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Vice President, Regulatory Affairs & Chief Risk Officer

BY RESS, EMAIL AND COURIER

October 17, 2019

Ms. Kirsten Walli
Board Secretary
Ontario Energy Board
Suite 2700, 2300 Yonge Street
P.O. Box 2319
Toronto, ON M4P 1E4

Dear Ms. Walli,

**EB-2019-0082 - Hydro One Networks Inc.'s 2020-2022 Transmission Custom IR
Application - Settlement of Issue 8**

Hydro One Networks Inc. ("Hydro One") and Environmental Defence, an intervenor in the above-noted proceeding, have agreed to terms of settlement in respect of Issue 8: "What is the status of Hydro One's joint work with the IESO to explore cost effective transmission line loss reduction opportunities and to report on those initiatives?"

Under the terms of settlement, Hydro One will take the following steps:

1. Hydro One will participate in and contribute to the ongoing IESO stakeholder engagement on transmission line losses, including offering to be a contributor to the final report which will document the IESO and Hydro One's respective practices with regard to mitigating transmission line losses as well as identifying potential areas for overall net benefit reductions in transmission line losses.
2. As part of the IESO stakeholder engagement process, Hydro One will endeavour to identify any additional opportunities to cost-effectively reduce transmission losses, including through improved processes, option analysis methodologies, documentation, and reporting. This includes the opportunities for improvement identified in points 3 and 4 below.
3. Hydro One will prepare an internal Hydro One guideline delineating the transmission line loss process that Hydro One will follow and is accountable for. This will be developed in Q1 2020 and refined throughout the IESO stakeholder consultation as necessary.
4. In business cases for projects where transmission line losses are material, Hydro One will include an option analysis and report on transmission line losses. This will be



implemented over the course of 2020 for any projects meeting a documented materiality threshold.

5. At the end of the IESO stakeholder consultation and issuance of the IESO report, if the IESO determines that it will not proceed to engage an independent third party to review the IESO's and Hydro One's processes, Hydro One will initiate an independent third party review of its own processes for cost-effectively reducing transmission line losses, to be filed at its next rate application. This review would aim to identify any additional opportunities to cost-effectively reduce transmission line losses, including through improved processes, option analysis methodologies, documentation, and reporting, and would invite input from stakeholders.

In consideration of Hydro One's actions and commitments, Environmental Defence will support, during the course of the proceeding, Hydro One's position that the actions outlined above are appropriate next steps with respect to transmission line losses and will not pursue any adverse position with respect to the foregoing. This includes examination of Hydro One witnesses and in submissions. Hydro One sets out the foregoing in an Update Exhibit attached to this letter as a schedule and hereby files this schedule with the OEB to form part of its pre-filed direct evidence in this proceeding. Although other parties may of course still address transmission line losses at the hearing, the above commitments may address any concerns other parties may have.

Hydro One and Environmental Defence have reached this agreement in an attempt to reduce the time required for a hearing and to focus on future improvements. We believe this forward-looking approach is preferable to expending the Board's time to engage in disputes regarding these issues at the hearing. We also believe this will further the Board's key objective outlined in the Issues List Decision to address Hydro One's "plans going forward to achieve concrete results."

Sincerely,

ORIGINAL SIGNED BY KATHLEEN BURKE ON BEHALF OF

Frank D'Andrea

Encls.

cc. EB-2019-0082 parties (electronic)

1 **A2 1.8 ATTACHMENT 2: UPDATE EXHIBIT ON TRANSMISSION LINE**
2 **LOSSES**

3
4 In the Ontario Energy Board (OEB)'s Decision on the Issues List and Confidentiality
5 dated September 23, 2019, the OEB determined that a separate issue dealing with
6 transmission lines losses would be included in the approved issues list:

7
8 *'What is the status of Hydro One's joint work with the IESO to explore*
9 *cost effective transmission line loss reduction opportunities and to report*
10 *on those initiatives.'*

11
12 Transmission line losses have been examined in prior Hydro One Networks Inc. (Hydro
13 One) and Independent Electricity System Operator (IESO) rate proceedings. This exhibit
14 will (i) summarize the procedural history and outcomes with respect to transmission line
15 losses; (ii) summarize transmission line loss practices described in reports; and (iii)
16 describe Hydro One's proposed next steps.

