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Ms. Christine Long
OEB Registrar
Ontario Energy Board
P.O. Box 2319, 27th Floor
2300 Yonge Street
Toronto, ON M4P 1E4

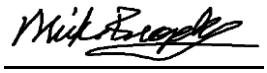
October 26, 2021

Re: EB-2021-0110 - Hydro One Network Inc. Custom IR Application (2023-2027)
Pollution Probe Interrogatories to Applicant

Dear Ms. Long:

In accordance with Procedural Order No. 2 dated October 25, 2021 please find attached Pollution Probe's Interrogatories to the Applicant.

Respectfully submitted on behalf of Pollution Probe.



Michael Brophy, P.Eng., M.Eng., MBA
Michael Brophy Consulting Inc.
Email: Michael.brophy@rogers.com

cc: Richard Carlson, Pollution Probe (via email)
John DeVenz (via email)
All Parties (via email)

EB-2021-0110

ONTARIO ENERGY BOARD

Hydro One Network Inc. Custom IR Application (2023-2027)

POLLUTION PROBE INTERROGATORIES

October 26, 2021

Submitted by: **Michael Brophy**

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Consultant for Pollution Probe

A-PP-1

[Ex. A-3-1]

a) Please indicate which scorecard metrics address the Hydro One Strategic Priority of "…plan, design and build a grid of the future…". For each relevant metric, please explain how the Strategic Priority is measured.

b) Please indicate which scorecard metrics addresses the Hydro One Strategic Priority of innovation. For each relevant metric, please explain how the Strategic Priority is measured.

A-PP-2

[Ex. A-3-1, Attachment 1]

a) Please provide a list of municipal, provincial and federal policies that were considered in development of the Business Plan and 2023-2027 Application. For each on the list, please indicate how the Business Plan and 2023-2027 Application reflects those policy priorities.

b) Please list which municipal energy and emissions plans were considered in development of the Business Plan and 2023-2027 Application. For each on the list, please indicate how the Business Plan and 2023-2027 Application reflects those priorities.

c) Please describe how Hydro One coordinates with Ontario municipalities to ensure that its proposed assets align with needs and assumptions in the local energy and emissions plans.

B1-PP-3

[Ex. B-1-1, Section 1.2, Page 6]

Reference: IRRP/RIP Process Diagram

a) Please indicate where non-wires and DER solution development and approvals fit into the IRRP/RIP process diagram.

b) If these are excluded from the IRRP/RIP process diagram, please indicate where they are assessed and brought forward as options.

c) Does Hydro One hold a responsibility to assess and bring forward non-wires or DER solutions for OEB consideration? If not, who holds that responsibility and why?

B1-PP-4

[Ex. B-1-1]

a) Please explain why no municipal representatives were included as a member on any of the Regional Infrastructure Plan Study Teams.

b) If requested, would Hydro One include a municipal representative on future Regional Investment Plan Study Teams? If not, please explain why. If, yes, please explain the process/contact municipal representatives should use to be included on the Study Teams for future Regional Investment Plans.

B1-PP-5

[Ex. B-1-1, Section 1.6, Attachment 1, Appendix 1, page 6]

Reference: 2023-2027 Draft Investment Plan, September, 2020

The evidence states:

"Most transformers in poor condition don't require immediate replacement, but they can deteriorate quickly, at which point they must be replaced. Hydro One regularly monitors their condition with the goal to replace deteriorating transformers before they fail."

a) Please provide the specific criteria and threshold used to determine when a transformer must be replaced.

b) How are the failure criteria assessed in the field to determine the need for an immediate replacement?

B1-PP-6

[Ex. B-1-1, Section 1.8.3.2]

Reference; Mitigating Hydro One's Contributions to Climate Change - Scope 3 Emissions

"Embodied carbon refers to the greenhouse gas emissions created in various phases of a building or piece of infrastructure's full life-cycle (e.g. material extraction, manufacturing, construction, maintenance, and end of life/disposal)"

"Each time we build infrastructure, whether in the form of a building or a road, we generate GHGs. Generally speaking, the GHGs generated will fall into one of two camps: (1) those that come from the operation of the infrastructure, such as heating a building or running traffic lights and signals on a road; and (2) those that come from the construction of infrastructure, the process used to create the materials used in construction, and how the materials travelled to get to the construction site. Respectively, these are known as operational GHGs and embodied carbon.3,4"

"Endnotes 3. Embodied carbon is also referred to as: scope 3 emissions, embodied emissions, embodied GHGs…."

