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May 24, 2016

Environment and Climate Change Canada  
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To Whom It May Concern:

**Subject: Enbridge Pipelines Inc. - Line 3 Replacement Program Review of Related Upstream Greenhouse Gas Emissions Estimates Draft for Public Comments**

Thank you for your notification of the upstream greenhouse gas emissions estimates for the Enbridge Line 3 Replacement Program that were posted for public comment on April 25, 2016. I am pleased to respond on behalf of the Government of Alberta.

Alberta agrees with Environment and Climate Change Canada's conclusion that upstream emissions would occur regardless of whether the Line 3 Replacement Program was built or not. Alberta has prepared the attached submission to refine and improve Environment and Climate Change Canada's analysis and emissions estimates. Alberta recommends the following:

- Providing Alberta-based emission factors that use third party verified (audited) emissions and crude production data from Alberta's 2015 Specified Gas Emitters Regulation,
- Accounting for expected emissions intensity reductions from Alberta's Climate Leadership Plan,
- Exemption of upgrading emissions, recognizing that these can occur upstream or downstream of the pipeline and inclusion in this analysis may lead to carbon leakage to downstream jurisdictions, and
- Quantification of Part A and Part B estimates with Alberta-based emission factors.

The attached analysis demonstrates that the Line 3 Replacement Program would result in maximum incremental emissions of 5.1 to 6.2 megatonnes in 2030, following the same calculation process as Environment and Climate Change Canada (not the 19.3 to 26.1 Mt estimate implied in the draft assessment. This reflects the incremental upstream emissions associated with the incremental 370,000 barrel a day capacity provided by the Line 3 replacement program. As indicated, these incremental upstream emissions would occur regardless of whether the Line 3 Replacement Program occurred because the incremental 370,000 barrels could continue to be transported in Enbridge's Alberta Clipper pipeline, by rail or the investments will occur in other jurisdictions globally. The table below summarizes the Government of Alberta's estimates in comparison to Environment and Climate Change Canada's.



**Environment and Climate Change Canada and Alberta Climate Change Office Upstream Greenhouse Gas Estimate Comparison**

Incremental Emissions (Mt)	Environment and Climate Change Canada		Alberta Climate Change Office			
	Part A	Part B	Part A	Part B	Maximum Incremental (*)	Estimated Incremental
Scenario 1	26.1	Not Specified	10.4	5.3	5.1	Negligible
Scenario 2	19.3	Not Specified	12.8	6.6	6.2	Negligible
Scenario 3	24.6	Not Specified	10.8	5.3	5.5	Negligible
Scenario 4	23.2	Not Specified	11.2	5.8	5.5	Negligible

(\*) These upstream emissions would occur regardless of whether the Line 3 Replacement Program was built or not because Alberta Clipper, rail transportation or investment in other jurisdictions globally will result in the same level of production of 370 thousand barrels per day.

The attachment provides Alberta's submission including calculations. Alberta's Climate Change Office is available to answer any questions you may have regarding our feedback and can offer additional data to help improve Environment and Climate Change Canada's estimates, upon request. Please contact Kate Rich, Climate Change Policy (kathleen.rich@gov.ab.ca), if further clarity is needed.

Thank you for considering Alberta's comments.

Sincerely,

<signature removed>

Lora Pillipow  
Assistant Deputy Minister

cc: Cynthia Farmer, Assistant Deputy Minister, Alberta Energy  
Graham Statt, Assistant Deputy Minister, Alberta Environment and Parks  
Garry Pocock, Deputy Minister, Alberta Intergovernmental Relations  
Kate Rich, Executive Director, Climate Change Office

Attachment

**Government of Alberta Submission  
Environment and Climate Change Canada's Upstream Greenhouse Gas  
Emissions Estimates for the Enbridge Line 3 Replacement Program (posted  
April 25, 2016)**

**A. Estimation of the Upstream Greenhouse Gas Emissions**

**A.1. Project Throughput**

**Context:**

The Draft for Public Comments provides an estimate of the upstream greenhouse gas emissions associated with the Line 3 replacement project as well as discussion of conditions under which the crude oil transported on a fully-utilized Line 3 replacement program could be considered incremental production.

