page which will be visible on the page only after a charge submission has been submitted and will display only results of submissions from the current user session. Failed enrollments will display an error message that the account is not eligible for the submitted charge; Union Gas will provide the error messages to be displayed for the Enlogix CIS validation errors.

Enrollment results will be displayed in the Your Recent Submissions table for the duration of the user's session. The Your Recent Submissions table will have the same functionality as the Submission History page's "Submitted Charges" table (see below) for the displayed results.

Submit Charges

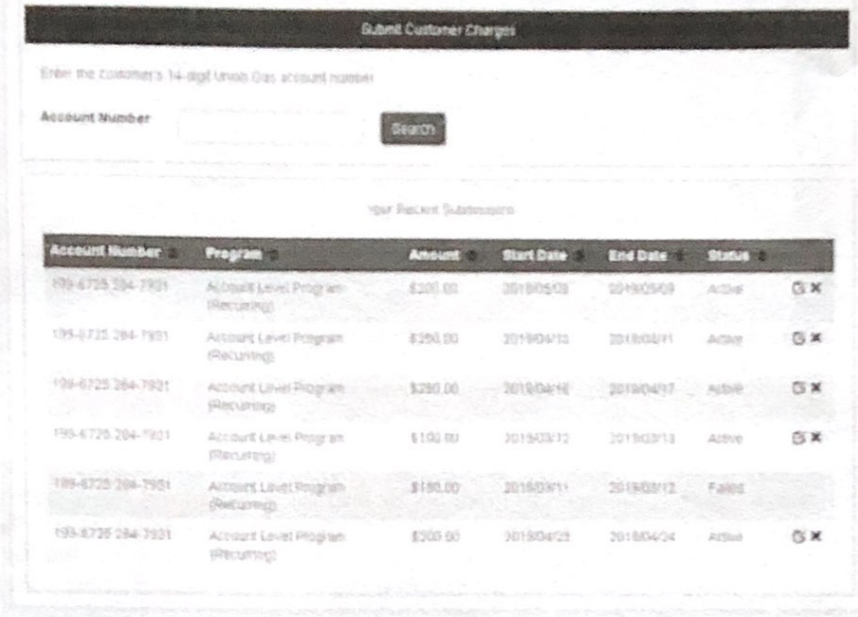


Figure 39. Successful submission shown in Your Recent Submissions table

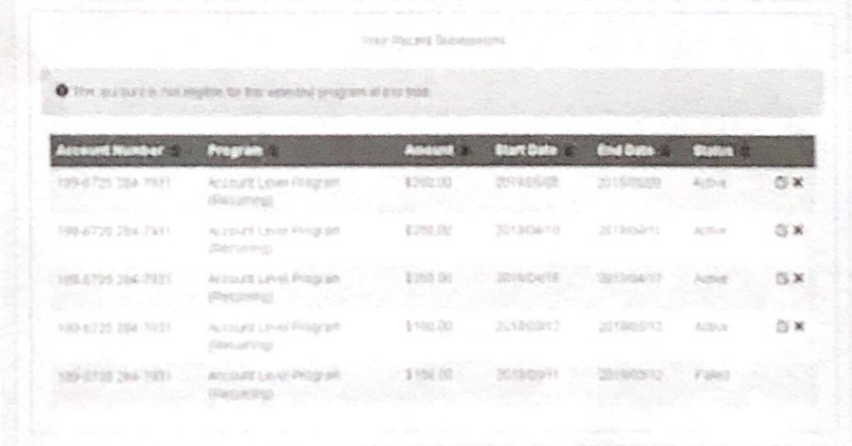


Figure 40. Failed submission shown in Your Recent Submissions table

Submit Customer Charges

Field Label	Type	Length	Description/Validations
Account Number	Text Input/ Label	14-19	Required field. Will accept number only or bill display format. Becomes label after confirmation.
Program	Dropdown	-	Required field. Display only if Customer Account is validated. Displays active programs for the biller by Description, and frequency. The initial value is empty.
Amount	Numeric	6	Required field. Display only if Customer Account is validated. Must be between Program allowed minimum and maximum values. Cannot be a negative value.
Start Date	Calendar	-	Required if Program selected is Recurring. Enabled only if Recurring program selected. Must be current date or later. No initial value displayed.
End Date	Calendar		Optional. Enabled only if Recurring program is selected. If selected must be later than Start Date. No initial value displayed.

Your Recent Submissions Table

Field Label	Description
Account Number	Customer Account Number
Program	Program associated to amount charged. Comprised of Program Description, program association, and program frequency (as assigned by Enlogix CIS from Program Association)
Amount	Amount submitted to be charged.
Start Date	Submitted start date of charge. Note: one-time charges are processed using Start Date of current date or following Monday in the case of Sunday submissions.
End Date.	Submitted end date of charge. Note: one-time charges are processed using End Date of current date.
Status	Current billable status. If submission to Enlogix CIS is unsuccessful will display as "Failed".
Edit/Cancel	Available to Active recurring programs.

4.1.4.6 Submission History – Search Programs and Modify Recurring Charges

Billers will be able to query submitted charges. Customer charge submissions will be displayed in a table with following sortable columns:

- Account Number
- Program
- Frequency, as defined by Enlogix CIS from the Program Association
- Start Date, which is the program start date or one-time charge date
- End Date, which is program end date (not available for one-time charges)
- Amount
- Status, program's billable status as defined by Biller/Biller Program/Customer Program hierarchy
- Active recurring programs will display an Edit and Cancel icon.

The initial display will show up to twenty (20) of the most recent submitted records for a configurable date range initially set as ninety (90) days from current date, and an information message stating the default load criteria. Users must submit Account Number, Program, or Status if they submit a search spanning more than ninety (90) days for Start Date or End Date or if Start Date and End Date are not provided as search parameters.

Since premises level programs are assigned to premises only and applied to accounts at the time of billing, the account number displayed for premises level accounts will be the most recently established Active account on the premises. If there is no Active account associated to the premises, the recurring program will not be displayed in the portal.

4.1.4.7 Modify Recurring Account Charges

Billers will be able to edit active recurring customer charges by selecting the edit icon ( ) for the program from Submission History and Recent Submissions sections of the portal. The biller may modify the amount charged or the end date of the program. The modification request will be submitted to Enlogix CIS for validation and the appropriate success or failure message will be displayed.

Billers will be able to end active recurring customer charges by selecting the Cancel icon (✖) for the program from Submission History and Recent Submissions sections of the portal. Programs that have been "cancelled" will be put in Completed status in Enlogix CIS. Note that when there are multiple programs of the same type for a single account (e.g. future-dated programs), completing a program will not complete other programs of the same type; users must cancel all programs individually. This restriction does not apply when Union Gas changes a biller level program status.

