Bonnie Jean Adams
Regulatory Coordinator

tel 416-495-5499
EGDRegulatoryProceedings@enbridge.com

Enbridge Gas Distribution
500 Consumers Road
North York, Ontario M2J 1P8
Canada

VIA COURIER, EMAIL, and RESS

October 11, 2018

Ms. Kirsten Walli
Ontario Energy Board
P.O. Box 2319
2300 Yonge Street, 26th Floor
Toronto, ON M4P 1E4

Dear Ms. Walli:

Re: Enbridge Gas Distribution Inc. ("Enbridge")
Ontario Energy Board ("Board") File No.: EB-2018-0097
Bathurst Pipeline Project – Interrogatory Responses

In accordance with the Board's Procedural Order No. 1 for the above noted proceeding, enclosed please find the interrogatory responses of Enbridge.

Please contact the undersigned if you have any questions.

Sincerely,

(Original Signed)

Bonnie Jean Adams
Regulatory Coordinator

cc: EB-2018-0097 Intervenors

STAFF INTERROGATORY # 1

INTERROGATORY

Ref: Pre-filed Evidence, page 1

Preamble:

Enbridge Gas Distribution Inc. (Enbridge) requests leave to construct approximately 3.2 kilometers nominal pipe size (NPS) 12-inch and 20 metres of NPS 8-inch natural gas pipeline in the City of Toronto.

Questions:
a) Please provide a reference number for the applicable Municipal Franchise Agreement(s).
b) Please provide a reference number for the applicable certificate(s) of public convenience and necessity.

RESPONSE

a-b) Enbridge Gas Distribution Inc.'s predecessor company, the Consumers Gas Company of Toronto was incorporated by statute in 1848. The Act to Incorporate the Consumers' Gas Company of Toronto (included as Attachment 1 to this response) provides Consumers with the right to supply gas to the City of Toronto.

11 VICTORIA, CAP. XIV. (CANADA)

AN ACT TO INCORPORATE THE CONSUMERS' GAS COMPANY OF TORONTO

(Passed 23rd March, 1848)

Whereas the great and increasing extent of the City of Toronto and the great demand for a cheap and effective mode of lighting the streets and places in the said City, as well as houses, shops and other buildings therein, render it desirable that more than one company should be established for the purpose of furnishing a further supply of Gas for lighting the said City; and whereas the Mayor, Aldermen and citizens of the City of Toronto, have signified their assent to the establishment of the said Company, and to their having the necessary powers connected with the establishment and construction of the necessary works; and whereas a considerable proportion of the stock of the said Company has already been subscribed for, and the first instalment at the rate of five per centum paid; and whereas at a general meeting of the stockholders of the said Company held on the twenty-ninth day of October, in the year of our Lord one thousand eight hundred and forty-seven, pursuant to public notice, the following persons were duly elected Directors to manage the affairs of the said Company for one year from the date of such election, namely: Charles Berczy, Richard Kneeshaw, Ezekiel F. Whittemore, Hugh Scobie, Hugh Miller, James Beatty, Richard Yates, George C. Horwood, John T. Smith, Peter Paterson, Robert H. Brett and David Paterson; and whereas at a subsequent meeting of the said Directors they did elect the said Charles Berczy, President, and the said Richard Kneeshaw, Vice-President of the said Company; and whereas the said several persons hereinbefore named and others, have by their petition prayed that they may be incorporated under the style and title of The Consumers' Gas Company of Toronto, and that the above-named Directors, President and Vice-President may continue in office and be confirmed as such Directors, President and Vice-President, until others shall be elected in their stead under the provisions hereinafter made, and have also prayed that they may be invested with all the necessary powers and privileges usually granted to similar corporations, for the purpose of supplying the City of Toronto with Gas in greater quantity, of better quality and at cheaper rate than the same hath been heretofore supplied; and whereas it is expedient to grant the prayer of the said petition: Be it therefore enacted by the Queen's most excellent Majesty, by and with the advice and consent of the Legislative council and of the Legislative Assembly of the Province of Canada, constituted and assembled by virtue of and under the authority of an Act passed in the Parliament of the United Kingdom of Great Britain and Ireland, intituled, An Act to reunite the Provinces of Upper and Lower Canada, and for the Government of Canada, and it is hereby enacted by the authority of the same, That the said directors or such of them and such other persons as now are or shall hereafter become shareholders in the said Company, shall be and are hereby ordained and

constituted a body politic and corporate by the name and style of The Consumers' Gas Company of Toronto, and by that name and style they and their successors being such shareholders shall and may have perpetual succession and a common seal, with full power to make, change, break or alter the same at pleasure, and shall and may by the same name sue and be sued, plead and be impleaded, answer and be answered unto, defend and be defended in all courts and places whatsoever, and shall and may have full power to purchase, take and hold personal property and lands, tenements and other real property for the purposes of the said Company, and for the erection and construction and convenient use of the Gas works hereinafter mentioned, and also to alienate such personal property, lands and other property, and others to purchase, take and hold in their stead for the purposes and uses aforesaid, and that any person or persons, body or bodies politic or corporate may give, grant, bargain, sell or convey to the said Company, any lands, tenements or hereditaments for the purposes aforesaid, and the same my repurchase from the said Company; provided always, that such lands, tenements and hereditaments to be holden by the said Company shall be so holden for the purposes and business of the said Company as set forth in this Act, and for constructing their necessary works for and about the same and for no other purposes whatsoever, ... and that it shall be lawful for the said Company, subject to the restrictions herein contained, from time to time to make, construct, lay down, maintain, alter or discontinue such retorts, gasometers, receivers and buildings, cisterns, engines, machines, and other apparatus, cuts, drains, sewers, water courses, reservoirs, machinery and other works, andalso such houses and buildings upon the lands hereby authorized to be held and purchased by the said Company, and to do all other acts necessary and convenient as they shall think proper for supplying the inhabitants of the said City with Gas, and also to sell and dispose of coke and of all and every product or products, refuse or residuum arising or to be obtained from the materials used in or necessary for the manufacture of Gas in such manner as the said Company may think proper, and also to manufacture the refuse of any such Gas.

2. And be it enacted, That the said Company may raise and contribute among themselves such sum as shall not exceed the sum of twenty-five thousand pounds, currency, in shares of twelve pounds, ten shillings, currency, each, and the money so raised shall be appropriated to the purpose of constructing, completing and maintaining their said Gas Works, and to the purposes of this Act and to no other object or purpose whatsoever; provided always, that if the said sum of twenty-five thousand pounds, currency, should be insufficient for the purposes of this Act, it shall be lawful for the said Company to increase their capital stock by a further sum, not exceeding twenty-five thousand pounds, currency, either among themselves or by the admission of new shareholders, such new stock being divided into shares of twelve pounds, ten shillings, currency, each.

3. And be it enacted, That the President, Vice-Presid-

ent and Directors hereinbefore named, shall continue in office until the last Monday in October in the year of our Lord, one thousand eight hundred and forty-nine, or until the then next general election, if no election be had on that day, unless they shall sooner resign, be removed, or become disqualified under the provisions of this Act.

13. And be it enacted, That it shall and may be lawful for the said Company, after two days' notice in writing to the Mayor, aldermen and citizens of the City of Toronto to break up, dig and trench so much and so many of the streets, squares and public places of the said City of Toronto as may at any time be necessary for the laying down the mains and pipes to conduct the Gas from the works of the said Company to the consumers thereof, or for taking up, renewing, altering or repairing the same when the said Company shall deem it expedient, doing no unnecessary damage in the premises, and taking care as far as may be to preserve a free and uninterrupted passage through the said streets, squares and public places while the works are in progress, and making the said openings in such parts of the said streets, squares and public places, as the City Surveyor, under the direction of the Council of the said City, shall reasonably permit and point out; also placing guards and fences with lamps, and providing watchmen during the night, and taking all other necessary precaution for the prevention of accidents to passengers and others which may be occasioned by such openings; also finishing the work and replacing the said streets, squares and public places in as good condition as before the commencement of the work without any unnecessary delay; and in case of the neglect of any of the duties herein provided as aforesaid, the said Company shall be subject to pay a fine of one pound, currency, for every day such neglect shall continue after receiving a legal or written notice thereof, to be recovered by civil action in Her Majesty's Court of Queen's Bench at Toronto, at the suit of any person or persons or of the corporation of the Mayor, Aldermen, and citizens of the City of Toronto, to and for the use of the said corporations, over and above such damages as may be recovered against the said Company by any other party.

14. And be it enacted, That where there are buildings within the said City of Toronto, the different parts whereof shall belong to different proprietors, or shall be in possession of different tenants or lessees, the said Company shall have power to carry pipes to any part of any building so situate, passing over the property of one or more proprietors, or in possession of one or more tenants, to convey the Gas to that of another, or in the possession of another, the pipes being carried up, and attached to the outside of the building, and also to break up and uplift all passages, which may be in common to neighboring proprietors, and to dig or cut trenches therein for the purpose of laying down pipes or taking up or repairing the same, and to lay any pipes, branches or other necessary apparatus, from any main or branch pipes, into, through, or against any building, for the purpose of lighting the same, and to provide and set up any apparatus necessary for securing to any buildings a proper and complete supply of

Gas, and for measuring and ascertaining the extent of such supply, the said Company doing as little damage as may be in the execution of the powers granted by this Act, and making satisfaction thereafter to the owners or proprietors of the buildings or other property, or to any other party, for all damages to be by them sustained in or by the execution of all or any of the said powers, subject to which provision this Act shall be sufficient to indemnify the Company or their servants, or those by them employed for what they or any of them shall do in pursuance of the powers granted by this Act.

16. And be it enacted, That the said Company shall so construct and locate their Gas Works and all apparatus and appurtenances thereto appertaining, or therewith connected, and wheresoever situated, as in nowise to endanger the public health or safety, and for the purpose of better ensuring the due execution of the provisions of this section, the said Company shall, with regard to the construction of such part of their said Gas Works as shall lie within the City of Toronto, be subject and bound by the existing By-laws of the Council of the said City for insuring the health, safety and convenience of the inhabitants thereof, and the said Gas Works, apparatus and appurtenances, or so much thereof as shall be within the said City, shall be moreover, at all reasonable times, subject to the visits and inspection of the municipal authorities thereof, or their officers, reasonable notice thereof being previously given to the said Company, and the said Company and their servants or workmen shall at all times obey all just and reasonable orders and directions they shall receive from the said municipal authorities in that respect, under a penalty of not more than five pounds, nor less than one pound currency for each offence, in refusing or neglecting to obey the same, to be recovered from the said Company, at the suit and for the use of the Mayor, Aldermen and citizens of the City of Toronto, in any court of competent civil jurisdiction.

17. And be it enacted, That in case the said Company shall open or break up any street, square or public place in the said City, and shall neglect to keep the passage of the said street, square or public place as far as may be free and uninterrupted, or to place guards or fences with lamps, or to place watchmen, or to take every necessary precaution for the prevention of accidents to passengers and others, or to close and replace the said streets, squares or public places without unnecessary delay as hereinbefore provided, the City Surveyor, under the direction of the said Council of the City, after notice in writing to the said Company, shall cause the duty so neglected to be forthwith performed, and the expense thereof shall be defrayed by the said Company, on its being demanded by the City Surveyor, at any time not less than one month after the work shall have been completed, in any case, from the Cashier or Treasurer, or any Director of the said Company, or in default of such payment, the amount of such claim shall and may be recovered from the said Company, at the suit of the Mayor, Aldermen and citizens of the City of Toronto, by a civil action in any court of competent jurisdiction.

19. And be it enacted, That if any person or persons shall wilfully or maliciously break up, pull down, or damage, injure, put out of order, or destroy any meter, main pipe, pipe, or other works, or apparatus, appurtenances or dependencies thereof, or any matter or thing already made or provided, or which shall be made or provided for the purposes aforesaid, or any of the materials used and provided for the same or ordered to be erected, laid down or belonging to the said Company, or shall in any wise wilfully do any other injury or damage for the purpose of obstructing, hindering or embarrassing the construction, completion, maintaining or repairing of the said works, or shall wilfully alter or impair any meter so that the same shall indicate less Gas than actually passes through the same, or shall cause or procure the same to be done, or shall increase the supply of Gas agreed for with the said Company by increasing the number or size of the holes in the Gas burners, or otherwise wrongfully, negligently or wastefully burning the same, or by wrongfully or improperly wasting the Gas, every such person or persons shall be guilty of a misdemeanor, and on conviction thereof the court before whom such person shall be tried and convicted, shall have power and authority to condemn such person to pay a penalty not exceeding ten pounds, currency, or be confined in the common gaol of the district for a space of time not exceeding three months as to such court may seem meet, and such person shall defray the expenses attending the repair or replacing of such meter.

20. And be it enacted, That nothing in this Act contained shall extend or be construed to extend to prevent any person or persons, body politic or corporate, from constructing any works for the supply of Gas to their own premises, or to prevent the Legislature of this Province at any time hereafter, from altering, modifying or repealing the powers, privileges or authorities hereinbefore granted to the said Company, or from incorporating any other Company for like purposes.

21. And be it enacted, That nothing herein contained shall affect or be construed to affect in any way or manner whatsoever the rights of Her Majesty, Her Heirs and Successors, or of any person or persons, or of any body or bodies corporate or collegiate, such only excepted as are herein mentioned.

22. And be it enacted, That the Gas Works hereinbefore mentioned shall be in operation within five years from the passing of this Act, and in default thereof the privileges and advantages granted by this Act to the said Company shall cease and be of no effect.

23. And be it enacted, That in all cases where it shall be lawful for the Company to cut off and take away the supply of any Gas from any house or building or premises under the provisions of this Act, it shall be lawful for the said Company, their agents and workmen, upon giving twenty-four hours' previous notice to the occupier, to enter into any such house, building or premises, between the hours of nine in the forenoon and four in the afternoon,

and to remove, take and carry away any pipe, meter, cock, branch or apparatus, the property of and belonging to the said Company, and also for the purpose of repairing and making good any such house, building and premises where such pipes or apparatus shall have been so introduced.

24. And be it enacted, That if any person supplied with Gas by the said Company shall neglect to pay any rate or rent due to them at any of the times of payment thereof, it shall be lawful for the said Company or any person acting under their authority, to stop the Gas from entering the premises of such person, by cutting off the service or other pipe to such premises or by such means as the Company shall think fit; and that the said Company may recover the rate or rent due from such persons, together with the expenses of cutting off the Gas and costs of recovering the same in any court of competent jurisdiction in this Province.

25. And be it enacted, That neither the service nor connect- pipes of the said Company, nor any meter belonging to the said Company, shall be taken or seized for rent due to landlords, or for the debts of any person or persons to or for whose use or the use of whose house or building the same may be supplied by the Company; any law or practice to the contrary notwithstanding.

28. And be it enacted, That this Act be and it is hereby declared to be a Public Act, and that the same may be construed as such in all Her Majesty's Courts in this Province.

STAFF INTERROGATORY # 2

INTERROGATORY

Ref: Application cover letter
Exhibit A, Tab 2, Schedule 1, page 1
Exhibit B, Tab 1, Schedule 1, page 2
Exhibit C, Tab 1, Schedule 1, page 3

Preamble:
The application cover letter states that Enbridge is proposing to build “up to 3.6 km” of pipeline (the length of the alternative route). Elsewhere in its application, Enbridge Gas describes the proposed pipeline as being 3.2 km in length (the length of the preferred route).

Questions:
a) Please confirm the length of the proposed pipeline.
b) If the proposed length of the pipeline is 3.2 km but there may be a need to construct up to 3.6 km, please explain what would necessitate any additional length and where the additional length would be constructed.
c) Please confirm that any additional length is considered in the Environmental Report.
d) Please confirm that any additional length is accounted for in the project economics.

RESPONSE

a) The proposed length of the pipeline is 3.2km.

b) The additional length noted of 3.6km was based on the alternate route which will not be constructed. The alternate route of 3.6km was considered in the environmental report and the project economics, however since that route was not selected that information does not impact the project.

c) There is no additional length considered for the preferred route in the Environmental Report in excess of the 3.2km length of the preferred route.

d) The project economics are based on the 3.2 km route length.

STAFF INTERROGATORY # 3

INTERROGATORY

Ref: Exhibit C, Tab 1, Schedule 2, page 2

Preamble:
Enbridge states that additional Species at Risk mitigation measures may be developed based on ongoing conversations with the Ministry of Natural Resources and Forestry.

Question:
Please provide an update on conversations with the Ministry of Natural Resources and Forestry and any additional Species at Risk mitigation measures.

RESPONSE

To date no additional Species at Risk mitigation measures have been identified or developed through communications between Enbridge, its consultant and the Ministry of Natural Resources and Forestry.

STAFF INTERROGATORY # 4

INTERROGATORY

Ref: Exhibit C, Tab 1, Schedule 3, page 1

Preamble:
Copies of the Environmental Reports were resubmitted to the Ontario Pipeline Coordination Committee (OPCC) on July 13, 2018. At the time of submission of the Application, no comments had been received from the OPCC. Enbridge will update the OEB regarding the OPCC review process of the ER should further information become available.

Question:
Please file an update on the comments (in tabular format) that Enbridge has received as part of the OPCC review. Include the dates of communication, the issues and concerns identified by the parties, as well as Enbridge's responses and actions to address these issues and concerns.

RESPONSE

To date, Enbridge has received comments from the Ministry of Tourism, Culture, and Sport (MTCS) as part of the OPCC review process. The table on the following page and Attachment 1 to this response set out the correspondence between Enbridge and the MTCS.

Date	Contact	Comment	Response
Sept 25-18	Laura Hatcher (MTCS)	MTCS had two questions regarding the final report: • Only section A of the checklist "Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes" was completed. Is there a reason that the study area was not screened for potential cultural heritage resources? • The report identifies two properties that are designated under the *Ontario Heritage Act* within the study area. Potential impacts to these properties are not discussed in section 6.0 and Table 12 which discusses potential effects and mitigation. Will heritage impact assessments be undertaken for these properties, and when?	Enbridge provide the following response: • Due to an oversight, the completion of the remainder of the Checklist was not completed. The Checklist has been updated and provided to the MTCS as part of the response. • A review of the City of Toronto's Heritage Property Search confirmed that there are sites designated (or otherwise protected under the Ontario Heritage Act) that have been designated by a municipal by-law as being of heritage value or interest. Based on email communication with Ontario Heritage Trust, the project area does not include any conservation easements or Trust-owned properties entered under Parts II or IV of the Ontario Heritage Act. Correspondence with Karla Barboza at MTCS indicated that the properties are not included in the Ministry's list of provincial heritage properties. The Checklist (question 3a) has been updated to reflect the absence of identified properties with cultural heritage value.

Bonnie Adams

Subject: FW: MTCS File 0008376: EB-2018-0097 - Bathurst Reinforcement Project - Ontario Energy Board - Notice of Application
Attachments: Appenix C2 - Cultural Heritage Checklist - Updated Sept 27 2018.pdf

From: Greg Asmussen
Sent: Thursday, October 04, 2018 12:50 PM
To: laura.e.hatcher@ontario.ca
Cc: Bonnie Adams
Subject: RE: MTCS File 0008376: EB-2018-0097 - Bathurst Reinforcement Project - Ontario Energy Board - Notice of Application

Hello Laura,

In response your inquiries regarding Enbridge's Bathurst Reinforcement Pipeline Project, I can offer the following clarification.

- Only section A of the checklist "**Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes**" was completed. Is there a reason that the study area was not screened for potential cultural heritage resources?

Due to an oversight, completion of the remainder of the Checklist was not done. The Checklist has since been updated, and fully completed. Please find the attached, updated Checklist for your review.

You will note that the updated Checklist does not identify any further resources with cultural heritage value, with the exception of question 4a, "Is the Project Area adjacent to a known burial site and/or cemetery?" This question was answered 'Yes'. However, the project's Stage 1 Archaeological Assessment identified no potential impacts to the cemetery properties within the project area, and did not recommend completion of additional cemetery boundary investigations. Correspondence with the MTCS was completed as a part of making this determination, which is included in the archaeological assessment (p.63).

- The report identifies two properties that are designated under the *Ontario Heritage Act* within the study area. Potential impacts to these properties are not discussed in section 6.0 and Table 12 which discusses potential effects and mitigation. Will heritage impact assessments be undertaken for these properties, and when?

To clarify, a review of the City of Toronto's Heritage Property Search confirmed that there are sites designated (or otherwise protected under the Ontario Heritage Act) that have been designated by a municipal by-law as being of heritage value or interest. Based on email communication with Thomas Wicks from Ontario Heritage Trust, the project area does not include any conservation easements or Trust-owned properties entered under Parts II or IV of the Ontario Heritage Act. Correspondence with Karla Barboza at MTCS indicated that the properties are not included in the Ministry's list of provincial heritage properties.

Based on these correspondences, Enbridge is confident that there are no provincially designated heritage properties that will be impacted by the proposed project. As a result, the Checklist (question 3a) has been updated to reflect the absence of identified properties with cultural heritage value. Due to the confirmation of the absence

of provincially identified properties with cultural heritage value, heritage impact assessments have not been identified to be necessary at this time.

If you have any further questions regarding the responses provided above, please do not hesitate to contact me for additional clarification.

Thank you,

Greg Asmussen B. Sc. (Env), A.Ag, Can-CISEC
Senior Environmental Analyst
EHS, Environmental Programs
—

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101 Honda Blvd., Markham, Ontario L6C 0M6

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Integrity. Safety. Respect.

From: Hatcher, Laura (MTCS) [mailto:Laura.E.Hatcher@ontario.ca]
Sent: Tuesday, September 25, 2018 11:42 AM
To: Bonnie Adams
Subject: [External] RE: MTCS File 0008376: EB-2018-0097 - Bathurst Reinforcement Project - Ontario Energy Board - Notice of Application

Hi Bonnie,

Thank you for this notice. I have reviewed the Final Report and I have two questions:

- Only section A of the checklist "**Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes**" was completed. Is there a reason that the study area was not screened for potential cultural heritage resources?

- The report identifies two properties that are designated under the *Ontario Heritage Act* within the study area. Potential impacts to these properties are not discussed in section 6.0 and Table 12 which discusses potential effects and mitigation. Will heritage impact assessments be undertaken for these properties, and when?

Thank you,

Laura

Laura Hatcher, MCIP, RPP
Heritage Planner
Heritage Program | Programs and Services Branch | Ministry of Tourism, Culture and Sport
401 Bay Street Suite 1700 Toronto ON M7A 0A7
Tel. 416.314.3108 | email: laura.e.hatcher@ontario.ca

From: Bonnie Adams [mailto:Bonnie.Adams@enbridge.com]
Sent: September-06-18 5:35 PM
Cc: MICHAEL.LEVITT@PARL.GC.CA; Ali.Ehsassi@parl.gc.ca; mkwinter.mpp@liberal.ola.org; dzimmer.mpp@liberal.ola.org; anjala.puvananathan@ceaa-acee.gc.ca; EACoordination_ON@aandc-aadnc.gc.ca;

rob.dobos@canada.ca; FisheriesProtection@dfo-mpo.gc.ca; maria.yu@hc-sc.gc.ca; EnviroOnt@tc.gc.ca; rossella.fazio@HydroOne.com; MAA.EA.REVIEW (IAO); Cooper, David (OMAFRA); Doncaster, Michele (OMAFRA); Barboza, Karla (MTCS); Keith, Darja (MTCS); Thomas, Mathew (EDU); Helfinger, Michael (MEDJCT); Yordi, Samer (ENERGY); Myslicki, Lisa (IO); Adderley, Barbara (MMA); Strong, Steven (MNRF); Nadeau, Michael (MTO); Wiesek, Marek (MTO); Mahmood, Mansoor (MECP); Trevisan, Lisa (MECP); Webster, Kevin (MECP); Malcolmson, Heather (MECP); O'Donnell, Cheryl (MECP); mayor_tory@toronto.ca; mdandre@toronto.ca; dsharma@toronto.ca; mwilliams@toronto.ca; AMeistr@toronto.ca; perry.korouyenis@toronto.ca; guy.matthew@toronto.ca; matthew.pegg@toronto.ca; cmoore1@toronto.ca; councillor_pasternak@toronto.ca; councillor_filion@toronto.ca; maurizio.bevilacqua@vaughan.ca; barbara.mcewan@vaughan.ca; stephen.collins@vaughan.ca; andrew.pearce@vaughan.ca; developmentengineering@vaughan.ca; dennis.cutajar@vaughan.ca; carol.birch@vaughan.ca; mark.antoine@vaughan.ca; larry.bentley@vaughan.ca; rita.selvaggi@vaughan.ca; alan.shefman@vaughan.ca; cfurtado@trca.on.ca; svarzgani@trca.on.ca; rory.mcguckin@tcdsb.org; GeneralInquiries@TDSB.on.ca; cheri@prossermanjcc.com; info@caasda.com; northview@tdsb.on.ca; yrennert@eitzchaim.com; joseph.bellissimo@tcdsb.org; Churchill.PS@tdsb.on.ca; Willowdale@tdsb.on.ca; neuberger@ujafed.org; info@greenbelt.ca; care@onekentonplace.ca; allison.bain@toronto.ca; ewong@trca.on.ca; utilrev@toronto.ca; craig.wilson@toronto.ca

Subject: EB-2018-0097 - Bathurst Reinforcement Project - Ontario Energy Board - Notice of Application

Good Afternoon,

On August 1, 2018, Enbridge filed an application with the Board for approval to construct up to 3.2 km of nominal pipe size ("NPS") 12 inch natural gas pipeline in North York (the "Project"). The Project is a reinforcement pipeline and as such will allow Enbridge to continue providing gas distribution service to customers in the area and meet gas demand stemming from customer growth in the area.