**Comments:**

Line 3 is currently approved by the National Energy Board for a design capacity of 760 thousand barrels per day and has a corresponding U.S. Presidential Permit. According to Draft for Public Comment (the "document"), Enbridge decided to reduce approved design capacity to the current capacity of 390 thousand barrels per day due to voluntary pressure restrictions in order to ensure safe operations.

**Recommendations:**

Enbridge has National Energy Board approval for its current 760 thousand barrel per day design capacity on Line 3, and Enbridge's Alberta Clipper pipeline expansion project is currently utilizing the incremental U.S. Presidential Permit capacity. It would be helpful if Environment and Climate Change Canada could further clarify its greenhouse gas assessment criteria for pipeline projects under review. Specifically, it would be important to know:

- Criteria when assessing existing/replacement pipeline projects vs. new/expansion pipeline projects. Definitions on "incremental capacity" would be useful as there could be cases when capacity is not being used or being used on rail or other pipelines.
- Detailed information about the assessment methodology as well as supporting documentation.

To provide directly comparable findings for Part A the Government of Alberta performed our analysis consistent with Environment and Climate Change Canada's scope for the Line 3 replacement project with capacity of 760 thousand barrels per day. For Part B, the Government of Alberta performed our analysis based on the existing 390 thousand barrels per day.

**A.2. Emission Factors**

**Context:**

The methodology described in Gazette 1 indicated that publicly available data would be used where available and applicable. Table 3 of the document provides upstream emission factors for various crude products, but the document does not provide clarity (i.e., calculation methodology) for how each emission factor was derived. Environment and Climate Change Canada also



indicates that the analysis does not include Alberta's Climate Leadership Plan, to be factored in for future estimates as certain policies take effect.

**Comments:**

Alberta was unable to replicate Environment and Climate Change Canada's emission factors using publicly available data. While the ranges in emission factors (68.5 kg CO<sub>2</sub>e per barrel – 104.4 kg CO<sub>2</sub>e per barrel) seem consistent with other commonly referenced upstream emission factors in various lifecycle assessment reports and studies (see the following table, Crude Oil Production column and WCSB rows with a range of 74 kg CO<sub>2</sub>e per barrel – 105 kg CO<sub>2</sub>e per barrel), further information with respect to Environment and Climate Change Canada's research methodology and assumptions for each crude oil type would allow for a more detailed analysis and verification of the annual projected upstream emissions.

**Wells to Wheels Greenhouse Gas Emissions per Barrel for Reference Crudes, by Study and Lifecycle Stage**

		GHG Emissions kgCO <sub>2</sub> e per Barrel of Gasoline and Distillates <sup>a</sup>						
Study	Crude Type	Crude Oil Production	Crude Oil Transport	Refining	Finished Fuel Transport	Fuel Combustion	WTW Total	
Jacobs	Middle Eastern Sour	43	15	69	2	396	526	
	Mexican Maya	68	6	74	2	398	549	
	Venezuelan	52	7	86	2	405	553	
	WCSB	96	1	71	2	387	557	
TIAX	Middle Eastern Sour	1	5	59	IE	390	456	
	Mexican Maya	17	1	63	IE	390	470	
	Venezuelan	55	1	67	IE	390	513	
	WCSB	74	9	59	IE	390	533	
NETL	U.S Average (2005)	36	7	47	5	393	488	
	Middle Eastern Sour	13	15	55	5	393	480	
	Mexican Maya	36	6	70	5	393	510	
	Venezuelan	23	6	58	5	393	485	
	WCSB	105	5	61	5	393	568	

Source: Modified from SEIS (<https://keystonepipeline-xl.state.gov/documents/organization/221247.pdf>)

While the document presents the various processing stages and high-level boundaries that were considered, detailed crude pathway assessments should be defined for each crude oil type outlined in the report. This would include the key parameters typically used to develop the respective emissions factors for each crude type. This information would also allow for an assessment of the emissions data vintage quality (i.e., audited and/or verified) used for the document's four scenarios.