The edit and cancel icons will have tooltip content of "Edit" for the modify icon and "Cancel" for the completed icon.

Inactive billers, including billers whose programs are not active (cancelled, suspended), will not be able to add one-time charges to customer accounts, nor add/modify/complete existing recurring programs on customer accounts.



Figure 41. Submission History query page (default load view)

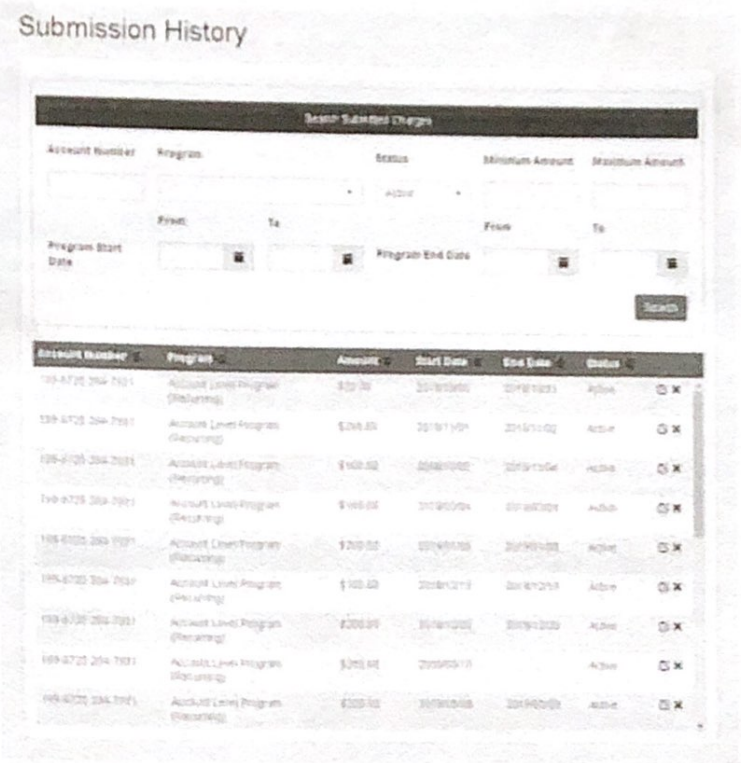


Figure 42. Submission History query page with customer search criteria



Figure 43. Submission History / Your Recent Submissions, modify program modal



Figure 44. Submission History / Your Recent Submissions, complete program modal

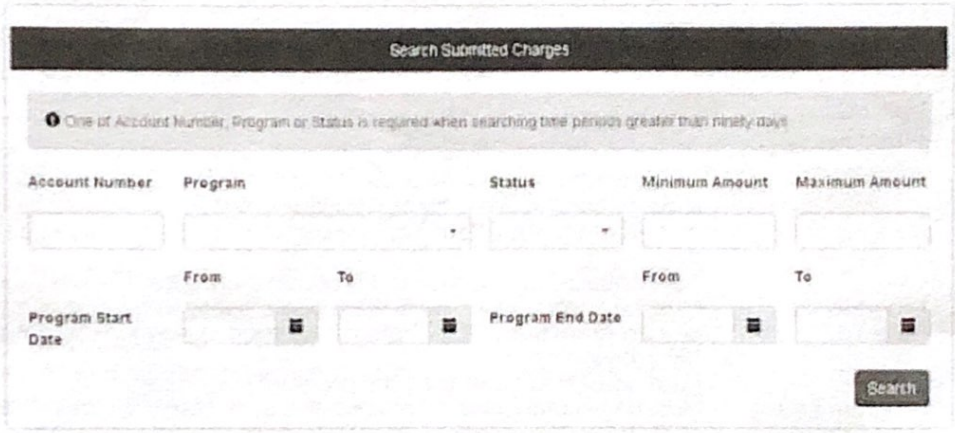


Figure 45. Search Submitted Charges minimum search criteria no met error

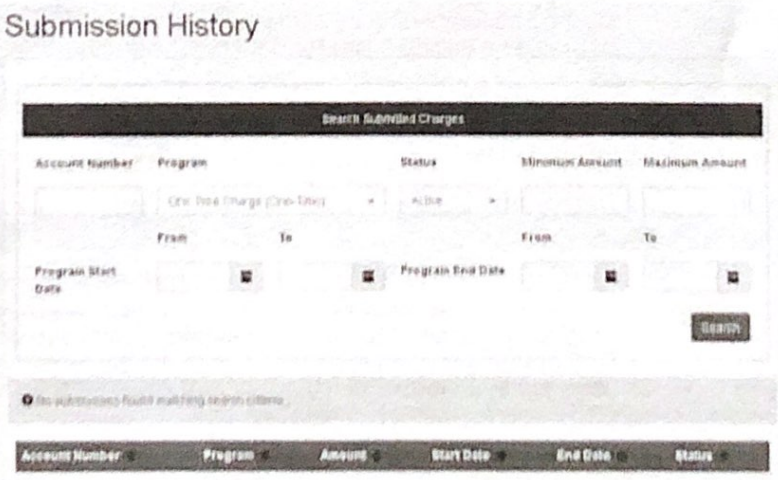


Figure 46. Search Submitted Charges no search results found

Submitted Charges Search Fields

Field Label	Description
Account Number	Customer Account Number
Program	Program associated to amount charged. Comprised of Program Description, program association, and program frequency (as assigned by Enlogix CIS from Program Association)
Status	Current billable status of program
Minimum Amount	Minimum amount of charge
Maximum Amount	Maximum amount of charge
Program Start Date From	Date equal to or later than the program start date Must be accompanied by at least one other search value of any value or a Program Start Date To for a period of no more than ninety (90) days
Program Start Date To	Date equal to or less than the program start date Must be accompanied by at least one other search value of any value or a Program Start Date From for a period of no more than ninety (90) days
Program End Date From	Date equal to or later than the program start date Must be accompanied by at least one of Account Number, Program, or Status when searching for date ranges greater than ninety (90) days.
Program End Date To	Date equal to or later than the program start date Must be accompanied by at least one of Account Number, Program, or Status when searching for date ranges greater than ninety (90) days.

Submitted Charges Result Table

Field Label	Description
Account Number	Customer Account Number
Program	Program associated to amount charged. Comprised of Program Description, program association, and program frequency (as assigned by Enlogix CIS from Program Association)
Amount	Amount submitted to be charged.