On August 30, 2018, the Board issued the Notice of Application (English and French) and the Letter of Direction for the proceeding.

Attached please find a copy of the English and French versions of the Board's Notice of Application along with Enbridge's application as filed with the Board for the Bathurst Pipeline Project. A paper copy of the application and evidence is available upon request.

The application and evidence, including the environmental report, is available on the Enbridge website at www.enbridgegas.com/Bathurst

Sincerely,

Bonnie Jean Adams
Regulatory Coordinator

Enbridge Gas Distribution
T: 416-495-6409 I F: 416-495-6072
500 Consumers Road I North York Ontario I M2J 1P8

enbridgegas.com
Integrity. Safety. Respect.

Ontario

Ministry of Tourism, Culture and Sport

Programs & Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7

Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes

A Checklist for the Non-Specialist

The **purpose of the checklist** is to determine:

- if a property(ies) or project area:
  - is a recognized heritage property
  - may be of cultural heritage value
- it includes all areas that may be impacted by project activities, including – but not limited to:
  - the main project area
  - temporary storage
  - staging and working areas
  - temporary roads and detours

Processes covered under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

Cultural Heritage Evaluation Report (CHER)

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a qualified person(s) (see page 5 for definitions) to undertake a cultural heritage evaluation report (CHER).

The CHER will help you:

- identify, evaluate and protect cultural heritage resources on your property or project area
- reduce potential delays and risks to a project

Other checklists

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – separate checklist
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages for more detailed information and when completing this form.

Project or Property Name
Bathurst Reinforcement Pipeline Project

Project or Property Location (upper and lower or single tier municipality)
North York, City of Toronto

Proponent Name
Enbridge Gas Distribution Incorporated

Proponent Contact Information
500 Consumers Road, North York, ON M2J 1P8, 1-877-362-7474

Screening Questions

	Yes	No
1. Is there a pre-approved screening checklist, methodology or process in place?	☐	☑

If Yes, please follow the pre-approved screening checklist, methodology or process.

If No, continue to Question 2.

Part A: Screening for known (or recognized) Cultural Heritage Value

	Yes	No
2. Has the property (or project area) been evaluated before and found **not** to be of cultural heritage value?	☐	☑

If Yes, do **not** complete the rest of the checklist.

The proponent, property owner and/or approval authority will:

- summarize the previous evaluation and
- add this checklist to the project file, with the appropriate documents that demonstrate a cultural heritage evaluation was undertaken

The summary and appropriate documentation may be:

- submitted as part of a report requirement
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

	Yes	No
3. Is the property (or project area):		
a. identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value?	☐	☑
b. a National Historic Site (or part of)?	☐	☑
c. designated under the *Heritage Railway Stations Protection Act*?	☐	☑
d. designated under the *Heritage Lighthouse Protection Act*?	☐	☑
e. identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office (FHBRO)?	☐	☑
f. located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?	☐	☑

If Yes to any of the above questions, you need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report, if a Statement of Cultural Heritage Value has not previously been prepared or the statement needs to be updated

If a Statement of Cultural Heritage Value has been prepared previously and if alterations or development are proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No, continue to Question 4.

Part B: Screening for Potential Cultural Heritage Value

	Yes	No
4. Does the property (or project area) contain a parcel of land that:		
a. is the subject of a municipal, provincial or federal commemorative or interpretive plaque?	☐	☑
b. has or is adjacent to a known burial site and/or cemetery?	☑	☐
c. is in a Canadian Heritage River watershed?	☐	☑
d. contains buildings or structures that are 40 or more years old?	☐	☑

Part C: Other Considerations

	Yes	No
5. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area):		
a. is considered a landmark in the local community or contains any structures or sites that are important in defining the character of the area?	☐	☑
b. has a special association with a community, person or historical event?	☐	☑
c. contains or is part of a cultural heritage landscape?	☐	☑

If Yes to one or more of the above questions (Part B and C), there is potential for cultural heritage resources on the property or within the project area.

You need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report (CHER)

If the property is determined to be of cultural heritage value and alterations or development is proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No to all of the above questions, there is low potential for built heritage or cultural heritage landscape on the property.

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g. under the *Environmental Assessment Act*, *Planning Act* processes
- maintained by the property owner, proponent or approval authority

Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
  - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

For more information, see the Ministry of Tourism, Culture and Sport's Ontario Heritage Toolkit or Standards and Guidelines for Conservation of Provincial Heritage Properties.

In this context, the following definitions apply:

- **qualified person(s)** means individuals – professional engineers, architects, archaeologists, etc. – having relevant, recent experience in the conservation of cultural heritage resources.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may already be in place for identifying potential cultural heritage resources, including:

- one endorsed by a municipality
- an environmental assessment process e.g. screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport (MTCS) under the Ontario government's Standards & Guidelines for Conservation of Provincial Heritage Properties [s.B.2.]

Part A: Screening for known (or recognized) Cultural Heritage Value

2. Has the property (or project area) been evaluated before and found not to be of cultural heritage value?

Respond 'yes' to this question, if all of the following are true:

A property can be considered not to be of cultural heritage value if:

- a Cultural Heritage Evaluation Report (CHER) - or equivalent - has been prepared for the property with the advice of a qualified person and it has been determined not to be of cultural heritage value and/or
- the municipal heritage committee has evaluated the property for its cultural heritage value or interest and determined that the property is not of cultural heritage value or interest

A property may need to be re-evaluated, if:

- there is evidence that its heritage attributes may have changed
- new information is available
- the existing Statement of Cultural Heritage Value does not provide the information necessary to manage the property
- the evaluation took place after 2005 and did not use the criteria in Regulations 9/06 and 10/06

Note: Ontario government ministries and public bodies [prescribed under Regulation 157/10] may continue to use their existing evaluation processes, until the evaluation process required under section B.2 of the Standards & Guidelines for Conservation of Provincial Heritage Properties has been developed and approved by MTCS.

To determine if your property or project area has been evaluated, contact:

- the approval authority
- the proponent
- the Ministry of Tourism, Culture and Sport

3a. Is the property (or project area) identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value e.g.:

i. designated under the *Ontario Heritage Act*

- individual designation (Part IV)
- part of a heritage conservation district (Part V)

Individual Designation – Part IV

A property that is designated:

- by a municipal by-law as being of cultural heritage value or interest [s.29 of the *Ontario Heritage Act*]
- by order of the Minister of Tourism, Culture and Sport as being of cultural heritage value or interest of provincial significance [s.34.5]. **Note**: To date, no properties have been designated by the Minister.

Heritage Conservation District – Part V

A property or project area that is located within an area designated by a municipal by-law as a heritage conservation district [s. 41 of the *Ontario Heritage Act*].

For more information on Parts IV and V, contact:

- municipal clerk
- Ontario Heritage Trust
- local land registry office (for a title search)

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ii. subject of an agreement, covenant or easement entered into under Parts II or IV of the *Ontario Heritage Act*

An agreement, covenant or easement is usually between the owner of a property and a conservation body or level of government. It is usually registered on title.

The primary purpose of the agreement is to:

- preserve, conserve, and maintain a cultural heritage resource
- prevent its destruction, demolition or loss

For more information, contact:

- Ontario Heritage Trust - for an agreement, covenant or easement [clause 10 (1) (c) of the *Ontario Heritage Act*]
- municipal clerk – for a property that is the subject of an easement or a covenant [s.37 of the *Ontario Heritage Act*]
- local land registry office (for a title search)

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iii. listed on a register of heritage properties maintained by the municipality

Municipal registers are the official lists - or record - of cultural heritage properties identified as being important to the community.

Registers include:

- all properties that are designated under the *Ontario Heritage Act* (Part IV or V)
- properties that have not been formally designated, but have been identified as having cultural heritage value or interest to the community

For more information, contact:

- municipal clerk
- municipal heritage planning staff
- municipal heritage committee

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iv. subject to a notice of:

- intention to designate (under Part IV of the *Ontario Heritage Act*)
- a Heritage Conservation District study area bylaw (under Part V of the *Ontario Heritage Act*)

A property that is subject to a **notice of intention to designate** as a property of cultural heritage value or interest and the notice is in accordance with:

- section 29 of the *Ontario Heritage Act*
- section 34.6 of the *Ontario Heritage Act.* **Note**: To date, the only applicable property is Meldrum Bay Inn, Manitoulin Island. [s.34.6]

An area designated by a municipal by-law made under section 40.1 of the *Ontario Heritage Act* as a **heritage conservation district study area**.

For more information, contact:

- municipal clerk – for a property that is the subject of notice of intention [s. 29 and s. 40.1]
- Ontario Heritage Trust

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v. included in the Ministry of Tourism, Culture and Sport's list of provincial heritage properties

Provincial heritage properties are properties the Government of Ontario owns or controls that have cultural heritage value or interest.

The Ministry of Tourism, Culture and Sport (MTCS) maintains a list of all provincial heritage properties based on information provided by ministries and prescribed public bodies. As they are identified, MTCS adds properties to the list of provincial heritage properties.

For more information, contact the MTCS Registrar at registrar@ontario.ca.

3b. Is the property (or project area) a National Historic Site (or part of)?

National Historic Sites are properties or districts of national historic significance that are designated by the Federal Minister of the Environment, under the *Canada National Parks Act*, based on the advice of the Historic Sites and Monuments Board of Canada.

For more information, see the National Historic Sites website.

3c. Is the property (or project area) designated under the *Heritage Railway Stations Protection Act*?

The *Heritage Railway Stations Protection Act* protects heritage railway stations that are owned by a railway company under federal jurisdiction. Designated railway stations that pass from federal ownership may continue to have cultural heritage value.

For more information, see the Directory of Designated Heritage Railway Stations.

3d. Is the property (or project area) designated under the *Heritage Lighthouse Protection Act*?

The *Heritage Lighthouse Protection Act* helps preserve historically significant Canadian lighthouses. The Act sets up a public nomination process and includes heritage building conservation standards for lighthouses which are officially designated.

For more information, see the Heritage Lighthouses of Canada website.

3e. Is the property (or project area) identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office?

The role of the Federal Heritage Buildings Review Office (FHBRO) is to help the federal government protect the heritage buildings it owns. The policy applies to all federal government departments that administer real property, but not to federal Crown Corporations.

For more information, contact the Federal Heritage Buildings Review Office.

See a directory of all federal heritage designations.

3f. Is the property (or project area) located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?

A UNESCO World Heritage Site is a place listed by UNESCO as having outstanding universal value to humanity under the Convention Concerning the Protection of the World Cultural and Natural Heritage. In order to retain the status of a World Heritage Site, each site must maintain its character defining features.

Currently, the Rideau Canal is the only World Heritage Site in Ontario.

For more information, see Parks Canada – World Heritage Site website.

Part B: Screening for potential Cultural Heritage Value

4a. Does the property (or project area) contain a parcel of land that has a municipal, provincial or federal commemorative or interpretive plaque?

Heritage resources are often recognized with formal plaques or markers.

Plaques are prepared by:

- municipalities
- provincial ministries or agencies
- federal ministries or agencies
- local non-government or non-profit organizations

For more information, contact:

- municipal heritage committees or local heritage organizations – for information on the location of plaques in their community
- Ontario Historical Society's Heritage directory – for a list of historical societies and heritage organizations
- Ontario Heritage Trust – for a list of plaques commemorating Ontario's history
- Historic Sites and Monuments Board of Canada – for a list of plaques commemorating Canada's history

4b. Does the property (or project area) contain a parcel of land that has or is adjacent to a known burial site and/or cemetery?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulations, Ontario Ministry of Consumer Services – for a database of registered cemeteries
- Ontario Genealogical Society (OGS) – to locate records of Ontario cemeteries, both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to locate early cemeteries

In this context, adjacent means contiguous or as otherwise defined in a municipal official plan.

4c. Does the property (or project area) contain a parcel of land that is in a Canadian Heritage River watershed?

The Canadian Heritage River System is a national river conservation program that promotes, protects and enhances the best examples of Canada's river heritage.

Canadian Heritage Rivers must have, and maintain, outstanding natural, cultural and/or recreational values, and a high level of public support.

For more information, contact the Canadian Heritage River System.

If you have questions regarding the boundaries of a watershed, please contact:

- your conservation authority
- municipal staff

4d. Does the property (or project area) contain a parcel of land that contains buildings or structures that are 40 or more years old?

A 40 year 'rule of thumb' is typically used to indicate the potential of a site to be of cultural heritage value. The approximate age of buildings and/or structures may be estimated based on:

- history of the development of the area
- fire insurance maps
- architectural style
- building methods

Property owners may have information on the age of any buildings or structures on their property. The municipality, local land registry office or library may also have background information on the property.

Note: 40+ year old buildings or structure do not necessarily hold cultural heritage value or interest; their age simply indicates a higher potential.

A building or structure can include:

- residential structure
- farm building or outbuilding
- industrial, commercial, or institutional building
- remnant or ruin
- engineering work such as a bridge, canal, dams, etc.

For more information on researching the age of buildings or properties, see the Ontario Heritage Tool Kit Guide Heritage Property Evaluation.

Part C: Other Considerations

5a. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) is considered a landmark in the local community or contains any structures or sites that are important to defining the character of the area?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has potential landmarks or defining structures and sites, for instance:

- buildings or landscape features accessible to the public or readily noticeable and widely known
- complexes of buildings
- monuments
- ruins

5b. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) has a special association with a community, person or historical event?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has a special association with a community, person or event of historic interest, for instance:

- Aboriginal sacred site
- traditional-use area
- battlefield
- birthplace of an individual of importance to the community

5c. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) contains or is part of a cultural heritage landscape?

Landscapes (which may include a combination of archaeological resources, built heritage resources and landscape elements) may be of cultural heritage value or interest to a community.

For example, an Aboriginal trail, historic road or rail corridor may have been established as a key transportation or trade route and may have been important to the early settlement of an area. Parks, designed gardens or unique landforms such as waterfalls, rock faces, caverns, or mounds are areas that may have connections to a particular event, group or belief.

For more information on Questions 5.a., 5.b. and 5.c., contact:

- Elders in Aboriginal Communities or community researchers who may have information on potential cultural heritage resources. Please note that Aboriginal traditional knowledge may be considered sensitive.
- municipal heritage committees or local heritage organizations
- Ontario Historical Society's "Heritage Directory" - for a list of historical societies and heritage organizations in the province

An internet search may find helpful resources, including:

- historical maps
- historical walking tours
- municipal heritage management plans
- cultural heritage landscape studies
- municipal cultural plans

Information specific to trails may be obtained through Ontario Trails.

STAFF INTERROGATORY # 5

INTERROGATORY

Ref: Exhibit C, Tab 1, Schedule 3, page 1

Preamble:
A Stage 1 Archaeological Assessment of the preferred and alternate routes were completed and submitted to the Ministry of Tourism, Culture, and Sport (MTCS) for review. At the time of submission of the Application, no comments had been received from the MTCS.

Questions:
a) What is the status of MTCS' review of the Stage 1 Archaeological Assessment?
b) Please provide copies of any correspondence Enbridge has received from MTCS since providing the Stage 1 Archaeological Assessment for review.

RESPONSE

a) Written confirmation of MTCS acceptance of Enbridge's submitted Stage 1 Archaeological Assessment was obtained on September 20, 2018.

b) The corresponding letter that Enbridge received from the MTCS can be seen in Attachment 1 to this response.

Ministry of Tourism, Culture and Sport

Archaeology Programs Unit
Programs and Services Branch
Culture Division
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Ontario

Sep 20, 2018

Matthew Beaudoin (P324)
Timmins Martelle Heritage Consultants Inc.
1600 Attawandaron London ON N6G 3M6

RE: Review and Entry into the Ontario Public Register of Archaeological Reports: Archaeological Assessment Report Entitled, "Stage 1 Archaeological Assessment Bathurst Reinforcement Pipeline Project Part of Lots 18-25, Concession 1 West of Younge St. and Lots 18-25, Concession 2 West of Younge St. Geographic Township of York And Part of Lot 1, Concession 2 and Lot 26, Concession 1 West of Younge St. Geographic Township of Vaughan Now the City of Toronto County of York, Ontario ", Dated May 14, 2018, Filed with MTCS Toronto Office on May 29, 2018, MTCS Project Information Form Number P324-0307-2018, MTCS File Number 0008376

Dear Dr. Beaudoin:

This office has reviewed the above-mentioned report, which has been submitted to this ministry as a condition of licensing in accordance with Part VI of the Ontario Heritage Act, R.S.O. 1990, c 0.18.[1] This review has been carried out in order to determine whether the licensed professional consultant archaeologist has met the terms and conditions of their licence, that the licensee assessed the property and documented archaeological resources using a process that accords with the 2011 Standards and Guidelines for Consultant Archaeologists set by the ministry, and that the archaeological fieldwork and report recommendations are consistent with the conservation, protection and preservation of the cultural heritage of Ontario.

The report documents the Stage 1 assessment of the study area as depicted in Maps 17-20 of the above titled report and recommends the following:

1. Betty Ann Drive to Finch Hydro Corridor
The lands within the ROW are extensively disturbed and do not retain archaeological potential. These would not require Stage 2 assessment if they are to be altered (Map 17).

2. Finch Hydro Corridor to Steeles Avenue West
The lands within the existing ROW are extensively disturbed and do not retain archaeological potential. These would not require Stage 2 assessment if they are to be altered (Map 18).

3. Betty Ann Drive to Finch Hydro Corridor
The lands within the existing ROW are extensively disturbed and do not retain archaeological potential.

These would not require Stage 2 assessment if they are to be altered (Map 19).

4. Finch Hydro Corridor to Steeles Avenue West
The lands within the ROW are extensively disturbed and do not retain archaeological potential. These would not require Stage 2 assessment if they are to be altered (Map 17).

Overall, if selected, no further archaeological work is recommended for the entirety of preferred route which is restricted to the Bathurst Street ROW, being located within disturbed lands. If the alternative route, which is restricted to the Senlac Road, Finch Avenue West, Grantbrook Street, Chelmsford Avenue, Village Green and Steeles Avenue West ROW, is selected the entire ROW is located within disturbed lands and no further archaeological work is recommended.
If the Project area is revised to incorporate lands not investigated during this study, further assessment will be required.

Based on the information contained in the report, the ministry is satisfied that the fieldwork and reporting for the archaeological assessment are consistent with the ministry's 2011 Standards and Guidelines for Consultant Archaeologists and the terms and conditions for archaeological licences. This report has been entered into the Ontario Public Register of Archaeological Reports. Please note that the ministry makes no representation or warranty as to the completeness, accuracy or quality of reports in the register.

Should you require any further information regarding this matter, please feel free to contact me.

Sincerely,

Shari Prowse
Archaeology Review Officer

cc. Archaeology Licensing Officer
Anni Buelles,Dillon Consulting Limited
Anni Buelles,Dillon Consulting Limited

[1]In no way will the ministry be liable for any harm, damages, costs, expenses, losses, claims or actions that may result: (a) if the Report(s) or its recommendations are discovered to be inaccurate, incomplete, misleading or fraudulent; or (b) from the issuance of this letter. Further measures may need to be taken in the event that additional artifacts or archaeological sites are identified or the Report(s) is otherwise found to be inaccurate, incomplete, misleading or fraudulent.

STAFF INTERROGATORY # 6

INTERROGATORY

Ref: Exhibit D, Tab 1, Schedule 2, page 1

Preamble:
The design pressure of the pipeline is reported as being 5675 kPa. This is higher than the typical design pressure of 4500 kPa reported in previous Enbridge Gas pipeline applications.[1]

Question:
Please explain why the design pressure is higher for this project than for other recent Enbridge projects.

RESPONSE

The design pressure cited in Board Staff Interrogatory #6 (Exhibit I.EGDI.STAFF.6) was included in the Application in error. Please find below an updated version of the table included within Exhibit D, Tab 1, Schedule 2.

[1] Examples include: Fenelon Falls EB-2017-0147 E/1/2/1, Scugog Island EB-2017-0261 E/1/2/1, Don River EB-2018-0108 D/1/2/1.

Pipe	Pipe - NPS 12	Units
Material	Steel	
Diameter	323.85	mm
Wall Thickness	6.4	mm
Grade	359	MPa
Specification	CSA Z245.1	
Material Toughness	CSA Z245.1	
Pipe Coating Specifications	CSA Z245.20	
Cathodic Protection	CGA OCC-1	
Cathodic Specification	Double Fusion Bond Epoxy	
Class Location	4	
Design Pressure	1200	kPa
Hoop Stress at Design Pressure	8.5% SMYS*	
Maximum Operating Pressure (MOP)	1200	kPa
Hoop Stress at MOP	8.5% SMYS*	
Minimum Cover	0.9	metre
Fittings	CSA Z245.11	
Flanges	CSA Z245.12	
Valves	CSA Z245.15	
Test Medium	Nitrogen	
Test Pressure	1700	kPa
Hoop Stress at Test Pressure	12% SMYS	

*SMYS – Specified Minimum Yield Strength

STAFF INTERROGATORY # 7

INTERROGATORY

Ref: Exhibit C, Tab 1, Schedule 3, page 1
Exhibit D, Tab 2, Schedule 1, page 1
Exhibit E, Tab 1, Schedule 1, page 2

Preamble:
The primary pipeline installation method will be via horizontal directional drill (HDD). The estimated Labour and Construction Cost is approximately $5.5 million representing approximately 80% of the project sub-total (i.e., the project cost less contingency and interest during construction). There is a 30% contingency applied to the project sub-total. The Profitability Index (PI) of the project is 0.857.

Question:
a) How many kilometres of the estimated length of the pipeline is planned to be installed by HDD?
b) Please explain how the estimate for Labour and Construction Cost was determined.
c) If the estimate for Labour and Construction Cost has been updated since the Application was filed, please provide the new estimate along with a variance explanation.
d) Please explain the need for a 30% contingency.
e) If the need for a 30% contingency was the result of uncertainties associated with the stage of planning and design the project was in at the time of the Application, please provide an updated estimate for the contingency based on the latest available information.
f) If the estimated Labour and Construction Cost and/or contingency costs have changed, please provide an updated PI.
g) Please compare the total capital cost of the project to two or more comparable projects completed by Enbridge in the last five years.

RESPONSE

a) Enbridge is still working with the City of Toronto to determine the running line and time and space requirements for the Project, as well as gathering subsurface utility information. At this time, the Company is still finalizing construction plans and cannot specify the precise proportion of the route to be installed via HDD.

b) The estimate for Labour and Construction Cost was provided by the construction contractor that will be installing the pipeline after completing a site review. No preliminary drawings, survey, or subsurface utility information was available at the

time the estimate was developed and the site review was limited to knowledge of Enbridge's existing infrastructure in the area and above grade features. The contractor visited the site and estimated crew makeup and days of construction to prepare the estimate using the rates in Enbridge's Extended Alliance Agreement. In addition to the Contractor's estimate, costs for internal and external construction support were considered based on days of construction.

c) Enbridge is still in the process of gathering subsurface utility information and working with the City of Toronto to determine the precise line location, working hours and space restrictions. At this time an updated cost estimate is not available.

d) The Contingency applied to this project conforms to Enbridge's Guidelines for a project at this stage of scope development and risk profile. At the time the estimate was prepared the project maturity level was at the screening stage and preliminary drawings were not available. The contingency funding for the project is required to cover the costs of known risks that cannot be estimated at the time the estimate is prepared including underground issues (e.g. utility conflicts, subsurface conditions such as rock and soil quality), working space requirements (e.g. major arterial road, width of right of way and congestion of utilities) and the possibility of delays due to weather. Additional project specific risks include working hour restrictions and shutdowns for events in the City of Toronto.

e) Please see response c above.

f) Please see response c above.

g) A comparison of the total capital cost of this project to two comparable projects is shown in the table provided on the following page. Costs have not been adjusted for inflation.