17
18 **A2 1.8.1 TRANSMISSION LINE LOSS PROCEDURAL HISTORY AND**
19 **OUTCOMES**

20
21 *Hydro One has substantially completed all OEB directives related to transmission line*
22 *losses from prior Hydro One Transmission proceedings.*

23
24 Hydro One Rate Applications

25 In EB-2016-0160 (2017 - 2018 Hydro One Transmission rates application) the OEB
26 Decision and Order stated:

27 *"Hydro One should work jointly with the IESO to explore cost effective*
28 *opportunities for line loss reduction. Hydro One should also explore, as part of its*

Witness: Robert Reinmuller

1 *investment decision process, opportunities for economically reducing line losses.*
2 *The OEB requires Hydro One to report on these initiatives as part of its next rate*
3 *application.”¹*

4

5 Exhibit B-1-1 TSP Section 1.8 and Attachment 1 fulfill the OEB’s decision issued in EB-
6 2016-0160 (Hydro One Transmission rates application) as follows:

7

8 (i) work with the IESO to explore cost effective opportunities for line loss
9 reduction:

10 Hydro One, with the support of the IESO, engaged EPRI to review
11 transmission line loss mitigation practices of other utilities and compare those
12 practices with Hydro One’s practices (Exhibit B-1-1 TSP Section 1.8.3). EPRI
13 prepared a report (the “EPRI Report”) on transmission line losses (found at
14 Exhibit B-1-1 TSP Section 1.8 Attachment 1) finding Hydro One’s design
15 practices materially consistent with industry best practices for loss mitigation.

16

17 Furthermore, Hydro One and the IESO, as part of the bulk transmission
18 planning and regional planning exercise, routinely work together to develop
19 projects aimed at addressing specific reliability and system capacity needs.
20 The recommended solutions also reduce line losses. (Exhibit B-1-1 TSP
21 Section 1.8.2).

22

23 (ii) explore, as part of its investment decision process, opportunities for
24 economically reducing line losses:

¹ EB-2016-0160, OEB Decision and Order, September 28, 2017.

1 The EPRI Report found that “the lifetime benefits of the mitigated losses do
2 not offset the financial cost of performing the necessary transmission line
3 modifications.”²

4
5 While the EPRI report demonstrated that line loss mitigation is not the
6 primary driver for transmission investments, secondary or implicit savings
7 may be achieved through system planning and equipment selection. On this
8 basis, Hydro One incorporates line loss mitigation into its investment plan by
9 identifying transmission line loss reduction for projects undertaken to provide
10 supply adequacy or reliability (Exhibit B-1-1 TSP Section 1.8.5 Table 2).

11
12 (iii) report on these initiatives as part of its next rate application:

13 Hydro One has provided evidence, reporting on above initiatives as per the
14 OEB’s Decision in EB-2016-0160, in this proceeding and provided a status
15 update in EB-2018-0130³ (Hydro One Networks’ 2019 Transmission rates
16 application). Line loss evidence provided in the current proceeding includes:

- 17 a) Exhibit B-1-1 TSP Section 1.8 - Transmission Line Losses;
18 b) Exhibit B-1-1 TSP Section 1.8 Attachment 1 – The EPRI Report;
19 c) Interrogatories I-06-EnvironmentalDefence-01 to 28; and
20 d) Undertakings JT1.30 to 1.35.

21
22 Hydro One has taken these steps to address the OEB directives related to transmission
23 line losses from prior Hydro One Transmission proceedings.

