ONTARIO ENERGY BOARD

EB-2017-0224
EB-2017-0255
EB-2017-0275

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

AND IN THE MATTER OF an applications for approval of the cost consequences of cap and trade compliance plans

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ENVIRONMENTAL DEFENCE COMPENDIUM FOR CROSS-EXAMINATION

Elson Advocacy
160 John Street, Suite 300
Toronto, Ontario M5V 2E5

Kent Elson
Tel: (416) 906-7305
Fax: (416) 763-5435
kent@elsonadvocacy.ca

Lawyers for Environmental Defence

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EB-2017-0255
Exhibit B.ED.22
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UNION GAS LIMITED

Answer to Interrogatory from
Environmental Defence ("ED")

Reference: Exhibit 3, Tab 4, Appendix A, pp. 1-7

Question: Please provide Union's cumulative TRC net benefits to date from all of its programs since the inception of its DSM program.

Response:
The Total Resource Cost ("TRC") net benefit resulting from Union's DSM programs (1997 to 2016) to date is $3,148,013,000. Please see Table 1 below for a detailed breakdown of annual TRC net benefits.

Table 1

Year	TRC Net Benefits ($000)
1997	$76,300
1998	$38,000
1999	$41,900
2000	$43,859
2001	$47,776
2002	$76,194
2003	$47,364
2004	$70,167
2005	$97,106
2006	$184,677
2007	$215,896
2008	$262,754
2009	$308,256
2010	$284,133
2011	$325,657
2012	$232,147
2013	$326,341
2014	$107,725
2015 (Pre-audit)	$161,193
Total (Pre-audit)	**$2,947,446**

Filed: 2018-04-16
EB-2017-0255
Exhibit JT1.2

UNION GAS LIMITED

Undertaking of Mr. Ginis
To Mr. Elson

Reference: Tr.1, p.11

TO UPDATE THE LARGE VOLUME PROGRAM TABLE IN EXHIBIT B.ED.24, ATTACHMENT A, TO INCLUDE AN ESTIMATE FOR THE VALUE OF AVOIDED NATURAL GAS COSTS.

Response:

Please see Attachment A for an updated version of Union's original response at Exhibit B.ED.24 Attachment A. Union has updated this response by adding the following information:

- Inclusion of estimates for the value of avoided natural gas costs;
- Inclusion of total 2018 DSM costs (program administration); and,
- An estimate of GHG emissions reductions between capped and non-capped customers.

The information has been organized in a manner consistent with Union's original response at Exhibit B.ED.24:

- 2018 DSM Residential Sector Forecasts –
  Residential program and Low Income program (single family only)

- 2018 DSM Commercial/Industrial Sector Forecasts –
  Commercial/Industrial program, Performance-Based program, and Low Income program (multi-family only)

- 2018 DSM Large Volume Sector Forecasts –
  Large Volume program

Notes:

- *Union utilized the Mid-Range LTCPF for all tables. The LTCPF is available to 2028 only; for years beyond 2028 Union assumed the 2028 price.*
- *Union utilized the estimated measure lives below, based on the typical measure life for the measures in the programs within each sector.*
  - *Residential sector – 25 years*
  - *Commercial/Industrial sector – 17 years*
  - *Large Volume sector – 12 years*
- *Capped vs. non-capped values are estimates only.*
- *Avoided natural gas costs are based on draft 2017 DSM avoided costs, and are subject to change.*

2018 DSM Residential Sector Forecasts

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	Total Lifetime Savings
Forecast annual gas savings (m3)	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	**184,954,250**
Forecast avoided natural gas (Real 2017 CAD)	$ 0.1269	$ 0.1291	$ 0.1325	$ 0.1290	$ 0.1389	$ 0.1389	$ 0.1429	$ 0.1533	$ 0.1663	$ 0.1663	$ 0.1729	$ 0.1740	$ 0.1883	$ 0.1988	$ 0.2119	$ 0.2101	$ 0.2127	$ 0.2180	$ 0.2245	$ 0.2312	$ 0.2381	$ 0.2453	$ 0.2526	$ 0.2602	$ 0.2680	**Not Applicable**
Forecast annual GHG reduction (t co2e)	13,872	13,872	13,872	13,872	13,872	13,872	13,872	13,872	13,872	13,872	13,872	13,872	13,872	13,872	13,872	13,872	13,872	13,872	13,872	13,872	13,872	13,872	13,872	13,872	13,872	**346,789**
Forecast carbon price (Mid-Range LTCPF)	$ 17	$ 18	$ 18	$ 19	$ 20	$ 21	$ 31	$ 36	$ 43	$ 50	$ 57	$ 57	$ 57	$ 57	$ 57	$ 57	$ 57	$ 57	$ 57	$ 57	$ 57	$ 57	$ 57	$ 57	$ 57	**Not Applicable**
Value of natural gas reduction	$ 939,133	$ 955,472	$ 980,440	$ 954,705	$ 1,027,686	$ 1,027,447	$ 1,057,153	$ 1,134,362	$ 1,230,592	$ 1,230,531	$ 1,278,867	$ 1,287,614	$ 1,392,990	$ 1,471,029	$ 1,567,737	$ 1,554,562	$ 1,573,512	$ 1,612,968	$ 1,661,094	$ 1,710,698	$ 1,761,828	$ 1,814,530	$ 1,868,853	$ 1,924,850	$ 1,982,572	**$ 35,001,223**
Value of GHG reduction	$ 235,817	$ 249,688	$ 249,688	$ 263,560	$ 277,431	$ 291,303	$ 430,019	$ 499,376	$ 596,477	$ 693,578	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	**$ 15,647,130**
Assumption of volumes from non-capped customers	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	**Not Applicable**
Value of GHG reduction from non-capped customers	$ 235,817	$ 249,688	$ 249,688	$ 263,560	$ 277,431	$ 291,303	$ 430,019	$ 499,376	$ 596,477	$ 693,578	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	**$ 15,647,130**
Value of GHG reduction from non-capped customers + Value of natural gas reduction	$ 1,174,949	$ 1,205,161	$ 1,230,129	$ 1,218,265	$ 1,305,117	$ 1,318,750	$ 1,487,172	$ 1,633,738	$ 1,827,070	$ 1,924,109	$ 2,069,546	$ 2,078,293	$ 2,183,669	$ 2,261,708	$ 2,358,416	$ 2,345,242	$ 2,364,191	$ 2,403,647	$ 2,451,773	$ 2,501,378	$ 2,552,507	$ 2,605,209	$ 2,659,533	$ 2,715,529	$ 2,773,251	**$ 50,648,353**

2018 DSM Commercial/Industrial Sector Forecasts

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	Total Lifetime Savings
Forecast annual gas savings (m3)	72,138,369	72,138,369	72,138,369	72,138,369	72,138,369	72,138,369	72,138,369	72,138,369	72,138,369	72,138,369	72,138,369	72,138,369	72,138,369	72,138,369	72,138,369	72,138,369	72,138,369									**1,226,352,273**
Forecast avoided natural gas (Real 2017 CAD)	$ 0.1269	$ 0.1291	$ 0.1325	$ 0.1290	$ 0.1389	$ 0.1389	$ 0.1429	$ 0.1533	$ 0.1663	$ 0.1663	$ 0.1729	$ 0.1740	$ 0.1883	$ 0.1988	$ 0.2119	$ 0.2101	$ 0.2127									**Not Applicable**
Forecast annual GHG reduction (t co2e)	135,259	135,259	135,259	135,259	135,259	135,259	135,259	135,259	135,259	135,259	135,259	135,259	135,259	135,259	135,259	135,259	135,259									**2,299,411**
Forecast carbon price (Mid-Range LTCPF)	$ 17	$ 18	$ 18	$ 19	$ 20	$ 21	$ 31	$ 36	$ 43	$ 50	$ 57	$ 57	$ 57	$ 57	$ 57	$ 57	$ 57									**Not Applicable**
Value of natural gas reduction	$ 9,157,332	$ 9,316,659	$ 9,560,117	$ 9,309,173	$ 10,020,798	$ 10,018,470	$ 10,308,131	$ 11,060,979	$ 11,999,310	$ 11,998,707	$ 12,470,028	$ 12,555,314	$ 13,582,819	$ 14,343,767	$ 15,286,748	$ 15,158,288	$ 15,343,060									**$ 201,489,701**
Value of GHG reduction	$ 2,299,411	$ 2,434,670	$ 2,434,670	$ 2,569,929	$ 2,705,189	$ 2,840,448	$ 4,193,043	$ 4,869,340	$ 5,816,156	$ 6,762,972	$ 7,709,788	$ 7,709,788	$ 7,709,788	$ 7,709,788	$ 7,709,788	$ 7,709,788	$ 7,709,788									**$ 90,894,345**
Assumption of volumes from non-capped customers	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%									**Not Applicable**
Value of GHG reduction from non-capped customers	$ 1,494,617	$ 1,582,535	$ 1,582,535	$ 1,670,454	$ 1,758,373	$ 1,846,291	$ 2,725,478	$ 3,165,071	$ 3,780,501	$ 4,395,932	$ 5,011,362	$ 5,011,362	$ 5,011,362	$ 5,011,362	$ 5,011,362	$ 5,011,362	$ 5,011,362									**$ 59,081,324**
Value of GHG reduction from non-capped customers + Value of natural gas reduction	$ 10,651,948	$ 10,899,194	$ 11,142,653	$ 10,979,627	$ 11,779,170	$ 11,864,762	$ 13,033,609	$ 14,226,050	$ 15,779,811	$ 16,394,639	$ 17,481,390	$ 17,566,677	$ 18,594,182	$ 19,355,129	$ 20,298,110	$ 20,169,651	$ 20,354,422									**$ 260,571,025**

2018 DSM Large Volume Sector Forecasts

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	Total Lifetime Savings
Forecast annual gas savings (m3)	83,549,330	83,549,330	83,549,330	83,549,330	83,549,330	83,549,330	83,549,330	83,549,330	83,549,330	83,549,330	83,549,330	83,549,330														**1,002,591,963**
Forecast avoided natural gas (Real 2017 CAD)	$ 0.1251	$ 0.1305	$ 0.1339	$ 0.1298	$ 0.1405	$ 0.1402	$ 0.1444	$ 0.1557	$ 0.1699	$ 0.1695	$ 0.1765	$ 0.1775														**Not Applicable**
Forecast annual GHG reduction (t co2e)	156,655	156,655	156,655	156,655	156,655	156,655	156,655	156,655	156,655	156,655	156,655	156,655														**1,879,860**
Forecast carbon price (Mid-Range LTCPF)	$ 17	$ 18	$ 18	$ 19	$ 20	$ 21	$ 31	$ 36	$ 43	$ 50	$ 57	$ 57														**Not Applicable**
Value of natural gas reduction	$ 10,455,461	$ 10,899,285	$ 11,191,001	$ 10,846,060	$ 11,739,381	$ 11,713,496	$ 12,062,908	$ 13,007,919	$ 14,191,150	$ 14,165,617	$ 14,746,896	$ 14,830,901														**$ 149,850,074**
Value of GHG reduction	$ 2,663,135	$ 2,819,790	$ 2,819,790	$ 2,976,445	$ 3,133,100	$ 3,289,755	$ 4,856,305	$ 5,639,580	$ 6,736,165	$ 7,832,750	$ 8,929,335	$ 8,929,335														**$ 60,625,483**
Assumption of volumes from non-capped customers	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%														**Not Applicable**
Value of GHG reduction from non-capped customers	$ 665,784	$ 704,947	$ 704,947	$ 744,111	$ 783,275	$ 822,439	$ 1,214,076	$ 1,409,895	$ 1,684,041	$ 1,958,187	$ 2,232,334	$ 2,232,334														**$ 15,156,371**
Value of GHG reduction from non-capped customers + Value of natural gas reduction	$ 11,121,245	$ 11,604,232	$ 11,895,949	$ 11,590,171	$ 12,522,656	$ 12,535,935	$ 13,276,984	$ 14,417,814	$ 15,875,191	$ 16,123,804	$ 16,979,230	$ 17,063,235														**$ 165,006,445**