	City	Work Year	Pipe Size	Length	Estimated cost	Estimated cost per meter	Actual Total Costs	Actual cost per meter
Brimley - Replacement	Scarborough	2017	12" ST HP, 4" ST HP and 2" ST HP	1024	3,348,416	3,270	2,339,152	2,284
Molson, MacPherson Roxborough Replacement	Toronto	2016-2017	12" ST HP 2"PE IP	1030	3,462,783	3,362	4,722,564	4,585
Bathurst Reinforcement	North York	2019	12" ST HP, 8" ST IP	3200	9,147,651	2,859	TBD	TBD

The estimated costs for Brimley included a 25% contingency and high level costs associated to permanent restoration. Due to the City being responsible for completion restoration work it has been challenging to determine the cost that will be invoiced and when the costs will hit the project. To date, Enbridge is still receiving actuals for restoration costs which will increase the total project cost. At the completion of the execution on this project the contingency was released as it was not required, therefore reducing the actual cost significantly more than what was originally estimated.

The Brimley project scope included installation of NPS 12 SC HP main and one district station, while the Bathurst Reinforcement includes installation of NPS 12 SC HP and two district stations. While the two projects face fairly similar construction challenges, the Bathurst route is more congested and crosses larger intersections. In addition, due to the complexity of the second station installation the estimated cost per meter on the Bathurst project is slightly higher than Brimley.

Given the constructability challenges faced during the execution of Molson Macpherson Roxborough (MMR) project, the 25% contingency utilized in the estimate was insufficient. The restoration costs from the City of Toronto, combined with the complex field conditions and the utility clearance challenges resulted in the project costing more than anticipated.

The Molson Macpherson Roxborough Replacement (MMR) project utilized similar pipe specifications to the Bathurst Reinforcement project. Permanent restoration contributed to cost overruns on the MMR project. Working with the City of Toronto the restoration requirements for the Bathurst Reinforcement project are not expected to be as extensive given that other utility work will commence within the project area upon completion of the Bathurst Reinforcement project, resulting in fewer permanent repairs required. The complex Yonge Street intersection crossing required as part of

the MMR project is comparable to the potential challenges to be faced by the Bathurst Reinforcement project at the Finch and Bathurst crossing, as underground infrastructure is densely populated in those areas. As a result of this circumstance the MMR project encountered an unforeseen requirement to install the main at depths that are not standard, causing considerable cost increases. Enbridge anticipates a significantly lower cost per metre for the Bathurst Reinforcement project relative to the MMR project, as the MMR project required approximately 67 customer services to be installed while the Bathurst Reinforcement project requires none.

STAFF INTERROGATORY # 8

INTERROGATORY

Ref: Exhibit F, Tab 1, Schedule 1, page 1 Exhibit F, Tab 1, Schedule 1, Attachment 1
Exhibit F, Tab 1, Schedule 2, page 1
Exhibit F, Tab 1, Schedule 3, Attachment 1

Preamble:
According to section 97 of the Ontario Energy Board Act, 1998 (OEB Act), "In an application under section 90, 91 or 92, leave to construct shall not be granted until the applicant satisfies the Board that it has offered or will offer to each owner of land affected by the approved route or location an agreement in a form approved by the Board."

Enbridge states that the preferred route is completely within the public road allowance. Some temporary working areas may be required. Enbridge filed its form of temporary working area agreement as part of the Application.

Enbridge further states that a permanent easement is required from the Toronto and Region Conservation Authority (TRCA). Enbridge did not file its form of permanent easement agreement as part of the Application.

Questions:
a) Has the form of temporary working area agreement filed as part of the Application been previously approved by the OEB? If so, in what proceeding?
b) Please explain why a permanent easement is required from the TRCA. Also, please provide an update on easement negotiations with the TRCA.
c) Please provide a copy of the proposed form of permanent easement agreement.
d) Has the form of easement agreement Enbridge has offered (or will offer) to the TRCA been previously approved by the OEB? If so, in which proceeding?

RESPONSE

a) The form of temporary working area agreement filed has previously been approved by the OEB in the Leave to Construct Application for the Liberty Village Project (EB-2018-0096).

b) A permanent easement is not required from the TRCA as the entire project route is in the public road allowance as indicated in Exhibit F, Tab 1, Schedule 1, page 1, paragraph 2 of the Application. The evidence stating that a permanent easement

would be required from the TRCA was made in error. Given that a permanent easement will not be required Enbridge has not filed a form of permanent easement agreement in this Application.

c) Please see the answer to b) above.

d) Please see the answer to b) above.

STAFF INTERROGATORY # 9

INTERROGATORY

Ref: Exhibit C, Tab 1, Schedule 1, page 2

Preamble:
The evidence shows that more than one routing alternative was considered. However, there is no evidence that any alternatives to constructing a pipeline in the vicinity of Bathurst Street and Steeles Avenue West were considered (e.g., increasing station outlet pressures in surrounding networks, pressure elevation(s), looping the network at a different location(s), etc.).

Question:
Please identify and describe the alternatives to constructing a pipeline in the vicinity of Bathurst Street and Steeles Avenue West that were considered. Please include cost and timing estimates for each alternative. If no alternatives were considered, please explain why not.

RESPONSE

As further described in Attachment 2 for the response to SEC Interrogatory#1 (Exhibit I.EGDI.SEC.1 Attachment 2), Enbridge considered geo-targeted DSM as an alternative to the construction of the Bathurst Reinforcement Project. The Company determined that geo-targeted DSM was not viable in this instance.

STAFF INTERROGATORY # 10

INTERROGATORY

Ref: Pre-filed Evidence, page 1

Enbridge applied for leave to construct facilities under section 90(1) of the OEB Act.

Question:
OEB staff has prepared the following draft Conditions of Approval. If Enbridge does not agree to any of the draft conditions of approval noted below, please identify the specific conditions that Enbridge disagrees with and explain why.

For conditions in respect of which Enbridge would like to recommend changes, please provide the proposed changes.

RESPONSE

Enbridge has reviewed the Board staff proposed draft conditions of approval provided as Attachment 1 to this response and does not have any concerns or comments. All conditions as set out by the Ontario Energy Board will be adhered to by Enbridge.

Draft
Leave to Construct Conditions of Approval
Application under Section 90 of the OEB Act
Enbridge Gas Distribution Inc.
EB-2018-0097

1. Enbridge Gas Distribution Inc. (Enbridge) shall construct the facilities and restore the land in accordance with the OEB's Decision and Order in EB-2018-0097 and these Conditions of Approval.

2. (a) Authorization for leave to construct shall terminate 18 months after the decision is issued, unless construction has commenced prior to that date.

   (b) Enbridge shall give the OEB notice in writing:

   i. Of the commencement of construction, at least ten days prior to the date construction commences

   ii. Of the planned in-service date, at least ten days prior to the date the facilities go into service

   iii. Of the date on which construction was completed, no later than 10 days following the completion of construction

   iv. of the in-service date, no later than 10 days after the facilities go into service

3. Enbridge shall implement all the recommendations of the Environmental Report filed in the proceeding, and all the recommendations and directives identified by the Ontario Pipeline Coordinating Committee review.

4. Enbridge shall advise the OEB of any proposed change to OEB-approved construction or restoration procedures. Except in an emergency, Enbridge shall not make any such change without prior notice to and written approval of the OEB. In the event of an emergency, the OEB shall be informed immediately after the fact.

5. Concurrent with the final monitoring report referred to in Condition 6(b), Enbridge shall file a Post Construction Financial Report, which shall indicate the actual capital costs of the project and shall provide an explanation for any significant variances from the cost estimates filed in this proceeding. Enbridge shall also file a copy of the Post Construction Financial Report in the proceeding where the actual capital costs of the project are proposed to be included in rate base or any proceeding where Enbridge proposes to start collecting revenues associated with the

project, whichever is earlier.

6. Both during and after construction, Enbridge shall monitor the impacts of construction, and shall file with the OEB one paper copy and one electronic (searchable PDF) version of each of the following reports:

a) a post construction report, within three months of the in-service date, which shall:

i. Provide a certification, by a senior executive of the company, of Enbridge's adherence to Condition 1

ii. Describe any impacts and outstanding concerns identified during construction

iii. Describe the actions taken or planned to be taken to prevent or mitigate any identified impacts of construction

iv. Include a log of all complaints received by Enbridge, including the date/time the complaint was received, a description of the complaint, any actions taken to address the complaint, the rationale for taking such actions

v. Provide a certification, by a senior executive of the company, that the company has obtained all other approvals, permits, licences, and certificates required to construct, operate and maintain the proposed project

b) a final monitoring report, no later than fifteen months after the in-service date, or, where the deadline falls between December 1 and May 31, the following June 1, which shall:

i. Provide a certification, by a senior executive of the company, of Enbridge's adherence to Condition 3

ii. Describe the condition of any rehabilitated land

iii. Describe the effectiveness of any actions taken to prevent or mitigate any identified impacts of construction

iv. Include the results of analyses and monitoring programs and any recommendations arising therefrom

v. Include a log of all complaints received by Enbridge, including the date/time the complaint was received, a description of the complaint, any actions taken to address the complaint, the rationale for taking such actions

SEC INTERROGATORY # 1

INTERROGATORY

Ref: General

Question:
Please provide copies of all reports, memoranda, analyses, emails or other documents of any type that have as their subject, or one of their subjects, the replacement or deferral of the Bathurst Reinforcement Project by DSM, whether general DSM programs, targeted load reduction programs, or otherwise.

RESPONSE

Please find at Attachment 1 the joint Enbridge / UG IRP Study prepared by ICF Canada dated January 2018. This study was filed with the Ontario Energy Board during the EB-2017-0128 DSM Mid-term review at Appendix D of the Company's submission. The material pertaining to the Bathurst St LTC project can be found in Section 6.4.2 Community Reinforcement, Page 32 of 49.

Included as Attachment 2, is an internal briefing dated May 2018, prepared by the Enbridge IRP Working group to Enbridge senior management detailing the changes in the Bathurst St project subsequent to the information provided to ICF. The growth information provided to ICF was originally the best available information at the time and was based on 2016 projections and included Hemson growth forecasts. The project was revised to utilize updated localized and current growth forecasts.

Natural Gas Integrated Resource Planning: Initial Assessment of the Potential to Employ Targeted DSM to Influence Future Natural Gas Infrastructure Investment

Executive Summary

January 2018

Submitted to:
Enbridge Gas Distribution, Inc. & Union Gas Limited

Submitted by:
ICF Canada
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ICF Disclaimer

No warranty or representation is made by the author of this report concerning the projections made herein. The author of this publication has assumed that the information, records and materials furnished by the Utilities and others are correct without any independent verification. In the opinion of the authors, the projections made herein are accurately calculated based upon historical and surveyed information in addition to the information, records and materials furnished to the author, and assuming that the defined critical key assumptions are realized. The projections are not intended to be and should not be understood to be any representation or warranty that the projections will occur as set forth herein and it is likely that the actual performance described will differ from, exceed or be less than, the amounts projected. Possession of this report or any portion thereof does not carry the right of publication. The author's liability for breach of any obligation or duty owed to the client for any element of this report is expressly limited to repayment of the consultant's fee for that element without any obligation or liability for consequential, compensatory or incidental damages.

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Executive Summary

1. Introduction, Scope and General Conclusions

1.1 Introduction

Integrated Resource Planning ("IRP"), has been considered in the regulatory environment in Ontario since the early 1990s. Between 1995 and the present, the gas utilities in Ontario have engaged in Demand Side Management ("DSM") activities which have generated significant natural gas savings across all rate classes as well as likely provided passive infrastructure investment savings by reducing demand in a broad based context.

Recently, the role of geo-targeted DSM programs in the infrastructure planning process was raised during the EB-2012-0451 proceeding as part of the review of the Enbridge GTA Reinforcement Project. The Board followed up on this question in the 2015-2020 DSM Framework issued by the Board on December 22, 2014. In this decision, the Board directed 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".[1]

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".[1]

Enbridge included a proposed study scope in EB-2015-0049. The study scope was designed to evaluate the potential to use DSM to avoid or defer (reduce) infrastructure costs through implementation of broad based or geo-targeted DSM programs to meet the forecasted hourly peak energy demand, consistent with the primary goals and principles of facilities planning, to provide reliable natural gas service with reasonable costs.

The study scope was reviewed by intervenors and ultimately approved by the Board in the DSM Multi-Year decision. Enbridge Gas Distribution and Union Gas Limited ("the Gas Utilities") jointly engaged ICF to conduct this study.

This executive summary provides an overview of the primary considerations and conclusions reached by ICF during the course of the study.

[1] OEB, Report of the Board: Demand Side Management Framework for Natural Gas Distributors (2015-2020), pg. 36, Dec. 22, 2014, available at: https://www.oeb.ca/sites/default/files/uploads/Report_Demand_Side_Management_Framework_20141222.pdf

1.2 Overview of Study Scope

Given the ultimate goal of identifying a process to ensure that DSM is considered as an option to avoid, defer or reduce ("reduce") infrastructure investment costs, the study attempted to identify the barriers to using DSM as an option, and to propose processes to address and overcome these barriers.

The scope of the study included the following items:

1. ***Review of Industry Experience*:** ICF conducted a literature review in which it evaluated how other leading utilities address issues related to broad-based DSM and distribution infrastructure planning and issues related to the impact of DSM programs on sub-division and new community planning. ICF also reached out to and interviewed leading North American utilities identified as having experience working on integrated resource plans
2. ***Assessment of DSM Impacts on Peak Hour and Peak Period Requirements*:** ICF leveraged the results of the 2016 OEB Conservation Potential Study (CPS) and developed load profiles and hours use factors to estimate the winter peak period demand breakdown and the achievable winter hourly peak demand reduction from DSM for the Gas Utilities. ICF also developed DSM supply curves to assess the costs of DSM implementation against the demand saving impacts.
3. ***Application of DSM Supply Curves to Facility Investments*:** ICF leveraged the results of the DSM impacts analysis to understand the potential of DSM programs to defer infrastructure investments (i.e. delay the need for additional capacity for new construction and reinforcements projects). As part of this step in the process, ICF worked with utility staff to identify appropriate hypothetical case studies based on specific examples of utility infrastructure investments. Information from these case studies that fed into the analysis included project costs, current and forecasted capacity requirements, and the distribution of energy consumption by facility type. The DSM supply curves developed in step 2 were used to compare the costs of peak demand reduction through the implementation of DSM against infrastructure project costs.
4. ***External Review and Stakeholder Engagements*:** Throughout the IRP study, ICF and the Gas Utilities consulted with a Study Advisory Group (SAG) in order to gain insights on IRP processes for similar utilities and to discuss the study approach and findings. The SAG was made up of members from other North American gas utilities, the Independent Electricity System Operator (IESO), the academic community, as well as an observer from the Ontario Energy Board Staff. The study has benefited from the hands-on experience of staff in other organizations that have undertaken system-wide Resource Planning. This external review has brought a broad perspective to the study and helped to ensure the quality of the study across the several specialized fields involved.
5. ***Transition Plan*:** The OEB directed Enbridge and Union to work jointly on the preparation of a proposed transition plan that outlines how to include DSM as part of future infrastructure planning activities within the Utility Planning Process. This ICF study provided critical insights used by the Gas Utilities during the development of the Utilities' Transition Plan. The Transition Plan will be filed with the OEB by the Gas Utilities as a companion document to this report.

1.3 Study Highlights

ICF's review of existing DSM programs at North American gas utilities in other jurisdictions found that little to no activity has been undertaken to directly reduce transmission and distribution costs using targeted DSM and Demand Response (DR). In addition, ICF found that the measured data on hourly natural gas consumption necessary to determine the potential impacts of DSM on new facilities requirements is generally unavailable.

ICF also assessed activity in the electric power industry. However, differences in utility cost structure, duration of peak period requirements, and availability of data on DSM impacts lead ICF to the conclusion that geo-targeted DSM programs are likely to be more cost-effective for the electric industry than they are for the natural gas industry, and that the electric industry experience provides only relatively limited value as an example for the gas industry.

Due to the lack of industry experience, and the lack of measured data on DSM peak period load impacts, ICF conducted most of the research into the potential for DSM to impact infrastructure requirements by extrapolating existing data on DSM program impacts from annual data to peak hourly period data based on building modeling, and other theoretical analysis. While ICF views the analysis as robust, there remains significant uncertainty, particularly on the cost and reliability of using DSM to reduce infrastructure investment. Hence, our conclusions should be treated as preliminary until additional research is completed.

1.3.1 Highlights

A more detailed discussion of ICF's general conclusions from this study are reviewed in Section eight of this executive summary. Highlights from the study are summarized below.

1. ***Based on ICF's initial assessment of the potential to reduce peak hour demand using DSM, it appears possible that some infrastructure investments may be reduced through the use of targeted DSM***.

    a. While there is little to no measured data on actual peak hour impacts of DSM programs, ICF's analysis indicates that many, but not all, DSM measures should be expected to have measurable impacts on peak hour natural gas demand.[2]

    b. ICF's analysis suggests that geo-targeted DSM programs would have the potential to offset demand growth by up to about 1.24 percent per year, before consideration of DSM program and measure costs.

    c. Opportunities to reduce facilities investments through the use of geo-targeted DSM are likely to be limited due to the cost of geo- targeted DSM programs relative to the cost of the infrastructure, as well as the maximum penetration rate of DSM programs, which appears likely to be lower than the rate of growth in areas where a significant share of new infrastructure projects are indicated.

[2] The clearest example is the inclusion of adaptive thermostats in DSM programs, which account for a significant amount of potential annual energy savings available through DSM programs, but appear likely to increase peak period infrastructure requirements.

2. ***ICF's review indicates that changes in Ontario energy policy and utility regulatory structure would be necessary to facilitate the use of DSM to reduce infrastructure investments.*** These include:

   a. Cost recovery guidelines for overlapping DSM and facilities planning and implementation costs, and criteria for addressing DSM impact risks.

   b. Approval to invest in, and recover the costs of the Advanced Metering Infrastructure (AMI) necessary to collect hourly data on the impacts of DSM programs and measures.

   c. Changes in the approval process for DSM programs to be consistent with the longer time frame associated with facilities planning.

   d. Clarification on the allocation of risk associated with DSM programs that might or might not successfully reduce facilities investments.

   e. Guidance on cross subsidization and customer discriminations inherent in geo-targeted DSM programs that do not provide similar opportunities to all customers.

   f. Guidance on how to treat conflicts between DSM programs designed primarily to reduce investment in new infrastructure and DSM programs designed to reduce carbon emissions or improve energy efficiency.

   g. Guidance on how to treat uncertainty associated with energy efficiency programs outside the control of the Utilities that impact peak period demand.

3. ***ICF's review indicates that changes in utility planning processes would be necessary to facilitate the use of DSM to reduce infrastructure investment.***

   a. Facilities planning is based on an avoidance of risk due to the potential consequences associated with the lack of necessary infrastructure, while DSM program design does not generally need to address similar concerns. The differences in risk profiles create significant challenges in incorporating DSM programs into the facilities planning process.

   b. Geo-targeted DSM programs will need to be implemented during the early stages of the facilities planning cycle in order to maximize the impact of the geo-targeted DSM programs and to facilitate risk management if the DSM programs do not meet objectives.

   c. Other differences between the DSM and facilities planning process within the utilities that must be reconciled include differences in asset lifetimes, cost-effectiveness criteria, and program assessment and planning timeframes.

1.3.2 Recommendations for Additional Analysis

Overall, there is currently a fundamental disconnect between the limited risk acceptable to the Utilities in the facilities planning process and the lack of information on the ability of DSM to reliably reduce peak period demand that will need to be addressed before the Utilities would be able to rely on DSM to reduce infrastructure investment:

- The lack of measured data on the actual impacts of DSM measures on peak period demand increases the risk (hence the cost) of using DSM to reduce infrastructure investments.

- The lack of reliable program implementation cost data for geo-targeted DSM programs makes accurate cost comparisons between facilities and DSM unavailable.
- The maximum market penetration rate for geo-targeted DSM programs limits the number of infrastructure projects where geo-targeted DSM programs should be considered as an alternative to infrastructure projects to low growth market areas.

As a result, additional research and additional hourly data by way of additional metered hourly reads (i.e. automated meter reading or infrastructure installation (AMI), as well as pilot studies to determine the cost effectiveness and implementation potential of DSM programs are necessary before the Gas Utilities would be able to rely on DSM to reduce new infrastructure investments as part of the standard facilities planning process.

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2. Review of Industry Experience

ICF conducted a literature and best practices review process in which it evaluated how other leading North American utilities address issues related to DSM and facilities planning, and issues related to the impact of DSM programs on sub-division and new community planning. The following subsections discuss other gas utility experiences using DSM to defer infrastructure investments and the differences found between natural gas and electric utilities' planning processes.

2.1 Utility Experience Using DSM to Defer Infrastructure Investments

As part of the review of the potential for DSM to reduce the need for infrastructure investment, ICF conducted a literature and best practices review across many North American jurisdictions to assess the state of the industry. The review focused on experience using DSM and demand response (DR) programs to reduce the need for infrastructure investment. ICF also included a review of the electric utility experience utilizing energy efficiency[3] and DR in the facilities planning process.

Based on a review of the state of the industry, there is no relevant precedent for, or evidence of natural gas utilities consideration of the impact of broad based DSM, geo-targeted DSM or dedicated DR programs impact on facilities planning. Further, while electric utilities have used DSM and DR programs to reduce the need for new generating capacity and transmission capacity for many years, there is only relatively limited experience deferring distribution system infrastructure.

ICF's review of existing energy efficiency programs at other North American gas utilities found that several other natural gas utilities have started looking into the potential impact of DSM programs on system infrastructure requirements. However, these efforts remain in the very early stages. As such, there has been much less progress on the gas side as compared with the electric power industry. Furthermore, ICF did not identify a natural gas utility in any other jurisdiction that is currently using geo-targeted DSM programs to actively avoid investing in infrastructure in specific areas. In fact, of the utilities ICF spoke to, only NW Natural Gas is planning a geo-targeted DSM program, which they are planning to implement through a pilot study.

ICF was also unable to identify any natural gas utilities outside of Ontario that explicitly consider the impact of DSM programs on peak hour or peak day demand. Rather, savings from DSM programs were found to be focused on annual savings and impacts of DSM on infrastructure planning are assessed as annual demand reductions, rather than the peak hour or peak day requirements that drive the facilities planning process.

Gas utilities in other jurisdictions expressed concerns about the reliability of the DSM impacts as an infrastructure investment alternative due to the lack of information, and metered data on the

[3] Electric utilities in Ontario refer to energy efficiency as Conservation and Demand Management (CDM) but energy efficiency is typically referred to as Demand Side Management (DSM) by most electric and gas utilities across North America (i.e. including the natural gas utilities in Ontario). For purposes of this report, all traditional annually focused DSM is referred to as energy efficiency or DSM, whether pertaining to electricity or natural gas. The terms have been used interchangeably.

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impacts of DSM on peak hourly demand. This is compounded by the fact that peak savings for DSM programs have not previously been tracked, although some jurisdictions are beginning to address this. For instance, Energy Trust of Oregon is tracking peak hour savings from DSM on behalf of NW Natural and Questar Gas was asked to consider the peak hour impacts of DSM measures such as tankless water heaters. Questar Gas is developing a framework to consider positive and negative peak impacts due to DSM.

ICF's review of gas industry DSM plans indicated that the estimated costs of peak day gas supply are commonly included in the avoided cost estimates used to assess the value of DSM programs. DSM is expected to reduce peak day requirements, leading to reduced need for peak day gas supply resources. Furthermore, avoided costs used to value DSM programs generally include estimates for infrastructure investment costs. These adders to the avoided costs are specific to the region in which the natural gas utility conducts business. Although they are appropriate for passive system-wide deferral from non-targeted DSM, they are generally small relative to the total avoided cost. ICF's review also found that, while the value of infrastructure investment is typically considered in the cost-effectiveness tests of DSM programs, the impact is not based on the assessment of individual infrastructure projects.

Planning staff at the utilities with whom ICF spoke expressed concerns related to leveraging DSM to defer infrastructure investments. Most of the concerns were related to the following items:

- **Reliability:** The reliability of peak hour reductions due to DSM investments
- **Lack of metered data:** Most utilities are able to identify peak hourly data only at a system gate station level and further granularity is limited. Advanced metering would be required in order to substantiate peak hour reductions from geo-targeted IRP. Questar and NWNG noted that they are considering additional metering as part of their work in the area.
- **Changing lead times for projects:** Planning staff from the other utilities indicated that a minimum lead time of 5 years is required to incorporate geo-targeted DSM. They noted that large customers can have disproportionate impacts on the demand on a network and the timing for additional capacity requirements.
- **Principle of universality:** This concern was related to not offering the same programs across the entire service territory and the correct funding mechanism to use in this scenario. The other gas utilities noted the concern about the possibility for unequal treatment in different income classes, as the largest peak hour savings will accrue to larger homes and it may not be economic to provide the same benefits to lower income residences.