24
25 IESO Revenue Requirement Applications

² Exhibit B-1-1 TSP Section 1.8 Attachment 1 p 9.

³ EB-2018-0130, Procedural Order 1, January 24, 2019, p 3: a. The OEB directs Hydro One to provide an update on the status of its work which was ordered by the OEB in the EB-2016-0160 proceeding regarding opportunities for reducing transmission line losses.

Witness: Robert Reinmuller

1 In EB-2018-0143 (IESO 2018 Revenue Requirement Application settlement) the OEB
2 approved the IESO settlement proposal that required the IESO to (i) describe the division
3 of responsibilities between Hydro One and the IESO relating to transmission losses
4 (subject to being able to jointly prepare this with Hydro One)⁴; and (ii) engage with
5 stakeholders regarding the IESO's transmission losses work/report (similar to the 2017
6 engagement the IESO undertook on the development of its regulatory scorecard)
7 including a discussion of the transmission losses processes used by National Grid UK, the
8 recommendations of the Council of European Energy Regulators, and methodologies to
9 assess the cost effectiveness of transmission loss reduction measures.⁵

10
11 (i) describing the division of responsibilities between Hydro One and the IESO
12 relating to transmission losses

13 In EB-2019-0002 (IESO 2018 Revenue Requirement Application settlement)
14 the IESO provided a description of the division of responsibilities between
15 Hydro One and the IESO (Exhibit C-5-1). Hydro One has provided a similar
16 summary of responsibilities at Exhibit B-1-1 TSP Section 1.8.2.

17 (ii) engage with stakeholders regarding the IESO's transmission losses
18 work/report

19 The IESO's engagement with stakeholders is ongoing. Hydro One attended
20 the first Public Information Session held on September 6, 2019 and will be
21 actively involved in future sessions.

22
23 Hydro One is committed to continue working collaboratively with the IESO to consider
24 cost effective opportunities for the reduction of transmission line losses.

⁴ EB-2018-0143, Exhibit S-1-1, October 2, 2018, p 14.

⁵ EB-2018-0143, Exhibit S-1-1, October 2, 2018, p 14-15.

1 **A2 1.8.2 TRANSMISSION LOSSES AND REPORTS**

2
3 *The Ontario transmission system has low transmission losses in comparison to other*
4 *jurisdictions.*

5
6 In 2018 the annual Ontario transmission losses were 1.82% of annual energy
7 consumption.⁶ In comparison, National Grid's reported losses were between 1.17% -
8 8.04% for different parts of their network⁷; EPRI reported transmission losses ranging
9 from 1.5% - 5.8%⁸ in surveyed jurisdictions; and CEER reported losses in the European
10 transmission system between 0.89% and 2.77%⁹. Notwithstanding transmission network
11 differences between Europe and North America, Ontario's transmission losses are low in
12 comparison to other jurisdictions.

13
14 *Hydro One substantially follows transmission line loss practices identified by National*
15 *Grid, CEER and EPRI.*

16
17 Numerous transmission line loss reports have been referenced by Hydro One and
18 intervenors. These reports include the EPRI Report (Exhibit B-1-1 TSP Section 1.8
19 Attachment 1), the National Grid Report¹⁰ and Council of European Regulators (CEER)
20 Report¹¹ (the latter two referenced by Environmental Defence I-06-
21 EnvironmentalDefence-025).

⁶ EB-2019-0002, Exhibit C-5-1, January 28, 2019, p 2.

⁷ I-06-EnvironmentalDefence-25 3): National Grid Strategy Paper to Address Transmission Licence Special Condition 2K: Electricity Transmission Losses, Reporting Period: 1 April 2013 to 31 March 2021, Published November 2013, Revised September 2014 Table 1.

⁸ I-06-EnvironmentalDefence-25 3): Exhibit B-1-1 TSP Section 1.8 Attachment 1 p 2-4.

⁹ C17-EQS-80-03 CEER Report on Power Losses – October 2017 p 7.