Field Label	Description
Start Date	Submitted start date of charge. Note: one-time charges are processed using Start Date of current date.
End Date.	Submitted end date of charge. Note: one-time charges are processed using End Date of current date.
Status	Current billable status and status changed date.
Edit/Cancel	Available to Active recurring programs.

4.1.4.8 Reports - Billed Charges

Billers will be able to download a detail of the charges that Union Gas has billed on their behalf for the period selected. The query results for the period of 30, 60, or 90 days from the current date, or a calendar month within the last two years will be retrieved from Enlogix CIS and provided as a CSV file to the biller. The CSV will contain the following columns:

- Date Charged
- Customer Account Number
- Program Code
- Program Description
- Amount Billed

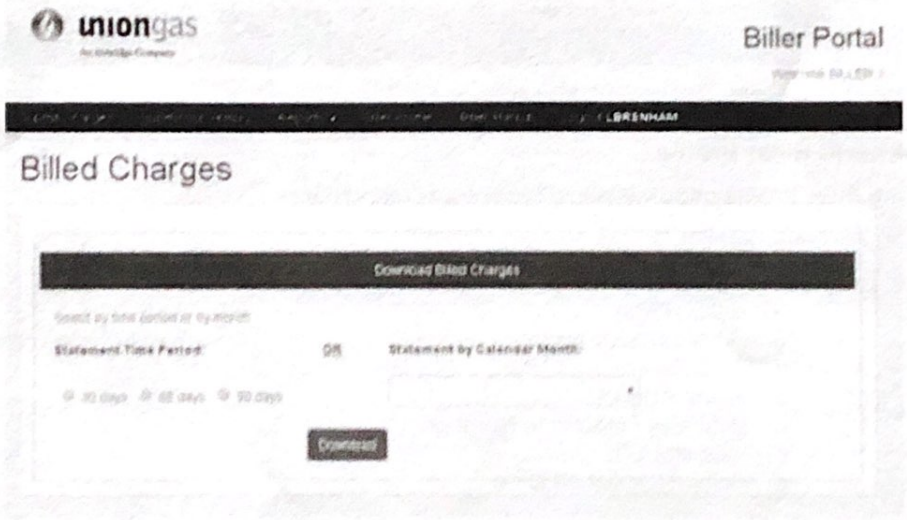


Figure 47. Monthly Charge Activity Query

4.1.4.9Reports - Monthly Remittance

Billers will be able to view Monthly Remittance reports from the Monthly Remittance page. The page will provide links to reports stored in a new archive that will open the archived PDF in the user's browser when it is selected.

The reports available to be viewed by billers will be any report dated within the last two years from the current date. The links to view the reports will display the date of the report and be listed in descending order from most recent to oldest.

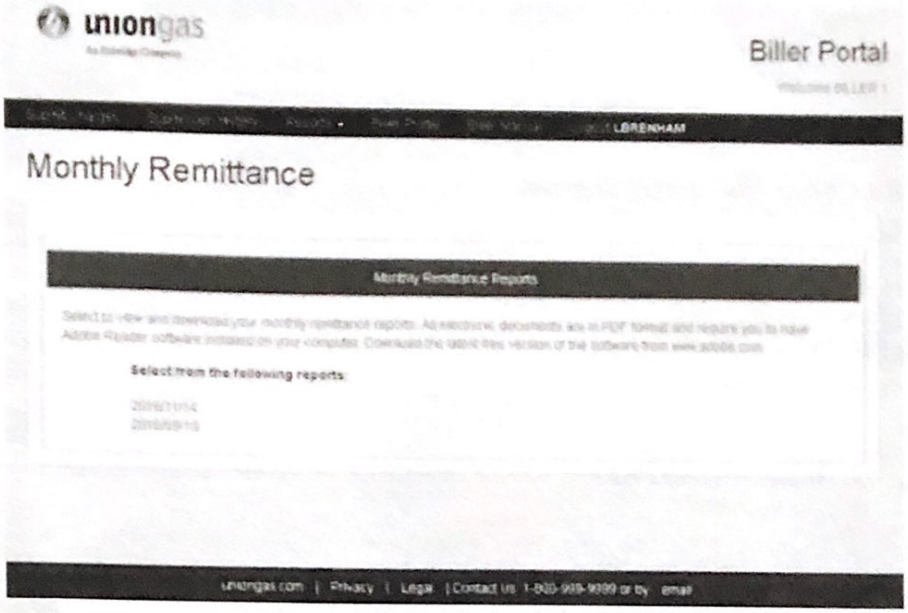


Image 48. Monthly Remittance Reports

4.1.4.10 Biller Profile

The Biller Profile page will allow registered billers to view:

- Biller details:
  - Biller Status (Active or Inactive)
  - Biller Name
  - Biller Contact Name
  - Address
  - Email Address
  - Business Telephone Number
  - Website URL
  - Biller Established Date

- Biller's authorized (Active, Suspended, Cancelled) program details sortable table:

- Program Description
- Program Association (Account or Premises)
- Minimum Amount
- Maximum Amount
- Status
- Status Change Date

The table will be initially sorted by Status in order of Active, Suspended, Cancelled.