2.2 Differences between Electric and Natural Gas Utilities

Electric utilities have been using Demand Side Management and Demand Response (referred to in Ontario by electric utilities as Conservation & Demand Management or "CDM") programs to reduce the need for new generating capacity and transmission capacity for many years. However, the electric industry has relatively limited experience with DSM to defer distribution system infrastructure. Like natural gas DSM, most electric utility DSM programs are focused on

reducing annual consumption. Where the electric utilities use DSM to offset infrastructure investment, the focus is generally on power generation capacity, or incremental transmission capacity into the company's service territory, rather than the impact on electricity distribution infrastructure. While interest in using DSM or DR to impact electricity distribution infrastructure has been increasing, so far, the information on the effectiveness of the programs has been limited.

Some concepts used for electric transmission and distribution ("T&D") facilities deferral in the IRP process can be applied to natural gas utilities. However there are some important differences between electric and gas infrastructure planning processes that need to be accounted for when trying to draw parallels between the electric industry approach to IRP and gas utilities approach. These differences include:

- **Facilities Planning Requirements:** Electricity facilities are designed to meet instantaneous peak requirements, while gas facilities are designed to meet hourly (distribution infrastructure) and hourly and daily (transmission infrastructure), and daily (gas supply) requirements.[4] These differences in planning time of day tend to increase the value of reductions in peak demand for the electric industry relative to the gas industry, which makes targeted DSM and DR programs more valuable for the electric industry than for the natural gas industry.
- **Cost Structure:** Gas facilities are typically less expensive than electric facilities per equivalent amount of energy delivered (GJ of delivered energy) for a given level of peak energy demand (peak GJ of delivered energy). As a result, utility facility costs typically make up a lower percentage of the typical customer gas bill than for their electric bill. This ultimately leads to the savings associated with a reduction in gas utility infrastructure tending to be lower than the savings available to the electric industry.
- **System Outage Risk:** Electric systems are designed with an acceptable level of system outage risk, while gas systems are designed with a higher degree of reliability. The reliability standard required for the natural gas system is discussed in more detail in the review of the facility planning process section. The higher degree of reliability required by the gas industry, with minimal risk tolerance for outages and increased costs to restart systems should outages occur, increases the costs associated with monitoring and evaluating the impacts of Geo-Targeted DSM programs targeted at avoiding or deferring infrastructure investments, and increases the risks of non-performance

[4] The peak demand period for facilities planning used in our analysis is the peak hour, which typically occurs during the morning period. For planning purposes, the peak period demand is projected based on extreme weather conditions, which typically occur on the coldest anticipated winter day, or design day. The duration of the peak period considered in the planning process depends on the type of infrastructure being evaluated. For individual service connections, the peak period used to size the service connection should be sufficient to meet the maximum customer demand. For certain distribution infrastructure projects serving a limited number of customers, the peak period used for facilities planning may need to be as short as 15 to 30 minutes, while larger transmission assets may be planned based on a longer time frame, potential a 24 hour design day.

associated with the DSM programs, and places utmost importance on ensuring savings can be realized and capacity requirements met without reinforcement.

- **Resource Planning**: Electric utilities must either acquire power and capacity from the market or produce their own. An electric utility IRP contains a review and assessment of the trade-offs between various generation and electricity purchase options. Gas utilities, in contrast, only acquire resources from the market. A natural gas IRP's purpose is to assess energy delivery infrastructure requirements needed to deliver gas to end-use customers.
- **Peak Hour Data Availability**: The need to measure peak hour electricity demand has resulted in the availability of electric "smart" meters that record data on a substantially more granular flow level than current natural gas meters. As a result, detailed data on peak hour demand at the individual customer level is available for the electric industry, and subsequently allows for assurances through data that savings will be realized. Most gas utilities customer meters are read every other month.

The differences between the electric system and the natural gas system reduce the cost-effectiveness of DSM as an alternative to new infrastructure for natural gas utilities relative to electric utilities. The electric industry can achieve greater infrastructure cost savings from similar DSM and DR measures, due to the higher cost structure of the industry. The difference in risk tolerance between the industries, for capacity shortage, also increases the attractiveness of DSM and DR for infrastructure deferral and avoidance in the electric industry relative to the natural gas industry.

In addition, the use of DSM in the electric industry to reduce capacity requirements, and the ability to accurately measure peak demand has resulted in a better understanding of the impact of DSM on peak requirements in the electric industry than in the natural gas industry. This difference reduces the risk to the electric industry associated with the reliance on DSM to displace electricity infrastructure relative to the risk to the gas industry of relying on DSM to reduce the need for natural gas infrastructure. Until the gas industry invests in advanced metering technology, it will be challenging for the gas utilities to measure the impacts of DSM programs on baseline peak hour demand.

As a result, geo-targeted DSM programs are likely to be more cost-effective for the electric industry than they are for the natural gas industry.

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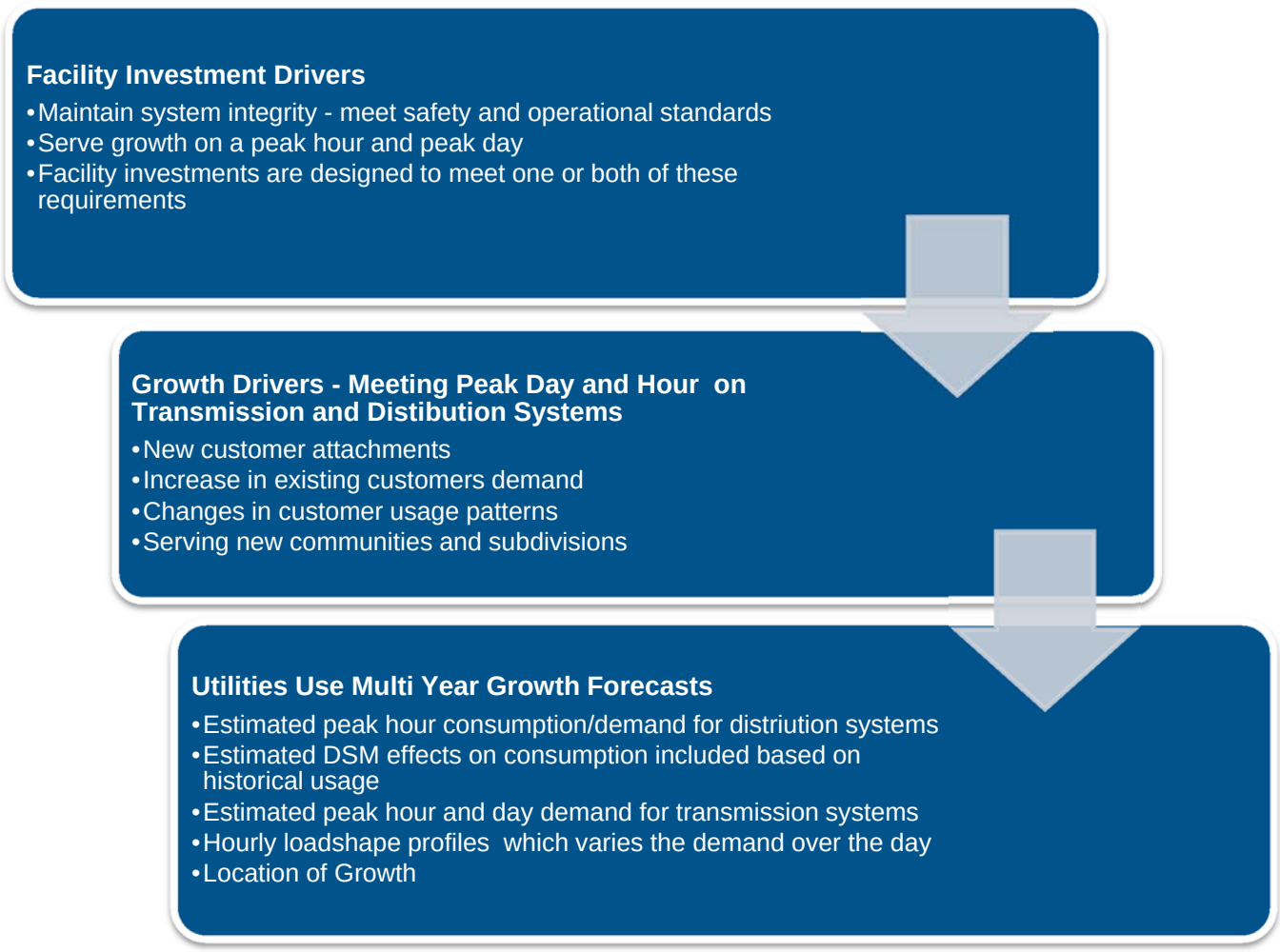
3. Overview of Natural Gas Facility Planning

The following exhibit provides an overview of the natural gas facility planning process. Key items are discussed in more detail in the following sections.

Exhibit 1: Overview of the Facilities Planning Process



3.1 Facilities Planning Principles

Facility investment plans are based on a long term growth forecast intended to identify potential incremental facility requirements and to develop these plans prior to the need for new facilities. ***The primarily goal of facilities planning is to ensure that the utility infrastructure is of sufficient size and at the appropriate/required time to provide reliable natural gas service at the design condition*** consistent with reasonable costs.

Facilities investments are required for a variety of reasons; although all investments are predicated on the need to reliably serve system demands at the required customer delivery pressure at the design degree day. Individual facility investments may be required to:

- Maintain system integrity, including the relocation and replacement of existing facilities that no longer meet current class location, safety and operational standards as determined by other engineering criteria.

- Serve growth in peak hourly and peak daily demand on existing systems resulting from attaching new customers, growth in existing customer requirements, and changes in customer usage patterns
- Serve new communities, new subdivisions and main extensions to unserved locations

Often, facilities investment projects are designed to accomplish more than one of these requirements.

Currently, the Gas Utilities develop facility investment plans with multiple-year demand forecasts. The facilities planning process for distribution systems require the estimation of peak hour consumption for each year in the planning forecast. The facilities planning process for transmission facilities requires forecasting of both peak hour and peak daily demand, with an hourly loadshape (profile) that varies the demand for gas over the day.

Historical gas use is used as a base to predict future consumption. The planning process includes changes in gas use resulting from historical implementation of DSM measures, as well as other factors such as improved building codes, and higher energy efficiency standards for natural gas equipment. However the facilities plans do not factor in DSM program effects on future peak day or peak hour demand.

The facilities planning process is designed to allow the utilities to proceed with planned investments, or accelerate/defer/revise planned investments depending on how closely customer attachment rates and demand growth match the forecast.

3.2 Facilities Investment Plan Schedules

Facility investment plans consider a multi-year forecast of system growth, as well as known replacement and relocations. The plans are reviewed annually to reflect changes in outlook, and updated as needed, to reflect changes in the forecast and as growth becomes more certain. A typical facilities investment plan begins by identifying the expected need for additional capacity about five years prior to the time that the capacity is likely to be required. No capital would be committed at this point. Between three and five years, the forecasts of demand growth are refined, projects with the potential to meet the requirement are identified, capital budgets are developed, and small initial investments are made for engineering, environmental assessments and design. During the period between one and three years prior to the identified need, the project is fully specified, the detailed capital budget is identified, and the gas utility submits for leave to construct. During this period, significant costs are incurred by the gas utility to finalize the engineering, begin land acquisition, go through the leave to construct process, and go through the required permitting and regulatory processes. The facility is built in the final year after the leave to construct is approved by the Board.

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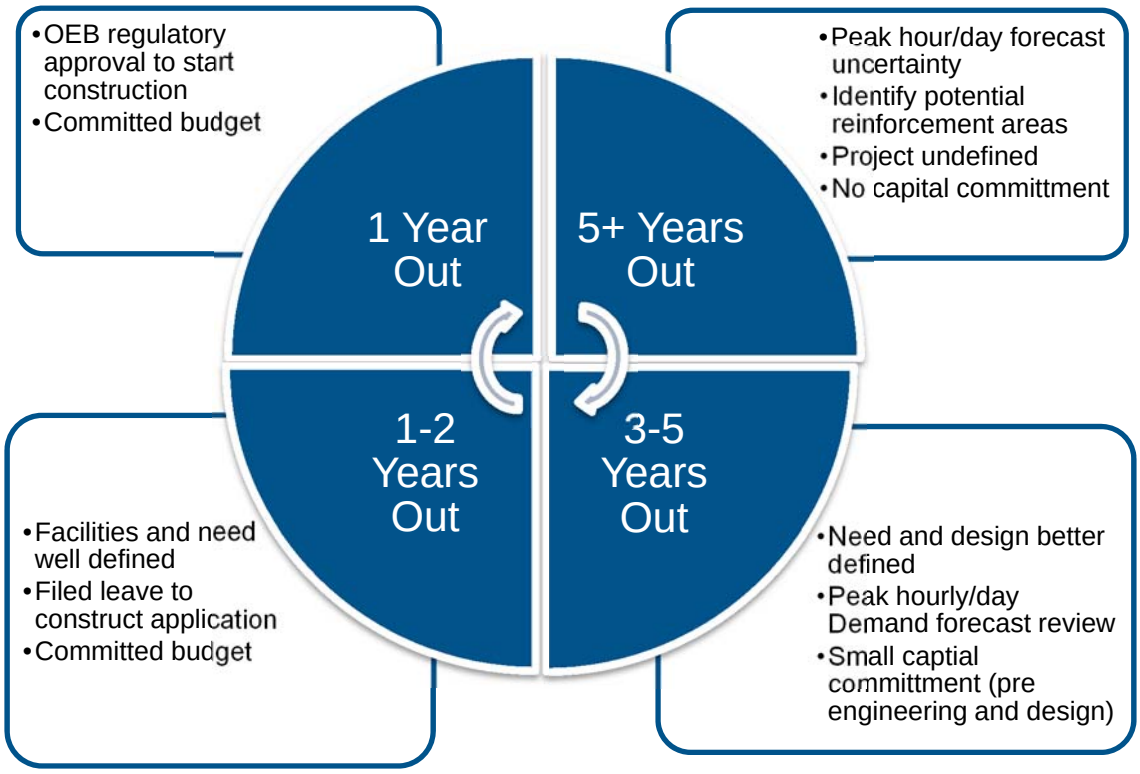
Exhibit 2: Facilities Planning Timeline



3.3 Consequences of Insufficient Facilities

Natural gas pipeline systems are designed to serve customer requirements during “design day” conditions. The planning design day is typically based on the coldest winter conditions deemed likely to occur. Under these cold weather conditions, the utility would likely curtail deliveries to interruptible customers consistent with the terms of the contracts signed by these customers.

In the event that the facilities in place are insufficient to be able to deliver the required demand on the design day, the utility will not be able to serve firm customer demand. The utility may not be able to react quickly enough to avoid unplanned customer outages. If there is time, the utility might call force majeure on large volume or power generator customers and / or may choose to shut down entire sections of the distribution system. The curtailment of firm large volume customers would create significant negative economic issues for the affected customers especially if critical equipment is damaged. Shutting power generators could cause broader issues, such as widespread electricity system outages.

If system operating pressure falls below minimum customer requirements, there may be widespread uncontrolled outages. These outages are difficult for utilities to predict and manage. Firstly, these locations need to be identified and isolated by valves from the operating portion of the system. The utility has to physically shut off each customer’s gas meter, and then the affected system needs to be purged of air, if a loss of containment has occurred. Once this is completed, the utility must physically turn on each gas meter and then enter the customers building to inspect and relight each gas appliance at incremental cost. Unlike an electric utility where the system typically re-energizes itself almost immediately after the issue causing the

loss of power is resolved, a gas system large scale relight would be expected to take weeks rather than days or hours to resolve. Insufficient infrastructure would lead to a system shut down during the coldest part of the winter, leaving residential and commercial customers without heat during dangerously cold weather. Utilities likely would need to enact emergency plans and would need hundreds of personnel to relight customers. Community emergency plans may need to be activated to move people into warming centers and provide food.

3.4 Forecast of Peak Day and Peak Hour Demand

The facilities planning process for a pipeline system requires the estimation of peak hour and peak day consumption for each year in the planning forecast, as well as an hourly load shape (profile). There are three main customer types in this planning process:

1. **Firm Contract Customers**: Large volume Commercial and Industrial customers which have contracts obligating the utility to provide the customers required hourly and daily firm delivery service. The firm contract customers have hourly and daily gas measurements which increase the accuracy of the estimated customer peak usage.
2. **Interruptible Contract Customers**: Large volume Commercial and Industrial customers which have some or all of their gas requirements contracted as interruptible service. These customers' contracts can include a fixed number of days the utility can call interruptions and require the customer to shut down gas usage. These customers often have alternate fuel capability and switch fuel use from natural gas to the alternative fuel, (which may have a higher GHG or air quality impact), or can shut down processes when called to interrupt by the utility. These customers could be curtailed under design conditions and transmission facilities are not normally installed to maintain service to these customers on design day.

   The Gas Utilities do consider interruptible load in the facilities planning process as they have to ensure that the pipeline systems can accommodate those interruptible volumes during off peak times. Since there may be a fixed number of days where the utility can call interruptions, there may be cases where the pipeline systems need reinforcement to comply with the contracts for these customers.
3. **General Service Firm Customers**: These customers include residential and small commercial and industrial firm service customers. Existing general service customers are assumed to behave in a manner consistent with their recent 24 month weather adjusted consumption behavior. The monthly billing history of each customer is examined and statistical relationships are fit to determine monthly consumption as a function of monthly heating degree days. The utilities use this process to estimate the peak day demand for existing customers at the design degree day.

   Customer usage of gas varies throughout the day and the peak gas usage occurs in the morning hours between 7 and 9 am. The usage is highest during this period as most people start their day at similar times. The highest co-incidence of furnace, hot water and other gas use occurs in the morning.

The facilities planning process forecasts new customer attachments and changes in per customer requirements. New customers are modeled based on a typical average for new customers within each "customer class" (for example a large single-family detached house). The

count of new customers is based on historical connection rates plus what is known about specific new large buildings and housing developments.

While the use per customer data that is utilized to project consumption per existing and new customer takes into account recent historical trends, including the impacts from historical energy efficiency efforts, the planning process does not explicitly factor in the impact of future DSM programs on peak day or peak hour consumption.

3.5 Sizing of Incremental Facility Investments

One of the challenges with developing new facility investment projects is determining the future demand and the location of the demand. Economic development, location of new housing developments, and customer types are all difficult to forecast with certainty, creating a range in future demand growth that must be planned for.

There are significant economies of scale associated with the construction of facility investment projects. The cost of the incremental unit of capacity declines as the size of the project increases due to efficiencies in planning, right-of-way and easement availability, mobilization costs, and labor and materials costs.

If the project proves to be undersized relative to future system growth, additional facility investment projects are likely to be much more expensive than increasing the size of the initial project. As a result, the utility, and the utility's customers have a significant economic incentive to plan based on upside uncertainty in the forecast rather than downside uncertainty.

New infrastructure projects can also result in significant disruptions to streets and communities that the projects pass through, leading to a strong incentive to be "one and done" with any project or group of projects. As a result, the timing of facilities investments can be influenced by factors outside the control of the Gas Utilities. In order to be "one and done" investments can be accelerated or delayed to correspond with municipal development schedules related to infrastructure projects such as bridge repair and replacement, road construction or water and sewer repairs and extensions.

The desire to take advantage of other infrastructure projects and the need to minimize community disruptions can lead to upsizing or accelerating facility investments for projects where future expansions would be particularly disruptive or expensive, and may make deferral of some gas infrastructure projects impractical despite the potential for geo-targeted DSM to reduce demand.

3.6 Impact of Reductions in Forecast Demand Growth

Reductions in forecast demand growth can impact facility investment plans in several ways. Generally, a reduction in peak hour load will result in decreased facility investment plans. The change in infrastructure requirements can result in:

- Delay or cancellation of project implementation.
- Decreased diameter of the pipeline.
- Decreased length of pipeline looping to be installed.

For many projects, the amount of capacity added is determined in part by the length of the pipeline project. Growth in a specific location can often be served by a project that eliminates constraints between a supply point and the region with expected demand growth. This rarely requires the construction of an additional pipeline from the supply point all the way to the location of the demand growth. Instead, the incremental capacity can be provided by adding sections of pipe on the most constrained section of the system. Hence, reducing hourly demand growth could also reduce the need for specific sections of new pipe.

4. Differences between Facilities and DSM Planning Criteria and Approach

While DSM programs do broadly impact facilities requirements, and the cost savings associated with a broad based reduction in distribution costs are generally included in the DSM planning process, the linkages between DSM planning and facilities planning are currently passive rather than active, and are not sufficient to actively integrate geo-targeted DSM programs into the facilities planning process. There are a number of differences between the DSM and facilities planning process that must be reconciled in order to potentially use geo-targeted DSM to reduce infrastructure investments. The most important are summarized below.

4.1 Differences in Risk and Reliability Criteria

Perhaps the most challenging difference to address between the current DSM and facilities planning processes is the difference in risk and reliability criteria.

- The primarily goal of the facilities planning process is to ensure the utility distribution system is sized sufficient to ensure that demand will not exceed the system capacity at design conditions. As a result, the facilities planning process is based on a primary philosophy of risk avoidance.
- The primary goals of the DSM program planning process are to reduce annual natural gas consumption and to influence a culture of conservation. DSM success has several metrics but often is evaluated based on program participation rates rather than measurement of actual savings. Risk is inherent in DSM planning and implementation, in part to encourage innovation in program delivery and increase program uptake.

The use of geo-targeted DSM programs to reduce the need for infrastructure projects changes the balance of risk for the DSM program. For a DSM program to be relied upon as an alternative to a new infrastructure investment, it would need to satisfy the same risk criteria as the infrastructure investment that it is replacing. As highlighted in Section 3.3, the facilities planning process risks are not just financial; there are also potential gas system outages if there are insufficient facilities. This is a risk that is not present for standard DSM programs, where the associated risks are strictly financial. As a result, if a geo-targeted DSM program designed to reduce infrastructure investment is non-performing and fails to deliver the expected savings, or if the savings appear to be uncertain during the evaluation phase, the utility will be required to proceed with the infrastructure project in order to ensure the same level of overall system reliability. This would lead to an increase in the overall cost of serving the load growth, as both the DSM costs and the infrastructure costs would need to be recovered. In addition, the infrastructure project may need to be accelerated in order to meet the need, resulting in higher than anticipated or originally budgeted project costs.

4.2 Coordinating Facilities and DSM Planning Timelines for Geo-Targeted DSM Programs

On an operational basis, the DSM planning process operates on a relatively short time-frame. The program planning schedule depends on the type of program, assuming that the program is being implemented in the current DSM framework, and that the policy issues as described in

Section 7 are settled and an appropriate framework is developed. The range of timing from decision on whether or not a program should be implemented to actual implementation ranges from 3 to 12 months. Hence, excluding any regulatory approval delays, the Gas Utilities could be able to implement a new geo-targeted DSM program within 12-18 months of the decision to proceed. This is recognizing that the Gas Utilities have had no experience with geo-targeted program design and these timeframes are based on broad based DSM efforts. The timing may change, as more is known about geo-targeted program design; the Gas Utilities expect to gain insight on these program enhancements during the course of the pilot studies.

The length of time that the DSM program will need to be in place in order to reduce peak demand by enough to delay or avoid a specific infrastructure project will always depend on the specific customer characteristics, the DSM program and the specific infrastructure project. The current lack of information on the ability of natural gas DSM programs to impact peak demand makes it currently impossible to know with certainty when a DSM program needs to be implemented and how long the program needs to be in operation to successfully delay or avoid the infrastructure project. However, the Gas Utilities anticipate that most geo-targeted projects will require two to four years of fully effective implementation to reduce demand growth sufficient to allow the facilities investment to be reduced.

For a geo-targeted DSM program to reduce an infrastructure project, the results of the geo-targeted program would need to be in place with sufficient reliability to ensure that the new facility will not be required to meet demand. Generally, this would require a successful evaluation of DSM program results prior to the time of the leave to construct filing. Given the need to evaluate the impacts of the DSM program, the DSM program would need to be completed or demonstrating measurable results, at least 2 years prior to the date at which the additional capacity provided by the infrastructure project was initially projected to be required.