¹⁰ National Grid Strategy Paper to Address Transmission Licence Special Condition 2K: Electricity Transmission Losses, Reporting Period: 1 April 2013 to 31 March 2021, Published November 2013, Revised September 2014.

¹¹ C17-EQS-80-03 CEER Report on Power Losses – October 2017

1 Table 1 below provides a summary of the current evidentiary record on Hydro One's use
2 of the loss practices compared to the loss practices identified in the three reports listed
3 above. To be consistent with the current evidentiary record, practices related to the IESO
4 that were provided in other exhibits have been included.

1
2

Table 1 Summary of Transmission Line Loss Reports' Practices

Description	Hydro One Networks Inc. ^{1, 2, 3, 4}
1A. Transmission System Planning/Investment Planning	
Investment Planning Process	The National Grid Report identifies a “Whole Life Value Framework” that is considered for all investments. Similarly Hydro One’s Investment Planning Process (Exhibit B-1-1 TSP 2.1) assesses all investments for safety, reliability and environmental risks.
Transmission System Planning/ Regional Planning	The EPRI, National Grid, CEER Reports identify this practice. Hydro One and the IESO work collaboratively on planning the transmission system including both the bulk transmission and regional transmission systems.
Development of Alternatives	The National Grid Report identifies this practice (called “Optioneering”). Hydro One works jointly with the IESO and LDCs during the bulk transmission and regional transmission planning process to develop alternative solutions which consider line losses qualitatively (in terms of higher voltage supply, shorter transmission route etc.
Line Loss Assessment	The EPRI and National Grid Reports identified the practice of preparing line loss assessments. Hydro One’s practice is similar to that of other utilities in that line losses are only considered where they could reasonably be consequential.
1B. Line Loss Mitigation Practices Considered During Transmission System Planning/Regional Planning Stage	
Raising Nominal Voltage	The National Grid, EPRI and CEER Reports identify this practice. Hydro One works with the IESO and the LDCs to evaluate opportunities to convert 115kV systems to 230kV operation for cost effectiveness and reduction of line losses. For example: The Barrie Upgrade (SS-09) and South Nepean (SS-11).
Optimization of Voltage Profile	The EPRI Report identifies this practice. Hydro One’s transmission system is already operated at voltages that are at or near equipment limits and therefore this opportunity is limited.
Reduce Transformational Steps	The CEER Report identifies this practice. Hydro One follows the same practice.
Network Reinforcement	The CEER report alludes to this practice. Hydro One considers system reinforcement or building a new line in parallel to provide capacity or increase reliability; which results in reducing line losses. For example: South Nepean (SS-11) and Southwest GTA Transmission project (SS-14)
Convert to DC, Bipole or Tripole or introduce HVDC Transmission	The EPRI, National Grid, CEER ⁵ Reports make note of this practice. Currently there are no HVDC systems in the province. Hydro One would consider such solutions in coordination with the IESO if these solutions were cost effective to meet the primary need of supply adequacy and reliability.
2. Line Loss Mitigation Practices at Equipment Selection Stage	
Use Lower Loss Conductors	The EPRI, National Grid, and CEER ⁵ Reports make note of this practice. Hydro One uses lower loss conductor (i.e., compact ACSR/TW conductors) to minimize line losses.