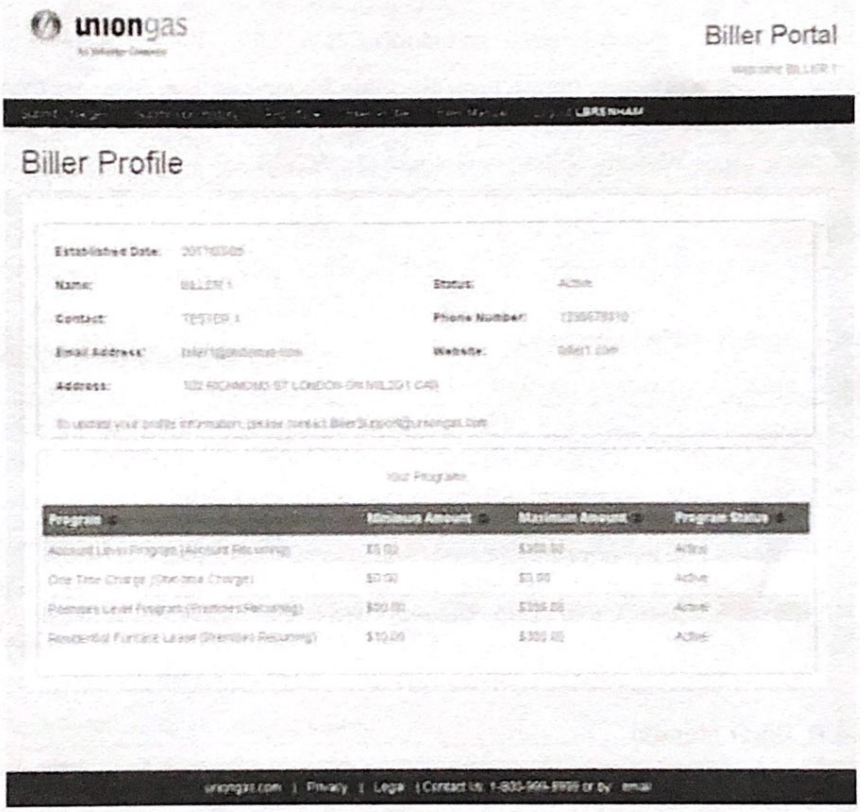


Figure 49. Biller Profile Page

Biller Information Fields

Field Label	Description/Validations, all fields display only
Name	Biller Name from Enlogix CIS WCMBLLR
Established Since	Established Date from Enlogix CIS WCMBLLR
Status	Status from Enlogix CIS WCMBLLR
Contact	Biller Contact Name from Enlogix CIS WCMBLLR
Email Address	Email Address from Enlogix CIS WCMBLLR
Phone Number	Business Phone Area, Business Phone Number, Business Phone Extension from Enlogix CIS WCMBLLR
Website	Website URL from Enlogix CIS WCMBLLR
Address	Unit, Unit Type, Street Number, Pre Direction, Street Name, Suffix, Post Direction, Address 2, Address 3, City, County, Zip/Postal Code from Enlogix CIS WCMBLLR

Biller Program Table Information

Field Label	Description/Validations
Description	Program Description from Enlogix CIS WCMBLLR and Program association from WTROBPR and Program Frequency
Minimum Amount	Minimum Amount from Enlogix CIS WTROBPR
Maximum Amount	Minimum Amount from Enlogix CIS WTROBPR
Program Status	Status, and Status Change Date from Enlogix CIS WCMBLLR

4.1.4.11 Biller Manual

The Biller Manual page will display Union Gas's Biller Manual on the page. Union Gas will provide the Biller Manual in HTML to be used in the Biller Manual page.

4.1.4.12 Maintenance Splash Page

A splash page will be displayed when the Open Bill Portal is offline for maintenance. Union Gas will provide the content for the splash page.

4.1.4.13 Test Instance

A test instance of the biller portal will be created for Union Gas.

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4.1.4.14 New Archive for Biller Monthly Remittance Reports

A new archive will be created that will store Monthly Remittance Reports uploaded through the CustomerAdvantage Management Portal.

The archive will have a scheduled process that will clean up reports where the report date is greater than two years from the current date and any reports indicated as Disabled/Deleted through the CustomerAdvantage Management Portal. Union Gas will provide the scheduled process interval (daily/weekly/monthly).

4.2 Enlogix CIS Modifications

The below sections correct/modify the original solution stated in the CM 29375 – Open Bill HLD v1.7.

4.2.1 Posting one-time charges to the new accounts

The scope has been changed to allow the biller to post Open Bill one-time charges to the **'New' accounts in addition to 'Active'** and **'Final'** accounts. The biller will be able only to post one charge item per Open Bill (one-time) program in a billing period.

To accommodate the change, the below sub-sections (original sections numbers are kept) will list corrections/modifications to the solution stated in the original CM 29375 – Open Bill HLD v1.7:

8.1.12 Modify New Charges Entry form

The New Charges Entry (UBACHRG) form will be modified to allow posting Open Bill charges also to the **Open Bill programs associated with the 'New'** accounts (**status = 'New'**), even if the account is not yet linked with the Open Bill program.

- The Rep will be responsible for calculating and posting the charge amount.
- Multiple (debit and credit) charges can be created in a single billing period.

The following validations will be applied when adjusting open bill charges via UBACHRG.

8.1.12.1 Validate reoccurring charges submission

The following checks will be performed for reoccurring charges:

- The submitted biller code is valid.
- The submitted program code is valid.
- The submitted program is associated with the biller.
- The submitted rate code is associated with the biller program.
- The account number is valid.
- The submitted account status is **not 'New'** (which is only allowed for one-time open bill program charges).
- The account or premises are associated with the program for the same biller.

- The submitted Charge Date does not fall on Sundays. If the charge date falls on Sunday, the user will be advised to select another date.
- The charges will be posted against the reoccurring open bill program based on the given Charge Date using the following hierarchy:
    - Account/Premises Level Program (in any status) for the given Charge Date (i.e. Charge Date falls between Program Start and End Date).
    - Most recent Account/Premises Level Program (in any status) where the Program Start Date is less than or equal to the Charge Date.
    - Account/Premises Level Program that is Active in the near future based on the Charge Date (i.e. next open bill program where Start Date > Charge Date, and Status = 'A')

If the validation succeeds, an open bill charge will be posted to the Ledger Card.

8.1.12.2 Validate one-time charges submission

The following checks will be performed for one-time charges:

- The submitted biller code is valid.
- The submitted program code is valid.
- The submitted program is associated with the biller.
- The submitted rate code is associated with the biller program.
- The account number is valid.
- The account does not belong to Unknown Customer (if the Customer Code value equals 10, 20, 30, 40, 50, 60 or 70)
- The submitted Charge Date does not fall on Sundays. If the charge date falls on Sunday, the user will be advised to select another date.
- If the account status is 'New', the open bill charge must be for a one-time program.

If the validation succeeds, an open bill charge will be posted to the Ledger Card and the account will be associated with the one-time program in "Completed" status for the given Charge Date.

Notes:

- The processing of regular (non-open bill) charges will remain unaffected by the open bill changes.
- The restriction of no charges being processed for Suspended or Cancelled programs, stated in section 8.1.5.5.4 - Program Status Transitions of the Open Bill HLD v1.7, will not apply to charges submitted via UBACHRG.
- Automatic tax calculations and sub-rate processing will not apply for the Open Bill charges. The charge will be created for the given amount using the Rate Code associated with the Open Bill program only.
- Other interfaces/processes, such as Open Item Charge Interface (UYPCHRG), Bulk Load (UYPETRN), Auto Service Order Close (UYPASOC), etc., will not be modified to handle creation of Open Bill charges.

8.1.22.4.4 Validate one-time charges submission

The following validation checks will be performed for one-time charges:

- The submitted account status is 'New', 'Active' or 'Final'

Note: All other validations as stated in the Open Bill HLD v1.7 will remain the same.

8.1.24 New Open Bill Charges Load process

The Open Bill Charges Load Process (UYPOBCL) will be modified to allow one-time charges for the 'New' accounts. The validation will be modified to include new accounts (Status = 'New') as described in Section 8.1.22.4.4 above.