Hence, a successful geo-targeted DSM program would need to be approved and put into motion about 4 - 5 years prior to the expected in-service date of the targeted facility investment. However, the need for new facilities is generally uncertain at four to five years prior to the in-service date. As a result, geo-targeted DSM programs may need to be implemented before the Gas Utilities have a high degree of certainty that the facility investment will actually be required, potentially leading to an expenditure that may not produce the full value as intended.

4.3 DSM Program Impact Uncertainty

As discussed in sections five and six of this Executive Summary, ICF expects most DSM measures to reduce peak day demand. However, the ability of a given DSM program to achieve a specific level of peak period demand reduction is relatively unknown. As a result, in order to ensure with sufficient reliability for planning purposes that the impact of the DSM program on peak period demand is sufficient to defer a facilities project, the DSM program will need to be designed to achieve greater peak period savings than the facility project that it replaces.

For example, a portfolio of DSM programs might have peak period impacts with a standard deviation of 10% around the expected impact. In order to plan on DSM program meeting the required peak period load reduction 95% of the time, the DSM program would need to be sized

to meet 116% of the required capacity. The same program would need to be sized at 121% of the required capacity to meet requirements 98% of the time.

The magnitude of the required oversizing of the DSM program can be influenced by the timing of the DSM program implementation. Earlier implementation of the DSM program would allow for additional monitoring and evaluation, and provide additional assurances that the facility could be constructed before the capacity is required if the DSM program appears unlikely to achieve its objectives. In practice, the optimum planning process is likely to include both oversizing of the DSM programs, and maintenance of the ability to construct the facility if needed, in order to assure required system reliability.

5. DSM Impacts on Peak Day and Peak Hour Demand

ICF leveraged the results of the 2016 OEB Conservation Potential Study (CPS), building modeling, and hourly gate station data from the Gas Utilities to develop load profiles and hours use factors to estimate the winter peak demand breakdown and the achievable winter hourly peak demand for the Gas Utilities for the DSM measures included in the CPS. This included DSM measures that apply to various types of residential, commercial, and industrial sector facilities and equipment. The comprehensive list of energy efficiency measures for the OEB CPS included 52 residential measures, 59 commercial measures, and 57 industrial measures. The scope of the DSM measures included higher efficiency equipment, such as condensing boilers and tankless water heaters, envelope measures, such as air leakage sealing and attic insulation, and controls measures, such as adaptive (smart) thermostats and demand control ventilation.

5.1 DSM Impacts on Peak Day and Peak Hour by Sector

Although ICF's analysis focused primarily on the peak hour, which was found to occur from 7-8 am in all regions, peak demand impacts across five peak periods were considered. This included each hour of the morning lift period between 6 am and 10 am (including the peak hour) and the entire peak day, considered as an aggregate.

The broad-based DSM impacts on peak day and peak hour demand by sector (residential, commercial, industrial) are summarized below. For each sector, the analysis identified which sub-sectors and end-uses have a larger relative impact on the achievable peak demand savings.

5.1.1 Residential Sector Results

The residential sector included all homes except for multi-unit residential buildings (MURBs or apartment buildings). ICF's analysis indicated that the highest peak demand savings potential in the residential sector occurs during 9-10 am and that adaptive thermostats could lead to an increase in peak demand during the peak hour (7-8 am). Other high-level results for the residential sector analysis can be summarized as follows:

- Low income homes represent a disproportionately large share of peak hour savings relative to peak hour demand due to the age and the nature of the housing stock
- Space heating measures are quite important from a peak demand perspective since they have both a higher relative impact and a higher savings potential
- The top three residential peak demand measures are all related to air tightening the building envelope

5.1.2 Commercial Sector Results

ICF's analysis indicated that the highest peak demand savings potential in the commercial sector occurs during 6-7 am, although the savings potential during this period is only slightly higher than the peak hour (7-8 am). Other high-level results for the commercial sector analysis can be summarized as follows:

- Subsectors that are more important from peak hour savings perspective include Offices, Education, Retail, Other.

- Low income apartments have a relative large peak hour savings potential relative to Reference Case due to the age and the nature of the housing stock.
- Space heating is the most important end use but there is also significant potential in DHW.
- Space heating measures, such as high efficiency boilers, condensing boilers, and condensing makeup air units (MAUs), are important from a peak hour savings perspective.

5.1.3 Industrial Sector Results

ICF's analysis indicated that the highest peak demand savings potential in the industrial sector occurs during 6-7 am, although the savings potential during this period is only slightly higher than the peak hour (7-8 am). Other high-level results for the industrial sector analysis can be summarized as follows:

- Manufacturing facilities and greenhouses/agriculture are more important as compared to other industrial customers from a peak hour savings perspective.
- Demand savings from mineral processing industries are less concentrated during the peak hour, but are still important due to the high percent savings that can be attained.
- The HVAC and Other end-use is quite important from a peak demand savings perspective since the demand and savings potential is focused on the winter peak hour.
- Space heating measures are important to consider in the industrial sector as well if the goal is to reduce winter peak demand.

5.1.4 All Sectors

The aggregated results for all sectors indicated that the highest peak demand savings potential occurs during 9-10 am, although the savings potential during this period is only slightly higher than the peak hour (7-8 am).

- ICF's analysis suggests that DSM is not expected to shift the timing of hourly peak demand.
- Compared to the Industrial sector, the achievable savings for the Commercial and Residential sectors are slightly more concentrated during the peak demand hour.
- The Industrial sector can achieve a much higher percent savings compared to the Commercial and Residential sectors.

5.2 DSM Measures of Interest

The majority of energy efficiency measures were found to reduce both annual load and peak hour load. However there were a few measures that had the potential to increase the peak hour load on a distribution system, even though they did contribute to a decrease in annual consumption. Adaptive thermostats and tankless water heaters were investigated in detail due to their significant annual savings potential and the complexity associated with their potential impacts on peak demand. The results of the analysis on these measures and the broader DSM impacts on peak day and peak hour demand are summarized below.

Filed: 2018-10-11, EB-2017-0097, Exhibit I.EGDI.SEC.1, Attachment 1

Filed: 2018-01-15
EB-2017-0128
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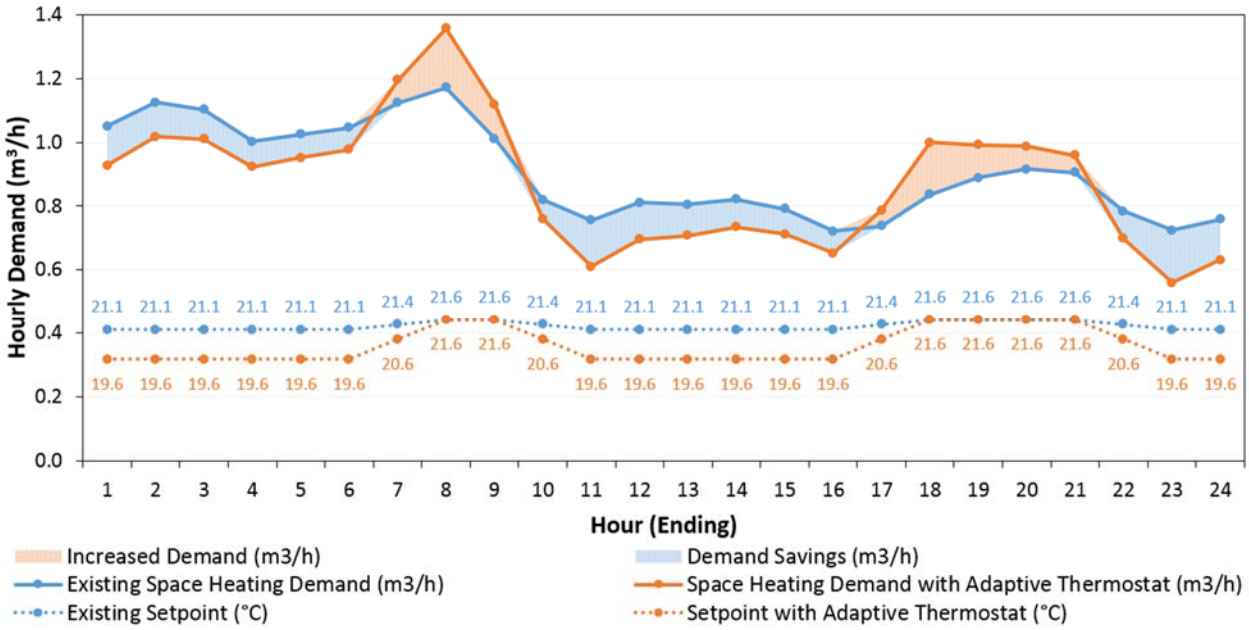
5.2.1 Adaptive Thermostats

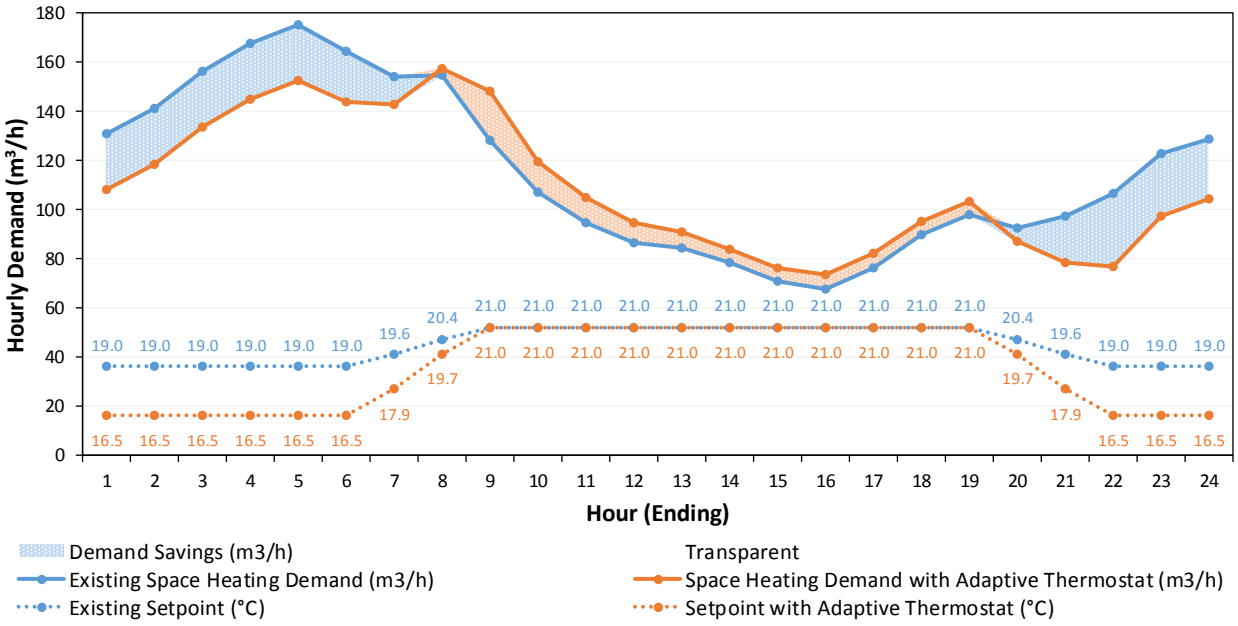
Adaptive thermostats account for a significant amount of the achievable DSM potential in both the residential and commercial sectors. According to the ICF CPS, in Ontario, adaptive thermostats account for 21.5% of the Business As Usual (BAU) Achievable DSM savings (44.8% of residential, and 2.62% of commercial). Although this measure leads to annual gas savings, building modeling suggests that adaptive thermostats contribute to increased demand during winter peak hour periods. These periods of increased demand occur when heating systems are recovering from temperature setback. Exhibit 3 demonstrates the demand impacts resulting from the implementation of adaptive thermostats in the residential sector during design day conditions. As shown in the exhibit, residential building modeling indicates that adaptive thermostats lead to a significant increase in winter peak hour demand in the residential sector.

Exhibit 3: Residential Sector Hourly Demand Comparison for Adaptive Thermostats



Commercial building modeling also suggested that adaptive thermostats lead to increases in winter peak hour demand in the commercial sector but, as demonstrated in Exhibit 4, the impact is much smaller than the residential sector. This is due to the lower applicability of this measure in the commercial sector and the diversity of operating schedules in the different types of commercial facilities being considered.

Exhibit 4: Hourly Demand Comparison for Adaptive Thermostats Applied to Offices



In both the residential and commercial modeling results, it can be seen that adaptive thermostats lead to increased demand during other non-setback hours during the winter peak day since it can take several hours to heat up a building's entire thermal mass. The results of this analysis suggest that, where adaptive thermostats are deployed on a broad basis, their impacts on a natural gas distribution system would need to be closely monitored. In the residential sector in particular, adaptive thermostats appear likely to lead to increases in distribution capacity requirements.

It is important to note that adaptive thermostats can be integrated into demand response (DR) programs to help mitigate peak demand increases during peak hours. Based on recent consultations completed by ICF,[5] thermostat manufacturers including Nest, ecobee, and Honeywell indicated that they run a large number of DR programs. Although these programs are typically focused on summer peak reduction, the thermostat manufacturers indicated that DR program focused on winter peak reduction are feasible..

5.2.2 Tankless Water Heaters

Typically, tankless water heaters have a much higher rated maximum natural gas consumption rate than standard water heaters. The potential increase in peak natural gas consumption by these appliances raised initial concerns that even though tankless water heaters would reduce annual and peak day natural gas consumption, they might increase peak period consumption. Only limited measured data is available on the impact of tankless water heaters on peak period natural gas demand. As a result, ICF used building modeling techniques, combined with the available data to estimate the impacts.

ICF modeling using metered DHW consumption profiles at 5 minute intervals suggests that tankless water heaters can increase peak demand during the relatively short periods that they

[5] ICF, Compatibility Study: Smart Learning Thermostats, completed on behalf of FortisBC, April 10, 2017.

are in use. However, on an aggregate basis for a community, ICF's analysis suggests that tankless water heaters contribute to hourly winter peak demand savings; especially if the diversity of hot water consumption is considered.

Exhibit 5 and Exhibit 6 summarize the results of ICF's modeling, which compared the demand draw of tankless water heaters and storage water heaters for a community of homes with heavy hot water usage. As depicted in Exhibit 5, there are brief instances where the aggregate demand for the community increases if demand is considered on 5-minute increments. However, Exhibit 6 demonstrates that, if demand is averaged out over 60-minute increments, tankless water heaters are consistently resulting in demand savings for the community. ICF's modeling was based on 5-minute interval hot water consumption data for homes with high hot water consumption and different types of hot water usage patterns.

Exhibit 5: Comparison of Water Heater Demand for Community with Heavy Hot Water Use, 5-Minute Intervals

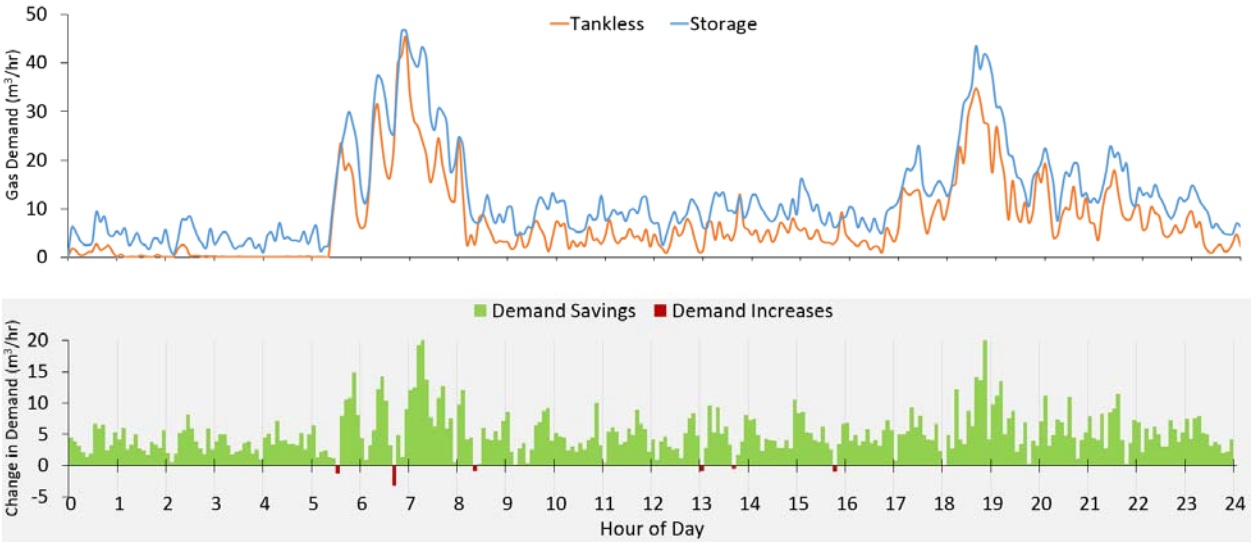
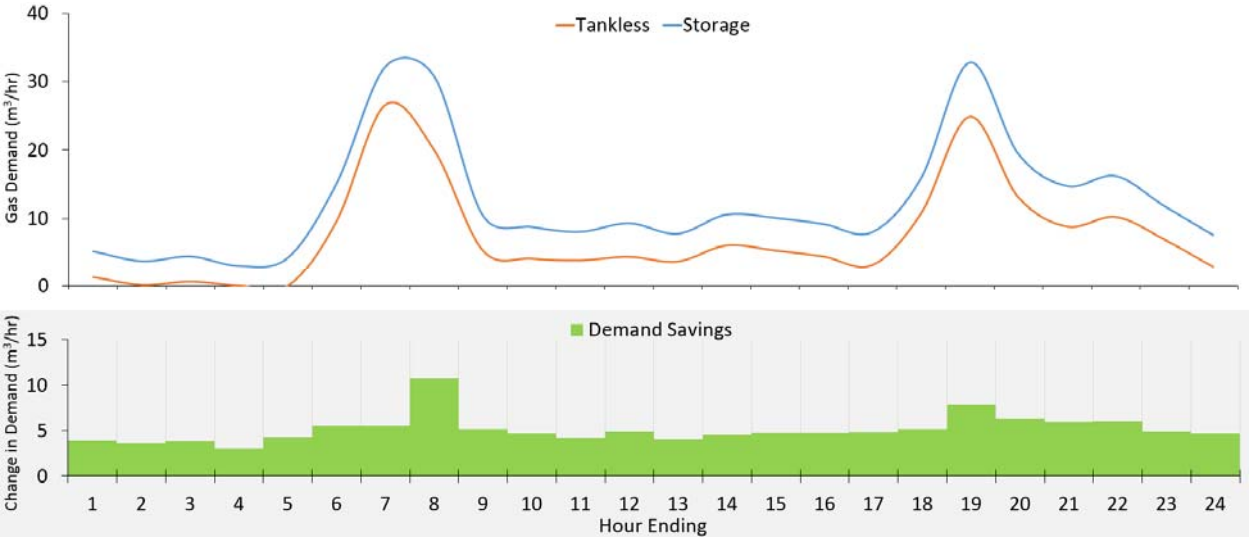


Exhibit 6: Comparison of Water Heater Demand for Community with Heavy Hot Water Use, 60-Minute Intervals



6. Potential Impacts of DSM on Facilities Requirements

ICF leveraged the results of the DSM impacts analysis described in Section Five to evaluate the potential of DSM programs to impact peak period demand and to reduce infrastructure investments.

As part of this step in the process, ICF worked with utility staff to identify appropriate hypothetical case studies based on specific examples of utility infrastructure investments. Information from these case studies that fed into the analysis included project costs, current and forecasted capacity requirements, and the distribution of energy consumption by facility type. The DSM supply curves were used to compare the costs of peak demand reduction through the implementation of DSM against infrastructure project costs.

6.1 Peak Hour DSM Supply Curves

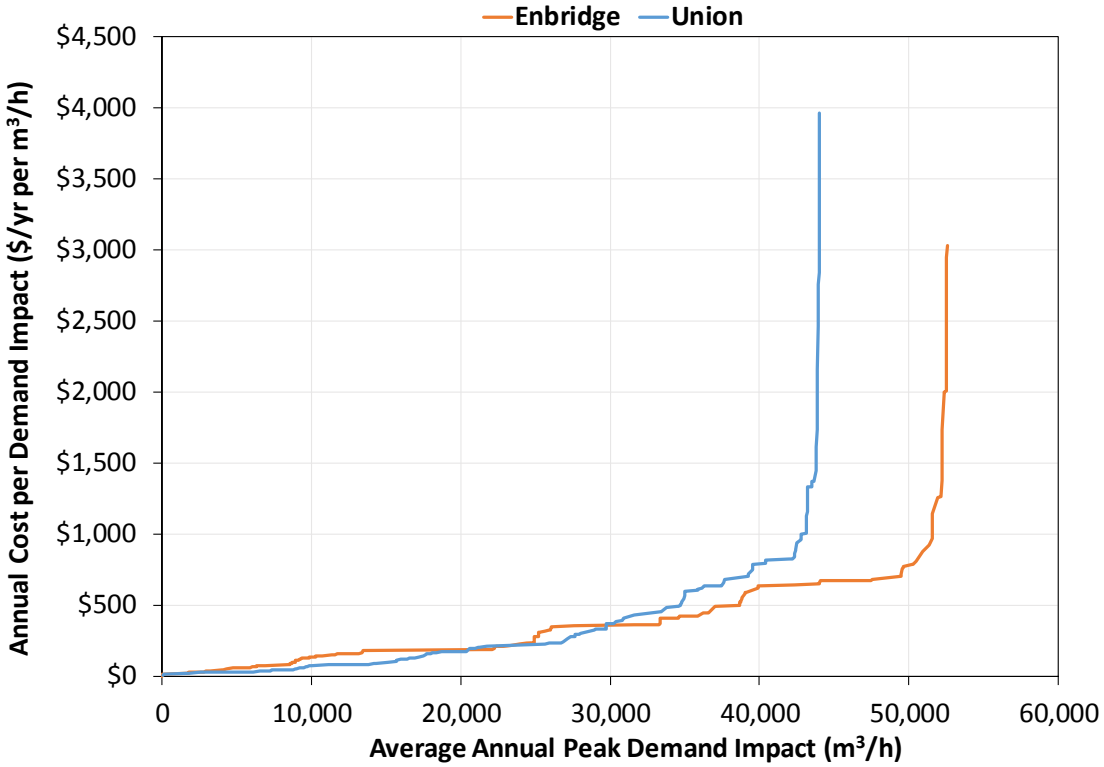
The peak hour DSM supply curve for each utility shows the relative DSM program cost (i.e. $ per m^3/h) to achieve the estimated peak hour demand impacts in each utility service territory. The DSM supply curves prioritize the measures based on their cost-effectiveness, based on the cost per unit gas demand savings, with the most cost-effective measures being implemented first. Each of the DSM supply curves includes measures from all of the sectors being considered (i.e. residential, commercial, and industrial). For the residential and commercial sector, each measure is split into two parts, with the Business As Usual (BAU) scenario reflecting the impacts that can be achieved based on modest incentives and the aggressive scenario demonstrating the incremental demand impacts and costs based on high incentive levels. Costs and savings were aggregated for each of the industrial sector measures since these measures were generally found to be much more cost-effective and there was limited value in splitting out the BAU and aggressive scenarios.

The program costs used to develop these DSM supply curves are composed of both incentive and non-incentive costs. Incentive costs are based upon the estimated level of incentive required to influence measure adoption, while non-incentive costs are administrative costs for program delivery activities, including items such as marketing and labour for program staff.

The most cost-effective measures on the DSM supply curves include industrial measures to optimize and have increased control of existing systems (as further outlined in section 6.3.1 below) which suggests that these measures should be implemented first if the goal is to reduce winter peak hour demand. Conversely, residential and commercial measures make up most of the least cost-effective measures (as outlined further in section 6.3.1) and would be a lower priority under a winter peak hour demand program.

The potential peak hour demand impact potential of 44,035 m^3/h per year in Union Gas territory (as shown in the exhibit below) represents an annual average savings of approximately 1.24% over the total hourly reference case demand of approximately 3.54 million m^3/h. For the Enbridge Gas service territory, the potential peak hour demand impact of 52,546 m^3/h per year represents an average annual savings of approximately 1.05% over the total hourly reference case demand of approximately 5.01 million m^3/h. The differences between the Enbridge Gas and Union Gas service territories is largely driven by differences in customer mix. Union Gas, with a higher percentage of industrial demand has somewhat more DSM potential.

Exhibit 7: Broad-Based DSM Supply Curve for EGD & UG



The application to specific projects will depend on the customer mix in the specific service territory served by the investment project. In the case studies reviewed below, the potential peak hour demand impact ranged from about 0.8% per year to 1.35% per year.

6.2 Application of DSM Supply Curves to Facility Investments

The peak hour DSM supply curves that ICF constructed leveraged measure-specific estimates of peak demand impacts and program costs. The numbers employed in these DSM supply curves are based on broad regional averages, including the distribution of different types of facilities, and the best available data on the penetration of different types of energy efficiency measures across each utility's service territory.