2018 Total DSM Forecasts

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	Total Lifetime Savings
Forecast annual gas savings (m3)	163,085,869	163,085,869	163,085,869	163,085,869	163,085,869	163,085,869	163,085,869	163,085,869	163,085,869	163,085,869	163,085,869	163,085,869	79,536,539	79,536,539	79,536,539	79,536,539	79,536,539	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	7,398,170	**2,413,898,486**
Forecast annual GHG reduction (t co2e)	305,786	305,786	305,786	305,786	305,786	305,786	305,786	305,786	305,786	305,786	305,786	305,786	149,131	149,131	149,131	149,131	149,131	13,872	13,872	13,872	13,872	13,872	13,872	13,872	13,872	**4,526,060**
Value of natural gas reduction	$ 20,551,925	$ 21,171,416	$ 21,731,559	$ 21,109,938	$ 22,787,864	$ 22,759,413	$ 23,428,192	$ 25,203,260	$ 27,421,052	$ 27,394,855	$ 28,495,791	$ 28,673,830	$ 14,975,809	$ 15,814,796	$ 16,854,485	$ 16,712,851	$ 16,916,572	$ 1,612,968	$ 1,661,094	$ 1,710,698	$ 1,761,828	$ 1,814,530	$ 1,868,853	$ 1,924,850	$ 1,982,572	**$ 386,340,999**
Value of GHG reduction	$ 5,198,362	$ 5,504,148	$ 5,504,148	$ 5,809,934	$ 6,115,720	$ 6,421,506	$ 9,479,366	$ 11,008,296	$ 13,148,798	$ 15,289,300	$ 17,429,802	$ 17,429,802	$ 8,500,468	$ 8,500,468	$ 8,500,468	$ 8,500,468	$ 8,500,468	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	**$ 167,166,957**
Value of GHG reduction from non-capped customers	$ 2,396,217	$ 2,537,171	$ 2,537,171	$ 2,678,125	$ 2,819,079	$ 2,960,033	$ 4,369,573	$ 5,074,342	$ 6,061,020	$ 7,047,698	$ 8,034,375	$ 8,034,375	$ 5,802,042	$ 5,802,042	$ 5,802,042	$ 5,802,042	$ 5,802,042	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	$ 790,679	**$ 89,884,824**
Value of GHG reduction from non-capped customers + Value of natural gas reduction	$ 22,948,143	$ 23,708,587	$ 24,268,730	$ 23,788,063	$ 25,606,943	$ 25,719,446	$ 27,797,765	$ 30,277,602	$ 33,482,072	$ 34,442,553	$ 36,530,167	$ 36,708,205	$ 20,777,851	$ 21,616,838	$ 22,656,526	$ 22,514,892	$ 22,718,613	$ 2,403,647	$ 2,451,773	$ 2,501,378	$ 2,552,507	$ 2,605,209	$ 2,659,533	$ 2,715,529	$ 2,773,251	**$ 476,225,823**
Total Forecast DSM Costs	$ 63,272,305	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ 63,272,305**

EB-2017-0255
Summary of Exhibit JT1.2
Attachment A

Union Gas 2018 DSM Programs - Forecast Cost and Gas/Carbon Savings

Summary of Figures in Exhibit JT1.2, Attachment A

Total Forecast DSM Costs - Union 2018 DSM Plan	$	63,272,305.00
Value of natural gas and GHG reductions	$	553,507,956.00
Value of natural gas and GHG reductions (excluding value of GHG reductions from capped customers)	$	476,225,823.00

Source Figures from JT1.2

Value of natural gas reduction	$	386,340,999.00
Value of GHG reduction	$	167,166,957.00
Value of GHG reduction from non-capped customers	$	89,884,824.00
Value of GHG reduction from capped customers	$	77,282,133.00
Total Forecast DSM Costs	$	63,272,305.00

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EB-2017-0255
Exhibit B.GEC.22
Page 1 of 2

UNION GAS LIMITED

Answer to Interrogatory from
Green Energy Coalition ("GEC")

Reference: Exhibit 3, Tab 4, p. 41

Preamble: At Exhibit 3, Tab 4, p. 41, Union states that it "believes that any cost-effective opportunity identified through the CPA and/or MACC analysis should not be pursued via the 2018 Compliance plan", but instead through the DSM framework.

Question: Why couldn't or shouldn't additional energy efficiency that is less expensive than other compliance options be included in the Company's Compliance plan?

Response:
Opportunities to abate carbon such as those identified through the CPS and/or MACC analysis should be considered within the appropriate regulatory framework. The DSM framework is proven and offers best practices in delivery of cost effective energy efficiency measures to the market. The existing approved DSM Framework:

- Allows the utility to propose and deliver energy conservation programs which meet principles established through a public regulatory process;
- Allows the OEB and interested stakeholders the opportunity to assess and provide comments on the utility's proposed energy conservation programs;
- Facilitates oversight by the regulator; the OEB can approve or reject the utility's proposed energy conservation programs; and,
- Ensures continued monitoring and verification of results; the OEB and interested stakeholders can assess the results of a utility's OEB-approved natural gas conservation programs.

It should be noted that cost-effectiveness is one of many factors used by utilities, the OEB, and stakeholders to assess the appropriateness of offering ratepayer-funded energy conservation programs. In other words, a simplified carbon cost-effectiveness test should not be the only tool used to determine whether an energy conservation program should be offered. Instead, the program should be assessed based on several factors as is the case within the DSM Framework. Other factors may include determining whether the program will provide value to customers or consider the potential success of the program given the technology's market saturation.

For example, within Union's 2015-2020 DSM Plan, Union proposed a residential behavioural offering and an energy savings kit offering within the residential segment. Upon OEB and stakeholder review of the offerings, both were denied by the OEB. Regarding the behavioural offering, the OEB stated it "is not convinced, based on the evidence filed, that the proposed

budgets are a good use of customer funds or that the programs provide value for money."[1] Similarly, regarding the energy saving kit offering, the OEB stated that it "is of the view that the market for ESK measures is saturated."[2] Although the behavioural and energy savings kit measures were identified as cost-effective within the CPS and the MACC, it would not be appropriate to propose and assess the programs again through the Cap-and-Trade Framework given the OEB's decision.

In addition to the regulatory inefficiency and associated financial burden to ratepayers that would result from assessing energy conservation programs within two OEB frameworks, if the utility were to deliver separate energy conservation programs to the same customer, it could result in customer confusion.

Rather than duplicating the assessment and delivery of energy conservation programs within two OEB frameworks, the DSM Framework should be enhanced to ensure that any energy conservation opportunity that is cost-effective relative to the cost of carbon is included for assessment within the DSM Framework.

Enhancing the DSM Framework, rather than assessing and delivering energy conservation programs within two separate OEB frameworks, would facilitate:

- Leveraging the existing DSM Framework, which is robust and effective, to assess and deliver any additional energy conservation programs that are deemed cost-effective relative to the cost of carbon.
- Ratepayers would avoid funding two regulatory processes for the assessment of energy conservation programs.

In order to ensure that energy conservation opportunities that are cost-effective relative to the cost of carbon are included for assessment within the DSM Framework, enhancements to the DSM Framework could include:

- Adding the LTCPF to the DSM Framework cost-effectiveness test (i.e. the TRC-Plus test), to ensure the benefits of the avoided cost of carbon is captured within the DSM Framework cost-effectiveness test.
- Adding the cost-effectiveness test from the Cap-and-Trade Framework (i.e. comparing the cost of energy conservation programs to the avoided cost of carbon) to the DSM Framework, to ensure opportunities that are cost-effective within the Cap-and-Trade Framework are included for assessment within the DSM Framework.

Further details and assessments of the specific enhancements to the DSM Framework should be part of the OEB's development of the next DSM Framework, should include stakeholder and utility input, and should begin as soon as possible.

[1] EB-2015-0029, Decision, p. 37.
[2] EB-2015-0029, Decision, p. 15.

Enbridge Gas Distribution

Impacts of Ontario's Proposed Climate Policy
Kick-off Meeting

July 7, 2015

POTENTIAL IMPLICATIONS FOR EGD

1 NG consumption will need to decline 40% – 50% by 2030

- Residential, commercial, institutional NG consumption will need to decline by >40%
- Even with protection afforded industrial emitters consumption will need to decline by 20 – 30%
- No net increase in NG consumption for electricity generation

2 Electrification of transport and buildings

- Fuel switch from fossil fuels to electricity in transport (gasoline/diesel) and buildings (NG, oil) required to reduce demand (beyond DSM potential)
- Electricity demand (current and growth) will need to be met with non-fossil sources (nuclear, hydro, renewables)

3 Energy Efficiency / Demand Side Management

- Rate of energy efficiency needs to be dramatically increased (+5X current)
- Rate of DSM and incentives needs to be increased accordingly
- Deeper DSM targets will require deeper analytics and broader scope

POTENTIAL IMPLICATIONS FOR EGD

4 EGD will need to acquire $300M–$500M of allowance per year

- Starting in 2017/18.
- 350-400 bcf/yr = 20 Mt CO_2e = $300M at $15 / allowance. $15/tCO2 = $0.8/mmBTU
- For context the commodity price of the NG distributed is $1.5B at $4/mmBTU

5 EGD will need to build allowance acquisition infrastructure

- Accounting, finance, trading, analytics, offset/allowance sourcing, brokerage, MM&V, billing, customer relations, DSM, IT,… EGD's business will be better positioned than most. Opportunity?
- In depth Quebec, California knowledge

6 EGD will need to re-imagine infrastructure and business model

- Existing operations and plans for demand growth vs. 2030/2050 targets and stranded pipe/storage assets
- Combined impact of economy wide demand destruction as well as cost to deliver (including premature retirement of assets) and price of allowance on customers

UNCERTAINTY FOR Ontario…

5 THIS IS NOT ABOUT LARGE EMITTERS

Large emitters will be allocated gratis. Electric and gas utility small/medium sized customers, personal and freight vehicles make up the majority of emissions and will likely wear the full cost of allowance.

6 ENERGY EFFICIENCY +DE-CO_2 IZATION

To meet emissions targets we will need to reduce the energy intensity of the economy (energy efficiency) and the GHG intensity of the energy that drives the economy (fuel switching, renewables etc…) or reduce the size of the economy.

7 IS THE SLOPE TOO STEEP

This is not about 2020 targets. The "straight-line" abatement trajectory from 2012-2050 runs through 100MtCO_2 circa 2030. Assuming the economy will grow modestly over the next 15 years, this would call for 65Mt to 75Mt of reductions;

- 50% electrification of the vehicle fleet.
- 40% improvement in energy efficiency in residential, commercial, institutional, industrial NG users or conversion to electric driven operations.
- 5000MW of nuclear base load replacement, new demand resulting from electrification and growth met with non-emitting dispatchable generation –no new NG fired units.
- Natural gas is not a viable transition fuel.
- Transfer of $100Ms to buy California allowance (assuming they are available).

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Exhibit B.ED.21
Page 1 of 1

UNION GAS LIMITED

Answer to Interrogatory from
Environmental Defence ("ED")

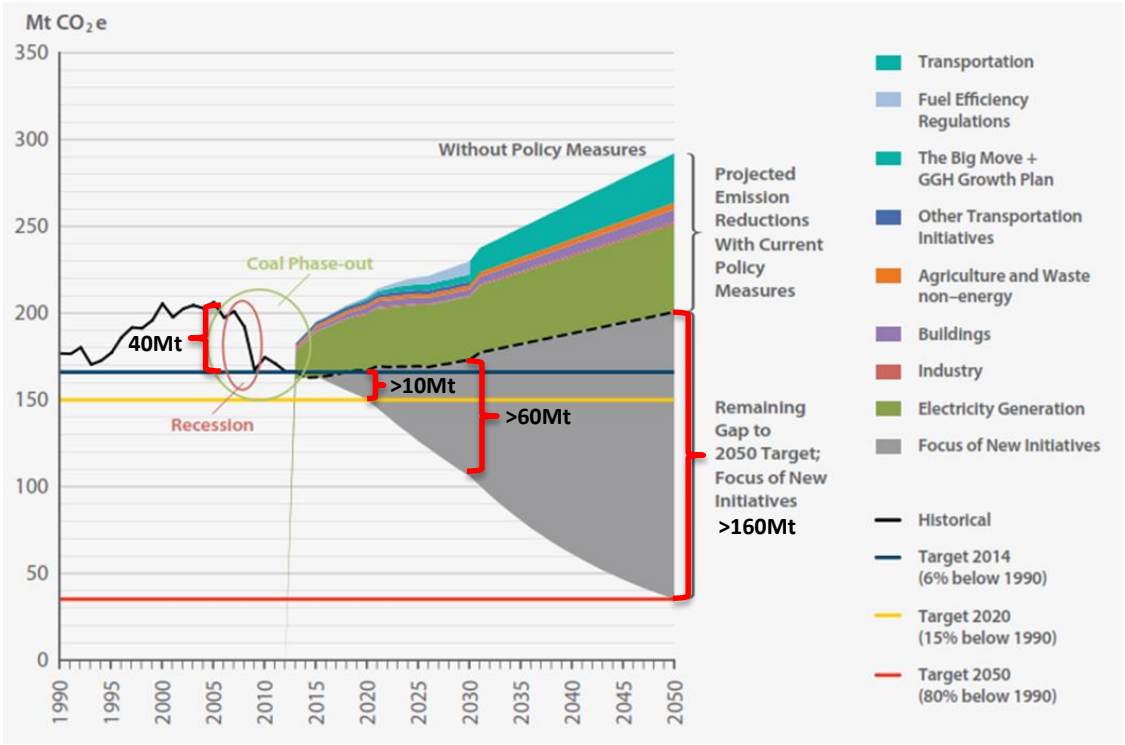
Reference: Exhibit 3, Tab 4, Appendix A, pp. 1-7

Question: Please provide a copy of any reports or presentations related to the same topics discussed in ICF, *Impacts of Ontario's Proposed Climate Policy*, dated July 7, 2015. Please include any reports or presentations by ICF providing updated or revised information following its July 7, 2015 report.