4.2.2 New Open Bill Program Rules page

The screens mockups were corrected to reflect the latest state of the Open Bill Program Rules (WTROBPR) page.

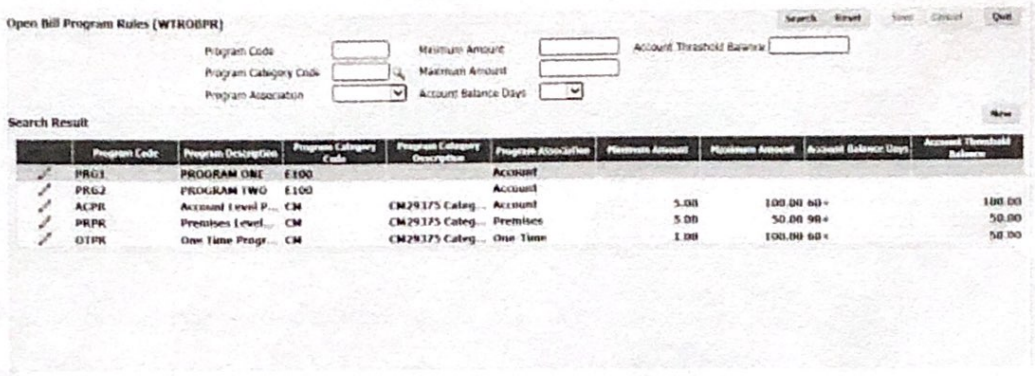


Figure 50. Open Bill Program Rules page

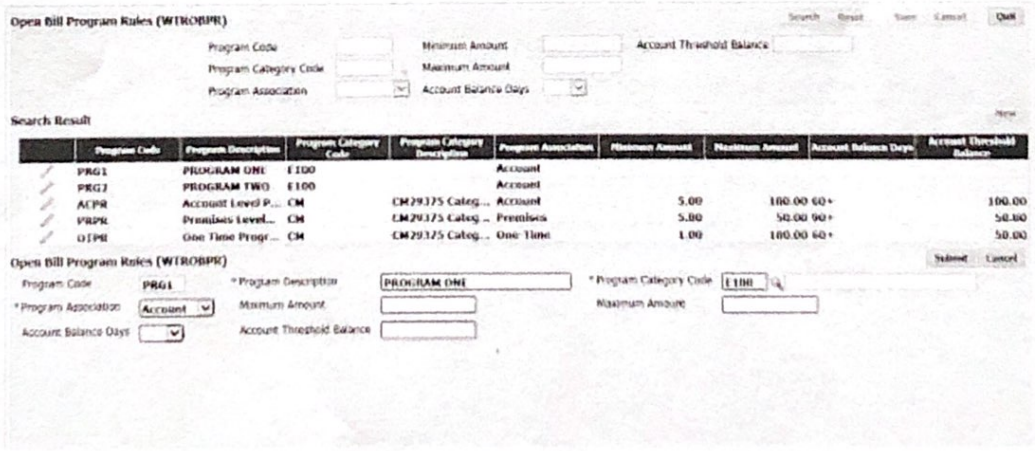


Figure 51. Open Bill Program Rules page – Edit Mode

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4.2.3 New Biller Maintenance page

The labels for communication preference have been corrected to read 'Paper' instead of 'Letter' and screens mockups were corrected to reflect the revised labels.

In addition, the validations of the address related fields have been corrected to follow the Enlogix CIS standards and match the Contact Profile (WCMCPFL) page fields validations.