Source: https://cleanenergycanada.org/wp-content/uploads/2019/02/Report_PublicInfrastructure_022019_FINAL.pdf

a) Does Hydro One have a commitment to net-zero GHG emissions or a commitment to reduce GHG emissions by a specific percentage and by a specific date (e.g. 80% reduction by 2030)? If yes, please provide a copy of that document.

b) Does Hydro One measure the embodied carbon (scope 3 emissions) of its capital program? If yes, please provide Hydro One's definition of embodied carbon.

c) Please provide an estimate of the embodied carbon for Hydro One's DSP, TSP and GSP capital investment plans? Please also indicate how this estimate compares to Hydro One's Scope 1 and Scope 2 emissions.

d) How does Hydro One consider the impact of embodied carbon in its decisions to purchase materials and equipment in order to mitigate its contribution to climate change? If not, why not?

B2-PP-7

[Ex. B-2-1, Section 2.3, Attachment 3; Ex. B-2-1, Section 2.11, ISD T-SR-01; Ex. B-2-1, Section 2.11, ISD T-SR-03]

Reference: Transmission Station Renewal - Connecting and Network Stations – Transformers – EPRI Report

Hydro One commissioned EPRI to perform an independent analysis of 198 transformers (208 transformer tanks) that it deemed to be in poor condition. The results of the EPRI report identified 155 transformers that were in poor condition based on a condition index above 0.5.

Page 5 of the EPRI report indicates "An abnormal condition index value above 0.5 in any category warrants consideration for replacement". Table 1 of the EPRI report indicates that transformers with a threshold above 0.5 condition index are candidates for replacement.

The threshold of 0.5 underpins the EPRI report's conclusion that 155 transformers are in poor condition and candidates for replacement.

a) Please provide specific reference from EPRI that definitively state transformers with a condition index above 0.5 create an unacceptable risk and must be replaced.

b) Is Hydro One's decision to recommend the 155 transformers for replacement primarily based on the EPRI report or other factors? Please explain.

c) Of the 198 transformers deemed in poor condition, how many are recommended for refurbishment instead of replacement?

PP-8

[Ex. B-2-1, Section 2.11, ISD T-SA-05]

Reference: Future Transmission Load Connection Plans

a) Please explain how Hydro One will consider DERs as an alternative non-wires solution for future transmission load connection plans in order to promote consumer choice and reduce ratepayer costs?

b) Please indicate what an aggressive penetration of DERs (e.g. MWs installed DERs as a scorecard metric for 2025 and 2027) would be and the basis for the estimate.

B2-PP-9

[Ex. B-2-1, Section 2.11, ISD T-SA-10]

Reference: Build Leamington Area Transformer Stations

a) Has Hydro One considered DER as a non-wires alternative solution to mitigate or avoid the cost associated with any or all of these transformer stations? If not, please explain why not? If yes, please provide the results of the analysis.

B2-PP-10

[Ex. B-2-1, Section 2.11, ISD T-SR-01; Ex. B-2-1, Section 2.11, ISD T-SR-03; Ex. B-2-1, Section 2.3, Attachment 3; Ex. B-2-1, Section 2.2]

Reference: Transmission Station Renewal - Connecting and Network Stations - Transformers.

The evidence (Ex. B-2-1, ISD T-SR-01, Ex. B-2-1, ISD T-SR-03) states:

“As discussed in TSP Section 2.2, transformer condition is a leading indicator of performance and the main driver for replacement.”