Witness: Robert Reinmuller

Description	Hydro One Networks Inc. ^{1, 2, 3, 4}
Bundle Conductor Optimization	The EPRI Report identifies this practice. Hydro One currently uses bundled conductors for 500kV and some 230kV lines. For example: Merivale x Hawthorne (SS-06)
Improve Corona Losses	The EPRI and CEER ⁵ Reports identify this practice. Hydro One implements insulator hardware systems that have been designed to eliminate corona. Conductor sizes are also selected to avoid corona.
Shieldwire Segmentation	The EPRI Report identifies this practice. Hydro One does not use shieldwire segmentation due to high tower ground potential rise.
Improve Insulation Losses	The EPRI and CEER ⁵ Reports identify this practice. Hydro One considers line losses during insulation coordination design of insulator assemblies and structure configurations.
Installation of Low Loss Transformers	The National Grid, EPRI and CEER ⁵ Reports identify this practice (for transformers). Hydro One's purchase specifications include cost of losses. Hydro One assesses the vendor transformer quotations and designs based on best overall economic benefit including losses.
Switch off Equipment Not in Use	The EPRI Report identified that Hydro One does not use this practice for safety and reliability reasons.
3. Line Loss Mitigation Practices at Transmission and Distribution System Operation	
Re-direct Power Flows	The EPRI and CEER Reports identify this practice. The IESO considers losses in the overall optimization of the generation dispatch.
Employ Distributed Generation	The CEER Report identifies this practice. This is not within Hydro One's control as the IESO and the proponent decide the location of the distributed generation.
<p>¹ I-06-EnvironmentalDefence-25 p 2-3: National Grid Strategy Paper to Address Transmission Licence Special Condition 2K: Electricity Transmission Losses, Reporting Period: 1 April 2013 to 31 March 2021, Published November 2013, Revised September 2014.</p> <p>² Exhibit B-1-1 TSP Section 1.8 Attachment 1 (the EPRI Report), Table 3-1: Loss mitigation efforts being considered and applied by the 25 EPRI survey respondents.</p> <p>³ I-06-EnvironmentalDefence-25 p 3-4: CEER Report on Power Losses – October 2017 p 7 and 36.</p> <p>⁴ Exhibit B-1-1 TSP Section 1.8 Table 1 p 9; which is provided in Exhibit B-1-1 TSP Section 1.8 Attachment 1, Table 5-3: Summary of Hydro One's Practices.</p> <p>⁵ The CEER report recommends using new and improved equipment which would apply to the practice described in the table.</p>	

1 **A2 1.8.3 HYDRO ONE'S PROPOSED NEXT STEPS**

2
3 The EPRI Report found Hydro One's practices with respect to line losses materially
4 consistent with industry best practices. However, to assure the OEB about Hydro One's
5 line loss practices, Hydro One plans to:

- 6 1. Hydro One will participate in and contribute to the ongoing IESO stakeholder
7 engagement on transmission line losses, including offering to be a contributor to
8 the final report which will document the IESO's and Hydro One's respective
9 practices with regard to mitigating transmission line losses as well as identifying
10 potential areas for overall net benefit reductions in transmission line losses.
- 11 2. As part of the IESO stakeholder engagement process, Hydro One will endeavour
12 to identify any additional opportunities to cost-effectively reduce transmission
13 losses, including through improved processes, option analysis methodologies,
14 documentation, and reporting. This includes the opportunities for improvement
15 identified in points 3 and 4 below.
- 16 3. Hydro One will prepare an internal Hydro One guideline delineating the
17 transmission line loss process that Hydro One will follow and is accountable for.
18 This will be developed in Q1 2020 and refined throughout the IESO stakeholder
19 consultation as necessary.
- 20 4. In business cases for projects where transmission line losses are material, Hydro
21 One will include an option analysis and report on transmission line losses. This
22 will be implemented over the course of 2020 for any projects meeting a
23 documented materiality threshold.
- 24 5. At the end of the IESO stakeholder consultation and issuance of the IESO report,
25 if the IESO determines that it will not proceed to engage an independent third
26 party to review the IESO's and Hydro One's processes, Hydro One will initiate an
27 independent third party review of its own processes for cost-effectively reducing
28 transmission line losses, to be filed at its next rate application. This review would

1 aim to identify any additional opportunities to cost-effectively reduce
2 transmission line losses, including through improved processes, option analysis
3 methodologies, documentation, and reporting, and would invite input from
4 stakeholders.

5 Hydro One proposes to report back on these two steps at its next transmission rebasing
6 rate application.