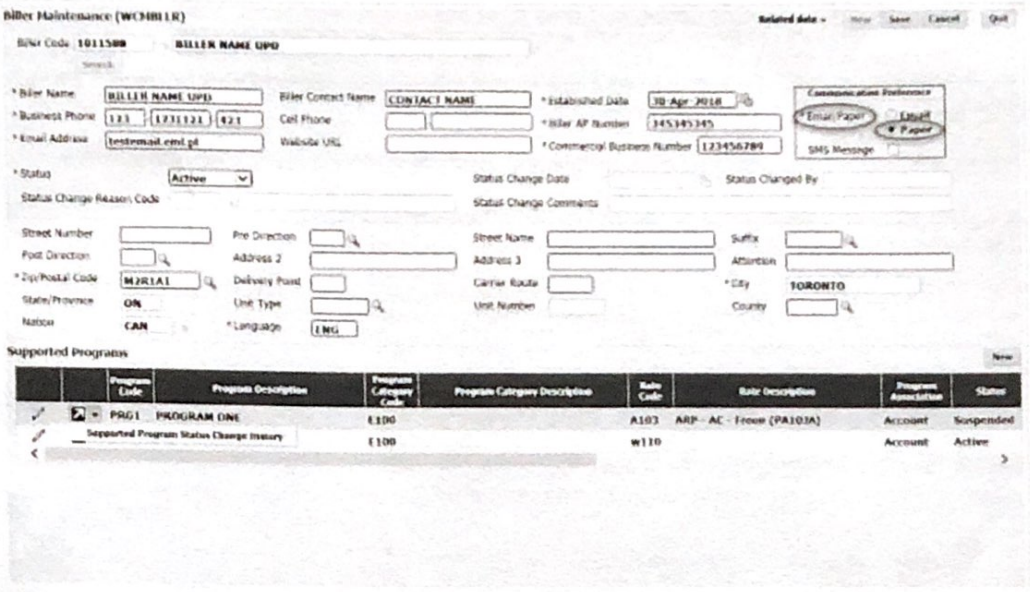


Figure 52. Biller Maintenance page

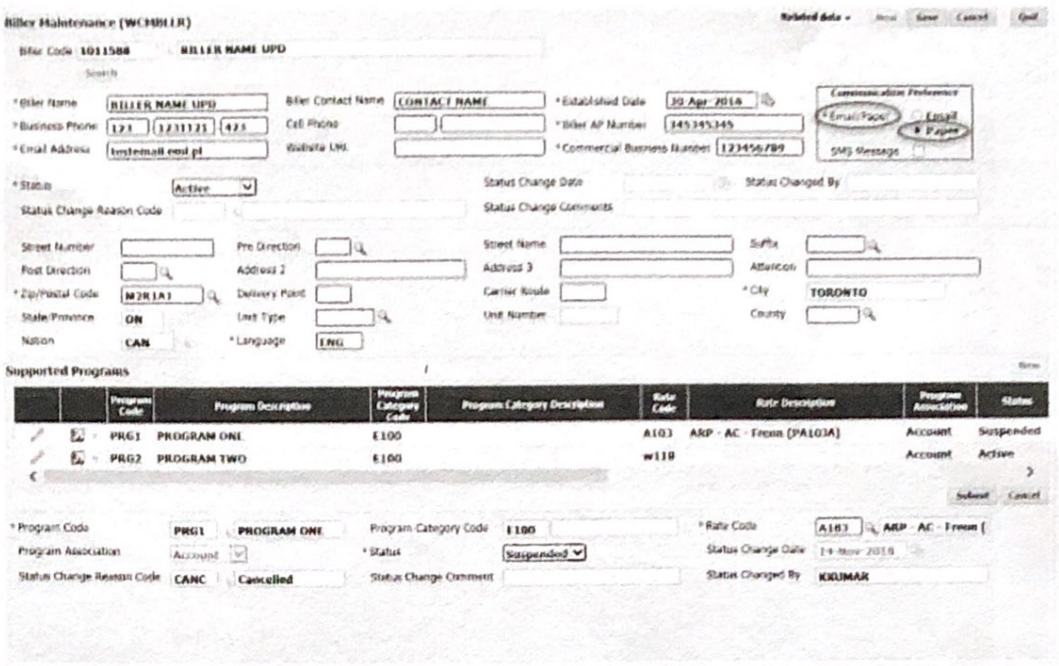


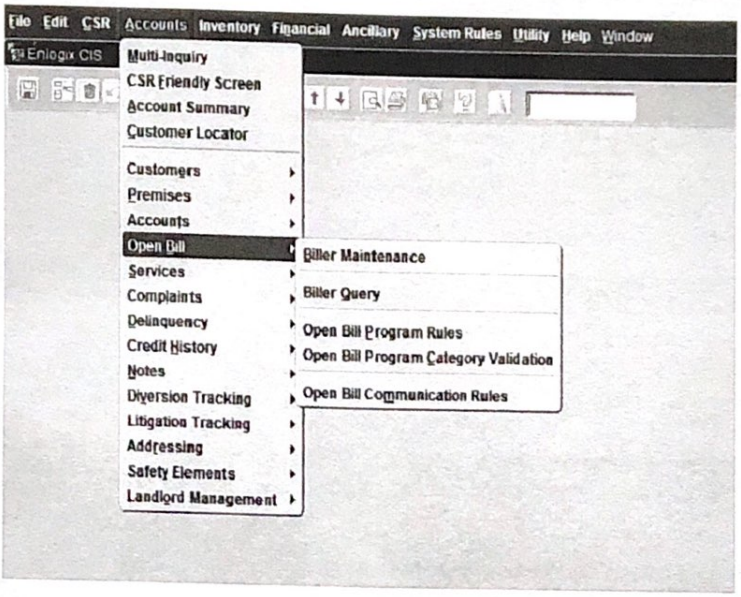
Figure 53. Biller Maintenance page - Supported Programs Edit Mode

The following fields were corrected:

Field Label	Type	Length	Description/Validations
'Biller Information' segment			
Email/Paper	Radio Button	N/A	This field is mandatory. Valid Values: • 'Email' (default option, editable) • 'Paper'
Zip/Postal Code	Character	10	This field is mandatory. It will have an LOV displaying Zip Code Validation (WTVZIPC) page to select a valid value.

4.2.4 Modified Legacy Main Menu

The screens mockup was corrected to reflect the proper shortcuts to enable navigation to the new pages.



4.2.5 Input fields validations

The validation of the input fields, mentioned in CM 29375 - Open Bill HLD v1.7 for the Open Bill new pages, will conform to the coding standards for editable fields as follows:

- 'Alphanumeric' type fields (defined as 'Alphanumeric' fields in HLD v1.7) will be limited to alphabets, digits, spaces, dashes (-) and dots (.) only.
    - Code fields i.e. 'Program Code', 'Program Category will be restricted to the upper-case alphabets and digits only.
    - Other alphanumeric fields i.e. 'Biller AP Number' will allow alphabets, digits, spaces, dashes (-) and dots (.).
- 'Character' type fields (defined as 'Character' fields in HLD v1.7) will allow alphabets, digits, spaces and all the special characters except for the following: single quotes ("), apostrophe ('), backslash (\), ampersand (&), pipe (|).
    - Name/Description fields i.e. 'Biller Name', 'Program Description' will have additional restriction of no special characters at all.
    - Other character fields i.e. 'Status Change Comment' will allow alphabets, digits, spaces and special characters including "?", "^", "%", "$", "@", "!", "~" etc. as per the definition of 'Character' type fields.

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Note: These are general guidelines about character type attributes. The specific field checks such e-mail address formatting will also apply to ensure proper validations and data integrity.

The pages that contain editable fields for the Open Bill project are:

- Open Bill Program Category Validation (WTVOBPC) page
- Open Bill Program Rules (WTROBPR) page
- Biller Maintenance (WCMBLLR) page

4.3 Communications Application Modification

The communication variables described in section 8.4.1.4.3 of HLD v. 1.7 will be modified to be template variables within the communication application instead of global variables. The following variables will be available to all templates identified as Open Bill communications:

- Biller Information retrieved by Biller Code when it is available:
  - Biller Contact Name
  - Established Date
  - Business Phone Area
  - Business Phone Number
  - Business Phone Extension
  - Cell Phone Area
  - Cell Phone Number
  - Biller AP Number
  - Email Address
  - Website URL
  - Business Number
  - Mailing address
  - Communication Preference
  - Last Status Change Date
- Program Information retrieved by Program Code when it is available:
  - Program Category Code
  - Program Category Description
  - Rate Code
  - Rate Description
  - Program Start Date
  - Program End Date

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- Program Frequency
- Program Association
- Last Status Change Date

Note: Although all the variables will be provided for the Open Bill communication templates, some of the information may not be applicable for a specific event (for example, when Biller Status is changed to Inactive, only Biller attributes will have the respective values, Program Information will return empty values). The client is advised to review and test the variables used when adding/editing Open Bill communication templates.

The Communication Application Communication Queue page will be modified to allow users to search for correspondence by Biller Code using a text input field. Biller values used in the communication will appear in the existing expanded details for the communication queue entry. Searchable communications will be those listed in HLD v. 1.7 s. 8.4.1.4.2.