Response:
Please see updated information completed by ICF as follows:

- Attachment A – Completed November 2015 for Union and EGD jointly
- Attachment B – Completed April 2016 for Union, following the release of the draft Cap-and-Trade Regulations

Ontario has defined 2020 and 2030 targets and a linear path to de-carbonization by 2050



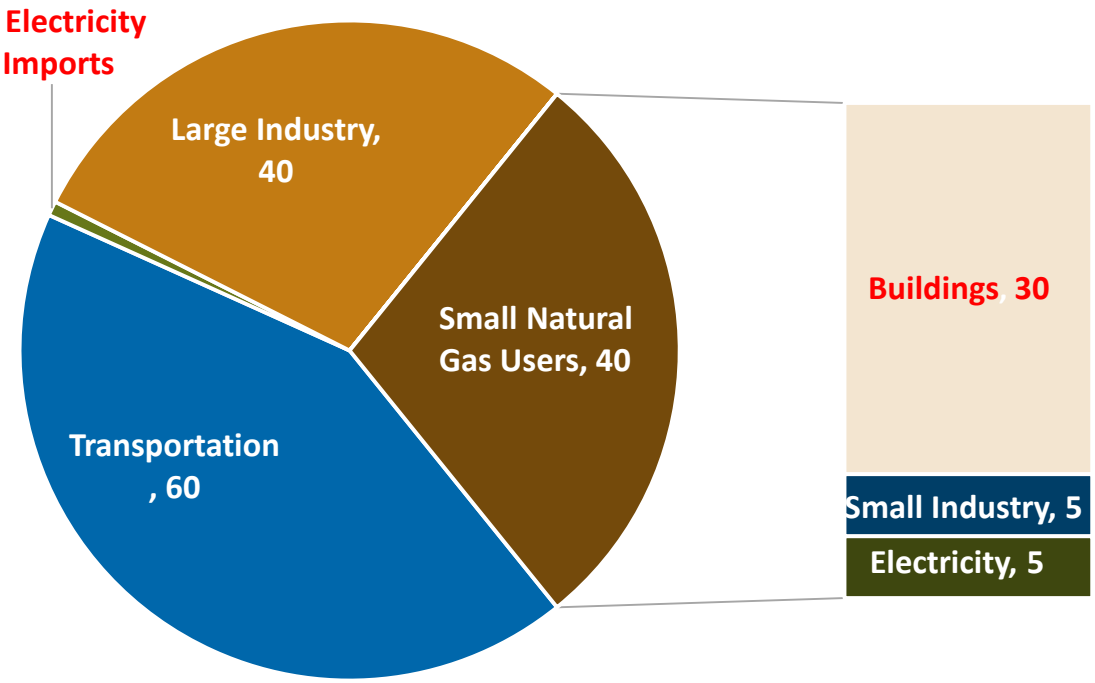
Significant reductions from 2005 to 2010. >40 Mt (20%).

Ontario's emission targets established versus 1990 baseline. 2020 (15%), 2030 (37%) and 2050 (80%).

Current measures identified for public transportation and energy efficiency.

Future reductions required to fill gap...

Based on Ontario's emissions profile reductions needed from NG and transport fuel use



Ontario Forecast 2017 GHG emissions for sectors / sources covered under proposed cap and trade ($MtCO_2e$)

NG and transportation fuel each meet 33% of energy demand and electricity meets 25%.

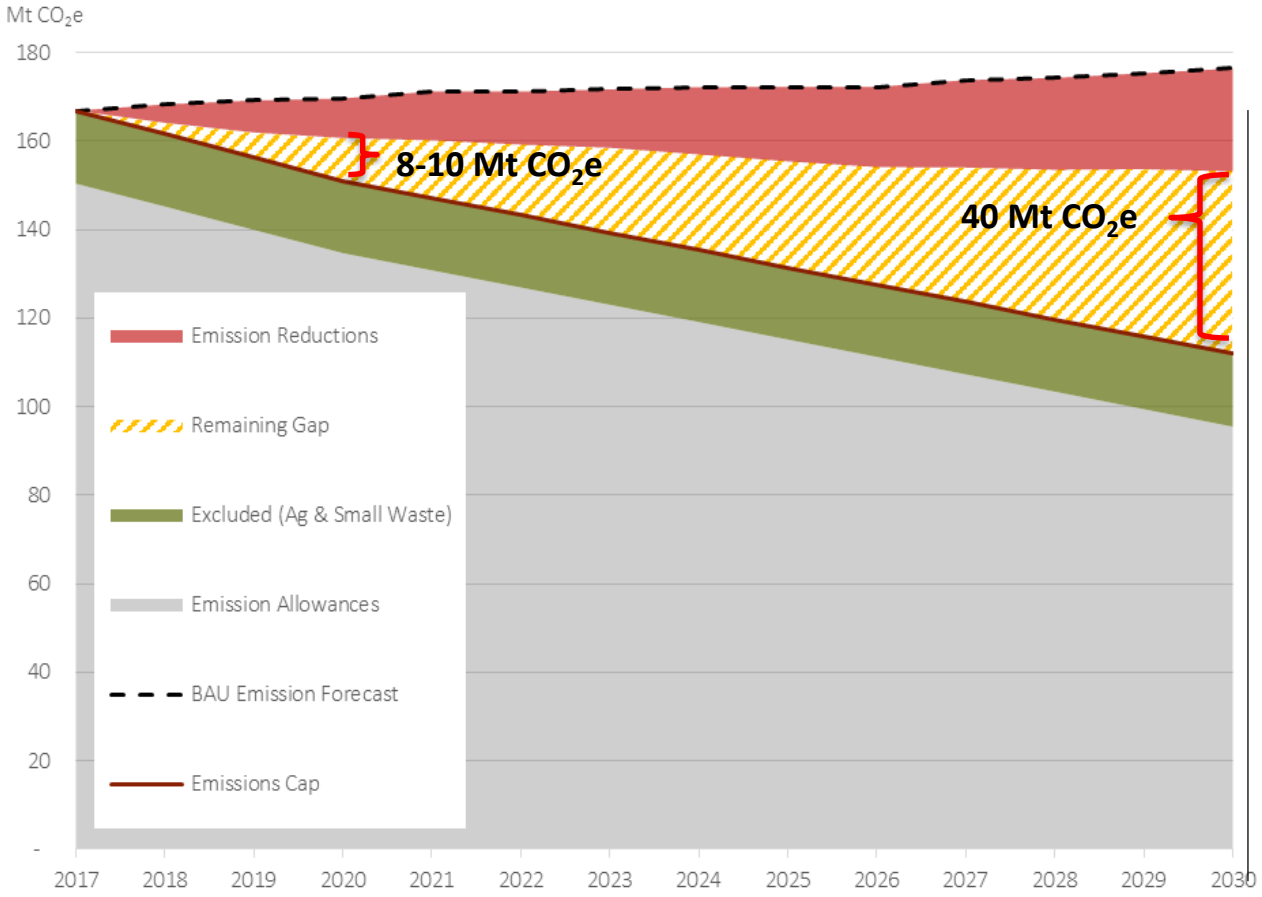
NG share of energy demand expected to grow over next 15 years.

Cap declines from 142M in 2017 to 124M in 2020 = 532M (avg 133M/yr)

To meet a 2030 target NG and transportation fuel use would need to decline by 50%.

Unlikely to influence consumer behavior – transport / NG use with a price on CO_2 alone.

ICF Ontario Emission Reduction Forecast



Informed by ICF economy wide model.

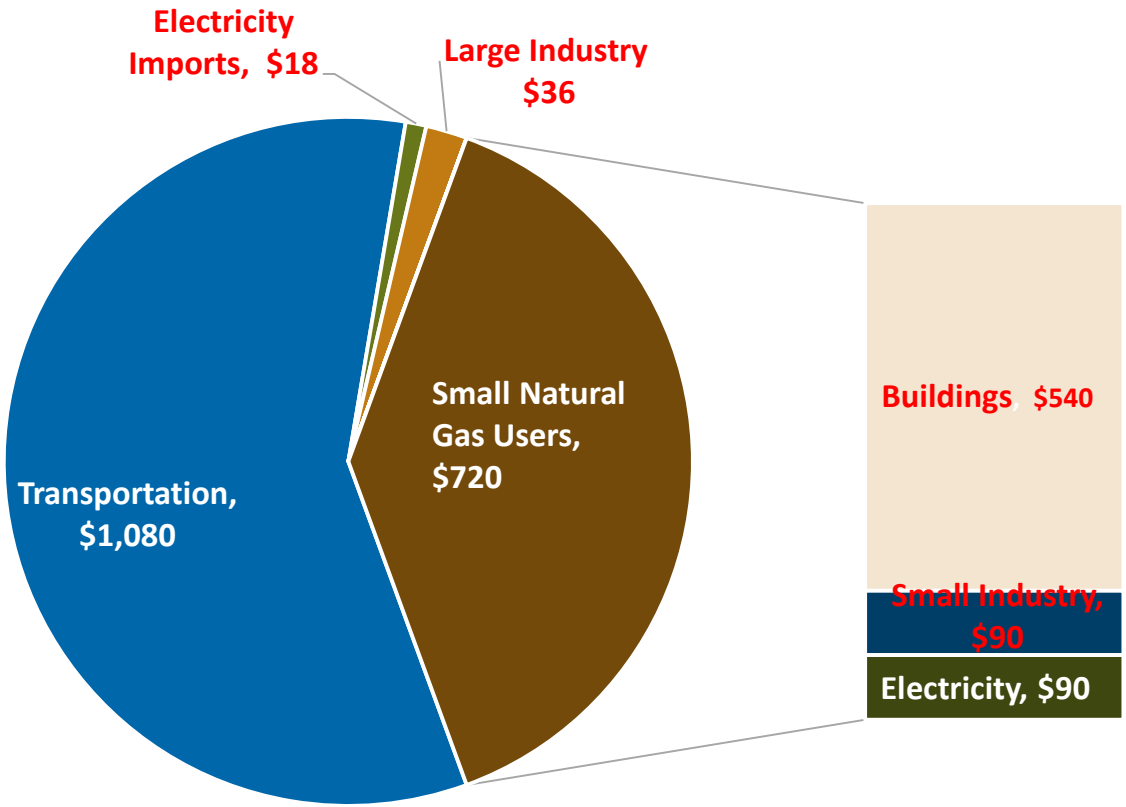
Identified reductions available at less than $100 / t CO_2e and within 2030 timeframe.

By 2030

- NG related initiatives (RNG, EE, LNG/CNG, CHP) reduce emissions by 10-12 Mt CO_2e.
- Refined fuel initiatives reduce emissions by 5-8 Mt CO_2e.
- Response to increasing fuel prices reduce 3-5 Mt CO_2e.

- **As a result of the 40 Mt CO_2e gap, Ontario is expected to enter the market short.**
- **This is NOT the "UG/EGD view" where the 2030 gap is closer to 25 Mt CO_2e.**
- **The 2017-2020 gap is NOT updated based on the "cap" defined in the Draft Reg**

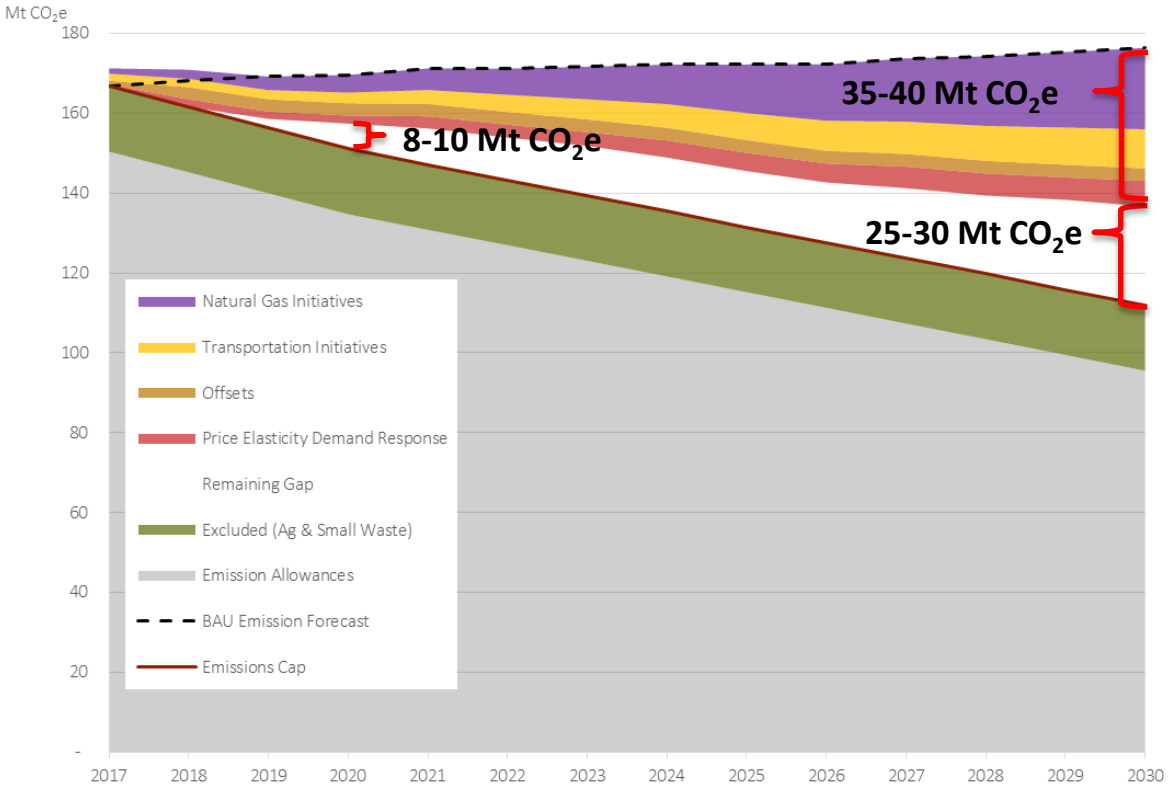
Year 1: >$1.8B in revenue from sale of allowance via auction. Mostly from the small energy user.