Hydro One has identified 35 transformers (ISD T-SR-01, network stations) and 151 transformers (ISD T-SR-03, connecting stations) for a total of 186 transformers to be in poor condition and proposed for replacement. This is above the 155 transformers identified in the EPRI report to be in poor condition. The evidence states:

“There are also transformers that EPRI was not able to validate based on main tank oil sampling, because Hydro One primarily selected those transformers for replacement based on factors other than main tank oil results, e.g. leaks, tap changer issues, cooling system issues, etc. Further detail in relation to EPRI’s study can be found in TSP Section 2.3.”

a) For the other factors listed (e.g. leaks, tap changer issues, cooling system issues, etc.), please provide the specific quantitative threshold for each factor used to deem a transformer in poor condition and designate for replacement.

b) Please provide the results of any quantitative analysis with respect to the "other factors" listed above that was done for all 186 (151+35) transformers and the threshold reached to determine that a transformer is in poor condition and recommended for replacement.

c) Please provide the number of transformers that have been deemed in poor condition and planned for refurbishment (as discussed in Section 2.2, page 21) as an alternative to replacement over the 2023 - 2027 period.

d) Hydro One identified 186 (151+35) transformers for replacement out of 198 transformers deemed in poor condition by Hydro One. Why were 12 (198-186) out the 198 not slated for replacement? What specific criteria and threshold was used to determine that the 12 transformers deemed in poor condition by Hydro One should not be replaced?

B2-PP-11

[Ex. B-2-1, Section 2.11, ISD T-SR-01]

Reference: Transmission Station Renewal - Network Stations

a) Please provide an approximate breakdown of the 5-year (2023-2027) spending based on transformers, breakers and protection equipment.

b) Please provide the amount Hydro One forecasts to spend on network stations for the 2018 - 2022 period. Please provide the annual amounts for actual and forecast spending.

B2-PP-12

[Ex. B-2-1, Section 2.11, ISD T-SR-03]

Reference: Transmission Station Renewal - Connecting Stations

a) Please provide an approximate breakdown of the 5-year (2023-2027) spending based on transformers, breakers and protection equipment.

b) Please provide the amount Hydro One is forecast to spend on connecting stations for the 2018 - 2022 period. Please provide the annual amounts for actual and forecast spending.

B3-PP-13

[Ex. B-3-1, Section 3.4]

Reference: Hydro One Transmission has the following requirements that pertain to the process:

- Submit an annual report to the OEB describing the status of the regional planning activities for all regions where it is a lead transmitter. The last report, 2020 Status Report, was filed on November 2, 2020.

a) Please indicate when the next annual report will be filed and what has changed since the November 2, 2020 annual report (if known).

b) Appendix A of the November 2020 report indicates only the DER capacity contracted with IESO. Please prove a full estimate of the DER MW capacity.

c) What does Hydro One expect the full DER capacity to be by 2025 and 2027?

d) Please provide a copy of the Barrie TS Local Achievable Potential Study* conducted by Guidehouse Canada Ltd. (formerly Navigant Consulting, Inc.) to explore the potential of non-wires alternatives to address Barrie TS needs identified in the 2016 Barrie/Innisfil IRRP.

e) Please provide a copy of the Local Achievable Potential Study* developed in the Ottawa area, or if not complete, please provide an update on the status and current findings.

f) Please provide a copy of the Parry Sound TS and Waubaushene TS Local Achievable Potential Study*, or if not complete, please provide an update on the status and current findings.

*Appendix A, Table 5, November 2, 2020 status report, https://www.hydroone.com/abouthydroone/CorporateInformation/regionalplans/Documents/HONI_OEB_RP_STATUS_REPORT_20201102.pdf

B3-PP-14

[Ex. B-3-1, Section 3.4]

Reference: DSP - Connecting Distributed Energy Resources (DER)

The following is an industry definition of DER from the National Standard Practice Manual (NSPM) for DER:

> Distributed Energy Resources (DERs) are resources located on the distribution system that are generally sited close to or at customers' facilities. DERs include EE, DR, DG, DS, EVs, and increased electrification of buildings. DERs can either be on the host customer side of the utility interconnection point (i.e., behind the meter) or on the utility side (i.e., in front of the meter). DERs are mostly associated with the electricity system and can provide all or some of host customers' immediate power needs and/or support the utility system by reducing demand

and/or providing supply to meet energy, capacity, or ancillary services (time and locational) needs of the electric grid.

Please confirm that all elements of NSPM DER definition are included (explicitly or implicitly) in the DER definition that Hydro One is using. If any elements are excluded, please identify them and indicate why they are excluded.