It also appears that the 'upgrading' stage is included in the calculation of 'synthetic' emission factors. However, for other crude types (e.g., conventional oil), identical engineering processes are often utilized at the refinery stage, and are consequently not included in upstream emissions. Alberta requests recognition that the upgrading process may occur upstream or downstream of the pipeline and should be exempt from the estimate in order to avoid carbon leakage to downstream jurisdictions. The emissions benefits of upgrading are seen in the allocation and substitution of co-products in downstream processes. This would result in inequitable treatment of components, under the reports methodology, and an overestimation for 'synthetic' emission factor projections.

Since we were unable to replicate or verify Environment and Climate Change Canada's emission factors with public data, Alberta offers the emission factors established with Alberta-

based data. Using Alberta's 2015 Specified Gas Emitters Regulation data provides additional assurance since the data is third-party verified (audited). Alberta's emission factors also reflect the reductions in emissions intensity that we expect for the announced methane policy and the new performance standards pricing regime.

**Recommendations:**

In accordance with the above comments, the Government of Alberta recommends using the following Alberta-based emissions factors in the table below. The footnotes provide their basis and more detailed information can be provided if needed.

**Alberta-based Emission Factors (kg CO<sub>2</sub>e per barrel)**

Year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Conventional Light (1)	69	69	69	69	69	69	52	52	52	52	52	52
Conventional Heavy (2)	59	59	58	58	57	57	13	12	12	12	12	11
CSS Heavy (3)	91	91	91	91	91	91	91	91	91	91	91	91
SAGD Heavy (4)	64	64	64	64	64	64	64	64	64	64	64	64
Mined Bitumen (5)	26	26	26	26	26	26	26	26	26	26	26	26
Synthetic Extraction Only (6)	31	31	31	31	31	31	31	31	31	31	31	31
Synthetic Extraction and Upgrading (7)	94	94	94	94	94	94	94	94	94	94	94	94

**Footnotes:**

- (1) Alberta methane reduction policy commits to a 45% reduction in conventional oil and gas methane by 2025. Alberta deducted an equivalent emission factor for the methane reductions from ECCC numbers, based on 18 kg/bbl for 2014 conventional light emissions (ECCC) and production (NEB). Although Alberta expects early reduction requirements and voluntary reductions, the Government of Alberta has factored in only after 2025 since those policy details have not been decided.
- (2) Alberta methane reduction policy commits to a 45% reduction in conventional oil and gas methane by 2025. Alberta deducted an equivalent emission factor for the methane reductions from ECCC numbers, based on 44 kg/bbl for 2014 conventional heavy emissions (ECCC) and production (NEB). Although Alberta expects early reduction requirements and voluntary reductions, the Government of Alberta has factored in only after 2025 since those policy details have not been decided.
- (3) Based on 2015 Specified Gas Emitters Regulation regulated-facilities, established in situ CSS product intensity using total direct emissions without biomass CO<sub>2</sub> and reported bitumen production. Under the Climate Leadership Plan (and building from the Climate Leadership Report to Minister), Alberta expects an average emission intensity reduction of 2 per cent relative to intensities under the Specified Gas Emitters Regulation in each year. Assumed constant emission intensity over time, aside from greenhouse gas reductions.
- (4) Based on 2015 Specified Gas Emitters Regulation regulated-facilities, established in situ SAGD product intensity using total direct emissions without biomass CO<sub>2</sub> and reported bitumen production. Note that Nexen Long Lake reports multi-product intensities for bitumen, synthetic crude (for upgrading), and cogeneration of electricity, for which this product intensity only counted bitumen (cogeneration of electricity allocated to synthetic crude). Under the Climate Leadership Plan (and building from the Climate Leadership Report to Minister), Alberta expects an average emission intensity reduction of 2 per cent relative to intensities under the Specified Gas Emitters Regulation in each year. Assumed constant emission intensity over time, aside from greenhouse gas reductions.
- (5) Based on 2015 Specified Gas Emitters Regulation regulated-facilities, established mining bitumen product intensity using total direct emissions without biomass CO<sub>2</sub> and reported bitumen production (Syncrude Mildred Lake and Aurora North and CNRL Horizon bitumen production taken from Alberta Energy Regulator ST-53 since bitumen is not reported separately to Alberta Climate Change Office). Note that Suncor reports multi-product intensities for bitumen and synthetic crude (for upgrading), for which this product intensity only counted bitumen. Facilities with integrated mining and upgrading (i.e., Syncrude Mildred Lake and Aurora North and CNRL Horizon) that do not report separate multi-product intensities were assumed to have similar proportions of emissions to Suncor. Under the Climate Leadership Plan (and building from the Climate Leadership Report to Minister), Alberta expects an average emission intensity reduction of 4 per cent relative to intensities under the Specified Gas Emitters Regulation in each year. Assumed constant emission intensity over time, aside from greenhouse gas reductions.