Ontario Forecast Year 1 (2017/18) proceeds of sale of allowance (Million $s) – assuming $18/tCO2e (WCI = $14US@0.77)

- 142M+ total allowances in Year 1
- ~38M free allocated to large industry (95% of 40M) = $0
- ~104M allowances auctioned.
  - ~$1.1B (60M) for transport fuels (6-12 buyers).
  - >$700M (40M) for NG small end users and NG generators (2 buyers).
  - <40$M (2M) by 100 large industrials (for portion not free allocated).
  - <$20M (<1M) by electricity importers.
- @18$/tCO2 the average family will pay +$85/yr for NG and +$106/yr for transport fuel.

UG/EGD Ontario Emission Reduction Forecast



Informed by ICF economy wide model and UG / EGD data.

By 2030

- NG related initiatives (RNG, EE, LNG/CNG,CHP) reduce emissions by 20 Mt CO_2e.
- Refined fuel initiatives reduce emissions by 10 Mt CO_2e.
- Response to increasing fuel prices reduce 5 Mt CO_2e.

- Gap of 25-30 Mt CO_2e.

ASSESS IMPACT of 25-30 Mt CO_2e gap?

ONTARIO ENERGY BOARD

FILE NO.:	**EB-2016-0296**	**Union Gas Limited**
	EB-2016-0300	**Enbridge Gas Distribution Inc.**
	EB-2016-0330	**Natural Resource Gas Limited**

VOLUME: **2**

DATE: **April 20, 2017**

BEFORE:	**Ken Quesnelle**	**Presiding Member and Vice-Chair**
	Victoria Christie	**Member**

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

the risks arising from carbon reduction.

Could you turn, please, to page 66 of our compendium? So this is a presentation that was prepared for Enbridge in July of 2015 by ICF International. I believe it's been the topic of discussion in this and a number of other hearings, and I assume that you are familiar with the conclusions of this assessment?

MS. BYNG: I have reviewed this study. I believe that it was filed with Enbridge's evidence.

MR. ELSON: And if we could turn to page 67, at the top of page 67, which is up one page, there is reference to natural gas consumption needing to decline by more than 40 percent by 2030.

And I'm just wondering if Union has done a similar analysis to assess the risks to its business associated with carbon reduction targets?

MS. BYNG: So my understanding from reviewing this study or this report that was filed, it was completed in July of 2015, Union did have interactions with ICF and did have some analysis completed, I would expect for a similar purpose, to try to understand what cap and trade was and what potential impact it could have longer-term.

MR. ELSON: Could you undertake to provide that analysis, if it's not already on the record?

MS. BYNG: I think you will find the analysis is very similar to what you see here.

MR. ELSON: Okay. So do you have any studies or analysis to estimate what the natural gas consumption

reductions will need to be to achieve Ontario's 2030 greenhouse gas reduction targets, other than the same ICF analysis?

MS. BYNG: There was this ICF analysis and then Enbridge also had filed a joint study that was done for both Union and Enbridge in November of 2015, which also lays out at a very high level what abatement would be required out to 2030 and what natural gas solutions might be a part of meeting the gap.

MR. ELSON: And was that an ICF report as well?

MS. BYNG: Yes, it was.

MR. ELSON: And are you able to file that?

MS. BYNG: It's already been filed. It is on the record. Enbridge provided it.

MR. ELSON: Okay. Thank you. And so the conclusions are consistent with the conclusions in the document in front of us today?

MS. BYNG: Well, what I would say is that these studies really were to indicate kind of a range of possibilities and a magnitude of what could occur.

The later study in November laid out where there could be some natural gas solutions to help address that.

MR. ELSON: So there is obviously a number of outcomes, one of them potentially being that you need to reduce consumption by 40 percent or more than 40 percent by 2030. Have you done an analysis of how likely that scenario is?

MS. BYNG: We have not. I would say that that

analysis also was quite early, this one being almost two years ago, before we had any indication of what other abatement activities the province would undertake.

MR. ELSON: And are you going to do an analysis of the likelihood of these various scenarios?

MR. HENDRY: We are evaluating the potential of engaging ICF on a study to do just that, to gain a better understanding of what the range of possible outcomes could be as a result of cap and trade.

MR. ELSON: And so let's turn to page 68. That's helpful. Page 68 talks about, in the sixth bullet here, the possibility that the 2030-2050 targets will result in stranded pipe and storage assets and also the possibility of economy-wide demand reduction.

Do you have any assessment of the likelihood of those scenarios becoming a reality?

MR. SMITH: Perhaps while the witnesses are conferring my friend could assist me in understanding the relationship to the 2017 compliance plan.

MR. ELSON: The relationship to the 2017 compliance plan is the reasonableness of going forward without any additional abatement, and one of the reasons that abatement is particularly important is because there are very significant risks that have been identified by ICF and others that in the future we are going to be dealing with stranded assets, demand destruction, the need to reduce consumption by 40 percent.

If there is a need to reduce consumption by 40 percent

by 2030, this is something we need to get on immediately. We can't wait and, I guess, dither. That is an extremely short time frame. That's 13 years from now, and these are issues that go to fundamental environmental issues, but also fundamental customer issues.

If there are risks of stranded assets because natural gas becomes too expensive, that's something we need to know the likelihood of.

And as we know the likelihood of it, it impacts how important it is to move forward with abatement activities. It seems like it's not only an issue that's important for this proceeding, and pursuing abatement activities as soon as possible, but also for customers, and the long-term viability of natural gas.

MR. QUESNELLE: Mr. Elson -- Mr. Smith.

MR. SMITH: Well, I mean, it seems to me that these were all issues that were discussed in the DSM proceeding that went on for some time where the Board considered these issues, people made arguments, Mr. Elson, about what we needed to do and what the appropriate DSM budget ought to be, and the Board rendered its decision.

So to suggest that people aren't thinking about this and thinking about what people should be doing from an abatement perspective, I think is just not borne out by the record before this Board.

MR. QUESNELLE: I think that Mr. Elson has successfully connected where he thinks the nexus is between the reductions, potential reductions in this context, which

is cap and trade.

So I think that -- and you've also provided a fair bit of argument in doing so. But that does answer the question, I think, Mr. Smith.

MS. BYNG: So is there an outstanding question for me to answer? Could you repeat it?

MR. ELSON: There was. I'll have to remember it first.

We were talking about the risk of demand destruction and stranded assets in 2030 and 2050, and whether you have done an analysis of the likelihood of those scenarios coming to pass.

MS. BYNG: To my knowledge, we have not done a detailed analysis of that likelihood. I would suggest that that is a range of possible outcomes that Mr. Hendry referred to, that might be captured by the ICF study that's being contemplated.

MR. ELSON: So that will be part of the ICF study that you're considering?

MR. HENDRY: I would say that the work that we're contemplating proceeding focuses on getting an understanding of the range of possible outcomes. We are not endeavouring to figure out what the likelihood of those outcomes are, to answer your question. So I would say the likelihood piece is not part of that analysis.

MR. ELSON: It would seem to me that the likelihood is a pretty important factor, and I'm just wondering why you wouldn't also look into the likelihood of such important

Filed: 2018-01-19
EB-2017-0255
Exhibit B.ED.5
Page 1 of 1

UNION GAS LIMITED

Answer to Interrogatory from
Environmental Defence ("ED")

Reference: Ex. 3, Tab 4, pages 17 – 24

Question:
Please estimate the cost per tonne of the greenhouse gas (GHG) emissions reductions (co2e) that the proposed procurement program is expected to achieve via the contracts to be entered into in 2018. Please provide the estimate based on the costs and emission reductions for the lifetime of the contracts (or if that is not possible, please use an illustrative contract year that would be representative of the average costs).
GHG emissions reductions may arise from (a) the displacement of conventional natural gas and (b) the capture of methane that would have been vented to the atmosphere as fugitive emissions. If the $/tonne estimate includes GHG emissions reductions arising from avoided fugitive methane emissions, please (a) provide the underlying calculations and (b) also provide an estimate that does not include the GHG emissions reductions from avoided fugitive methane emissions.
Presumably the cost per tonne would roughly equal the amount of the proposed subsidy divided by the tonnes of carbon emissions avoided by the RNG in question – if Union uses a different calculation, please explain why, and indicate the magnitude of difference between the two calculation methods.

Response:

The cost per tonne of carbon emission reductions from displacement of conventional natural gas supply is equal to the total incremental cost of RNG over conventional natural gas divided by the carbon emissions avoided by the use of RNG.

Assuming that commodity prices are equal to the amounts shown in Exhibit B.Staff.6, Attachment 1, the average cost per tonne of the carbon emissions reduced over the 10 year term would be approximately $231.07/tonne. Of this amount, $27.30/tonne would be charged to ratepayers in Cap-and-Trade rates (which is expected to be equal to what they would otherwise pay in Cap-and-Trade rates) and $203.77/tonne would come from government funding. This does not include any GHG emissions reductions from fugitive emissions that would be recognized from a potential future offset program in Ontario (see the response at Exhibit B.Staff.3).

Under Union's proposed RNG procurement mechanism, the cost per tonne of carbon emission reductions to Union and its customers will be equal to the OEB's mid-range Long Term Carbon Price Forecast that is available at the time of contracting for RNG supply. In 2018, this cost is equal to $17/tonne.

Filed: 2018-01-19
EB-2017-0255
Exhibit B.ED.7
Page 1 of 1

UNION GAS LIMITED

Answer to Interrogatory from
Environmental Defence ("ED")

Reference: Ex. 3, Tab 4, pages 17 – 24

Question:

a) How many customers does Union have?
b) How many residential customers does Union have?
c) Please calculate the cost of the proposed subsidy on a per customer basis (i.e. the grand total calculated in the previous interrogatory divided by the number of customers).

Response:

a) As of December 31, 2017, the total number of in-franchise customers for Union was 1,474,944.

b) As of December 31, 2017, the total number of residential customers for Union was 1,353,104.

c) Union expects that up to $100 million could be granted by the province for the purposes of Union and EGD's RNG procurement programs. Assuming that half of this amount is available to Union, the government grant per in-franchise customer is $33.90. It is important to note that Union will not be allocating the ratepayer portion of costs associated with RNG purchases across all in-franchise customers. Please see response at Exhibit B.Staff.6 d) for a description of how Union proposes to allocate these costs.

Filed: 2018-01-19
EB-2017-0255
Exhibit B.ED.13
Page 1 of 1

UNION GAS LIMITED

Answer to Interrogatory from
Environmental Defence ("ED")

Reference: Ex. 3, Tab 4, pages 17 – 24

Question:

a) Please list all facilities (and organizations) that Union has identified as potentially being in a position to enter into an RNG supply contract with Union.
b) Of those, please provide a list of those which are currently venting methane to the atmosphere without capture or flaring.
c) Of those, please provide a list of those which would be required by government regulations to capture and/or flare their methane emissions within the next five years regardless of whether they enter into an RNG supply contract.
d) Please provide an estimate of the percent of the RNG supplies (i.e. % of m3/yr) that could be contracted for over the next 10 years that will result in the capture of methane emissions that would otherwise be released to the atmosphere without flaring. If a single estimate is not possible, please provide a range of potential, including any caveats and a discussion.

Response:

a) Please see the response at Exhibit B.Energy Probe.2 f), Attachment 8, p. 2.

b) No facilities referenced are currently venting methane without a flare with the exception of agricultural projects.