These DSM supply curves were used to estimate the peak demand impacts resulting from the implementation of DSM at the level of an individual facility investment, despite the obvious limitations with this approach, including a significantly larger degree of uncertainty with the results. One item that warranted special attention was the program costs associated with implementing DSM at the geo-targeted (i.e. community) level. Simply scaling the program costs from the broad-based analysis to estimate the geo-targeted program costs ignores the fact that there are efficiencies of scale associated with implementing DSM programs across a large service territory and these will not translate to geo-targeted programs. Essentially, although incentive costs can be scaled despite the size of the program, admin costs would be much higher for geo-targeted programs.

Geo-targeted DSM programs would tend to be smaller than most broad-based DSM programs and even for an equivalent program size (i.e. $/yr.), geo-targeted programs will be more expensive per unit impact than broad-based DSM programs due to several factors, including the

need for metering and on-going monitoring of impacts. Based on the review of a 2014 ACEEE study,[6] which included an assessment of the annualized costs of implementing natural gas DSM program in a large number of US jurisdictions and provided a sense for how much these costs vary, and ICF's experience with implementing DSM programs across North America, ICF estimated that the cost of implementing geo-targeted DSM programs would be in the range of 1.5 - 2 times more expensive than implementing broad-based DSM programs, on a per unit savings basis. As such, the cost of implementing geo-targeted DSM programs is presented as a band.

The Gas Utilities staff also provided details pertaining to example facility investment projects, including associated costs, existing and projected system peak demand, and the best available data regarding the breakdown of peak demand by different types of facilities. These example facility investment projects were used as case studies to assess the theoretical potential costs and benefits of using DSM to reduce infrastructure investment. The broad peak hour DSM supply curves were scaled to match the demand of these case study facility investment projects, including the distribution by facility type. The resulting DSM supply curves were used to compare the estimated cost of peak demand reduction from DSM measures against the cost of facility investments for these example case studies.

6.3 Accounting for Other Costs and Benefits from DSM Programs

6.3.1 Reduction in Annual Natural Gas Demand

The primary design objective of DSM programs designed to reduce infrastructure investment would be to reduce peak period demand. However, DSM programs implemented with the goal of impacting peak will also save avoided costs associated with annual energy efficiency including gas commodity cost savings, upstream capacity costs and the value of non-energy benefits including the value of the carbon emission reductions. ICF's analysis does not account for any additional benefits. How various savings would be valued in an IRP context will require additional analysis.

6.3.2 Duplication of DSM Benefits

The DSM supply curves incorporate all of the DSM measures included in the 2016 OEB Conservation Potential Study that are capable of reducing peak period demand. Many of these measures will be available to the Gas Utilities' customers through existing broad-based DSM programs. ICF did not attempt to separate out the impact of broad-based DSM programs when developing the initial DSM supply curves for geo-targeted programs in this initial study. Since the natural gas demand forecasts used to develop infrastructure investment plans are based on demand data that includes the impact of existing DSM programs, the current DSM supply curves likely overstate the potential incremental reduction in peak period demand available for geo-targeted DSM programs.

Determining the best approach to eliminating the duplication of DSM benefits is expected to require additional analysis, and may require an assessment on a case by case basis.

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[6] Molina, Maggie, ACEEE, The Best Value for America's Energy Dollar: A National Review of the Cost of Utility Energy Efficiency Programs, Report #U1402, March 2014.

6.4 Intersections between DSM and Infrastructure Planning

The Gas Utilities identified three areas where the intersection between DSM programs and the infrastructure planning process could impact (reduce) infrastructure costs.

1. **Broad Based DSM Impacts on Infrastructure Planning Reinforcement Projects (Passive Deferral)**
   All DSM programs have the potential to impact peak hourly and peak daily demand and to change the need for new infrastructure investment regardless of whether or not the programs are specifically designed to reduce peak hourly or daily demand.[7] This is referred to as passive deferral of infrastructure investment.

   The impact of historical broad based DSM programs on infrastructure investment is inherently captured in the facilities planning process. Customer usage is updated each year using consumption based on recent historical usage. The historical usage used in the process reflects the impact of past and current broad based DSM once it has materialized, but it does not reflect anticipated or unknown future DSM program impacts.

   Passive deferral of infrastructure investment based on broad based DSM activity requires two basic components to be accurately captured in the facilities planning process.

   - Use of appropriate avoided infrastructure investment cost estimates that fully value the potential costs and benefits associated with deferral of facilities investments by utilizing DSM programs.
   - Accurate consideration of the expected impacts of Energy Efficiency measures and DSM programs on the peak hour and peak day demand forecasts used to evaluate the need for infrastructure investments.

2. **Geo-Targeted DSM Impacts on Facilities Planning for New Subdivisions or Community Projects**
   The final type of infrastructure investments that might be affected by DSM are expansions to serve new communities or subdivisions. Serving new communities typically requires a significant investment in new pipeline capacity to deliver gas to the community, as well as reinforcements on existing parts of the system to meet the growth in overall requirements.

   Given the nature of a new community expansion, where the project is necessary to provide the initial gas service to the community, DSM programs would not be useful in *deferring* the facility investment. However, in certain circumstances, the overall magnitude of the investment and project might be reduced if the DSM programs alone or in conjunction with other Distributed Energy Resources are capable of reducing the expected demand in the new community.

[7] Not all DSM measures will impact peak hour or peak day demand in the same way. Most DSM measures are expected to reduce peak hour and peak day demand, although the relative magnitude of the impact will differ by some measure. Adaptive thermostats are expected to reduce peak day demand but increase peak hour demand. Other DSM measures may have no impact on peak hour or peak day demand.

3. Geo-Targeted DSM Impacts on Infrastructure Planning Reinforcement Projects (Active Deferral)

DSM programs that target peak hour and peak day demand reductions in specific areas where infrastructure investments are planned have the potential to delay, or avoid the need for the infrastructure investment. Use of Geo-Targeted DSM programs to reduce specific infrastructure projects requires three key steps:

- Identifying infrastructure projects that could be reduced by a reduction in peak hour or peak day demand.[8]
- Designing and implementing cost-effective DSM programs capable of reducing peak hour or peak day demand sufficient enough to reduce the infrastructure project within the available time frame.
- Verifying the effectiveness of the DSM programs on a time line sufficient to ensure that infrastructure project can be reduced without impacting the Gas Utilities' ability to reliably serve natural gas system demand.

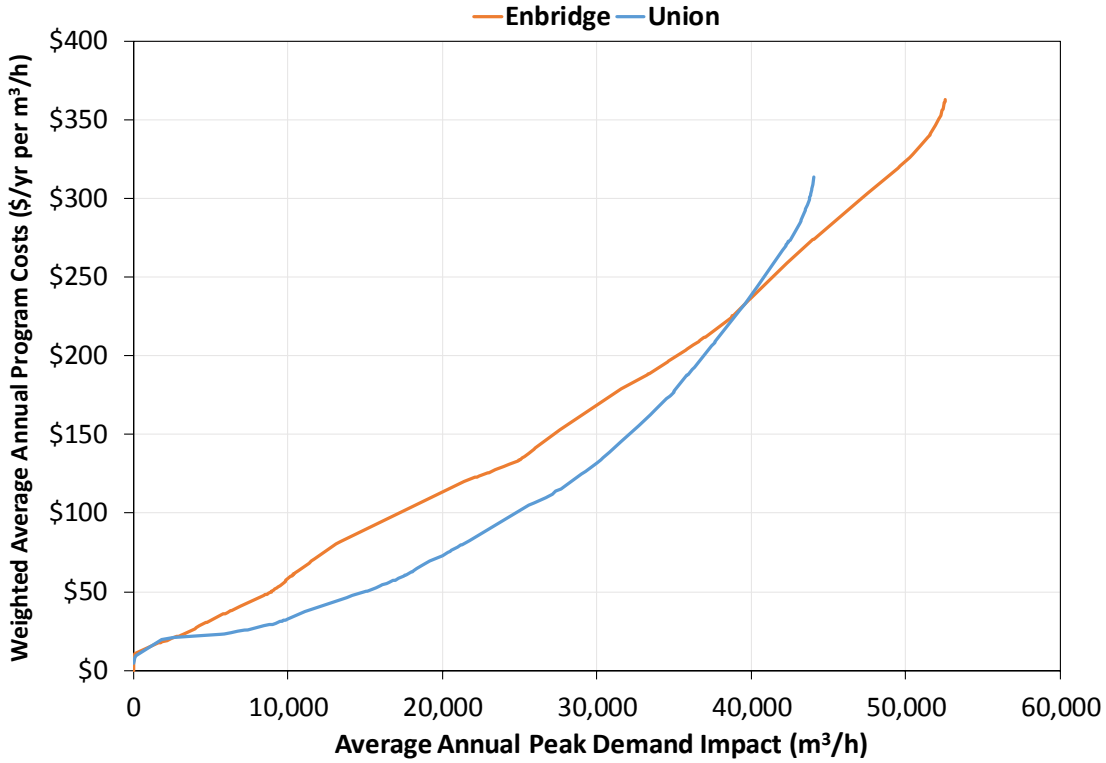
6.4.1 Broad-Based DSM

The peak hour DSM supply curve for each utility is presented below showing measures from all the sectors being considered (i.e. residential, commercial, and industrial). The broad-based analysis curves show the cost of implementing DSM measures against their demand savings impacts. Section 6.1 presented the broad based DSM supply curve showing annual program costs on the vertical axis and the average annual peak demand impact (m^3/h) on the horizontal axis. Exhibit 8 presents the annual weighted average cost per unit demand impact, essentially demonstrating the weighted average program cost and savings that would be associated with implementing a program starting with the most cost-effective measure.

The majority of the industrial measures are at the bottom of the DSM supply curves presented in Exhibit 8, with some commercial and residential behavioral, optimization and control type measures also on the lower end of the supply curve for both Gas Utilities. Examples of some of the most cost-effective measures include industrial measures such as reduce boiler steam pressure, burn digester gas in boilers, regenerative thermal oxidizers, and ventilation optimization (ranging from an estimated annual \$4-23 per m^3/h). Commercial measures including ventilation fan VFDs and ozone laundry treatment are also very cost-effective (estimated annual costs of \$9-11 per m^3/h and \$18-26 per m^3/h, respectively).

[8] Many infrastructure investments are driven by pipeline integrity requirements, class location and/or municipal replacement requirements, and would not have the flexibility to be delayed or avoided.

Exhibit 8: Broad-Based DSM Supply Curve for EGD & UG – Weighted Average Annual Program Costs[9]



Measures that were found to be the least cost-effective are mostly commercial and residential sector measures. This includes commercial measures such as wall insulation, ENERGY STAR clothes washers, and advanced BAS/controllers, each with estimated annual costs greater than $300 per m^3/h.

6.4.2 Community Reinforcement

The Gas Utilities staff provided details based on a criteria provided by ICF pertaining to case study facility investment projects. ICF scaled the broad-based DSM supply curves to create the community-level supply curves. These scaled-down curves allowed for a comparison of the estimated cost of peak demand reduction from DSM measures against the cost of facility investments.[10] Furthermore, the following approach was taken to compare the facilities investment projects to DSM:

- The full annual investments (program costs, including both incentives and admin) for DSM were modeled on an extended timeframe.

[9] In Exhibit 8, the broad-based DSM program costs have been annualized over the lifetime of the DSM measures. As such, the annual DSM program costs cannot be calculated by multiplying the Weighted Average Annual Program Costs by the Average Annual Peak Demand Impact. In this particular example, the cost of implementing DSM to defer 40,000 m^3/h of growth in Union's service territory is estimated at approximately $98,975,000, and the peak demand impact of individual measures would persist from 1 to 30 years (the weighted average lifetime of the measures is approximately 15.2 years).

[10] As noted in Section 6.2, program costs were scaled up by a factor of 1.5-2 to account for the fact that admin costs related to running a geo-targeted program would be significantly higher than the admin costs associated with a broad-based DSM program portfolio.

Filed: 2018-10-11, EB-2017-0097, Exhibit I.EGDI.SEC.1, Attachment 1

- It was assumed that DSM would start being implemented 3 years ahead of a facility investment project.
- The net present value of the DSM program costs were compared against the net present value of the infrastructure investment costs.

Exhibit 9 presents the geo-targeted DSM supply curve for a community reinforcement project located in Enbridge's Central region. Based on information provided by the utility, the total capital cost of this project is approximately $8,200,000 and it involves the installation of 3.2 km of NPS 12" ST HP pipeline. As shown in Exhibit 9, ICF's analysis for this particular scenario suggests that the present value of the costs associated with running a geo-targeted DSM program is slightly lower than the present value of the costs associated with the reinforcement project. In other words, it may be more cost-effective to launch geo-targeted DSM program than to install the reinforcement project. This finding is primarily a result of the high capital costs of the reinforcement project and the relatively small demand growth rate in this community (i.e. 0.5% annually).

Exhibit 9: Supply Curve for Reinforcement Project in Enbridge's Central Region

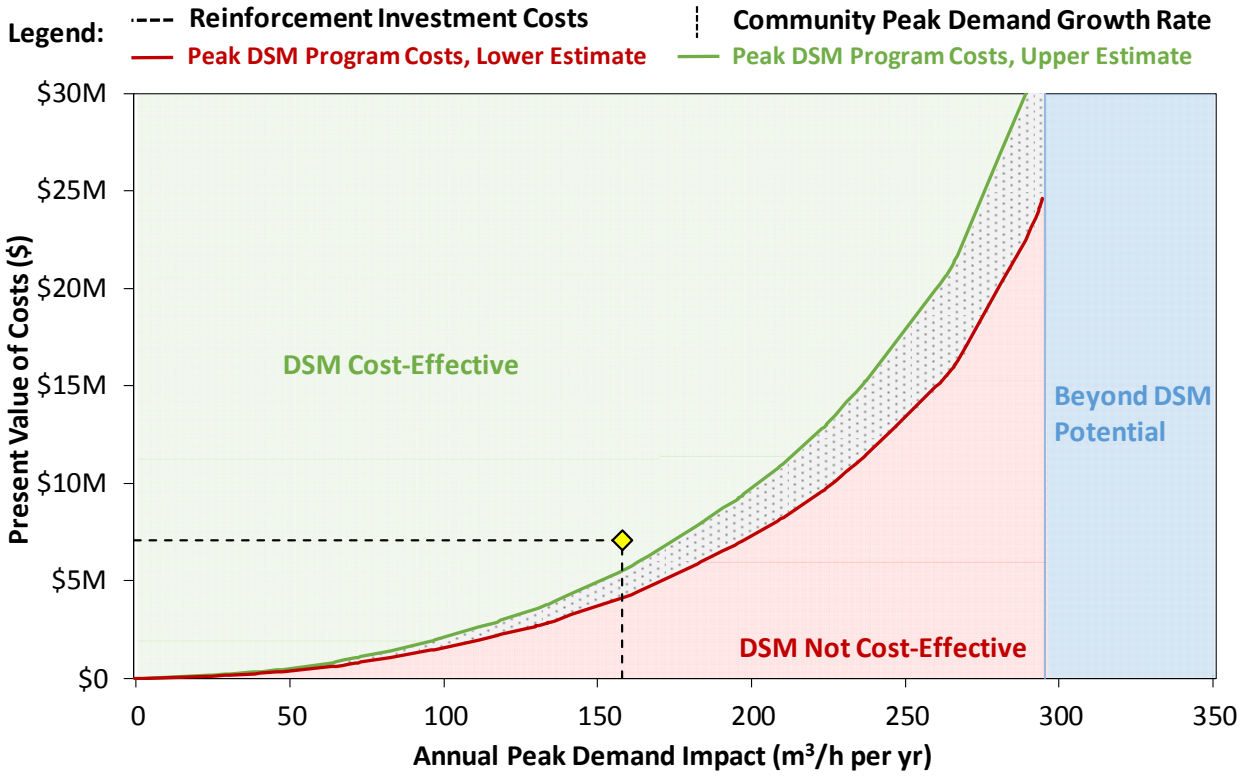
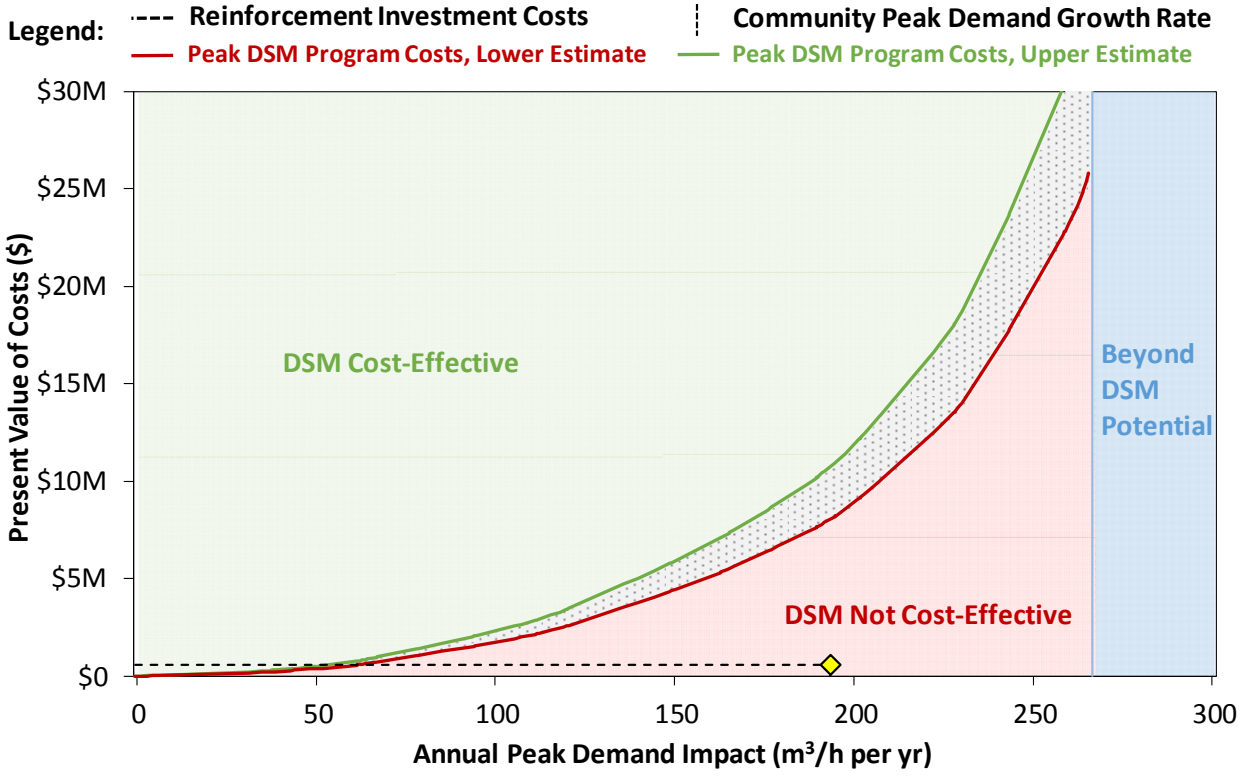


Exhibit 10 demonstrates that DSM is not always a cost-effective option for deferring reinforcement projects. In this case, Union Gas is planning to install 1.3 km of NPS 6" ST 6895 kPa pipeline to accommodate a growing community whose peak demand is increasing by approximately 194 m^3/h annually (0.7% per year). Although ICF's analysis suggests there is enough DSM potential to offset this growth, Exhibit 10 illustrates that it would not be cost-effective to defer the reinforcement project with a geo-targeted DSM program due to the lower capital costs of the project ($690,000) relative to the cost of the geo-targeted DSM.

Filed: 2018-10-11, EB-2017-0097, Exhibit I.EGDI.SEC.1, Attachment 1

Exhibit 10: DSM Supply Curve for Reinforcement Project in Union's North Region



A third scenario could also arise when comparing a reinforcement project to a geo-targeted DSM program aimed at reducing peak demand: there may not be enough DSM potential to offset the peak demand growth rate of the community. Such a scenario is depicted in Exhibit 11, which compares the costs of a reinforcement project in Union Gas' southern region against the costs of a geo-targeted DSM program. This reinforcement project would involve the installation of 7.6 km of NPS 12" ST 6160 kPa pipeline at a cost of $14,100,000. However, the peak demand of the community is expected to grow by 2.6% annually (~550 m^3/h), while ICF's analysis suggests that a geo-targeted DSM program would only be capable of offsetting ~355 m^3/h of growth annually, or about 1.35% growth per year in this market (approx. 295 m^3/h) at the same NPV cost as the infrastructure investment project. For this scenario, a geo-targeted DSM program could not feasibly defer the reinforcement project, and would also not be practical from a financial perspective, as shown in Exhibit 11.

Filed: 2018-10-11, EB-2017-0097, Exhibit I.EGDI.SEC.1, Attachment 1

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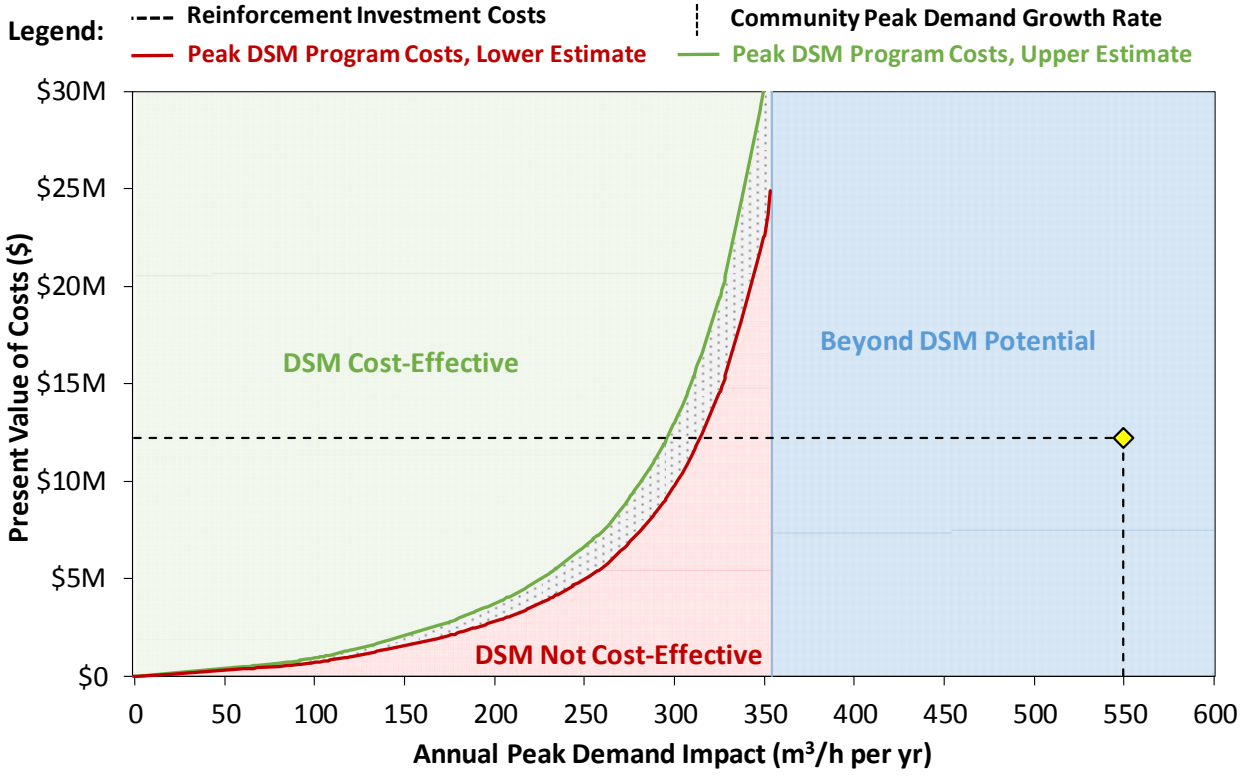
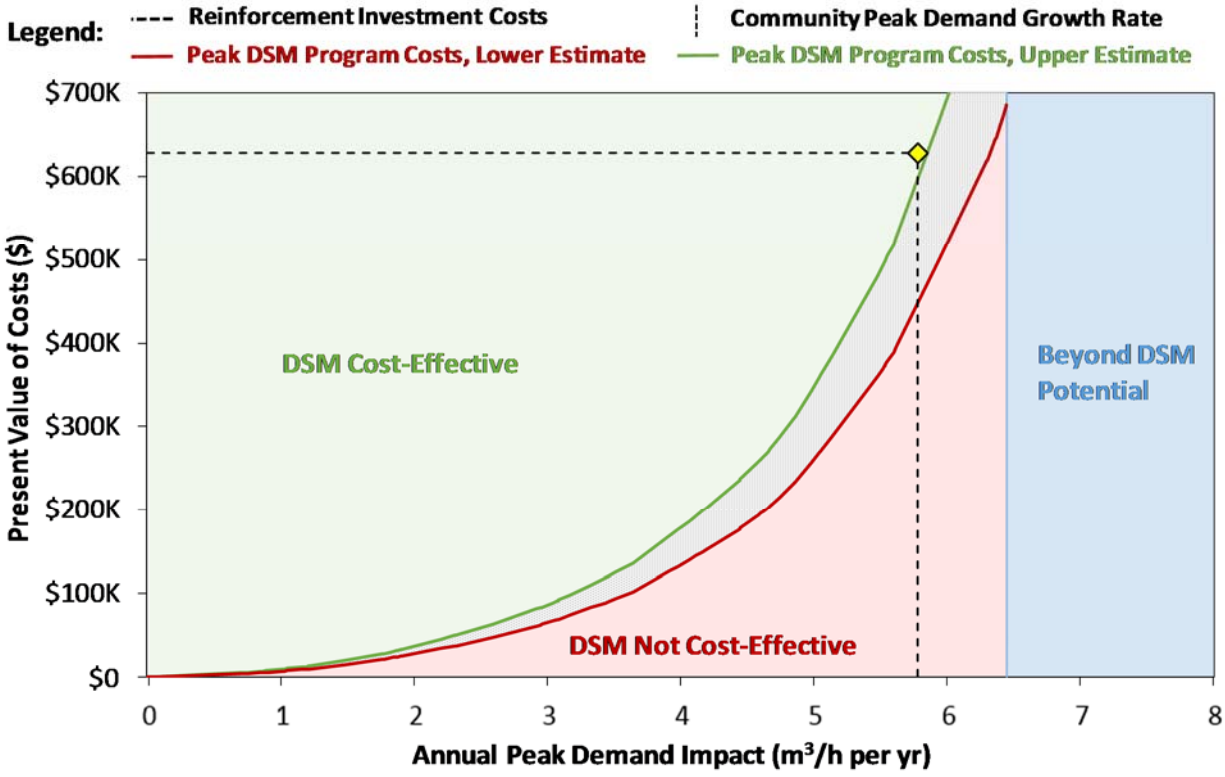


6.4.3 New Community Expansion

In addition to reinforcement projects, this study also investigated the potential for DSM to reduce capital costs for new community expansion projects. Of particular interest was the scenario where the demand from the new community is expected to be near the maximum capacity of a specific pipe size. Exhibit 12 shows the supply curve for such a hypothetical situation, wherein a NPS 2" steel pipe can be installed for $5,275,000, but would barely meet the new community's peak demand of 675 m^3/h. Alternatively, a NPS 4" steel pipe can be installed for $6,000,000 to comfortably meet the community's peak demand for many years to come (i.e. peak demand capacity of 4,160 m^3/h).