- (6) Recommend using synthetic with only the extraction portion. Upgrading can occur upstream or downstream of the pipeline and the applicable emissions should be exempt to avoid carbon leakage. Based on 2015 Specified Gas Emitters Regulation regulated-facilities, established synthetic crude oil extraction intensity using total direct emissions without biomass CO<sub>2</sub> allocated as in (4) and (5). Facilities used in the emission factor have integrated extraction and upgrading: Nexen Long Lake, Syncrude Mildred Lake and Aurora North, CNRL Horizon, and Suncor. Under the Climate Leadership Plan, we expect an average emission intensity reduction of 4 per cent relative to intensities under the Specified Gas Emitters Regulation in each year. Assumed constant emission intensity over time, aside from greenhouse gas reductions.
- (7) For reference only, this emission factor includes extraction and upgrading intensity. Based on 2015 Specified Gas Emitters Regulation regulated-facilities, established synthetic crude extraction and upgrading intensity using total direct emissions without biomass CO<sub>2</sub> and reported synthetic crude oil production. Facilities used in the emission factor have integrated extraction and upgrading: Nexen Long Lake, Syncrude Mildred Lake and Aurora North, CNRL Horizon, and Suncor. Under the Climate Leadership Plan (and building from the Climate Leadership Report to Minister), Alberta expects an average emission intensity reduction of 4 per cent relative to intensities under the Specified Gas Emitters Regulation in each year. Assumed constant emission intensity over time, aside from greenhouse gas reductions.

### A.3. Scenario Emissions

#### Context:

Table 2 of the Draft for Public Comment provides total emissions projections for the four scenarios, indicating that the Line 3 replacement program could generate between 19 and 26 megatonnes of carbon dioxide equivalent per year. These are based on the emission factors in Table 3, the production compositions in Table 1, and the full 760 thousand barrels per day of capacity as noted in the Draft for Public Comment.

#### Comments:

As noted in section A.2, Alberta Climate Change Office offers Alberta-based emission factors that factor in the Climate Leadership Plan and exempt synthetic crude upgrading emissions. Replicating Environment and Climate Change Canada's analysis of the 760 thousand barrels per day with audited Alberta-based emission factors, we estimate upstream greenhouse gas emissions resulting from the Enbridge Line 3 replacement program to be 10.4 to 15.8 megatonnes. The full results are provided in the table below.

**Alberta Estimates of Part A Upstream Greenhouse Gas Emissions (megatonnes CO<sub>2</sub>e)**

Year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Scenario 1	11.8	11.8	11.8	11.8	11.8	11.8	10.4	10.4	10.4	10.4	10.4	10.4
Scenario 2	14.8	14.9	14.8	14.8	15.0	15.2	12.7	12.8	12.8	12.9	12.8	12.8
Scenario 3	12.3	12.3	12.3	12.4	12.4	12.4	10.8	10.8	10.8	10.8	10.8	10.8
Scenario 4	12.9	12.9	12.9	12.9	12.9	12.9	11.2	11.2	11.2	11.2	11.2	11.2

However, even if the replacement pipeline is built, there is not expected to be any incremental throughput unless the U.S. grants additional Presidential Permit capacity for Alberta Clipper. Also, where there are alternatives, producers use the transportation option that will secure the highest netback.