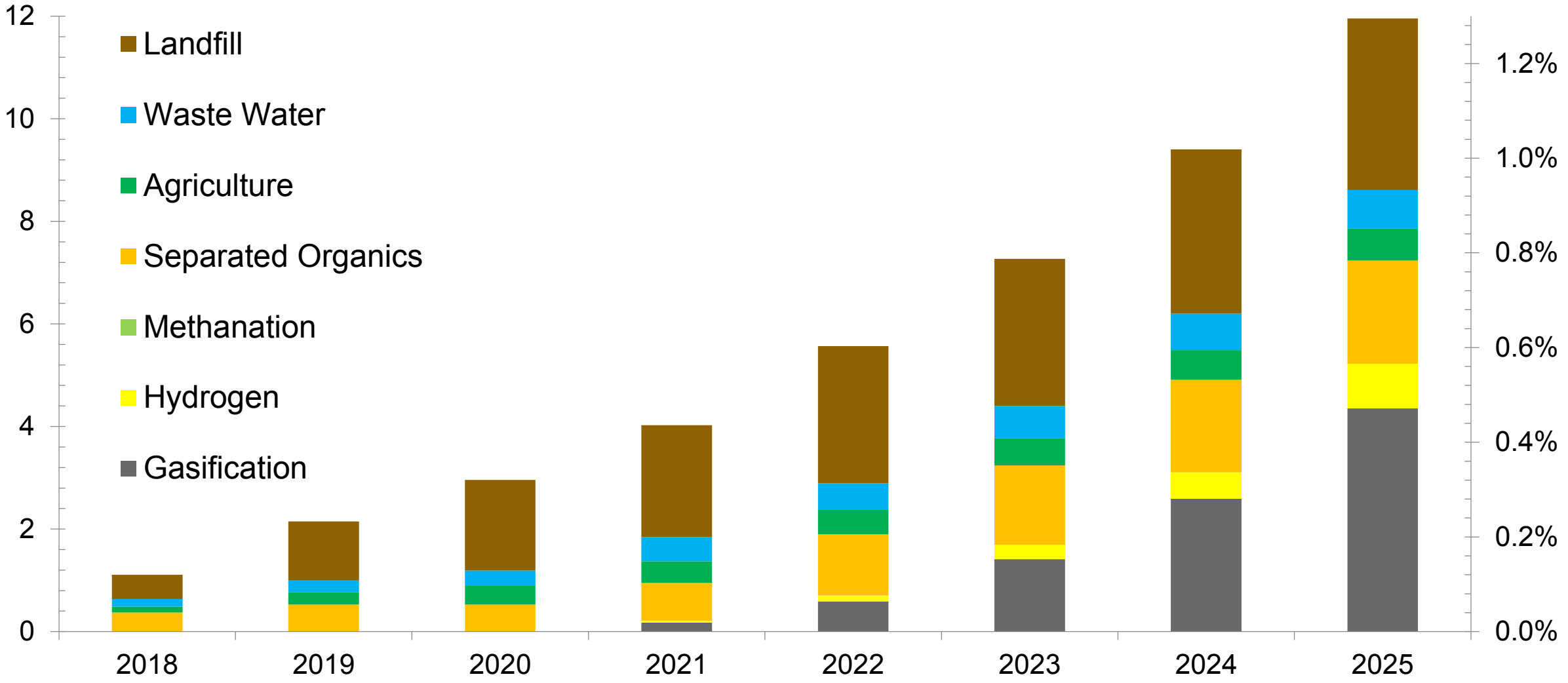
c) Ontario Regulation 232/98 ("O. Reg. 232/98") and Revised Regulations of Ontario 1990, Regulation 347 (General Waste Management) ("Regulation 347") under the Environmental Protection Act (EPA) require landfill gas collection and flaring (burning), or use, for new, expanding and operating landfills larger than 1.5 million cubic metres. For facilities that are not yet constructed or permitted, it is unlikely that an environmental permit would be issued allowing methane to vent to atmosphere. Farming operations do not have legislation to capture or flare their methane emissions.

d) See Exhibit B.Energy Probe.2 f), Attachment 8, p. 2 for a list of facilities that could produce RNG in the province which was sent to the MOECC. Union's RNG proposal contemplates contracting for supplies within the next two years. Union currently cannot estimate a range of volumes that could be contracted over the next 10 years.

Renewable Natural Gas Volumes

Filed: 2018-01-19
EB-2017-0255
Exhibit B.Energy Probe.2
Attachment 8
Page 7 of 11

PJ Total Supply Potential and Percentage of Total Throughput



Ontario Energy Board

Report of the Board

Regulatory Framework for the Assessment of Costs of Natural Gas Utilities' Cap and Trade Activities

EB-2015-0363

September 26, 2016

3 Guiding Principles for Assessment of Costs

The OEB expects Utilities to develop Compliance Plans that outline how they will meet their obligations under Ontario's *Climate Change Act* and *Cap and Trade Regulation*. The OEB will review these Plans for prudence and reasonableness in meeting Cap and Trade obligations with a view to determining the appropriate costs to be recovered from natural gas customers in rates.

The OEB will not approve the Utilities' Compliance Plans. Utilities are responsible for deciding on the exact makeup of activities to be included in their Plans, how best to prioritize and pace investments in Cap and Trade compliance options and abatement activities, and how and when to participate in the market.

The Regulatory Framework describes how the OEB intends to assess the Utilities' Compliance Plans for cost-effectiveness and reasonableness and describes the information to be included in a Plan to assist the OEB in assessing and monitoring the Plans for prudence and protecting the interests of customers.

The OEB review of Utility Compliance Plans will be informed by a number of guiding principles intended to encourage optimal decision-making by Utilities and appropriate rate protection for customers. This principle-based approach will provide the Utilities the flexibility to develop compliance strategies that are responsive to changing market and volume conditions and that best suit their operations and customer base.

3.1 The Guiding Principles

The OEB's assessment of the reasonableness of Compliance Plan costs for recovery in rates will be guided by the following principles:

- **Cost-effectiveness**: cap and trade activities are optimized for economic efficiency and risk management
- **Rate Predictability**: customers have just and reasonable, and predictable rates resulting from the impact of the Utilities' cap and trade activities
- **Cost Recovery**: prudently incurred costs related to cap and trade activities are recovered from customers as a cost pass-through

consideration the results of the previous year's auctions. It will be possible to extrapolate the five-year cost of carbon from the 10-year forecast

Stakeholders that commented on this issue agreed that the OEB should be responsible for providing the long-term carbon price forecast.

5.2.4 **Marginal Abatement Cost Curve (MACC)**

The OEB has determined that it will develop a province-wide, generic MACC for the Utilities to use as an input into the development of their Compliance Plans and as a key input to the OEB's assessment of the cost consequences of the Plans.

The MACC will provide the Utilities and the OEB with the range of all possible compliance options along a spectrum of costs. It is an essential input that the OEB expects all Utilities to use in developing their Compliance Plans. A single, generic province-wide MACC (OEB MACC), used by all Utilities, will ensure a standard description of compliance costs for the purpose of the OEB's assessment of the Compliance Plans.

The OEB MACC and the Utilities' description of their compliance strategy and activities will allow the OEB to assess the Compliance Plans for evidence of the Utilities' cost-effective optimization of compliance instruments.

The timeframe for the OEB MACC will be 10 years, to align with the long-term carbon price forecast. The OEB will develop a MACC for mid-2017 and will update the MACC at the beginning of each subsequent three-year Compliance Plan term.

Stakeholders were supportive of the idea of developing a single MACC to be used by all Utilities. Stakeholder preference was for the OEB to develop the MACC. The Utilities suggested that the MACC supporting their Compliance Plans should be developed by each Utility to reflect its specific considerations.

The OEB understands that a Utility may choose to develop its own, company-specific MACC to inform the development of its Compliance Plan however, the OEB will rely on the OEB MACC as its principal tool for assessing Utilities' selection of compliance options and resulting costs consequences.

5.3 Approach to Assessment of Cost Implications of the Utilities' Compliance Plans

Consistent with the Regulatory Framework's six guiding principles discussed in Section 3, in determining whether the cost consequences of the Utilities' Compliance Plans are cost-effective, optimized and reasonable, the OEB will consider the following:

1. whether a Utility has engaged in strategic decision-making and risk mitigation, resulting in a Compliance Plan that is as cost-effective as possible in reducing its facility-related and customer-related GHG emissions, and whether the Utility has considered a diversity (portfolio) of compliance options;

2. whether a Utility has selected GHG abatement activities and investments that, to the extent possible, align with other broad investment requirements and priorities of the Utility in order to extract the maximum value from the activity or investment; and,

3. whether the Compliance Plans are sufficiently flexible to adapt to variability in volume, changes in market prices, market dynamics and other sources of risk thereby providing for greater rate predictability as well as mitigating the risk to customers of changes in the Cap and Trade market.

5.3.1 **Assessment of Cost-Effectiveness and Optimization**

Inherent in the OEB's review of cost-effectiveness and reasonableness is an assessment of whether Compliance Plans reflect optimized decision-making. This includes:

- A consideration of a diversity of compliance options;
- Risk mitigation;
- Whether a Utility has approached its compliance strategy in an integrated manner that extracts maximum value from commitments that integrate multiple benefits; and,
- Whether a Utility has demonstrated flexibility to adapt to changes.

The OEB believes that assessing the Utilities' plans through this lens will lead to cost-effectiveness and greater rate predictability, and will reduce the costs and risk to customers.

To carry out this assessment, the OEB will expect robust and thorough information from the Utilities. The OEB will want to see information from the Utilities that demonstrates they have undertaken a detailed analysis which supports their choice of compliance options, including use of the OEB MACC to pace and prioritize their investments.

Most stakeholders that commented on the issue of Compliance Plan assessment were generally supportive of the OEB's approach. Some environmental groups felt that the cost-effectiveness test should be based on total societal costs and benefits (TRC [Total Resource Cost] or SCT [Societal Cost Test]), and that the OEB should require Utilities to undertake abatement where it is less costly than the procurement of allowances.

Given the newness of the Cap and Trade program the OEB considers it premature to apply the TRC or SCT to the Utilities' Compliance Plans at this time. The OEB will consider the use of additional tests such as the TRC or SCT after gaining experience with the assessment of Compliance Plans.

The OEB's approach to assessing the cost-effectiveness and reasonableness of Compliance Plans is discussed below.

5.3.1.1 Compliance option analysis and optimization of decision-making

The OEB's assessment will require a general understanding of the Utilities' approach to compliance. The OEB expects a Utility to provide an overview of its strategy, including an outline of the activities that it proposes to take to meet its compliance obligations (such as procurement of allowances and offset credits, GHG abatement programs for natural gas customers, and GHG abatement and mitigation activities for the Utility's own facilities and operations, and the rationale behind their selection of compliance actions and activities.

As part of its assessment of cost-effectiveness and reasonableness, the OEB will assess whether the Utilities effectively used the OEB MACC, their forecasts, and any other inputs to prioritize and select the compliance instruments and activities they have decided to include in their Compliance Portfolio.

The OEB will use the information provided by the Utilities to assess whether Compliance Plans reflect optimized and strategic decision-making, including consideration of a diversity of compliance instruments. The OEB will also use the

information provided by the Utilities to assess whether a Utility has selected investments in GHG abatement activities[4] that, to the extent possible, align with other general investment needs and priorities of the Utility in order to extract maximum value from any GHG abatement activities.

The OEB recognizes that although some longer-term investments in GHG abatement may be more expensive than the price of emissions units in any given year, there may be strategic value in investments that decrease emissions over the longer term. For any activities included in the Compliance Plans that are more expensive per tonne of CO_2e than the annual carbon forecast price, the Utilities should provide a qualitative and quantitative description of the strategic value in these investments (e.g., long-term considerations related to GHG mitigation and the increasing price of emissions units in the longer term).

The OEB also recognizes that in any given year, a Utility may develop a Compliance Plan in which the only activity proposed is the procurement of allowances (and offset credits), if the Utility has determined that this is the most cost-effective and reasonable approach.

The implementation of a Cap and Trade program is a new activity for the Utilities and will require processes for ensuring that any procurement and trading decisions related to carbon emissions units are governed appropriately, similar to activity related to gas supply acquisitions. For the OEB to properly assess whether the Utilities' Compliance Plans are cost-effective and reasonable it will be important to understand how the Utilities have structured their decision-making and ensured they have adequate resources to manage the implementation of the Plan.

5.3.1.2 Performance Metrics and Cost Information

The OEB's assessment of cost-effectiveness and reasonableness will include a consideration of metrics and cost information to be provided by the Utilities. The OEB must assess the cost effectiveness of the Utilities' compliance activities in meeting their emission reduction obligations for customers and their own facilities. That assessment will include a consideration of objective and independent analysis of Utilities' Compliance Plan implementation performance and costs.

[4] The customer-related GHG abatement activities must be incremental to the Utilities' 2015-2020 multi-year DSM plans (EB-2015-0029/EB-2015-0049).

The metrics and cost information will allow the OEB to assess whether the Utilities have considered a diversity of compliance options and their costs, and whether the Utilities have selected investments in GHG abatement activities that are cost-effective and extract maximum value. The OEB will rely on the performance metrics in the monitoring of the Utilities' activities to ensure continuous improvement in the planning and actions taken to achieve compliance, and the achievement of the government's objectives under the *Climate Change Act.*

Performance Metrics

The OEB will rely on performance benchmarks for the purpose of assessing forecast costs of Compliance Plans. Performance benchmarks will provide objective measures of the Utilities' proposed compliance activities. To assess the cost effectiveness of the Utilities' Compliance Plans, the OEB will require a Utility to calculate and provide key performance metrics, including cost per tonne ($/tonne) of each compliance instrument or activity and a comparison of costs of investing in GHG abatement activities versus procuring emissions units. The OEB MACC will establish benchmarks for the cost per tonne, as will the results of the allowance auctions, the annual and long-term carbon price forecasts and other carbon market information.

A few stakeholders suggested adding additional metrics, such as a cost per customer, or undertaking further work to develop metrics given the lack of experience with Cap and Trade programs. The metrics that the OEB will use for the assessment of the Utilities' Compliance Plans are intended to measure both cost-effectiveness and reasonableness. The assessment will not be based on an upper limit of costs as would be the case with a cost per customer metric. Rather, because compliance is an obligation for the Utilities, the assessment will need to focus on the most cost-effective approach. This does not mean that the OEB will not consider customer bill impacts, only that the implementation of Cap and Trade cannot be tied to a specific cost per customer. In many cases the costs of the Compliance Plans will be largely dependent on prices in the Cap and Trade market and the cost of abatement opportunities.

With experience reviewing Compliance Plans, and through the monitoring process, there will be an opportunity to identify new metrics that may be useful in the assessment of Utilities' requests for cost recovery. As discussed in Section 8, the OEB intends to establish a working group that will consider, among other things, the need for and design of potential new metrics for evaluating the Utilities' Plans and performance.