As shown in Exhibit 812, ICF's analysis suggests that DSM can cost-effectively offset annual peak demand growth of up to 5.8 m^3/h (or about 0.8% per year) in this market. If the peak hour demand for the community is growing faster than this rate, DSM would not be able to cost-effectively offset this growth.



6.4.4 Summary of Results and Practical Considerations

The DSM measure supply curves reflect ICF's best current assessment of the costs and impacts on peak period demand available from DSM programs, while the facilities costs reflect the potential cost of serving incremental demand growth via investments in new facilities. As indicated in the summary analysis, there are facilities investments where the incremental cost of reducing load using geo-targeted DSM programs may be lower than the incremental cost of the facilities, when compared strictly on a $ per m^3/h of incremental capacity provided. Hence, ICF's analysis of the potential for geo-targeted DSM to reduce peak hour demand growth suggests that under certain circumstances, there may be potential to reduce infrastructure investments using geo-targeted DSM programs.

However, there are a number of factors that need to be considered when making a project specific comparison of the cost of geo-targeted DSM and the cost of new facilities. These include:

- **Other benefits of facilities projects:** Many facilities projects provide additional reliability and flexibility to the natural gas distribution system in addition to increasing capacity. For projects where system reliability and flexibility are a significant factor in project design, the cost of the project needs to be allocated between the increase in capacity and the other project benefits.
- **Reliability of DSM programs to reduce peak demand:** To be useful in reducing infrastructure investments, geo-targeted DSM programs must achieve the same level of reliability as the infrastructure investments that they are designed to reduce. In the short

term, the uncertainty regarding the cost and reliability of geo-targeted DSM programs limits the Gas Utilities' ability to rely on geo-targeted DSM programs during infrastructure planning.

- **DSM penetration rates:** ICF's analysis suggests that, on average, the maximum achievable potential for peak demand savings from aggressive DSM implementation ranges from about 1.05% of peak demand per year in the Enbridge service territory to 1.24% of peak demand per year in the Union Gas service territory.[11] Based on the initial Enbridge facility investment data reviewed by ICF, when measured by the amount of incremental capacity being added, only about 20% of the planned facility expansion projects[12, 13] fall below this level.

- **Short Term Project Deferral:** In some cases where the projected growth in peak period demand exceeds the potential annual savings available from DSM, aggressive implementation of DSM might be sufficient to delay the project for a period of time without obviating the eventual need for the project. This would require implementation of the DSM program early in the facilities planning process in order to accumulate sufficient DSM savings to delay the facility. The cost effectiveness of using DSM to delay the project depends to a significant degree on the length of time that the project can be delayed. A relatively short delay (one to three years) is unlikely to be useful due to the potential risk associated with the timing of the project and the need to monitor DSM program impacts, to ensure that the facilities are in place when needed.

- **Size of the geo-targeted community:** As with all DSM programs, geo-targeted DSM programs will benefit from economies of scale. As a result, as facility investment projects decline in size, the cost per m^3/h of peak demand savings from DSM is expected to increase, and smaller projects are unlikely to be cost-effective.

[11] Some of this potential may not be available for geo-targeted DSM programs due to its inclusion in pre-existing broad-based DSM programs.

[12] The planned facility expansion projects reviewed by ICF represent the list of potential expansion projects at a specific point in time, and should not be considered representative of future capacity expansion projects.

[13] The planned facility expansion projects represent a subset of facilities investments, and include only those projects with the primary objective of meeting growth in natural gas demand.

7. Policy Considerations

ICF's review of the DSM and infrastructure planning processes at the Gas Utilities has identified several potential barriers or concerns to using DSM to help reduce infrastructure costs that should be addressed as policy issues. These include:

1. Changes in the Approval Process for Infrastructure Targeted DSM

The differences in timeline and risk between DSM achieving annual energy savings and related benefits, and DSM targeted at specific infrastructure investment deferral or avoidance create different planning requirements. Geo-targeted DSM programs designed to reduce peak hour demand will need to be implemented much earlier in the facility planning cycle, often before there is certainty around load growth, and will have limited opportunity for revisions if the programs are not meeting expectations. In addition, the ultimate impacts of the programs – deferral or avoidance of infrastructure investment – will be subject to the general planning uncertainty consistent with the necessary implementation time frame.

As such, DSM programs and technologies targeted at infrastructure deferral or avoidance may need to be subject to a different business and regulatory construct, cost benefit analysis and different evaluation standards than standard DSM.

2. Allocation of Risk

While the Gas Utilities are planning pilot studies and reviewing additional analyses, the Gas Utilities currently face uncertainty regarding the reliability of DSM programs designed to reduce peak demand. As a result, there is an increase in risk and an increase in cost to the utility of relying on DSM programs as an alternative to infrastructure investment. This leads to a number of public policy questions:

- How much risk is appropriate? And how should the risk of underestimating facilities requirements be weighted relative to the risk of overestimating facilities requirements? Is the risk to society of potentially not having the necessary energy services in place an acceptable risk? How would this risk be assessed?
- In order to provide reasonable assurance that the system will be available to meet demand, the Gas Utilities likely will need to develop plans for both geo-targeted DSM programs and the facilities investments needed to meet demand if the DSM program is not successful. Alternatively, the DSM program will need to be oversized to minimize risk. In both cases, the Gas Utilities expect to incur additional costs that do not directly serve to meet system requirements. How do the Gas Utilities recover these additional costs?
- Who bears the risk if a geo-targeted DSM program does not lead to a deferral of an infrastructure investment? In this scenario, the utility would have invested in geo-targeted DSM activities without reducing facilities investment.
- Who bears the risk if the benefits of a geo-targeted DSM program do not materialize, and the utility pipeline system is insufficient to meet peak demand?

3. Additional Research

Incorporation of DSM to reduce infrastructure investments as part of the normal infrastructure planning process will require additional certainty regarding the costs of geo-

targeted DSM programs, and the impact of DSM programs on peak period demand, which will require additional data collection and research. The Gas Utilities will need regulatory approval to invest in, and recover the costs of the Advanced Metering Infrastructure (AMI) necessary to collect hourly data on the impacts of DSM programs and measures, as well as pilot programs necessary to determine the costs, impacts, and potential penetration rates for geo-targeted DSM programs.

4. Cross-Subsidization

In the current 'postage stamp' rate setting framework, the costs of new infrastructure are shared across customer classes, where all customers within a rate class pay the same amount throughout the franchise, except in specific cases where the Board has determined that a specific customer contribution is required for a particular new infrastructure. Geo-targeted DSM programs have the potential to lead to cross-subsidization between customer classes, and between DSM participants and other customers.

5. Customer Discrimination

By definition, the use of geo-targeted DSM programs to reduce infrastructure investments will lead to discrimination between customers at the boundary of the geo-targeted region. Customers within the boundary will be eligible for potentially significant incentives, while customers outside of the boundary will not. This leads to policy questions that will need to be addressed:

- Is it appropriate to subsidize customer energy efficiency based on location, potentially providing incentives to customer on one side of the street, while denying these incentives to customers on the other side of the street, or in other nearby locations?
- Is it appropriate to provide energy efficiency subsidies to some new communities?

A geo-targeted DSM program designed to impact peak hour requirements may also result in differences in incentives available based on customer characteristics, leading to additional customer discrimination.

- Customers in smaller homes are less likely to be creating significant new gas loads, hence are less likely to be effective targets for geo-targeted DSM. This could result in a high proportion of the incentive payments being paid to customers that are generating the increased peak load.
- As a result, the overall costs of geo-targeted DSM may be inappropriately distributed to those customers who are in older, smaller, less efficient homes.

6. Incentives for Non-General Services Customers

Achieving the DSM market penetration necessary to defer investments in new facilities is likely to take several years of targeted DSM activity. Given the relative timeframes for DSM program implementation, geo-targeted DSM programs designed to reduce infrastructure costs for projects targeting new communities may need to target consumers that are not currently utility customers in order to reduce future demand by sufficient amount to achieve the program's objectives. This would not be allowed under the current DSM Framework. Is it appropriate to provide subsidies to consumers that are not currently customers of the utility, with the expectation that they might become customers in the future?

In addition, the need for much of the utility infrastructure investment, particularly on the Union system, is driven by the growth in Firm Transportation (FT) demand by large industrial customers. These customers contract for a specific level of pipeline capacity. However, in the Gas Utilities' experience, when these customers participate in DSM programs, they typically do not reduce the amount of FT capacity that they hold. Instead, they hold on to the capacity to make sure that they have access to the capacity in the future if their requirements increase, or use the capacity to meet new loads.

Hence a geo-targeted DSM program aimed at these customers might not have any impact on facilities requirements unless the program provides a sufficient incentive to the customer for the customer to release the (FT) capacity. This is likely to require different types of incentives and larger incentives than currently offered by the Gas Utilities, and would also require contracting terms that would discourage these customers from requesting additional capacity in the future.

7. Establishment of an Appropriate Leave-to-Construct (LTC) Budget Threshold for Geo-Targeted DSM Programs

Current guidance from the Board suggests that energy efficiency programs should be considered during the planning for each facility project brought before the Board as part of a Leave-to-Construct (LTC) application. The threshold for these LTC projects is currently $2 million, and as further outlined in the OEB Act 1998, part VI, Sect 90. However, developing, implementing, modelling and evaluating geo-targeted DSM programs as an alternative to a specific infrastructure project is expected to be both time consuming and require significant internal resources to perform the modelling, conduct the analysis, and investigate alternatives. Hence considering DSM as an alternative to infrastructure investments is likely to only impact those infrastructure projects with significant savings potential.

Once the initial study of the potential for DSM to reduce infrastructure investment is completed, and the Gas Utilities can provide the Board with a reasonable assessment of the costs and potential benefits, the Gas Utilities will provide a recommendation to the Board on the appropriate cost threshold and which facilities projects should be accompanied by a comprehensive assessment of the potential to reduce the project.

8. Appropriate Cost Effectiveness Test(s)

Geo-targeted DSM programs may have benefits that combine the attributes of facilities planning and DSM programs, and should be evaluated considering the end user resource costs as well as the benefits of the DSM program on both energy consumption (Traditional DSM) and on their ability to reduce infrastructure investment based on the impact on peak hour/peak day demand (traditional facilities planning).

The Gas Utilities consider a combined approach to cost effectiveness testing to be appropriate for geo-targeted DSM programs. Benefits should include the direct cost savings associated with the reduced infrastructure plus the annual energy savings associated with the program. Costs should consider both the ratepayer and societal costs of developing and implementing the targeted DSM programs. The cost-effectiveness criteria also needs to address the increase in risk associated with geo-targeted DSM programs. Ultimately the cost of the resource to the consumer should be a consideration in the various planning

processes, with the affordability of energy supply a factor in the decision making process, and whether or not other resources are a viable alternative. If the deferral of a geo-targeted infrastructure project would result in fuel switching to a more expensive energy source this should be recognized and the additional costs to the end use consumer fully valued.

8. Conclusions and Recommendations

To the best of ICF's knowledge, the ICF Integrated Resource Planning study conducted for the Gas Utilities provides the first comprehensive assessment of the potential to use broad-based and geo-targeted DSM as part of the natural gas distribution company facilities planning process in order to reduce investments in new natural gas utility infrastructure. The study includes a review of industry experience, an overview of the facilities planning process, an assessment of the potential impact of DSM programs on peak period demand, and the potential to use DSM to avoid or defer new investments in utility infrastructure, and a review of the policy changes that would facilitate the incorporation of DSM into the facilities planning process. The primary conclusions of the study are developed based on the findings discussed earlier in this Executive Summary, and are summarized below.

8.1 Critical Elements of the Facilities Planning Process

Section 3 of this Executive Summary provides an overview of the facilities planning process. However, there are a few basic facilities planning principles that impact the potential for DSM programs to reduce infrastructure investments that need to be highlighted due to their importance. These include:

1) ***The primarily goal of facilities planning is to ensure that the utility infrastructure is of sufficient size and at the appropriate/required time to provide reliable natural gas service during peak demand periods***[14] ***at system design conditions consistent with reasonable costs.*** Failure to meet peak period demands could result in loss of gas supply to firm utility customers during extreme cold conditions, leading to extreme social and economic costs to the utilities and their customers. As a result, the Gas Utilities and their customers have significant economic and social incentives to develop infrastructure based on upside uncertainty in the forecast rather than downside uncertainty.

2) ***The facilities planning process requires significant lead time in order to ensure that facilities are available by the time that the facilities are required***. The facilities planning process is designed to identify expected requirements at about five years prior to the time at which the capacity will be needed in order to allow sufficient time for the project planning

[14] The peak demand period for facilities planning used in our analysis is the peak hour, which typically occurs during the morning period between 7:00 AM and 9:00 AM. For planning purposes, the peak period demand is projected based on design day weather conditions, which typically occur on the coldest anticipated winter day, or design day. The duration of the peak period considered in the planning process depends on the type of infrastructure being evaluated. For individual service connections, the peak period used to size the service connection should be sufficient to meet the maximum customer demand. For certain distribution infrastructure projects serving a limited number of customers, the peak period used for facilities planning may need to be as short as 15 to 30 minutes, while larger transmission assets may be planned based on a longer time frame, potentially a 24 hour design day.

and design, regulatory review, and construction to be completed prior to the need for the facility.

3) ***There are significant economies of scale associated with the construction of facility investment projects.*** The cost of the incremental unit of capacity declines as the size of the project increases due to efficiency in planning, right-of-way and easement availability, mobilization costs, and labor and materials costs. As a result, downsizing a specific project is likely to lead to only modest cost savings. In addition, if a project proves to be undersized relative to future system growth, additional facility investment projects are likely to be much more expensive than increasing the size of the initial project.

4) ***Facilities costs vary widely depending on specific circumstances:*** The ability to cost effectively reduce infrastructure investments through the use of targeted DSM programs depends on the cost of the infrastructure that can be avoided, which vary significantly based on the size of the project, the characteristics of the existing system, and the areas impacted by the project. As a result, the cost effectiveness of DSM programs as an alternative to infrastructure investments can differ widely for different infrastructure projects.

8.2 Summary of Industry Experience using DSM to Reduce Infrastructure Investments

ICF's review of existing DSM programs at North American gas utilities in other jurisdictions, documented in Section 2 of this Executive Summary, found that little to no activity has been undertaken that was designed to reduce transmission and distribution costs using targeted DSM and Demand Response (DR). In addition, measured data necessary to determine the potential impacts of DSM on new facilities requirements is generally unavailable. Overall, the review of industry experience found that:

1) The natural gas industry has extremely limited experience integrating DSM into the facilities planning process, and in using targeted DSM to reduce investments in infrastructure projects. ICF's review of existing DSM programs at North American gas utilities in other jurisdictions found that no activity has been undertaken that was designed to deferred transmission and distribution costs using targeted DSM and DR.

- ICF did not identify any natural gas utilities outside of Ontario that actively consider the impact of DSM programs on peak hour or peak day demand forecasts used for facilities planning. Since this study was initiated in October of 2016, a few gas utilities have begun to consider these impacts. However, these efforts remain in the very early stages.
- Gas utilities in other jurisdictions have expressed concerns about the reliability of the DSM impacts as an infrastructure investment alternative due to the lack of information on the measured impacts of DSM on peak hourly demand.[15]

2) ICF also assessed activity in the electric power industry. While some progress has been made in the electric power industry to defer transmission and distribution costs using

[15] Note that, to date, no natural gas utilities have actually measured the impact of DSM programs on peak period demand.

targeted energy efficiency, differences in utility cost structure, duration of peak period requirements, and availability of data on DSM impacts leads ICF to the conclusion that geo-targeted DSM programs are likely to be more cost-effective for the electric industry than they are for the natural gas industry, and that the electric industry experience provides only relatively limited value as an example for the gas industry.

The differences between the electric system and the natural gas system include:

- The electric industry can achieve greater infrastructure cost savings from similar DSM and DR measures, due to the higher cost infrastructure of the industry.
- The difference in risk tolerance between the industries, for capacity shortage, also increases the attractiveness of DSM and DR for infrastructure deferral and avoidance in the electric industry relative to the natural gas industry.
- In addition, the ability to accurately measure the impact of DSM due to the advanced metering capabilities of electric utilities reduces risk associated with the reliance on DSM to displace electricity infrastructure. The lack of metered customer data makes estimating peak hour demand impacts difficult for gas utilities and increases facility planning risks.

8.3 Potential for Targeted DSM to Impact Infrastructure Investment

Due to the lack of industry experience, and the lack of measured data on DSM peak period load impacts, ICF conducted most of the research into the potential for DSM to impact infrastructure requirements by extrapolating existing data on DSM program impacts from annual data to peak hourly period data based on building modeling, and other theoretical analysis. While we view the analysis as robust, there remains significant uncertainty, particularly on the cost and reliability of using DSM to reduce infrastructure investment. Hence, our conclusions should be treated as preliminary until additional research is completed.

The assessment of the potential for DSM to impact infrastructure investments is reviewed in Sections 5 and 6 of this Executive Summary. The primary conclusions from ICF's study related to the potential impacts of DSM measures and programs are summarized below:

1) ***DSM can impact peak hour natural gas demand and natural gas demand growth.*** While there is little to no measured data on actual peak hour impacts of natural gas DSM programs, ICF's analysis indicates that many, but not all, DSM measures should be expected to have measurable impacts on peak hour natural gas demand:
   - In general, industrial measures are most cost-effective at reducing peak hour demand, followed by commercial sector measures, and then residential sector measures.
   - Space heating is important from a winter peak hourly demand perspective, even in the industrial sector. Measures that result in space heating savings, such as air sealing, insulation, central heating systems and boiler measures, contribute disproportionately to winter peak hour savings.
   - Adaptive thermostats lead to annual gas consumption savings but initial analysis shows that this measure may increase winter peak hour demand since HVAC systems are recovering from temperature setback during this period.

  - Residential building modeling indicates that adaptive thermostats lead to a significant increase in winter peak hour demand.
  - Commercial building modeling suggest that adaptive thermostats lead to increases in winter peak hour demand in the commercial sector as well but the impact is much smaller than the residential sector due to the lower applicability of this measure in the commercial sector and the diversity of operating schedules in the different types of commercial facilities being considered.
  - During the winter peak day, adaptive thermostats lead to increased demand during other non-setback hours as well since it can take several hours to heat up a building's entire thermal mass.

- At least a portion of the demand impacts from other measures with a controls component may not be coincident with winter peak hourly demand.
- Modeling of tankless water heaters suggests that they can increase peak demand for an individual customer during the relatively short periods that they are in use. However, when impacts are considered on an hourly basis and aggregated across many customers within a community (i.e. such that the diversity of water usage profiles are considered), tankless water heaters are expected to lead to peak demand reductions.
- Based on the building modeling conducted by ICF, DSM is not expected to shift the timing of the hourly peak demand.

2) ***Based on ICF's initial assessment of the potential to reduce peak hour demand using DSM, it appears possible that some infrastructure investments may be reduced through the use of targeted DSM.***

- ICF's analysis suggests that geo-targeted DSM programs would have the potential to offset demand growth by up to about 1.2 percent per year, before consideration of DSM program and measure costs.
- ICF's analysis suggests that DSM may be able to cost-effectively defer infrastructure investments in certain situations where annual peak hour demand growth is relatively low and project costs per unit of demand are relatively high.

3) ***Based on ICF's initial assessment of the likely costs of reducing peak hour demand using DSM, the number of infrastructure projects that appear likely to be cost-effectively reduced by targeted DSM is expected to be limited.***

- Opportunities to reduce facilities investments in a cost-effective manner through the use of geo-targeted DSM are likely to be limited due to the cost of geo- targeted DSM programs relative to the cost of many infrastructure projects.
- The maximum penetration rate of DSM programs appears likely to be lower than the rate of growth in areas where a significant share of new infrastructure projects are indicated. As a result, DSM programs targeted at infrastructure projects in these regions are more likely to be able to delay a specific project than to eliminate the need for the infrastructure project altogether. The cost effectiveness of geo-targeted DSM programs decreases as the delay in project implementation becomes shorter.

- There is likely a minimum size for facilities investments where geo-targeted DSM programs could be cost-effectively implemented due to DSM program development, implementation, and monitoring costs.

8.4 Policy and Planning Changes Needed to Facilitate Use of Targeted DSM to Impact Infrastructure Investment

Facilities planning and DSM planning processes are currently independent of each other, and operate under different regulatory structures. Given the range of differences between the existing planning process, and the needs and objectives of the facilities planning process, it is likely that implementation of geo-targeted DSM will require a specific planning and regulatory framework, determined for the express purpose of deferring natural gas infrastructure.

Integrating the potential for DSM to reduce infrastructure requirements into the facilities planning process will require significant changes in policy, as well as changes in the utility planning process. These issues are explored in more depth in Section 4 (Utility Planning) and Section 7 (Policy) of this Executive Summary. The primary conclusions include:

1) ***ICF's review indicates that changes in Ontario energy policy and utility regulatory structure would be necessary to facilitate the use of DSM to reduce infrastructure investments.*** These changes would include:

   - Cost recovery guidelines for overlapping DSM and facilities planning and implementation costs, and criteria for addressing DSM impact risks.
   - Approval to invest in, and recover the costs of, the Advanced Metering Infrastructure (AMI) necessary to collect hourly data on the impacts of DSM programs and measures.
   - Changes in the approval process for DSM programs to be consistent with the longer lead time frame associated with facilities planning.
   - Clarification on the allocation of risk associated with DSM programs that might or might not successfully reduce facilities investments.
   - Guidance on cross subsidization and customer discriminations inherent in geo-targeted DSM programs that do not provide similar opportunities to all customers.
   - Guidance on how to treat conflicts between DSM programs designed primarily to reduce investment in new infrastructure and DSM programs designed to reduce carbon emissions or improve energy efficiency.
   - Guidance on how to treat uncertainty associated with energy efficiency programs outside the control of the Utilities that impact peak period demand.