4.4 Assumptions

The following assumptions are added to the Assumptions in HLD v. 1.7:

- Biller communications will not be archived in Document Manager. All communications to billers will use a Biller template, which will be created by Union Gas with the "Archive in Document Manager" setting set to False (i.e. un-checked). Communications noted in CM 29375 HLD v. 1.7, and future communications templates, that get sent to customers and billers, will have separate templates for customers and billers. Event-triggered communications described in CM 29375 HLD v 1.7 that trigger communications to the customer and biller will have the same variables provided from Enlogix CIS for both templates.
- Program end date values in the Open Bill portal are optional, but are required in Enlogix CIS. The value used to indicate End Date in Enlogix CIS for indefinite programs (i.e. those submitted by users without an end date) will be suppressed in the Open Bill portal when displaying program details.
- The estimated usage of the Open Bill portal will be up to 250,000 program enrolments over five (5) years.
- The Biller Portal will use existing validation methods for common functions (e.g. field validation for email address format, required fields, etc.) as displayed in the mockups provided in this Addendum. Additional user-specific content to be displayed to users will be provided by Union Gas as indicated in specific sections of this Addendum.
- Union Gas will provide the Biller Manual displayed in the Biller Portal in HTML format.
- The Open Bill Portal and Open Bill Management Portal will leverage existing transaction logging functionality for logging user activity (e.g. login, download, charge submission, etc.). New and existing event types and attributes will be utilized to track operations conducted in these applications.

[redacted]

5 Estimate of effort

Phase	Analyst hours	Confidence (+ or – %)	Cost
Development, Testing and Documentation			$65,100.00
Totals*			**$65,100.00**

[redacted]

Transaction	Usage fees type	Volume	Cost	Total*
Biller Portal Monthly Remittance Archive	Monthly	1	$1,000.00	$1,000.00

*** This amount does not include applicable taxes.**

6 Approval signature

By signing this HLD Addendum A, you are authorizing Vertex Data LP (Vertex) to proceed with the work outlined in this document and guaranteeing full payment to Vertex for the work performed on *CM 29375 – Open Bill Addendum A*.

[redacted]	Date: DEC 19/2018	Date: December 19, 2018	
Project or Development Manager Vertex Data LP		[redacted]	
[redacted]	Date: Dec. 19, 2018		
Client Manager Vertex Data LP		**Project Manager or Lead Requestor *(Client)***	

vertex

TO: Union Gas Limited
[redacted]
50 Keil Drive North
Chatham, Ontario
N7M 5M1

Date: June 11, 2018
Due Date: July 11, 2018
Invoice No: FI3502530
P.O. **SRO# 4950014275**

INVOICE

UNION GAS - May 2018 CRF ACTIVITY

CRF	DESCRIPTION	COST
CR 29694	Please run process to create Annual Summary Statements in SUG01	$875.00
CR 29833	WRMCREX - ORA-29273 Profile Exception	$175.00
CR 29949	Community Expansion - CARS Interface Exceptions Issue	$350.00
CR 30099	Welcome Package Recipient Listing	$4,550.00
CR 30284	Additional UYPCARS run	$175.00
CR 30298	Require Completion of Cyber Questionnaire for Open Bill Project	$3,150.00
CR 30310	Remove Accts from Annual Summary	$350.00
CR 30389	Oracle Licensing	$350.00
CR 30409	UG_UGRCBCON_02-02 Aborted	$350.00
CR 30436	Service Maintenance Not Populated with Business Type	$175.00
CR 30449	CM29301 - Account Opening Fee Waived Until	$175.00
CR 30471	UXPBUDR in PUG 01	$175.00
CR 30485	WTRCOMM Rule (emergency fee)	$1,525.00
CR 30555	Run UYPMTSO for Battery Orders for Q2 2018	$175.00
CR 30636	Issue Tracker access	n/c
Data Fixes		
CR 30541	Data Fix - Account Issues	$700.00
CR 30730	Data fix - Accounts on Out of Cycle Exceptions	$1,050.00

SUBTOTAL	$	14,300.00
HST	$	1,859.00
TOTAL	$	16,159.00

Terms: Net 30 Days from End of Billing Period

Late Payment Charges as per CIS Business Service agreement on all outstanding balances
Billing On Behalf of Vertex Data L.P.. GST/HST [redacted]

Please Remit to: [redacted]

E-mail Inquiries: [redacted]

vertex

TO: Union Gas Limited
[redacted]
50 Keil Drive North
Chatham, Ontario
N7M 5M1

Date: December 10, 2018
Due Date: January 9, 2019
Invoice No: FI3502709
P.O. **SRO#**

INVOICE

[redacted] Union Gas CM 29375

CM 29375		Open Bill Project	$ 778,900.00
	Monthly Fee	Biller Portal-Production and one test instance	$ 1,500.00

SUB-TOTAL	$ 780,400.00
HST	$ 101,452.00
TOTAL	**$ 881,852.00**

Terms: Net 30 Days from End of Billing Period
Late Payment Charges as per CIS Business Service agreement on all outstanding balances
Billing On Behalf of Vertex Data L.P., GST/HST [redacted]

Please Remit to: [redacted]

E-mail Inquiries:

ENBRIDGE GAS INC.

Answer to Interrogatory from
School Energy Coalition ("SEC")

Interrogatory

Reference:

[Ex. C/3/1, p. 9 and C/3/1/A10, p. 1]

Question(s):

Please restate Tables 6 and 7 removing all impacts of the Home Reno Rebate Program in DSMIDA, DMSVA, and LRAMVA, including any budget transfers, incremental incentives, lost revenues, and increased costs. Please recalculate the figures in Appendix A10 on the same basis.

Response:

Tables 6 and 7 have been restated below as Tables 1 and 2 respectively, removing all impacts of the Home Reno Rebate Program offer from 2017 and 2018 results and spend. No adjustment has been made to scorecard targets as a result of these adjustments as the Home Energy Conservation Program offer is part of an integrated scorecard and cannot simply be removed. Spend that was directly tracked as part of the Home Energy Conservation Program offer has been removed, however, spending that was not tracked at the program offer level, such as portfolio overheads, has been redistributed using the original methodology.

Please see Attachment 1 for Appendix A10 calculated on the same basis as the revised Table 6 and Table 7. For purposes of this response, deferral interest has not been adjusted from the original filing.

Table 1
2017 DSM Deferral and Variance Account Balances by Rate Class – Union Rate Zones

Rate Class	DSMIDA	LRAMVA	DSMVA [1]	TOTAL DEFERRAL/ VARIANCES
M1	$415,053	N/A	($10,647,862)	($10,232,809)
M2	$194,909	N/A	($2,245,832)	($2,050,923)
M4	$0	$208,838	$2,502,447	$2,711,285
M5	$0	$208,373	($787,997)	($579,624)
M7	$0	$50,079	($830,681)	($780,601)
T1	$0	$4,626	$936,367	$940,993
T2	$0	($5,301)	($458,111)	($463,412)
Rate 01	$132,178	N/A	($4,342,748)	($4,210,570)
Rate 10	$23,808	N/A	($877,179)	($853,371)
Rate 20	$0	$6,769	($235,445)	($228,676)
Rate 100	$0	($5,032)	($1,036,183)	($1,041,215)
Total	**$765,949**	**$468,352**	**($18,023,223)**	**($16,788,923)**

NOTES:
1. Allocation to Rate M4, M5 and M7 prior to rate pooling adjustment.