5.6 Customer Abatement Programs and the Demand Side Management Framework

As part of the 2013 Long Term Energy Plan, the Minister of Energy, issued a Directive dated March 26, 2014, which directed the OEB to develop a DSM policy framework for natural gas distributors for the period January 2015 to December 2020. The OEB issued its multi-year Demand Side Management (DSM) framework (EB-2014-0134)[5] on December 22, 2014, and subsequently approved 2015-2020 DSM Plans for two of the Utilities.

The DSM framework is designed to reduce natural gas consumption throughout Ontario, and includes the OEB's policies on all elements of the Utilities' DSM activities. Utility DSM Plans[6]include annual targets and performance measurement tools related to the Utilities' DSM activities. The DSM framework also includes an OEB-led evaluation, measurement and verification ("EM&V") process to ensure that the Utilities are only rewarded for the natural gas savings directly attributable to the customer-funded DSM programs previously approved by the OEB.

The introduction of the Cap and Trade program requires Utilities to meet emissions reduction obligations, which creates the potential for significant overlap between existing DSM programs and future Compliance Plans.

Several stakeholders argued that customer-funded DSM has now been supplanted by the Cap and Trade program and therefore customer-funded DSM should be discontinued.
The OEB is confident that any potential overlap can be appropriately addressed through the robust EM&V process of the DSM framework. The DSM framework also includes a mid-term review provision (to be completed by June 1, 2018) that will provide an appropriate opportunity to assess the DSM framework in light of the Cap and Trade program.

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5 http://www.rds.ontarioenergyboard.ca/webdrawer/webdrawer.dll/webdrawer/search/rec&sm_udf10=eb-2014-0134&sortd1=rs_dateregistered&rows=200

6 http://www.rds.ontarioenergyboard.ca/webdrawer/webdrawer.dll/webdrawer/rec/513656/view/

6 Cost Recovery

As discussed in section 5, the Compliance Plans will include procurement and investment strategies that the Utilities will use to meet their GHG compliance obligations. These compliance obligations will have costs associated with them. These costs will include:

- Facility-related obligations for facilities owned or operated by the Utilities for the purpose of distribution, transmission and storage of natural gas;
- Customer-related obligations for natural gas-fired generators, and residential, commercial and industrial customers who are not Large Final Emitters (LFEs) or voluntary participants; and,
- Administrative costs to meet their compliance obligations.

Customer-related and facility-related obligation costs will be incurred for emissions units procurement and for GHG abatement programs. The amount of these costs will be determined by the OEB through its assessment of each of the Utilities' Compliance Plans.

For emissions units procurement, the Utilities will be indifferent as to whether they are purchasing emissions units for their customers, their facilities or both. Consequently, the OEB will expect that the emissions units procurement costs will be a total cost that includes both customer-related and facility-related obligations.

For abatement programs, each of the Utilities will likely develop targeted programs for their residential, commercial and industrial customers. The Utilities will also develop programs for reducing emissions from their own facilities. The OEB will therefore expect to see a separation of customer-related and facility-related abatement program costs for the purpose of allocating costs to the appropriate customer classes, similar to DSM programs.

This section addresses the mechanisms for recovery of costs incurred by the Utilities to meet their Cap and Trade obligations including: cost causation, cost allocation, rate design and bill presentment, and the rate-setting approaches (including re-calibration and the true up process).

8 Monitoring and Reporting

The OEB will require annual monitoring and reporting by the Utilities on the results of their Cap and Trade activities and any changes to their Compliance Plans. Ongoing monitoring of the Utilities' costs and performance is essential to achieving the OEB's guiding principles for the Regulatory Framework. Monitoring will support the OEB's assessment of future plans for cost-effectiveness and identify whether the Utilities are improving their planning and delivering greater value to customers.

The performance metrics used to monitor the Utilities' Compliance Plans will be the same as the performance metrics used to assess those plans:

- Costs per tonne ($/tonne) of each compliance instrument or activity;
- A comparison of costs of investing in GHG abatement activities versus procuring emission units over the short-term and long-term; and,
- Comparison of actuals with forecasts.

The OEB will also use the latest settlement price from the quarterly auctions to benchmark utility costs. It is important that the metrics used to monitor the plans are consistent for all Utilities as this will allow the OEB, ratepayer groups and other stakeholders to compare Plans as between the Utilities and over time.

The Utilities will file annual monitoring reports to align with the Utilities' annual review of Cap and Trade costs (as discussed in section 6). The OEB expects the Utilities to provide supporting documentation (including auction transactions, summaries of offsets and secondary market transactions, etc.) to allow the OEB to review the execution and performance of the Compliance Plans with regard to cost recovery.

The OEB notes that most stakeholders did not comment on the monitoring and reporting section in the Discussion Paper. The stakeholders that did comment were generally supportive of the Utilities filing annual monitoring reports with the OEB.

One ratepayer group suggested that the OEB establish a working group to define the reporting requirements and establish the metrics. The OEB has considered the suggestion of a working group and intends to establish one for the purpose of further refining metrics, but more importantly as a means to facilitate the monitoring and review of the Utilities' compliance activities and support the OEB's review of the Regulatory Framework during the initial Cap and Trade compliance period.

Appendix A: Filing Guidelines

Filing Guidelines for Natural Gas Utility Cap and Trade Compliance Plans

Introduction

These filing guidelines outline the minimum information necessary to be filed by natural gas utilities in order for the OEB to review the applicant's Cap and Trade Compliance Plan application. The applicant should review the Report of the Board, *Cap and Trade Regulatory Framework for the Assessment of Costs Natural Gas Utilities' Cap and Trade Activities* (OEB Report), which provides an explanation of the OEB's expectations and rationale for requiring the information outlined in these guidelines.

These filing guidelines include information the OEB will use to assess the utility's Compliance Plans, including:

- Forecasts and compliance plan documents;
- Reports to be filed annually for the purposes of monitoring the gas utility's compliance activities;
- Expected customer outreach and communication plans; and,
- Cost recovery documents (including annual re-calibration and true-up of Compliance Plans).

The applicant is expected to file information outlined in these filing guidelines in a separate application by August 1 of each year.

General Requirements

The basic format of an application for cost recovery of the applicant's Compliance Plan must include the following exhibits:

Exhibit 1	Administrative Documents
Exhibit 2	Forecasts
Exhibit 3	Compliance Plan Documents

consumption forecasts related to its operations (including unaccounted for gas losses, etc.).

The methodology to be used to prepare the volume forecasts will be the same OEB-approved methodology the utility already uses for the purpose of rate-setting. The utility must provide all supporting documentation regarding its forecasts. For the volume forecasts, the DSM forecasts and customer-related abatement activities forecasts[1] must be shown separately.

3 GHG Emissions Forecasts

The applicant must include its GHG emissions forecasts of the following emissions:

- Customer-related GHG emissions (emissions related to customers' natural gas usage) – as with the volume forecast, the utility will need to exclude GHG emissions of LFEs and voluntary participants
- Facility-related GHG obligations (related to the distribution, transmission and storage of natural gas) – this will include process emissions, emissions from fugitive and leaked gas, and emissions from the utility's facilities and operations

The methodology to be used by the utility to calculate these GHG emissions is contained in the government's GHG Reporting Regulation (Ontario Regulation 452,09as amended and Ontario's Guideline for Greenhouse Gas Emissions Reporting issued on May 19, 2016).

4 Annual Carbon Price Forecasts

The applicant must include:

- The forecast, which will be set using the average of the Intercontinental Exchange (ICE) daily settlement prices of a California Carbon Allowance for each day of the forecast period for each month of the forecast year. The forecast period shall be 21 business days and should be as close as possible to the forecast year
- All supporting documentation that outlines methodology, calculations and assumptions

[1] The GHG abatement activities must be incremental to the applicant's 2015-2020 multi-year DSM plans (EB-2015-0029/EB-2015-0049).

2. An explanation of how the utility's approach to compliance achieves the guiding principles set out in section 3 of the OEB Report as well as the assessment objectives of optimization, integration and adaptability set out in section 5.3 of the OEB Report.

3. An explanation of the utility's rationale for compliance options selection and reasons why alternative compliance options were not selected.

4. An explanation of how the utility used the OEB Marginal Abatement Cost Curve (MACC) to pace and prioritize compliance instruments to manage costs and risks.

5. A qualitative and quantitative explanation of how the compliance options selected by the utility are cost-effective and result in optimal decision-making.

6. An explanation of whether the utility's approach considers long-term (5-10 years) strategies for GHG abatement, and if so how these are considered. If not, the utility is to explain why it did not consider long-term abatement strategies.

7. For any activities included in the Compliance Plan that are more expensive per tonne of carbon dioxide equivalent than the annual carbon forecast price, a qualitative and quantitative description of the strategic value in these investments (e.g., long-term considerations related to GHG mitigation and the increasing price of emissions units in the longer term).

8. A comparison of costs of investing in GHG abatement activities versus procuring emissions units over the short-term and long-term.

Note: As noted in section3, any information that is Auction Confidential and/or Market Sensitive (as defined in the OEB Report) must be clearly marked confidential.

3. Performance Metrics and Cost Information

1. A quantitative and qualitative description of the total costs of the Compliance Plan portfolio, outlined by year and over the entire compliance period, including:
    a. Cost of total Compliance Plan
    b. Costs by year

c. Cost by year per compliance instrument/activity (Auction Confidential and Market Sensitive)

2. An outline of the utility's compliance options for each year of the Compliance Plan, including:
    a. Allowances (Auction Confidential and Market Sensitive)
        i. Number of allowances to be procured (through auctions and through bilaterals, over-the-counter (OTC), etc.)
        ii. Price of allowances (using annual forecast or OEB 10-year carbon price forecast)
        iii. Timing of procurement
        iv. Total forecasted cost
        v. Forecasted cost per tonne of GHG

    b. Offset credits (Market Sensitive)
        i. Number of offset credits to be procured (from government registries, bilaterals, OTC, etc.)
        ii. Forecasted price of offset credits
        iii. Timing of procurement
        iv. Total forecasted cost
        v. Forecasted cost per tonne of GHG

    c. Abatement activities – customer-related[2]
        i. Type of program
        ii. Total forecasted cost (include quantity and forecasted price by program)
        iii. Forecasted GHG reduction
        iv. Forecasted cost per tonne of GHG reduction

    d. Abatement activities – facility-related
        i. Type of program
        ii. Total forecasted cost (include quantity and forecasted price by program)
        iii. Forecasted GHG reduction
        iv. Forecasted cost per GHG tonne reduction

[2] The GHG customer-related abatement costs must be incremental to the applicant's 2015-2020 multi-year DSM plans (EB-2015-0029/EB-2015-0049).

Filed: 2018-02-16
EB-2017-0224
Exhibit I.1.EGDI.ED.22
Page 1 of 1

ENVIRONMENTAL DEFENCE INTERROGATORY #22

INTERROGATORY

Reference: Ex. C, Tab 5, Sch. 2, pages 25-28

Please provide Enbridge's cumulative TRC net benefits to date from all of its programs since the inception of its DSM program.

RESPONSE

Please see the table below for the TRC net benefits to date.

Year	Net TRC Benefits
2015	$116,328,683
2014	$89,622,342
2013	$79,366,462
2012	$167,684,328
2011	$173,183,348
2010	$184,593,043
2009	$215,833,455
2008	$182,706,679
2007	$199,798,420
2006	$180,667,779
2005	$27,611,534
2005	$168,061,203
2004	$135,958,467
2003	$125,933,313
2002	$147,498,185
2001	$166,324,425
2000	$74,621,798
1999	$63,289,025

Notes:
2016 values have not been included as the audit has not been finalized
2015 values have not yet been approved by the board

Witness: D. Johnson

Filed: 2018-04-17
EB-2017-0224
Exhibit JT2.1
Page 1 of 1
Plus Attachment

UNDERTAKING JT2.1

UNDERTAKING

TR 2, p.5

To add a row to the table attached to ED24 estimating the value of the avoided natural gas costs.

RESPONSE

Please see the attached excel worksheet.

In preparing this undertaking response, the Company corrected an error made in the original response to Environmental Defence Interrogatory #24 filed at I.1.EGDI.ED.24, whereby the carbon price for years 2029 to 2033 had incorrectly included inflation. The table attached now includes the carbon price for years 2029 to 2033 in Real dollars.