2) ***There are a number of differences between the DSM and facilities planning process that must be reconciled in order to factor in geo-targeted DSM to reduce facilities investments.***

   - This includes differences in risk and reliability criteria, cost-effectiveness criteria, program assessment and planning timeframes.

- The linkages between DSM planning and facilities planning are currently 'passive' rather than 'active', and are not sufficient to actively integrate geo-targeted DSM programs into the facilities planning process.
- Underestimating facilities requirements can lead to significant operational problems for the gas utility (such as widespread customer outages during cold weather), leading to a very risk adverse planning process for facilities investments. Given the lack of data on actual impacts of DSM measures on peak hour demand, DSM is generally considered a high risk alternative to facility investments that would be inconsistent with facilities planning criteria.

3) ***Differences in the risk profile between facilities planning and DSM planning create significant challenges in incorporating DSM programs into the facilities planning process.*** Underestimating facilities requirements can lead to significant operational problems for the gas utility, leading to a very risk adverse planning process for facilities investments. Given the lack of data on actual impacts of DSM measures on peak hour demand, DSM is generally considered a high risk alternative to facility investments that would be inconsistent with facilities planning criteria.

8.5 Recommendations for Additional Research

The use of DSM to reduce investments in natural gas facilities remains relatively untried and untested. While ICF has identified areas where there is potential to use DSM to avoid infrastructure investments, there remains significant uncertainty in both the potential and the cost of achieving that potential. There is little to no actual measured data on DSM program impacts on peak period demand for natural gas, and there are no significant real world examples that ICF can point at to indicate that DSM can be used effectively for this purpose.

As a result, there is currently a fundamental disconnect between the limited risk acceptable to the Utilities in the facilities planning process and the lack of information on the ability of DSM to reliably reduce peak period demand that will need to be addressed before the Utilities would be able to rely on DSM to reduce infrastructure investment as part of the normal business planning process:

- The lack of real measured data creates significant uncertainty in the evaluation of the potential to use DSM to reduce infrastructure investments and increases the risk (hence the cost) of using DSM to reduce infrastructure investments.
- The lack of reliable program implementation cost data for geo-targeted DSM programs makes accurate cost comparisons between facilities and DSM unavailable.

Hence, one of the most important conclusions from this study is that ***additional research is necessary before the Gas Utilities would be able to rely on DSM to reduce new infrastructure investments as part of the standard utility facilities planning process***. This research needs to include:

- ***Collection of hourly demand data:*** Collection and evaluation of measured hourly demand data needed to more accurately assess the impact of DSM measures and programs on peak period demand is needed to determine the cost and implementation potential of DSM measures and programs before the Gas Utilities would be able to rely

on DSM to reduce new infrastructure investments as part of the standard facilities planning process. This will require installation of Advanced Meter infrastructure installation (AMI), and automated meter reading (AMR) capability. Until actual hourly data is available, the Gas Utilities will not be in a position to accurately determine the potential cost-effectiveness of using DSM as an alternative to infrastructure investments.

- **Assessment of the reliability of using targeted DSM to reduce peak hour demand growth:** The risk associated with relying on DSM to reduce peak hour demand is one of the major stumbling blocks in using DSM to reduce infrastructure investments. ICF expects that development of specific pilot studies that test the ability of the utility to offset demand growth using DSM pilot programs will be the best approach to resolving these reliability issues.
- ***Assessment of the cost of geo-targeted DSM implementation*:** The cost per participant of implementing geo-targeted DSM programs is expected to be significantly higher than the costs of implementing system-wide DSM programs. The additional costs are based on the smaller program scale associated with geo-targeted DSM programs, the tailored nature of targeted DSM programs, and the need for additional monitoring and evaluation. Based on available information, and on our experience with DSM program implementation, these costs are estimated at 2-4 times higher than typical DSM program costs. However, until actual pilot studies are developed and implemented, the actual increase in costs will be unknown. The magnitude of these costs may determine whether or not geo-targeted DSM programs can be cost-effective.


ICF

The purpose of this document is to provide a summary of a finding from the IRP Study Report regarding the viability of Demand Side Management (DSM) to be a cost effective alternative to an infrastructure project. The project in question known as "Case Study #1" in the IRP Report is the Bathurst LTC.

Background:

- **The IRP study used several actual reinforcements from EGD and UGL portfolios to test the high-level models developed for the study based on insights and costing related to the Natural Gas's Achievable Potential Study from 2016.**

- **The reinforcements were selected by the Utilities and designed to determine the 'best case' option for targeted DSM to be effective (i.e. if it can't work in the best case, it cannot work elsewhere).**

- **The reinforcement evaluated in Case Study 1 was an EGD CDA area reinforcement and was provided with long term Hemson growth forecasts. The LTC is now being developed and is using updated localized and current growth forecasts.**

Passage from IRP Study:

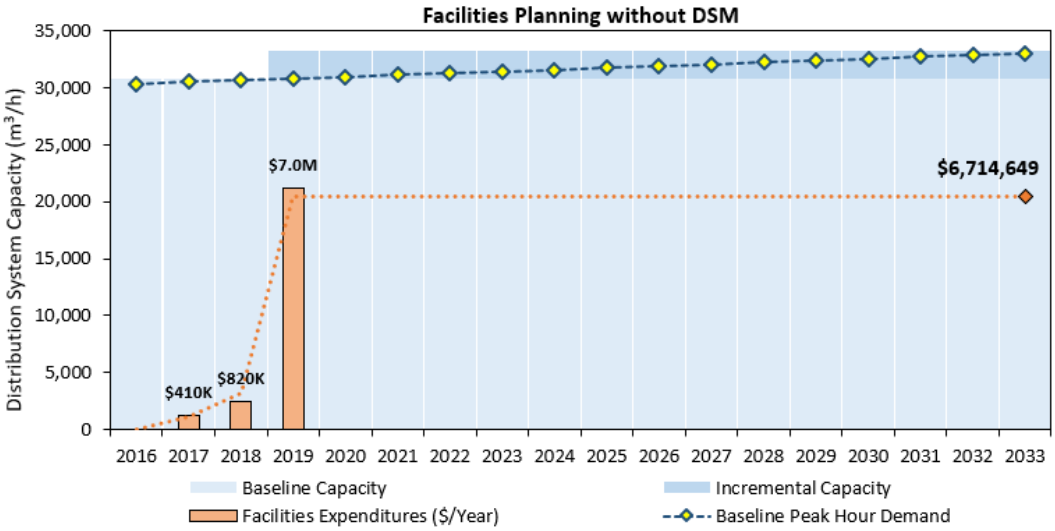
"Case Study 1: Geo-Targeted DSM Costs Less than Planned Facility Investments

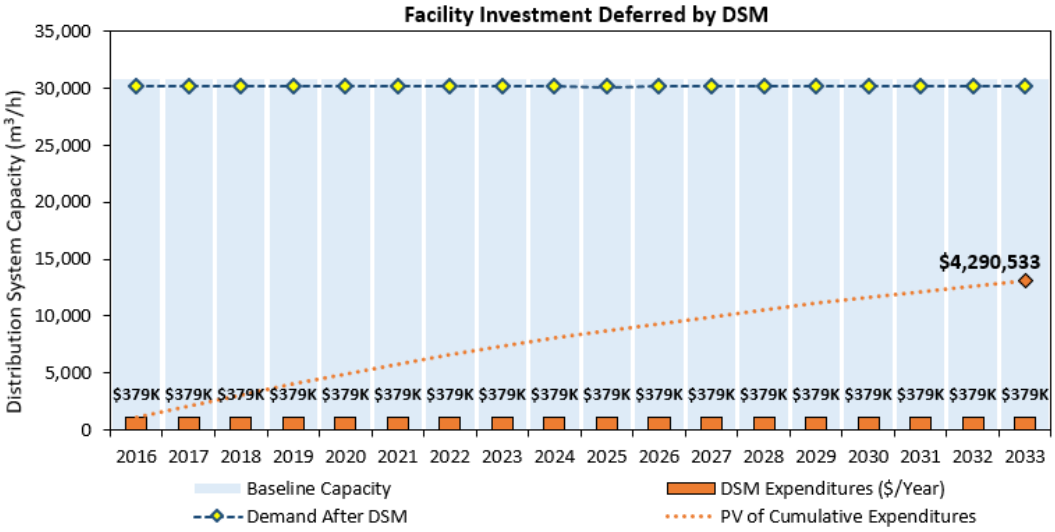
Exhibit 104 presents the geo-targeted DSM supply curve for a distribution system located in Enbridge's Central region, where 48% of the peak hour demand is attributed to residential customers, and the remaining 52% to commercial customers. The current peak hour demand from the distribution system is approximately 30,000 m^3/h and is growing at an average rate of 158 m^3/h per year (or 0.5%). Based on information provided by Enbridge, the peak hour demand growth will need to be accommodated by a facility investment project that is anticipated to have a capital cost of approximately $8,200,000 for the installation of 3.2 km of an NPS 12 steel high-pressure pipeline.

For this case study, geo-targeted DSM appears to be a cost-effective. This result is shown in Exhibit 104, where it can be seen that the PV of the planned facility investment project is approximately $6.7M, while it is estimated that a geo-targeted DSM program can provide the necessary annual peak hour demand savings of 158 m^3/h for a PV cost ranging somewhere between $3.7M and $4.9M.[1]

The cash flows for each scenario are displayed in Exhibit 105, where it can be seen that annual expenditures of $379,000 on geo-targeted DSM until 2033 would result in a total PV cost of ~$4.3M while maintaining the peak hour demand below the capacity of the existing distribution pipeline.

[1] This range of geo-targeted DSM program costs corresponds to the points on the green line and the red line along the vertical dotted line corresponding to 158 m^3/h.





”

<u>Inputs used in analysis:</u>

- **The project particulars, including growth and network demands provided by EGD in 2017 were determined using the 2016 Long Range Plan (LRP) method for calculating demand growth , and included a smaller list of affected networks. Customer growth projections used in the 2016 Long Range Plan were based on franchise-wide longer term economic growth data provided by Hemson Consulting.**
- **The reinforcement was submitted as an output of the 2016 LRP and included in the approved capital portfolio for 2018 based on the 2016 LRP numbers.**

<u>Changes since Case Study 1 (Bathurst LTC) developed:</u>

- **Subsequent to ICF providing their analysis of the project, a revised LRP method was devised and employed for the 2017/18 LRP refresh that included more timing and geographically relevant data points based on updated information from Developer and Municipal plans. For instance, in the**

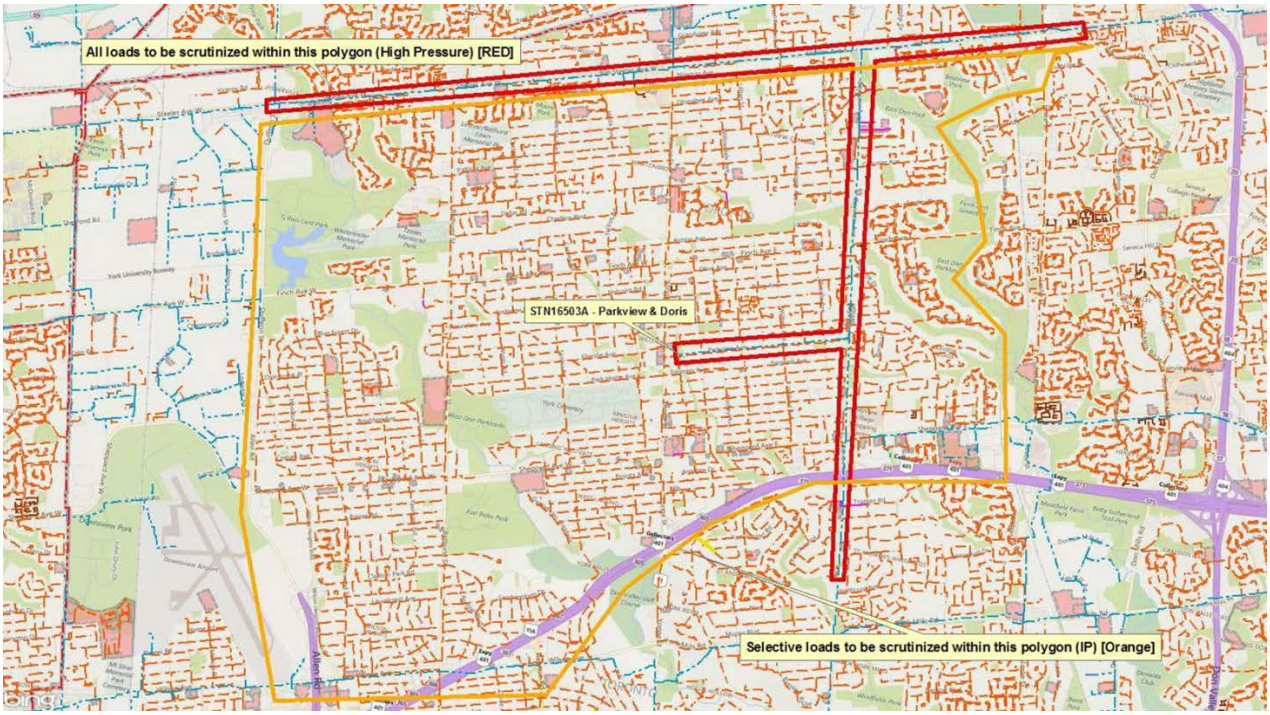
Bathurst LTC, information (i.e. additional data points) around possible high rise development that was not fully factored in Hemson's longer-term view of growth was built into the planning forecasts.

- **Timing was not able to be accelerated (already in 2018 approved portfolio)**
- **Additionally, the area of impact considered in the planning process was expanded to account for increased growth in upstream development contributing to lower inlet pressures downstream.**
- **External to the Utilities, the non-transparent funding from GreenON in energy efficiency creates a situation where estimated future costs for energy efficiency may not follow past information.**

Results:

- **As a consequence, the project now more adequately captures the demand growth for the area. This key variable change means that the initiative is anticipated based on the Company's initial analysis to fall out of the "green area" of being able to implement DSM to defer the project. In addition, any costs determined for energy efficiency to impact peak usage may be less reliable and possibly more expensive.**

Metric	Bathurst (IRP case study)	Bathurst (LTC application)
Cost	$8.2M	$9.9M
Res Growth	1470	1675
Comm Growth	*21*	*151*
Apt Growth	*6*	*42*
Load Growth	153 m3/h yearly (average)	590 m3/h yearly (average)



Risk Mitigation:

- **System flexibility needs are also a driver for the project, but not included or valued in the ICF analysis which was strictly on a $ per m3/h of incremental capacity basis, though have noted that assumption in Study and executive summary (ES-33, p.160).**
    - **PENDING - Final growth numbers for the project on a flow basis is 3.8 times larger compared to the 2016 LRP forecast of 0.5%, (590m3/h vs. 153m3/h) thus making the project likely not possible to be affected by DSM.**
    - **PENDING - Further, frameworks are not currently in place to implement a geo targeted DSM program, as well timelines for the project do not allow for sufficient time for DSM to be implemented, monitored and evaluated before the project is required.**
- **Of note: the "incremental capacity" shown in the figures in the ICF report is the incremental capacity USED by growth over 10 years, not the ultimate incremental capacity PROVIDED by the reinforcement, which was designed to have a lifespan of AT LEAST 10 years and will provide support in the area likely far beyond that.**

SEC INTERROGATORY # 2

INTERROGATORY

Ref: General

Question:
At the DSM Mid-Term Review Stakeholder Conference, Enbridge representatives referred to a “high level review” of IRP alternatives to the Bathurst Reinforcement Project. Without limiting the generality of Question #1, please provide a full copy of that high level review, including any scope or parameters documents (such as instructions to the person or firm doing the review), any analysis, any conclusions or reports, and any responses from system planners relating to those conclusions or reports.

RESPONSE

Please see the response to SEC Interrogatory #1 and attachments found at Exhibit I.EGDI.SEC.1, Attachments 1 and 2.

SEC INTERROGATORY # 3

INTERROGATORY

Ref: A/2/1, p. 1

Question:
The Application states “the customer growth in the area has reduced capacity within the gas network servicing the area”. Please provide the total customer attachments, by rate class, in the said area in each of the years 2009 to 2018, and the average and peak load for the most recent twelve months for those customers added in that period, again by rate class.

RESPONSE

In order to fulfill all requests above the Company has provided net annual customer attachments, annual volume for an average customer, and estimated average peak load for an average customer by customer type rather than rate class. Please note that these figures have been provided on a best efforts basis. As such while the net customer attachments provided represent a fair approximation of annual customer attachments, due to the nature and purpose of the system from which this data was retrieved it is possible that the customer attachments noted did not fall precisely within the calendar years noted below. Similarly, the average annual and peak volumes provided by customer type are simple averages calculated by dividing total volumes by total number of customers for each customer type. As such these volumes may not be representative of the specific customers attached since 2009 or the customers forecast to be attached moving forward.

Net Annual Customer Attachments

	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Apartment	5	4	0	1	2	0	0	0	1
Commercial	17	13	11	22	48	51	-6	22	36
Industrial	0	0	0	0	0	0	0	0	0
Residential	841	653	246	346	686	464	-186	141	514

Average Annual Consumption & Estimated Average Peak Demand (Past 12 Months)

	Average Annual Consumption per Customer (m^3)	**Estimated Average Peak Demand per Customer (m^3/hr)**
Apartment	268,885	123.3
Commercial	29,727	14.1
Industrial	2,286,909	397.0
Residential	2,561	1.3

SEC INTERROGATORY # 4

INTERROGATORY

Ref: A/2/1, p. 1

Question:
Please provide details of any significant loads lost or reduced during the last ten years, including without limitation the former Jewish Community Centre on Bathurst south of Ellerslie.

RESPONSE

In order to protect the privacy of its customers and in compliance with GDAR, Enbridge cannot comment on the past, present or future consumption of any specific customer. On the community level, to the degree individual customers have been removed from the system in years past due to demolition or renovation they have generally been replaced by similar, if not larger consumers of natural gas due to ongoing growth in the area, resulting in net increases to peak gas consumption.

SEC INTERROGATORY # 5

INTERROGATORY

Ref: A/2/3

Question:
Please provide copies of all materials provided to persons on the List of Interested Parties that refer to the use of conservation, load management, DSM, or similar approaches as an alternative to building additional capacity as proposed in the Application.

RESPONSE

As noted in Attachment 2 to the response to SEC Interrogatory #1(Exhibit I.EGDI.SEC.1), Enbridge determined in the first half of 2018 that the use of DSM was not a viable alternative to the Bathurst Reinforcement Project. Further, as noted on page 7 of Attachment 1 to the response to SEC Interrogatory #1 (Exhibit I.EGDI.SEC.1) a wide variety of "…changes in Ontario energy policy and utility regulatory structure would be necessary to facilitate the use of DSM to reduce infrastructure investments."

Enbridge did not provide persons on the List of Interested Parties with materials regarding the use of conservation, load management, DSM or similar approaches in light of the fact that these approaches are not viable alternatives to the Bathurst Reinforcement Project.

SEC INTERROGATORY # 6

INTERROGATORY

Ref: B/1/1, p. 1,3

Question:
Please reconcile the proposed in-service date of December, 2019 with the forecast customer additions, which start in 2020 and thus will be zero in the 2019/2020 heating season.

RESPONSE

The proposed in-service date of December 2019 was heavily influenced by the City of Toronto. Due to other utility works and City of Toronto water work required to take place on Bathurst Enbridge was provided a window to construct the Bathurst Reinforcement Project between April and December of 2019 to alleviate utility conflicts of time and space. Upon completion of the Bathurst Reinforcement Project and other utility works on Bathurst, Enbridge anticipates a moratorium will be placed on further work along the preferred route.

SEC INTERROGATORY # 7

INTERROGATORY

Ref: B/1/1, p. 1

Question:
Please provide a map indicating the locations of the forecast customer additions set out in Table 1. Please provide details of the sources of the customer addition forecasts, and specify by rate class new builds vs. conversions of existing buildings to gas.

RESPONSE

Enbridge's long range growth forecast leverages several data sets to inform system demand forecasts. These datasets include information regarding development proposals received by municipalities in our service territory as well as internal growth forecasts, tacit knowledge, and the output of a third party growth forecast. These data sets are used as inputs into a complex proprietary algorithm which forecasts incremental demand at the network level. As a result the forecast customer additions cannot be represented on a map, nor can they be provided by rate class as net customer additions are determined by customer type. The Company would expect few if any conversions from another fuel toward natural gas in an urban area such as the one in question.

SEC INTERROGATORY # 8

INTERROGATORY

Ref: B/1/1, p. 1

Question:
Please advise whether the primary reason for the project is to solve current low inlet pressures, or to meet forecast customer growth in the service area.

a. If it is the former, please provide details of the alternative solutions to solve that problem that have been considered, other than building more pipe.
b. If it is the latter, please provide details of how much deferral of the project can be achieved by reducing load in the area, either through general DSM programs focusing on that area, or targeted programs for the new additions forecast.
c. Please advise the timing of the project if either of the two reasons for the project is solved by other means.

RESPONSE

a- b) Enbridge must consider all factors contributing to the need for projects such as the Bathurst Reinforcement Project when developing plans for the continued operation of a safe and reliable natural gas network, and cannot evaluate the impact of future customer growth in isolation of low inlet pressures due to past customer attachments or the need for redundant infrastructure within the area as described in Exhibit B, Tab 1, Schedule 1, paragraph 2. As outlined in Attachment 2 of the response to SEC Interrogatory #1 (Exhibit I.EGDI.SEC.1), the Company considered alternatives to the Bathurst Reinforcement Project in light of all the purposes and needs the project was required to fulfill, ultimately concluding that these alternatives were not viable.

c) As described above neither of the two reasons cited can be solved by other means. Further, as noted in the response to SEC Interrogatory#6 found at Exhibit I.EGDI.SEC.6 the timing of the Bathurst Reinforcement Project has and must continue to coordinate closely with the City of Toronto due to upcoming municipal infrastructure projects and an anticipated moratorium on further work along the preferred route.

SEC INTERROGATORY # 9

INTERROGATORY

Ref: E/1/1, p.3

Question:
Please provide the current total annual volumes of the area that the proposed pipeline would serve, and the percentage increase in those volumes represented by the 13 million m3 forecast.

RESPONSE

The total delivered volume for the area in question from October 2017 through September 2018 was approximately 245 $10^6 m^{3,1}$. The incremental volume forecast provided in Exhibit E, Tab 1, Schedule 1, page 3 represents a 5.3% increase in annual consumption relative to this amount.

[1] Volume provided is not weather normalized

SEC INTERROGATORY # 10

INTERROGATORY

Ref: E/1/1, p. 5-8

Question:
Please provide the backup calculations for the annual forecast distribution revenues, including forecast load by rate class and distribution rates assumed for each year.

RESPONSE

Annual forecast of distribution revenues are provided in Exhibit F, Tab 1, Schedule 1, page 5, line 13. Forecast load, rate class and distribution rates assumed for this forecast are summarized below.

	Average Annual Load[1] (m3)	Rate Class	Distribution Rates	Annual Distribution Revenue
Residential	2,358	Rate 1	OEB approved rates [2]	$443.48
Commercial	19,627	Rate 6	OEB approved rates [2]	$2,200.38
Apartment	147,130	Rate 6	OEB approved rates [2]	$8,169.50

1. Approved by the Board in EB-2017-0086
2. Approved by the Board in EB-2018-0090

SEC INTERROGATORY # 11

INTERROGATORY

Ref: General

Question:
Please provide an estimate, with backup calculations, of the number of homes in the subject area that would have to be retrofitted under the Home Energy Conservation program each year in order to displace the need for this reinforcement. Please provide an estimate of the annual and cumulative cost of achieving those results.

RESPONSE

The estimate requested by this interrogatory would involve an expenditure of time and effort that is disproportionate to any perceived value in the response. This is due to a number of factors, not the least of which are the number of assumptions that would need to be made without an empirical basis. Such assumptions include details regarding the current condition of the existing housing stock, the availability of contractors and trades over the short term, the take up rate by home owners to a geo-targeted Home Energy Conservation offering and the customer incentive levels that would be necessary to attract the minimum number of participants necessary to potentially have any material impact on peak load. Given the uncertainty of the assumptions that would necessarily be required, the requested estimate would be of no value to the Board. The question further presupposes some resolve of the very important policy issues that have been identified by Enbridge and ICF in the IRP Study[1] that require contemplation and resolution by the Board before it would be possible to undertake a DSM program offering of the magnitude that this interrogatory contemplates.

[1] Included as Exhibit I.EGDI.SEC.1 Attachment 1