#### Recommendations:

The Government of Alberta recommends Environment and Climate Change Canada consider using the Alberta-based emission factors for its estimate, which are based on third party verified emissions and production. As noted in section A.2, these emission factors also exempt synthetic crude upgrading emissions and incorporate aspects of the Climate Leadership Plan.

Additionally, it would be helpful if Environment and Climate Change Canada confirms that the throughput is not incremental and that the assessment is representative of existing upstream emissions. We also ask Environment and Climate Change Canada to provide more detailed

information on its emissions quantification methodology and calculations: tables or excel documents would be excellent complements to its analysis.

## **B. Impacts on Canadian and Global Upstream Greenhouse Gas Emissions**

### **B.1. Effect of oil price on production**

#### **Context:**

The Draft for Public Comment notes that production is more likely to be enabled by increased pipeline capacity when long-term oil prices are in a range between \$60 and 80 per barrel and at higher oil prices more production would be profitable even if transported by rail.

#### **Comments:**

The analysis recognizes that production growth depends on crude oil prices and Environment and Climate Change Canada provides a benchmark analysis from Wood Mackenzie to support its conclusion on a price range where incremental production may be fostered.

#### **Recommendations:**

It is important to highlight that price ranges that can foster future oil sands development are not static and may change based on production costs, taxes, royalties, transportation costs, market prices and economic conditions. This should be considered in the assessment.

### **B.2. Downstream Emissions Impacts**

#### **Context:**

The Draft for Public Comment notes that given global competition for investment in oil production, it is likely that if oil sands production did not occur in Canada, investments would be made in other jurisdictions and global oil production and consumption would be materially unchanged.

#### **Comments:**

The Draft for Public Comment notes the main destination for increased Western Canada production is the U.S. Gulf Coast. In evaluating the impact of Line 3 expansion on global upstream GHG emissions, emissions from the incremental oil sands exports to the U.S. Gulf Coast may need to be compared to emissions of likely displaced crude in the U.S. Gulf Coast such as Mexican Maya and Venezuelan Bachaquero.

As Alberta noted in our submission for Gazette 1, if Line 3 is not replaced or new pipeline capacity is not constructed, the resulting upstream greenhouse gas emissions would not change globally. Displacement of crude from highly regulated Canadian production by other jurisdictions may result in carbon leakage downstream that could be higher than if Canadian oil were not displaced.

#### **Recommendations:**

Since there may be changes in downstream emissions if the Line 3 replacement program is not approved and built, the Government of Alberta recommends Environment and Climate Change Canada consider including a calculation of emission in the U.S. Gulf Coast from Mexican Maya and Venezuelan Bachaquero to compare it with emissions from displaced oil sands Canadian crude that would have been transported from Western Canada. Please refer to the table provided previously in this document for these emission intensities.



### B.3. Emissions Impact of Existing Line 3 Capacity

**Context:**

Environment and Climate Change Canada note in Part B of the Draft for Public Comment that if the Line 3 replacement program did not proceed, Enbridge would continue to operate the pipeline at its current rate of 390 thousand barrels per day, which is consistent with Enbridge's regulatory filings with the NEB. Although the existing capacity of 390 thousand barrels per day is included in the scope of Part B, Environment and Climate Change Canada has not completed an upstream greenhouse gas emissions estimate for this level of production.

**Comments:**

Estimating the emissions impact of the existing 390 thousand barrels per day Line 3 are necessary for a complete assessment of Part B upstream greenhouse gas emissions and subsequent calculation of the incremental emissions.

**Recommendations:**

The Government of Alberta recommends repeating the analysis set out in Part A for existing Line 3 capacity under Part B. Using the Alberta-based emission factors provided in the table above, Alberta estimates the maximum level of emission from the existing Line 3 to be between 5.3 and 7.8 megatonnes. The full results are provided in the following table.