Value of Lifetime[1] GHG Emissions Reductions from 2018 DSM Residential Program

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total
Forecast Annual Gas Savings m3[2]	16,756,884	16,756,884	16,756,884	16,756,884	16,756,884	16,756,884	16,756,884	16,756,884	16,756,884	16,756,884	16,756,884	16,756,884	16,756,884	16,756,884	16,756,884	16,756,884	268,110,144
Forecast Annual GHG Reductions (t C02e)[3]	31,419	31,419	31,419	31,419	31,419	31,419	31,419	31,419	31,419	31,419	31,419	31,419	31,419	31,419	31,419	31,419	502,707
Forecast Carbon Price ($/t C02e)[4,5]	$17.00	$18.00	$18.00	$19.00	$20.00	$21.00	$31.00	$36.00	$43.00	$50.00	$57.00	$60.88	$65.02	$69.44	$74.16	$79.20	n/a
Value of GHG Reduction	$534,126	$565,545	$565,545	$596,964	$628,383	$659,802	$973,994	$1,131,090	$1,351,024	$1,570,958	$1,790,892	$1,912,673	$2,042,734	$2,181,640	$2,329,992	$2,488,431	$21,323,792
Cost of Gas ($/m3)[6,7]	$0.1766	$0.2112	$0.1993	$0.2038	$0.2085	$0.2133	$0.2182	$0.2232	$0.2283	$0.2335	$0.2388	$0.2443	$0.2499	$0.2556	$0.2614	$0.2674	n/a
Avoided Cost of Gas	$2,958,938	$3,538,779	$3,339,368	$3,415,781	$3,493,944	$3,573,894	$3,655,675	$3,739,326	$3,824,892	$3,912,416	$4,001,943	$4,093,518	$4,187,189	$4,283,003	$4,381,010	$4,481,259	$60,880,935

Value of Lifetime[1] GHG Emissions Reductions from 2018 DSM Commercial and Industrial Program

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total
Forecast Annual Gas Savings m3[2]	59,891,949	59,891,949	59,891,949	59,891,949	59,891,949	59,891,949	59,891,949	59,891,949	59,891,949	59,891,949	59,891,949	59,891,949	59,891,949	59,891,949	59,891,949	59,891,949	958,271,184
Forecast Annual GHG Reductions (t C02e)[3]	112,297	112,297	112,297	112,297	112,297	112,297	112,297	112,297	112,297	112,297	112,297	112,297	112,297	112,297	112,297	112,297	1,796,758
Forecast Carbon Price ($/t C02e)[4,5]	$17.00	$18.00	$18.00	$19.00	$20.00	$21.00	$31.00	$36.00	$43.00	$50.00	$57.00	$60.88	$65.02	$69.44	$74.16	$79.20	n/a
Value of GHG Reduction	$1,909,056	$2,021,353	$2,021,353	$2,133,651	$2,245,948	$2,358,245	$3,481,220	$4,042,707	$4,828,788	$5,614,870	$6,400,952	$6,836,217	$7,301,080	$7,797,553	$8,327,787	$8,894,076	$76,214,855
Cost of Gas ($/m3)[6,7]	$0.1766	$0.2112	$0.1993	$0.2038	$0.2085	$0.2133	$0.2182	$0.2232	$0.2283	$0.2335	$0.2388	$0.2443	$0.2499	$0.2556	$0.2614	$0.2674	n/a
Avoided Cost of Gas	$ 10,575,746	$ 12,648,197	$ 11,935,467	$ 12,208,582	$ 12,487,948	$ 12,773,706	$ 13,066,002	$ 13,364,988	$ 13,670,815	$ 13,983,640	$ 14,303,623	$ 14,630,929	$ 14,965,724	$ 15,308,180	$ 15,658,473	$ 16,016,781	$ 217,598,801

Value of Lifetime[1] GHG Emissions Reductions from 2018 Total DSM Program

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total
Forecast Annual Gas Savings m3[2]	76,648,833	76,648,833	76,648,833	76,648,833	76,648,833	76,648,833	76,648,833	76,648,833	76,648,833	76,648,833	76,648,833	76,648,833	76,648,833	76,648,833	76,648,833	76,648,833	1,226,381,328
Forecast Annual GHG Reductions (t C02e)[3]	143,717	143,717	143,717	143,717	143,717	143,717	143,717	143,717	143,717	143,717	143,717	143,717	143,717	143,717	143,717	143,717	2,299,465
Forecast Carbon Price ($/t C02e)[4,5]	$17.00	$18.00	$18.00	$19.00	$20.00	$21.00	$31.00	$36.00	$43.00	$50.00	$57.00	$60.88	$65.02	$69.44	$74.16	$79.20	n/a
Value of GHG Reduction	$2,443,182	$2,586,898	$2,586,898	$2,730,615	$2,874,331	$3,018,048	$4,455,213	$5,173,796	$6,179,812	$7,185,828	$8,191,844	$8,748,889	$9,343,814	$9,979,193	$10,657,778	$11,382,507	$97,538,648
Cost of Gas ($/m3)[6,7]	$0.1766	$0.2112	$0.1993	$0.2038	$0.2085	$0.2133	$0.2182	$0.2232	$0.2283	$0.2335	$0.2388	$0.2443	$0.2499	$0.2556	$0.2614	$0.2674	n/a
Total Program Costs[8]	$ 56,267,166	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	$56,528,979
Avoided Cost of Gas	$13,534,684	$16,186,976	$15,274,834	$15,624,364	$15,981,891	$16,347,600	$16,721,677	$17,104,314	$17,495,707	$17,896,056	$18,305,566	$18,724,447	$19,152,913	$19,591,183	$20,039,483	$20,498,040	$278,479,736

1. For simplicty assumes a 15 year measure life for all measures, although some components may have a longer measure life.
2. Forecast residential gas savings (including Low Income Part 9)less gas savings from proposed O-Power Program, commercial and industrial gas savings (including Low Income Part 3) as filed in the Multi-Year DSM Plan (EB-2015-0049) escalated by 2% productivity factor.
3. Assumes a conversion rate of 1.875kg of C02e per cubic meter of gas.
4. Assumes the Mid-Range LTCPF 2018 - 2028 Carbon Price (Real 2017 CAD) per the "Long Term Carbon Price Forecast Report" (ICF, 2017).
5. Assumes Mid-Range LTCPF 2029-2033 Carbon Price (Real 2017 CAD) esclated using the Minimum LTCPF methodology per the 'Long Term Carbon Price Forecast Report'(ICF, 2017).
6. The unit cost of gas relies on unaudited 2017 inputs converted to real dollars using the inflation value from the LTCPF.
7. For simplicity the cost of gas is a reasonable average based on a combination of DSM measures.
8. Administration costs attributed to programs that claim gas savings have been included.

EB-2017-0224
Summary of Exhibit JT2.1
Attachment A

Enbridge 2018 DSM Programs - Forecast Cost and Gas/Carbon Savings

Summary of Figures in Exhibit JT2.1, Attachment A

Total Forecast DSM Costs - Enbridge 2018 DSM Plan	$	56,528,979.00
Value of natural gas and GHG reductions	$	376,018,384.00
Value of natural gas and GHG reductions (excluding value of GHG reduction from capped customers)	$	362,663,120.00

Source Figures from JT2.1

Value of natural gas reduction	$	278,479,736.00
Value of GHG reduction	$	97,538,648.00
Value of natural gas reduction from capped customers	$	39,167,785.00
Value of GHG reduction from capped customers	$	13,355,264.00
Total Forecast DSM Costs	$	56,528,979.00

UNDERTAKING JT2.4

UNDERTAKING

TR 2, p.10

To update on a best-efforts basis the net benefits according to the program administrator cost test and the TRC for 2018 DSM programs, to add the long-term carbon price forecast

RESPONSE

Enbridge does not update forecasts for TRC on an annual basis.

In order to be responsive to this undertaking, Enbridge has referenced "Table 3: 2018 TRC-Plus and PAC Analysis and Ratios" from EB-2015-0049[1] and tables utilized in the response to Environmental Defence Interrogatory #24 found at Exhibit I.1.EGDI.ED.24 for the EB-2017-0224 proceeding.

Because the TRC Plus test included a component to account for benefits such as environmental, economic and social, two scenarios are presented below, one where the LTCPF is added to the TRC Plus test and a second scenario where the LTCPF is added to the TRC test but the "Plus" (i.e., the 15% adder) is removed. Enbridge does not have insight into what portion of the 15% adder the Board intended to account for carbon, and so is using these two scenarios for illustrative purposes.

TRC Plus Net Benefits	TRC Plus + GHG Related Benefits*	TRC (no plus) + GHG Related Benefits*
$165,962,507	$222,960,321	$193,799,630

PACT Net Benefits	PACT + GHG Related Benefits*
$196,098,168	$262,040,550

*GHG Avoided costs were derived through a conversion of the $/t$CO_2$e values provided in Exhibit I.1.EGDI.ED.24.

[1] EB-2015-0049, Exhibit B, Tab 2, Schedule 3, page 5 of 8.

UNDERTAKING JT2.5

UNDERTAKING

TR 2, p.19

For Attachment 1 of STAFF IR 24, to redo the analysis comparing the 2018 potential according to the potential study versus the DSM plan for all three scenarios

RESPONSE

The incremental analysis requested is presented below. Please note it is presented differently as the analysis in Board Staff Interrogatory #14 filed at I.1.EGDI.STAFF.24 was a sum of 2018-2020, while the request was for 2018 only.

	Enbridge	**OEB CPS Scenarios**		
	2018 DSM Filed Plan[2]	**Constrained**	**Semi-constrained**	**Unconstrained**
Aggregate Annual Savings Ontario 2015 - 2020 (million m^3/yr)		1,187	1,338	1,869
Average Annual savings - Ontario 2015 - 2020 (million m^3/yr)		198	223	312
Annual Program Spending Ontario ($ million)		111	149	550
Enbridge % of Total[1]		56	56	56
Enbridge Annual Gross Savings (million m^3/yr)		112	126	176
Net to Gross (NTG) Adjustment Factor[1]		0.73	0.73	0.73
Enbridge - Annual Net Savings (million m^3/yr)	74	81	92	128
Enbridge Annual Program Spending ($million/yr)	68	63	84	310

1 - Calculated average from Exhibit C, Tab 5, Schedule 2
2 – The values for the 2018 DSM filed plan, exclude the programs that were not approved. These were forecasted values at the time of the plan. The actual targets for 2018 will be set according to the Target Adjustment Mechanism and the actual results can vary significantly.

EB-2017-0224
Source: Exhibit JT2.5

Enbridge 2018 DSM Programs vs. OEB Conservation Potential Study

Per Enbridge Calculations in Exhibit JT2.5

	Enbridge	OEB CPS Scenarios		
	2018 DSM Filed Plan	Constrained	Semi-constrained	Unconstrained
Enbridge Annual Gross Savings (million m^3/yr)		112	126	176
Net to Gross (NTG) Adjustment Factor		0.73	0.73	0.73
Enbridge - Annual Net Savings (million m3/yr)	74	81	92	128
Enbridge Annual Program Spending ($million/yr)	68	63	84	310
Spending per m3 of Gas Savings ($/m3)	$0.92	$0.78	$0.91	$2.42
Increase in Savings vs. 2018 DSM Plan		9%	24%	73%

Assume no NTG Adjustment Needed to Potential Study Figures

	Enbridge	OEB CPS Scenarios		
	2018 DSM Filed Plan	Constrained	Semi-constrained	Unconstrained
Enbridge - Annual Net Savings (million m3/yr)	74	112	126	176
Enbridge Annual Program Spending ($million/yr)	68	63	84	310
Spending per m3 of Gas Savings ($/m3)	$0.92	$0.56	$0.67	$1.76
Increase in Savings vs. 2018 DSM Plan		51%	70%	138%

11. The numbers shown in Table 2 represent the forecasted m^3 volumes and CO_2e reductions for this 2017 compliance period. The forecasted 2016 values have been presented along with 2017, as the anticipated program impacts (due to the timing launch of the program) will be most notable in the 2017 compliance period. For the purposes of determining impact on the annual carbon compliance, 502,003 tonnes in CO_2e reductions is the best estimate of the lifetime savings attributable to the GIF program delivered by Enbridge.

12. In summary, the Company believes that DSM should be considered a vital part of its overall long-term Compliance Plan. This is especially so where the results from conservation and energy efficiency can be shown to be more cost effective over the long term than the purchase of compliance instruments. Given the timing of the release of the Framework, and given the scheduled Mid-Term Review for the Company's DSM Framework, the Company believes the issue of including the existing and any incremental DSM activity into the Company's compliance planning acitivities is best suited for the Mid-Term Review.

B. Renewable Content Objectives for Natural Gas Pipelines

13. Enbridge believes that establishing a renewable content objective for natural gas pipeline systems can provide a flexible low-carbon solution that offers good value to customers because it leverages the existing natural gas transmission, distribution and storage infrastructure as well as the heating, water heating and other gas-fired equipment used by our customers. Next to conservation, the addition of a renewable content objective, for natural gas pipelines, is expected to offer one of the more cost-effective carbon abatement measures for Ontario to broadly meet its GHG reduction and climate change mitigation goals.

Witnesses: M. Lister
S. Mills
F. Oliver-Glasford
D. Teichrob
J. Tideman

Ontario

Ontario Energy Board
Commission de l'énergie de l'Ontario

DECISION AND ORDER

EB-2016-0296 / EB-2016-0300 / EB-2016-0330

UNION GAS LIMITED AND

ENBRIDGE GAS DISTRIBUTION INC. AND

NATURAL RESOURCE GAS LIMITED

Applications for approval of 2017 Cap and Trade Compliance Plan cost consequences.

BEFORE: **Ken Quesnelle**
Presiding Member and Vice Chair

Victoria Christie
Member

September 21, 2017

5.7.1 Evidence

None of the Gas Utilities proposed any longer-term investments, new business activities or abatement activities[33] in their 2017 Compliance Plans for the reasons set out below.