B3-PP-15

[Ex. B-3-1, Section 3.4 page 2]

Reference: Hydro One has classified battery energy storage systems as a non-renewable DER project.

a) Please explain why battery energy storage systems are classified as a non-renewable DER project together with natural gas-fired combined heat and power and diesel-fired generators and not as a renewable DER project?
b) Would a hybrid solar project together with battery energy storage be classified as a renewable DER project in its entirety?
c) Are other forms of energy storage (e.g.: mechanical, thermal, hydrogen, etc.) also classified as non-renewable DER by Hydro One?

B3-PP-16

[Ex. B-3-1, Section 3.4.3, page 5; Ex. B-3-1, Section 3.11, ISD D-SA-03 page 3]

Reference: In Table 3 (and Table 1 of Ex. B-3-1. Section 3.11, ISD D-SA-03), Hydro One has provided a forecast for both renewable and non-renewable DER for the 2021 - 2027 period.

a) Please provide the additional information or analysis used to prepare the forecasts included in Table 3.
b) Has Hydro One assumed any savings associated with DERs (beyond those outlined in Ex. B-3-1, Section 3.11, ISD D-SS-04) as a “non-wires” alternative to traditional capital spending plans for the 2023 - 2027 period? If so, please provide the amount Hydro One forecasts to save for each year of the 2023-2027 period as a result of DER investments.

B3-PP-17

[Ex. B-3-1, Section 3.11, ISD D-SR-04]

Reference: Distribution Station Refurbishment

"This investment involves the planned replacement of station transformers that have been assessed to be in poor condition."

a) Please provide the specific quantitative criteria and threshold used by Hydro One Distribution to determine that a transformer is in poor condition and must be replaced.

b) Hydro One Transmission engaged ERPI to undertake an independent third-party assessment of the condition of 198 transformers (208 transformer tanks) deemed to be in poor condition by Hydro One. Did Hydro One Distribution engage EPRI or an equivalent third-party expert to provide an independent assessment of the transformers that were determined to be in poor condition and recommended for replacement by Hydro One? If the answer is yes, please provide the report(s). If the answer to b) is no, please explain why not?

B4-PP-18

[Ex. B-4-1, Section 4.6, page 2, Ex B-4-1. Section 4.11, ISD, G-GP-01]

Reference: Hydro One has committed to transforming a portion of its fleet to plug-in electric or hybrid electric vehicles by 2030.

Ex. B-4-1, Section 4.6, page 2 states:

"As a member of the Edison Electric Institute (EEI), Hydro One has committed to transforming a portion of its fleet to plug-in electric or hybrid electric vehicles by 2030.3 Fleet Management Services has begun a gradual adoption of EVs, devoting 5% of its capital budget for EV purchases in 2021 and 50% by 2030 (including but not limited to the purchase of pickup trucks, vans and heavy power take-off units, provided their procurement is feasible based on market availability and conditions)."

Ex B-4-1, Section 4.11, ISD, G-GP-01, page 6 states:

"In 2023, Hydro One will devote 16% of fleet's capital investment towards EVs and increasing to 50% by 2030 with the purchase of pickup trucks, vans and Heavy Power Take-Off (PTO) units as they become available in the market."

a) Please advise which is the correct percentage of Hydro One's fleet budget that will be allocated to the purchase of EVs in 2023; 16% or 5%?

b) Please provide the business case that outlines the benefits, costs and risks for plug-in electric vehicles versus conventional fueled and hybrid vehicles. Please

include in this analysis a comparison of maintenance and operating costs; vehicle range and expected vehicle life in years and kms.

c) Please provide the following financial analysis for plug-in electric pick-up trucks and vans versus conventional fueled and hybrid vehicles: NPV (discounted at the weighted average cost of capital), simple payback and IRR.

d) Does the range of plug-in EVs create any wide-ranging operational limitations for Hydro One? If yes, please explain.

e) Please provide a forecast for the % of the fleet renewal capital budget that will be devoted to zero emission plug-in electric vehicles by 2023, 2025 and 2027. Please also provide the specific forecast for annual purchases of plug-in electric vehicles in 2023, 2025 and 2027.

f) Are the hybrid vehicles identified in your plan conventional fossil fueled vehicles or dual fueled plug-in electric hybrids?