Alberta Estimates of Part B Upstream Greenhouse Gas Emissions (megatonnes CO<sub>2</sub>e)

Year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Scenario 1	6.0	6.0	6.1	6.1	6.1	6.1	5.3	5.3	5.3	5.3	5.3	5.3
Scenario 2	7.6	7.7	7.6	7.6	7.7	7.8	6.5	6.6	6.6	6.6	6.6	6.6
Scenario 3	6.0	6.0	6.1	6.1	6.1	6.1	5.3	5.3	5.3	5.3	5.3	5.3
Scenario 4	6.6	6.6	6.6	6.6	6.6	6.6	5.8	5.8	5.8	5.8	5.8	5.8

Although Alberta has not factored in crude by rail transportation, we believe that upstream oil and gas production will proceed at prices of \$60 to 80 per barrel and the remaining 370 thousand barrels per day currently being transported on Alberta Clipper under Line 3's Presidential Permit regardless of the Line 3 replacement program.

### C. Conclusions

#### C.1. Enbridge Line 3 Replacement Program Yields Zero Net Upstream Greenhouse Gas Emissions

**Context:**

Environment and Climate Change Canada concludes in the Draft for Public Comments that upstream emissions 19 to 26 megatonnes upstream emissions would occur regardless of whether Line 3 project was built or not. Upstream oil and gas investments would be made in other jurisdictions, causing global consumption and emissions to be materially unchanged.

**Comments:**

While Alberta agrees with Environment and Climate Change Canada's conclusion, additional quantitative analysis can provide further substantiation.



**Recommendations:**

The Government of Alberta recommends a deeper quantitative analysis to support the conclusion that 19 to 26 megatonnes upstream emissions would occur regardless of whether the Line 3 replacement program was built or not. For instance, when evaluating different scenarios, Environment and Climate Change Canada could develop a comparative upstream crude oil production profile using the table in section A.2 with and without the Line 3 replacement to show that the project will not necessarily lead to incremental production.

Alternatively, for comparative purposes, Alberta offers its estimate of the assumed incremental emissions from Enbridge Line 3 replacement using Alberta-based emission factors and under the same calculation process used by Environment and Climate Change Canada. By taking Alberta's Part A estimate (reflecting 760 thousand barrels per day of Line 3 replacement program capacity) and subtracting our Part B (reflecting 390 thousand barrels per day of existing Line 3 capacity), the resulting maximum incremental emissions are shown in the following table. We believe these would be the maximum incremental emissions because our Part B estimate does not factor in the upstream emissions that would occur from transporting Alberta crude by rail or carbon leakage that would occur from upstream oil and gas investments globally.

**Alberta-based Calculation of Maximum Incremental Upstream Greenhouse Gas Emissions Resulting from Enbridge Line 3 Replacement Program (megatonnes CO<sub>2</sub>e)**

Maximum Incremental Emissions	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Scenario 1	5.7	5.7	5.7	5.8	5.8	5.8	5.0	5.0	5.1	5.1	5.1	5.1
Scenario 2	7.2	7.3	7.2	7.2	7.3	7.4	6.2	6.2	6.2	6.3	6.3	6.2
Scenario 3	6.3	6.3	6.3	6.3	6.3	6.3	5.5	5.5	5.5	5.5	5.5	5.5
Scenario 4	6.3	6.3	6.3	6.3	6.3	6.3	5.5	5.5	5.5	5.5	5.5	5.5

Alberta wishes to reinforce that these are assumed, enabled the maximum incremental emissions that could occur because our Part B estimate does not factor in the upstream emissions that would occur from transporting Alberta crude by rail or carbon leakage that would occur from upstream oil and gas investments globally. When these are factored in, the result is net zero upstream greenhouse gas emissions.

While Environment and Climate Change Canada only quantified Part A emissions, we recommend similar quantification for Part B emissions as we have shown here to complete the assessment and replace the only available estimate of 19 to 26 megatonnes provided in Part A.