Enbridge

Enbridge noted that it has not included any longer-term investments, new business activities, or abatement activities in its 2017 Compliance Plan. Enbridge indicated that it has assessed the viability of such options and expects that there will be a better opportunity to provide an expanded view as part of future Compliance Plans. Enbridge is delivering GIF home retrofit programming but has not included the volume reductions in its forecasts as the numbers are small and not yet verified. Going forward, it expects to have more experience and information, including the OEB's MACC and Long-term Carbon Price Forecast (LTCPF). Enbridge outlined a list of compliance options that it may pursue over the longer-term, including renewable natural gas, demand side management (DSM) and low-carbon technologies, fuel switching and fugitive/venting emissions reductions.[34]

Union

Union indicated that it has not included long-term investment options and new business activities in its Compliance Plan due to the infancy of the Cap and Trade program, the number of uncertainties that still remain, and the lack of time to develop them. While Union has included the impacts of its GIF abatement programming in its volume forecast it has not considered other DSM programs for the reasons outlined above. Union also noted that assurance of cost recovery is required; otherwise, it might have to absorb the cost of such investments.[35]

Union indicated its commitment to address abatement and long-term investments more fully in future Compliance Plans.[36]

NRG

NRG indicated that although it has not proposed any longer-term investments or new business activities as part of its 2017 Compliance Plan, it will use the OEB's MACC to

[33] Enbridge and Union referenced energy efficiency programs supported by the Government of Ontario through the GIF, but have not included proposals for the OEB's consideration.
[34] Enbridge's Public Evidence, Exhibit C, Tab 5, Schedule 1, pp. 1-4
[35] Union's Public Evidence, Exhibit 3, p .46
[36] Union's Public Argument In-Chief, p. 11

identify the financial feasibility of investment opportunities as part of future Compliance Plans.[37]

NRG indicated that although it has been working with Natural Resources Canada and Union to promote residential abatement programs, its 2017 Compliance Plan does not include any abatement.

5.7.2 Submissions

Several intervenors and OEB staff accepted the Gas Utilities' position that it was not feasible for the Gas Utilities to make proposals related to longer term investments, new business activities or abatement activities as part of the 2017 Compliance Plans due to time constraints, uncertainties in the market and the lack of the OEB's MACC and LTCPF. SEC noted that the OEB should consider abatement opportunities as part of its DSM mid-term review.

Several intervenors however, submitted that the lack of abatement activities in the 2017 Compliance Plans prohibited the appropriate and necessary cost comparison between compliance options. Environmental Defence submitted that excluding abatement opportunities, including incremental conservation, was unjustified and unreasonable and that as a result the Compliance Plans would not be as cost-effective as possible. Environmental Defence requested that a certain amount of Enbridge's and Union's 2017 Compliance Plan costs be disallowed as being unreasonable for this reason and a lack of compliance with the Cap and Trade Framework. Environmental Defence indicated that the OEB could disallow up to $22 million in 2017 costs; its conservative estimate of the resultant unrealised reduction in customer cost savings. Environmental Defence reduced the suggested cost disallowance to $500,000 for each Enbridge and Union considering this is the first Compliance Plan, and that there may be some relevant developments over time. Similarly, BOMA submitted that because of the Gas Utilities' lack of abatement activities the OEB would be unable to conclude that the proposed Compliance Plans, taken as a whole, are cost-effective, reasonable and optimized.

In its reply, Enbridge submitted that Environmental Defence's submission that the Gas Utilities have "fundamentally breached the OEB's Framework" is wholly without support or merit. Enbridge noted that advocating that a material amount of incremental DSM should have been added to Enbridge's 2017 Compliance Plan is inappropriate as it is effectively arguing that the OEB's DSM Decision and Order on the Enbridge and Union's 2015-2020 DSM Plans[38] should be disregarded and that the 2017 Compliance

[37] NRG's Public Evidence, Exhibit 3, p. 24
[38] EB-2015-0029 / EB-2015-0049, OEB Decision and Order on Enbridge and Union 2015-2020 DSM Plans, January 20, 2016

Plan proceeding should have reconsidered DSM budgets, cost effectiveness, targets and scorecards. Enbridge submitted that it would have been premature to propose incremental DSM as part of its Compliance Plan until the Government of Ontario's intentions under its *Climate Change Action Plan* are fully known.

Union responded to Environmental Defence's proposal and stated that there is no evidentiary basis for Union's cap and trade compliance costs to be disallowed. Union re-iterated that it was not feasible to include incremental abatement as part of its 2017 Compliance Plan, but that it is continuing to investigate opportunities for possible inclusion in future Compliance Plans.

5.7.3 OEB Findings

The OEB finds that each of the Gas Utilities' approaches to longer term investments, new business activities and abatement strategies as outlined in their respective 2017 Compliance Plans are reasonable and appropriate, given the lack of time between the announcement of the program and submission of the Compliance Plans, and the nascence of the cap and trade program.

The OEB is responsible for reviewing the Compliance Plans, that outline how the Gas Utilities will meet their GHG compliance obligations, for prudence and reasonableness to determine the appropriate costs to be recovered from natural gas customers in rates. The OEB does not dictate what elements should be contained in the Compliance Plans. The OEB agrees with the Gas Utilities' argument, supported by some parties, that the lack of Compliance Plan preparation time and the lack of the MACC and LTCPF during that development timeframe made it difficult to include these elements in their 2017 Compliance Plans. The OEB will not, therefore, disallow any of the Gas Utilities' cost requests on the basis that they did not include substantive abatement activities in their 2017 Compliance Plans.

Gas Utilities are encouraged to give further consideration to these options for inclusion in future Compliance Plans with the benefit of time, availability of the MACC and LTCPF, as well as new information and regulations/policies regarding other options such as offsets.

5.8 Monitoring and Reporting

Issue 2 - Monitoring and Reporting – Are the proposed monitoring and reporting processes reasonable and appropriate?

Undertaking No. JT2.15:

To Rerun the Table at Exhibit GEC.ED.Staff.3 using that savings that are included with the Conservation Potential Report, and at the three various scenarios – constrained, semi-constrained and unconstrained – for the period 2018 to 2020.

GEC Response:

The requested information is provided in Tables 1 and 2 below. Note that, as in GEC's response to Staff.3, all of the results are expressed in terms of utility costs (i.e. under the UCT) and exclude large volume industrial customers.

Table 1 shows the estimated net cost per tonne of carbon emission reduction, by sector, for each of the three Conservation Potential Study (CPS) scenarios in their totality – i.e. the *total* net cost for each scenario divided by the *total* carbon emission reduction for each scenario. The sources of the information used in the analysis are provided below the table. Depending on the life of the savings, anything with a carbon emission reduction cost on the order or $25 to $30 would be cost-effective under the UCT. As the table shows, the value of just the avoided gas costs is hundreds of millions of dollars greater than the utility DSM program costs for each sector in each scenario. As a result, the net utility cost per tonne of carbon emission reduction is *negative* for each sector for each scenario.

Table 2 shows the *incremental* net utility costs per *incremental* tonne of carbon emission reduction for each of the following two "steps" of increased savings above the CPS constrained scenario:

(1) between the constrained and semi-constrained scenarios; and
(2) between the semi-constrained and unconstrained scenarios.

This second tables provides insight into how far up the "supply curve" of savings one can go and still achieve additional increments of carbon emission reduction cost-effectively. As the table shows, for both the residential and commercial sectors, both the increment from constrained to semi-constrained and the increment from semi-constrained to unconstrained are very cost effective.[1] In other words, of the three levels of efficiency analyzed under the CPS, the unconstrained scenario provides the greatest incremental benefit per incremental dollar spent on DSM. For the industrial sector, the increment between the constrained and semi-constrained scenarios is cost-effective, with net cost savings and negative costs per tonne of carbon emission reduction. However, the increment between the semi-constrained and the unconstrained scenarios is not cost-effective.

[1] All have costs per tonne of carbon emission reduction well below the cost-effectiveness breakeven point of about $25-$30 per tonne, with almost all of them providing carbon emission reductions at negative net cost.

Table 1: 2018-2020 Total Cost per Tonne of Carbon Emission Reduction
(CPS Scenarios Analyzed Separately, excluding Large Volume Industrial Customers)

Utility/Sector	Annual Savings (million m3)	Budget (millions $)	Lifetime Carbon Avoided (tonnes)	Avoided Gas Costs (millions $)	Net Cost (millions $)	Net cost per Tonne Carbon
Constrained						
Res	201	$175	3,227,376	$355	($181)	($56)
Com	126	$110	3,266,518	$326	($216)	($66)
Ind	209	$59	6,460,908	$604	($545)	($84)
Total	536	$344	12,954,802	$1,286	($942)	($73)
Semi-Constrained						
Res	216	$238	4,075,773	$418	($180)	($44)
Com	146	$146	3,923,346	$377	($231)	($59)
Ind	222	$79	6,901,391	$676	($597)	($87)
Total	584	$463	14,900,510	$1,471	($1,009)	($68)
Unconstrained						
Res	351	$865	11,129,247	$1,067	($202)	($18)
Com	211	$254	5,091,317	$512	($258)	($51)
Ind	237	$354	7,338,042	$720	($366)	($50)
Total	799	$1,473	23,558,606	$2,299	($826)	($35)

Notes

1 Annual m3 from Tables ES7 (Res), ES11 (Com) and ES 15 (Ind), with industrial numbers adjusted down to exclude large volume customers based on percent of total 2020 industrial savings from such large customers (based on CPS tables ES16 and ES17), as year-by-year annual savings values are only available for the sector as a whole.

2 Lifetime savings based on 2020 ratios of lifetime to annual savings from Tables ES8 (Res excl Low Inc), ES12 (Com excl Low Inc) and ES16 (Ind excl large volume). This extrapolation is necessary since year by year lifetime savings values by sector are not available. Note that this approach may understate lifetime savings because some of the measures installed in 2015 through 2019 will no longer be producing savings in 2020.

3 Sector budgets based on ratios of total budgets through 2020 to total annual savings through 2020 (multiplied by 2018-2020 annual savings) from Tables ES8 (Res excl Low Inc), ES9 (Res low income), ES12 (Com excl Low Inc), ES13 (Com Low Income) and ES16 (Ind excl large volume). This extrapolation is necessary since year by year budgets by sector are not available.

4 Avoided carbon emissions calculated as 1875 tonnes/million m3 savings

5 Value of avoided gas costs calculated using avoided costs in CPS Exh. 11, assuming 50% weather sensitive savings and 50% baseload, as well as a real discount rate of 4%.

6 Net cost is the difference between avoided gas costs (i.e. savings) and program costs.

7 Cost per tonne of carbon emission reduction is net cost divided by lifetime tonnes of carbon emission reduction.

Table 2: 2018-2020 Incremental Cost per Tonne Carbon Emission Reduction
(CPS Scenario Incremental Impacts, Excluding Large Volume Industrial Customers)

Utility/Sector	Annual Savings (million m3)	Budget (millions $)	Lifetime Carbon Avoided (tonnes)	Avoided Gas Costs (millions $)	Net Cost (millions $)	Net cost per Tonne Carbon
Constrained to Semi-Constrained						
Res	15	$63	848,397	$63	$1	$1
Com	20	$36	656,828	$52	($16)	($24)
Ind	13	$19	440,483	$72	($52)	($119)
Total	48	$119	1,945,708	$186	($67)	($34)
Semi-Constrained to Unconstrained						
Res	135	$627	7,053,474	$649	($22)	($3)
Com	65	$108	1,167,971	$134	($26)	($22)
Ind	15	$275	436,651	$44	$231	$529
Total	215	$1,011	8,658,096	$828	$183	$21

It should be emphasized that the incremental UCT cost-effectiveness of additional DSM spending and savings by the utilities – relative to their 2018-2020 plans – is likely to be considerably better than the increment shown in Table 2 for the increment between the CPS constrained and CPS semi-constrained scenarios. There are a couple of reasons for this. First, the utilities planned spending for 2018-2020 (i.e. about $381 million, as shown in GEC's response to Staff.3) is actually a little more than 10% higher than implied by the CPS report for the constrained scenario (i.e. $344 million as shown in the first table below). Second, and more importantly, the CPS constrained scenario savings (536 million annual m^3, as shown in the first part of the first table below) is 22% higher than utilities' forecast savings (i.e. 438 million m^3 between the two utilities as shown in GEC's response to Staff.3). Thus, while the difference between the CPS constrained and semi-constrained scenarios is only 9% more annual savings[2] for 35% more budget (still a very cost-effective increment), the difference between the utilities' current plans and the semi-constrained scenario is 33% more annual savings for just 21% more budget. The principal reason for this difference appears to be that each of the CPS scenarios were optimized – i.e. designed to maximize savings for a given budget level – whereas the level of savings achieved was only one of several considerations in the design of the utilities' efficiency program portfolios. To be clear, I am not suggesting that the utilities could achieve 33% more savings with 21% more budget – or at least not with dramatic changes to their DSM plans (likely including elimination of market transformation activities).

[2] Note that the 9% increase in annual savings is associated with a 15% increase in lifetime savings and lifetime carbon emission reductions. In essence, the additional measures added to the constrained scenario to produce the semi-constrained scenario are much longer-lived (an average life of more than 21 years) than the measures in the constrained scenario (an average life of a little under 13 years). The difference is most pronounced for the residential sector (incremental savings between constrained and semi-constrained scenarios of about 30 years compared to average of about 9 years for the constrained scenario).

However, the utilities should be able to achieve significantly more additional savings per dollar than implied by the difference in the CPS constrained and semi-constrained scenarios.