

## GHG EMISSIONS FORECASTS

1. This evidence sets out an overview of Enbridge's 2018 forecast of Greenhouse Gas ("GHG") emissions.
2. Under *Ontario Regulation 143/16* "Quantification, Reporting and Verification of Greenhouse Gas Emissions" ("O.Reg 143/16") and the associated "Guidelines for Quantification, Reporting and Verification of Greenhouse Gas Emissions" ("Guidelines"), as a natural gas distributor Enbridge is required to report emissions from the distribution of natural gas (ON.400). Enbridge is also required to report emissions from stationary combustion (ON.20) and from the operation of equipment related to natural gas (ON.350).
3. Enbridge has prepared 2018 forecasts of GHG emissions related to customers' use of natural gas. These are referred to as "customer-related obligations". It has also prepared forecasts of emissions related to the operation of its distribution, transmission and storage systems. These are referred to as "facility-related obligations."
4. In order to estimate GHG emissions, forecasted natural gas volumes were converted to GHG emissions in tonnes of carbon dioxide equivalent ("tCO<sub>2</sub>e"), using the methodology, emission factors and global warming potentials provided in O.Reg 143/16 and the Guidelines.

### Customer-Related Emissions Forecast

5. The total customer-related emissions for 2018 based on the customer-related volume forecast is 19,855,327 tCO<sub>2</sub>e, representing approximately 99% of the total forecasted carbon compliance obligation. The methodology, source and

assumptions for the volume forecast can be found in Exhibit B, Tab 2, Schedule 1 and the assumptions and the derivation of the customer-related GHG emissions forecast is set out in Tables 1 and 2 of this exhibit.

#### Facility-Related Emissions Forecast

6. The total facility-related emissions for 2018 based on the facility-related volume forecast is 242,464 tCO<sub>2</sub>e, representing approximately 1% of the total forecasted carbon compliance obligation. The methodology, source and assumptions for the volume forecast can be found in Exhibit B, Tab 2, Schedule 1 and the assumptions and derivation of the facility-related GHG emissions forecast is set out in Tables 3 and 4 of this exhibit.

#### Total 2018 GHG Emissions Forecast

7. The total GHG emissions forecast, inclusive of both the customer-related and facility-related volumes is 20,097,791 tCO<sub>2</sub>e. A summary of the GHG emissions is included in Table 5 of this exhibit.
8. Enbridge notes that the GHG forecast is calculated with “net volumes,” which is after the volumes applicable to the Green Investment Fund (“GIF”) incremental customer abatement program were removed from the forecasted customer-related volume. The total GHG emissions forecast before this adjustment is 20,108,211 tCO<sub>2</sub>e.

TABLE 1: 2018 CUSTOMER-RELATED EMISSIONS BY RATE CLASS

|      |                        | Col. 1  | Col. 2  | Col. 3  | Col. 4   | Col. 5   |
|------|------------------------|---|---|---|--|--|
| Line | Rate                   | Net Volumes <sup>1</sup><br>(10 <sup>3</sup> m <sup>3</sup> ) | CO <sub>2</sub> Emissions <sup>2</sup><br>(Tonnes CO <sub>2</sub> ) | CH <sub>4</sub> Emissions <sup>3</sup><br>(Tonnes CH <sub>4</sub> ) | N <sub>2</sub> O Emissions <sup>4</sup><br>(Tonnes N <sub>2</sub> O) | Net CO <sub>2</sub> e Emissions <sup>5</sup><br>(Tonnes CO <sub>2</sub> e) |
| 1.1  | 1                      | 4,754,623.9   | 8,857,864.3   | 175.9   | 166.4  | 8,913,146.3  |
| 1.2  | 6                      | 4,673,142.8   | 8,706,065.0   | 172.9   | 163.6  | 8,760,399.7  |
| 1.3  | 9                      | 0.0   | 0.0   | 0.0   | 0.0  | 0.0  |
| 1.4  | 100                    | 0.0   | 0.0   | 0.0   | 0.0  | 0.0  |
| 1.5  | 110                    | 421,897.8   | 785,995.6   | 15.6  | 14.8   | 790,901.0  |
| 1.6  | 115                    | 132,481.1   | 246,812.3   | 4.9   | 4.6  | 248,352.6  |
| 1.7a | 125                    | 319,562.5   | 595,344.9   | 11.8  | 11.2   | 599,060.5  |
| 1.7b | 125D                   | 124,896.5   | 232,682.2   | 4.6   | 4.4  | 234,134.4  |
| 1.8  | 135                    | 64,501.3  | 120,165.9   | 2.4   | 2.3  | 120,915.9  |
| 1.9  | 145                    | 46,465.5  | 86,565.2  | 1.7   | 1.6  | 87,105.5   |
| 1.10 | 170                    | 53,524.6  | 99,716.3  | 2.0   | 1.9  | 100,338.7  |
| 1.11 | 200                    | 0.0   | 0.0   | 0.0   | 0.0  | 0.0  |
| 1.12 | 300                    | 518.6   | 966.15  | 0.02  | 0.02   | 972.2  |
| 1    | Total Customer-Related | 10,591,614.6  | 19,732,178.0  | 391.9   | 370.7  | 19,855,326.7   |