B4-PP-19

[Ex. B-4-1, Section 4.6, page 2]

a) Has Hydro One assessed the opportunity to leverage its future EV fleet for DER purposed, i.e. off-peak charging and supporting the grid during peak needs in constrained areas? If no, please explain why not. If yes, please provide a copy of any analysis, reports and recommendations.

b) Please explain if Hydro One has a plan to support bi-directional charging or if it does not differentiate between EV charging infrastructure.

c) Has Hydro One done an assessment of the value of using bi-directional charging over conventional EV charges? If yes, please provide a copy of all related reports and materials.

B4-PP-20

[Ex. B-4-1, Section 4.11, ISD G-GP-03]

Reference: Facilities and Real Estate

Ex 4-1-1. Section 4.9.3, Table 3 indicates the total Facilities and Real Estate (F&RE) budget for 2018-2022 is forecast to be $214.5M versus $353.8M for the 2023-2027 period, which represents a 65% increase.

Ex 4-1-1, Section 4.8.3, page 15 states: “Planned F&RE investments also include new facilities that will benefit rate payers by minimizing total asset lifecycle costs.”

Table 2 of Ex. B-4-1, Section 4.11, ISD G-GP-03 outlines 8 New Facility and Major Renovation projects totally $186.5M over the 2023 - 2027 period.

“Overall, the investments in new facilities and major renovations are necessary to address the end-of-life condition of current facilities.”

a) For each of the 8 New Facility and Major Renovation projects that total $186.5M in Table 2, please provide the business case outlining the benefits, costs and risks.

b) Please outline the specific alternatives to full replacement and major renovations that were considered for each of the 8 projects.

c) Please provide the financial analysis that outlines the NPV (discounted at the weighted average cost of capital), simple payback and IRR for each project versus the do-nothing case and any specific alternatives considered.

d) Please provide the expected annual operating and maintenance costs savings and any productivity improvements in annual financial savings per year that are forecast for the 2023-2027 period for each of the 8 projects.
.

e) For the 8 projects that are expected to generate operating, maintenance and productivity related financial savings, please confirm these forecast savings have been incorporated into the OM&A budgets as part of this Application.

f) Please provide the detailed cost estimate for the Orillia Warehouse project ($37.8M) and the Orillia OC project ($20.4M).

PP-21

[Ex. B-4-1, Section 4.11, ISD, G-GP-01; Exhibit B-4-1, Section 4.9]

Reference: Transport and Work Equipment (TWE) – Fleet

Table 3 of Ex. B-4-1, Section 4.9.3 indicates that the total fleet budget over the 2018 – 2022 period is forecast to be $196.7M. Ex B-4-1, Section 4.11, ISD, G-GP-01 indicates the total budget for TWE over the 2023 – 2027 period is $348.5M, which represents a 77% increase over the $196.7M.

"A range of criteria inform the assessment of TWE assets. As a key input for the company's fleet lifecycle management approach, the ESLs of different categories of TWE help identify the assets that are considered "out of life". These assets are then further examined by technicians to verify condition prior to replacements."

"In addition, to verify that an identified candidate is indeed at end-of-life, Hydro One assesses the mechanical condition of potential replacement candidates based on findings of detailed mechanical inspections and/or a unit's inspection and maintenance history."

a) Ex 4-1-1, Section 4.11, ISD, G-GP-01, Figure 3 indicates that the average age of Hydro One's fleet is forecast to be 10 years in 2022. Please provide the corresponding forecast for median age and average mileage in kms for Hydro One's fleet in 2022.

b) Please provide a capital budget forecast for the 2023-2027 period if Hydro One's fleet was maintained steady at an average age of 10 years. Please include the number of vehicles purchased per year.

c) Please provide the specific criterion and threshold(s) reached that are used by technicians to verify a TWE asset is at end-of-life and needs to be replaced.

d) Ex. B-4-1, Section 4.2, page.2, Table 2 forecasts the average age for light and heavy-duty vehicles in January, 2023 to be 6.1 and 9.5 years respectively. Please provide the forecast average age for light and heavy-duty vehicles in 2027 for the proposed fleet capital plan.

e) Ex. B-4-1, Section 4.2, page.2, Table 2 forecasts the average mileage for light and heavy-duty vehicles in January, 2023 to be 161,000 kms and 171,000 kms respectively. Please provide the forecast average mileage in kms for light and heavy-duty vehicles in 2027 for the proposed fleet capital plan.

f) Please outline the process used by Hydro One when selling off "out-of-life" vehicles in order to obtain fair market value for ratepayers.