Table 2
2018 DSM Deferral and Variance Account Balances by Rate Class – Union Rate Zones

Rate Class	DSMIDA	LRAMVA	DSMVA [1]	TOTAL DEFERRAL/ VARIANCES
M1	$304,765	N/A	($13,116,206)	($12,811,441)
M2	$141,984	N/A	($2,798,309)	($2,656,324)
M4	$0	$381,014	$3,346,269	$3,727,284
M5	$0	$2,010	($1,544,165)	($1,542,156)
M7	$0	$19,524	$567,460	$586,984
T1	$0	$4,687	$345,738	$350,426
T2	$0	($9,316)	($36,551)	($45,867)
				$0
Rate 01	$74,385	N/A	($4,382,071)	($4,307,686)
Rate 10	$35,432	N/A	($1,285,716)	($1,250,284)
Rate 20	$0	$9,190	($1,458,709)	($1,449,519)
Rate 100	$0	($5,012)	($1,016,223)	($1,021,234)
Total	**$556,566**	**$402,098**	**($21,378,482)**	**($20,419,818)**

NOTES:
1. Allocation to Rate M4, M5 and M7 prior to rate pooling adjustment.

ENBRIDGE GAS INC.
Union Rate Zones
Union North and Union South Combined Unit Rates - Delivery
2017 & 2018 DSM Deferral Account Disposition
Updated for Exhibit I.SEC.10

Line No.	Particulars	Rate Class	2017 Unit Rate (1) (cents/m^3) (a)	2018 Unit Rate (2) (cents/m^3) (b)	Total Unit Rate (3) (cents/m^3) (c) = (a + b)
	Union North				
1	Small Volume General Service	01	(0.6422)	(0.6675)	(1.3097)
2	Large Volume General Service	10	(0.3935)	(0.5819)	(0.9754)
3	Medium Volume Firm Service	20	(0.0466)	(0.2987)	(0.3453)
4	Large Volume High Load Factor	100	(0.0984)	(0.0973)	(0.1957)
5	Large Volume Interruptible	25	-	-	-
	Union South				
6	Small Volume General Service	M1	(0.5093)	(0.6488)	(1.1581)
7	Large Volume General Service	M2	(0.2536)	(0.3386)	(0.5922)
8	Firm Com/Ind Contract	M4	0.1038	0.2496	0.3534
9	Interruptible Com/Ind Contract	M5A	0.3693	0.1916	0.5609
10	Special Large Volume Contract	M7	0.0802	0.1927	0.2729
11	Large Wholesale	M9	-	-	-
12	Small Wholesale	M10	-	-	-
13	Contract Carriage Service	T1	0.1983	0.0745	0.2728
14	Contract Carriage Service	T2	(0.0111)	(0.0011)	(0.0122)
15	Contract Carriage- Wholesale	T3	-	-	-

Notes:
(1) Unit rates updated per Exhibit I.SEC.10.
(2) Unit rates updated per Exhibit I.SEC.10.
(3) Unit rate for general service rate classes represents the unit rate for propective recovery for the period January 1, 2021 to June 30, 2021. Unit rate contract rate classes represents the unit rate for one-time adjustment applied to 2018 actual volumes by customer.

ENBRIDGE GAS INC.

Answer to Interrogatory from
School Energy Coalition ("SEC")

Interrogatory

Reference:

[Ex. C/3/1/A10, p. 1]

Question(s):

Please confirm that, for an average Union South school with January to June volume of 25,000 m^3, the six month charge is expected to total $450. Please confirm that, for the approximately 1,100 schools in the Union South franchise area, the expected six month charge is about $500,000. Please calculate how much is currently included in annual rates for the DSM programs for these 1,100 schools assuming that consumption level.

Response:

The total clearance for a Rate M1 customer in the Union South rate zone consuming 25,000 m^3 of natural gas during the January to June 2021 period is a charge of approximately $451 related to the clearance of 2017/2018 DSM deferral and variance account balances.[1]

The expected clearance for approximately 1,100 schools, each consuming 25,000 m^3 during the January to June 2021 period, in the Union South rate zone is a total charge of $495,853 (approximately $500,000).

For Rate M1, the current OEB-approved DSM unit rates for 2020 result in a total cost for a school using 40,000 m^3 per year of approximately $317.[2] The total DSM cost for 1,100 schools, each consuming the annual volume of 40,000 m^3, is approximately $348,700.[3]

[1] The calculation is based on the unit rate of 1.8031 cents/m^3 multiplied by 25,000 m^3.
[2] The annual consumption assumption of 40,000 m^3 is consistent with the response at Exhibit I.SEC.7 and with consumption of 25,000 m^3 during the January to June period.
[3] $317 x 1,100.

ENBRIDGE GAS INC.

Answer to Interrogatory from
School Energy Coalition ("SEC")

Interrogatory

Reference:

[Same]

Question(s):

Please confirm that, for an average Union North school with January to June volume of 25,000 m^3, the six month credit is expected to total $150. Please confirm that, for the approximately 600 schools in the Union North franchise area, the expected six month credit is about $90,000. Please calculate how much is currently included in annual rates for the DSM programs for these 600 schools assuming that consumption level.

Response:

The total clearance for a Rate 01 customer in the Union North rate zone consuming 25,000 m^3 of natural gas during the January to June 2021 period is a refund of approximately $150 related to the clearance of 2017/2018 DSM deferral and variance account balances.[1]

The expected clearance for approximately 600 schools, each consuming 25,000 m^3 during the January to June 2021 period, in the Union North rate zone is a total refund of $89,775 (approximately $90,000).

For Rate 01, the current OEB-approved DSM unit rates for 2020 result in a total cost for a school using 40,000 m^3 per year of approximately $242.[2] The total DSM cost for 600 schools, each consuming the annual volume of 40,000 m^3, is approximately $145,200.[3]

[1] The calculation is based on the unit rate of (0.5985) cents/m^3 multiplied by 25,000 m^3.
[2] The annual consumption assumption of 40,000 m^3 is consistent with the response at Exhibit I.SEC.7 and with consumption of 25,000 m^3 during the January to June period.
[3] $242 x 600.