Notes:

- (1) Exhibit B, Tab 2, Schedule 1, Table 1, Col. 6
- (2) Col. 1 x Table 2, Line 2, Col. 1 x 1000
- (3) Col. 1 x Table 2, Line 2, Col. 2 x 1000
- (4) Col. 1 x Table 2, Line 2, Col. 3 x 1000
- (5) Col. 2 + (Col. 3 x Table 2, Line 3, Col. 2) + (Col. 4 x Table 2, Line 3, Col. 3)

TABLE 2: CONVERSION FACTORS

|      |  | Col. 1                                       | Col. 2                                       | Col. 3  |
|------|--|--|--|---|
| Line |  | CO <sub>2</sub> Emission Factor <sup>6</sup> | CH <sub>4</sub> Emission Factor <sup>7</sup> | N <sub>2</sub> O Emission Factor <sup>7</sup> |
| 2    | Tonne/m <sup>3</sup>                                   | 0.001863                                     | 0.000000037                                  | 0.000000035                                   |
| Line |  |  | Methane <sup>8</sup>                         | Nitrous Oxide <sup>8</sup>                    |
| 3    | Global Warming Potential for Carbon Dioxide Equivalent |  | 21   | 310   |

Notes:

- (6) Ontario Ministry of Environment and Climate Change's "Guideline for Quantification, Reporting and Verification for GHG Emissions - July 2017", Table 400-2
- (7) Ontario Ministry of Environment and Climate Change's "Guidelines for Quantification, Reporting and Verification for GHG Emissions - July 2017", Table 20-4
- (8) Ontario Regulation 143/16 "Quantification, Reporting and Verification of Greenhouse Gas Emissions", Schedule 1

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**TABLE 3: 2018 FACILITY-RELATED EMISSIONS**

| Line |                           | Col. 1<br>Volumes <sup>1</sup><br>(10 <sup>3</sup> m <sup>3</sup> ) | Col. 2<br>CO <sub>2</sub> Emissions <sup>2</sup><br>(Tonnes CO <sub>2</sub> ) | Col. 3<br>CH <sub>4</sub> Emissions <sup>3</sup><br>(Tonnes CH <sub>4</sub> ) | Col. 4<br>N <sub>2</sub> O Emissions <sup>4</sup><br>(Tonnes N <sub>2</sub> O) | Col. 5<br>CO <sub>2</sub> e Emissions <sup>5</sup><br>(Tonnes CO <sub>2</sub> e) |
|------|---------------------------|---|---|---|--|--|
| 1.   | Company Use - Buildings   | 1,388.8   | 2,587.3   | 0.1   | 0.0  | 2,603.5  |
| 2.   | Company Use - Boilers     | 4,078.8   | 7,683.4   | 7.8   | 0.2  | 7,909.9  |
| 3.   |                           | 5,467.6   | 10,270.7  | 7.8   | 0.3  | 10,513.4   |
| 4.   | Company Use - Fleet       | 1,147.2   | 2,137.2   | 0.0   | 0.0  | 2,150.6  |
| 5.   | Total Company Use         | 6,614.8   | 12,407.9  | 7.9   | 0.3  | 12,664.0   |
| 6.   | Unaccounted For Gas (UAF) | 106,077.0   | 197,621.5   | 3.9   | 3.7  | 198,854.8  |
| 7.   | Compressor Fuel           | 15,957.3  | 30,059.2  | 30.4  | 0.8  | 30,945.5   |
| 8.   | Total Facility-Related    | 128,649.1   | 240,088.6   | 42.2  | 4.8  | 242,464.3  |

Notes:

- (1) Exhibit B, Tab 2, Schedule 1, Table 2, Col. 1  
 (2) Col. 1 x Table 4, Line 1, Col. 1 x 1000 (For Boilers and Compressor Fuel: Col. 1 x Table 4, Line 2, Col. 1 x Table 4, Line 3, Col. 1)  
 (3) Col. 1 x Table 4, Line 1, Col. 2 x 1000 (For Boilers and Compressor Fuel: Col. 1 x Table 4, Line 2, Col. 2 x Table 4, Line 3, Col. 2)  
 (4) Col. 1 x Table 4, Line 1, Col. 3 x 1000 (For Boilers and Compressor Fuel: Col. 1 x Table 4, Line 2, Col. 3 x Table 4, Line 3, Col. 3)  
 (5) Col. 2 + (Col. 3 x Table 4, Line 5, Col. 2) + (Col. 4 x Table 4, Line 5, Col. 3)

**TABLE 4: CONVERSION FACTOR**

| Line |  | Units                             | Col. 1<br>CO <sub>2</sub> Emission<br>Factor <sup>6, 10</sup> | Col. 2<br>CH <sub>4</sub> Emission<br>Factor <sup>7</sup> | Col. 3<br>N <sub>2</sub> O Emission<br>Factor <sup>7</sup> |
|------|--|-----------------------------------|---|---|--|
| 1    | Fleet, Buildings & Unaccounted For Volumes (UAF)       | Tonne/m <sup>3</sup>              | 0.001863  | 0.000000037   | 0.000000035  |
| 2    | Boilers & Compressor Fuel Volumes                      | Tonne/GJ                          | 0.04903   | 0.00004958  | 0.000001305  |
| 3    | Budget Heat Value <sup>8</sup>                         | GJ/10 <sup>3</sup> m <sup>3</sup> | 38.42   | 38.42   | 38.42  |
| Line |  |                                   |   | Methane <sup>9</sup>                                      | Nitrous Oxide <sup>9</sup>                                 |
| 4    | Global Warming Potential for Carbon Dioxide Equivalent |                                   |   | 21  | 310  |

Notes:

- (6) Ontario Ministry of Environment and Climate Change's "Guideline for Quantification, Reporting and Verification for GHG Emissions - July 2017", Table 400-2  
 (7) Ontario Ministry of Environment and Climate Change's "Guidelines for Quantification, Reporting and Verification for GHG Emissions - July 2017", Table 20-4  
 (8) Assumed Budget Heat Value = 38.42 GJ/10<sup>3</sup>m<sup>3</sup>. This value should be assumed as a placeholder. In calculating actual emissions, actual heating value will be used.  
 (9) Ontario Regulation 143/16 "Quantification, Reporting and Verification of Greenhouse Gas Emissions", Schedule 1  
 (10) CO<sub>2</sub> Emission Factor for 'Boilers & Compressor Fuel': Ontario Ministry of Environment and Climate Change's "Guidelines for Quantification, Reporting and Verification for GHG Emissions - July 2017", Table 20-3

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TABLE 5: 2018 SUMMARY OF CUSTOMER-RELATED AND FACILITY-RELATED FORECAST GHG EMISSIONS

| <u>Line</u>                                    | <u>Description</u>   | <u>2018 Forecast</u> |
|--|--|----------------------|
| <u>Customer-Related GHG Emissions Forecast</u> |  |                      |
| 1  | Customer-related Forecast Volume (10 <sup>3</sup> m <sup>3</sup> )           | 10,591,615           |
| 2  | ON.400 Emission Conversion Factor (tonnes CO <sub>2</sub> e/m <sup>3</sup> ) | 0.001875             |
| 3  | <b>Customer-Related Emissions (tonnes CO<sub>2</sub>e)</b>                   | <b>19,855,327</b>    |
| <u>Facility-Related GHG Emissions Forecast</u> |  |                      |
| 4  | Facility-related Forecast Volume (10 <sup>3</sup> m <sup>3</sup> )           | 128,649              |
| 5  | ON.20 Emission Conversion Factor (tonnes CO <sub>2</sub> e/m <sup>3</sup> )  | 0.001939             |
| 6  | <b>Facility-Related Emissions (tonnes CO<sub>2</sub>e)</b>                   | <b>242,464</b>       |
| <u>Total Compliance Obligation</u>             |  |                      |
| 7  | <b>Total Compliance Obligation (tonnes CO<sub>2</sub>e)</b>                  | <b>20,097,791</b>    |

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