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

**BY EMAIL**

November 10, 2021

Ms. Christine E. Long
Registrar
Ontario Energy Board
2300 Yonge Street, 27th Floor
Toronto, ON M4P 1E4
Registrar@oeb.ca

Dear Ms. Long:

**Re: Ontario Energy Board (OEB) Staff Clearspring Evidence Interrogatories**
**Hydro One Networks Inc. (Hydro One)**
**2023-2027 Joint Rate Application (JRAP)**
**OEB File Number: EB-2021-0110**

Please find attached OEB staff's interrogatories on the Clearspring (CLS) evidence in the above referenced proceeding, pursuant to the Decision on Blue Page Update, Confidentiality Request and Reply on Expert Evidence and Procedural Order No. 2.

Please note, Hydro One is responsible for ensuring that all documents that it files with the OEB, including responses to OEB staff questions and any other supporting documentation, do not include personal information (as that phrase is defined in the *Freedom of Information and Protection of Privacy Act*), unless filed in accordance with rule 9A of the OEB's *Rules of Practice and Procedure*.

Yours truly,

Keith C. Ritchie
Digitally signed by Keith C. Ritchie
Date: 2021.11.10 13:28:32 -05'00'

Keith C. Ritchie
Project Advisor, Electricity Distribution: Major Rate Applications & Consolidations

Encl.

cc: All parties in EB-2021-0110

**HYDRO ONE NETWORKS INC.**

**2023-2027 JOINT RATE APPLICATION**

**EB-2021-0110**

**OEB STAFF CLEARSPRING EVIDENCE INTERROGATORIES**

**November 10, 2021**

**A-CLS-Staff-335**

Ref: Exhibit A/Tab 4/Schedule 1

Preamble:

On page 1 of 8, Hydro One defines "C" as

> Hydro One's Custom Capital Factor, designed to recover incremental revenue each year necessary to support Hydro One's proposed system plans, beyond the amount of revenue recovered through the I – X adjustment, but reduced by a supplemental stretch factor on capital of 0.15%.

Question(s):

a) Please provide an explanation and any supporting calculations for the proposed supplemental stretch factor on capital of 0.15%.
b) Why are the transmission and distribution supplemental stretch factors on capital the same?

**A-CLS-Staff-336**

Ref: Exhibit A/Tab 4/Schedule 1

Preamble:

On page 2 of 8, Hydro One states

> Hydro One's overall approach is consistent with the RRF and with the Custom RCIs approved by the OEB for Hydro One Distribution in EB-2017-0049 and for Hydro One Transmission in EB-2019-0082. However, Hydro One is proposing

the following additions or adjustments compared to the RCIs it proposed in those prior applications, to the benefit of ratepayers:

1. Hydro One is adding a supplemental stretch factor of 0.15% to the capital related revenue requirement (Supplemental Stretch);

2. The productivity factors which form the X-factor, as well as the Supplemental Stretch on capital, are being applied cumulatively to the capital related revenue requirement in each year of the Custom IR term; and

3. The C-factor will be updated annually to reflect any changes to inflation.

Question(s):

a) Please explain how updating the C-factor annually to reflect changes to inflation is a benefit for customers.

**A-CLS-Staff-337**

Ref: Exhibit A/Tab 4/Schedule 1/Attachment 1
Régie de l'énergie/R-4167-2021/B-0012/pp. VII-67, 70

Preamble:

PEG has submitted econometric benchmarking models of operation, maintenance, and administrative expenses and capital costs in recent proceedings in Ontario and Québec. These models shed additional light on cost performance at modest incremental cost since most variables are the same as in the corresponding total cost model. For example, in the current proceeding, it would shed light on whether the recent improved total cost performance of Hydro One Distribution is a matter of OM&A or capital, or both. This is a matter of some interest given, for example, asymmetrical incentives to contain OM&A expenses and capital cost.

In a recent proceeding before the Régie de l'énergie, Hydro-Québec Transmission witness Augustin Ros of The Brattle Group submitted OM&A and capital cost benchmarking models as well as a total cost model in the ongoing Québec proceeding.

Question(s):

a) Please develop econometric models of Transmission and Distribution capital costs and OM&A expenses and use them to benchmark Hydro One's corresponding costs. Please file the results in a format similar to that reported in Clearspring's evidence.

**A-CLS-Staff-338**

Ref: Exhibit A/Tab 4/Schedule 1/Attachment 1
Régie de l'énergie/R-4167-2021/B-0012/VII-63

Preamble:

Clearspring states on page 24 of 84 that "The transmission benchmarking sample is comprised of 59 U.S. utilities plus Hydro One." Further, Clearspring states on page 36 of 84 that "The distribution benchmarking sample is comprised of 81 U.S. utilities plus Hydro One."

Hydro-Québec witness Agustin Ros of The Brattle Group provided econometric results with and without the Company's data in his recent report on pages VII-63 of his report for total cost, page VII-67 for capital cost, and page VII-70 for O&M cost.[1]

Question(s):

a) Why did Clearspring include Hydro One in the samples for its econometric benchmarking inasmuch as they state on p. 50 of 84 of its report that "Hydro One should have no impact on the measured industry TFP trend?"
b) Please explain why the sample for the transmission econometric study is so much smaller than the sample for the distribution study.
c) Similar to what has been done by The Brattle Group in the Hydro-Québec proceeding, please run Transmission and Distribution econometric models that exclude Hydro One from the sample and report the econometric and benchmarking results.

**A-CLS-Staff-339**

Ref: Exhibit A/Tab 4/Schedule 1/Attachment 1
Régie de l'énergie/R-4167-2021/B-0012/p. VI-53
Régie de l'énergie/R-4167-2021/C-AQCIE-CIFQ-0009/p. 84

Preamble:

Clearspring calculates U.S. power transmission productivity trends using a 19-year sample period that begins in 2001 and ends in 2019.

[1] On page VII-63 for total cost, page VII-67 for capital cost, and page VII-70 for O&M cost.

Clearspring states on page 10 (p. 14 of 84) of its report that:

> The 1990s had considerably different and lower cost challenges than those now faced by transmission utilities; current challenges include cybersecurity, reliability enhancements and NERC requirements, distributed energy resource connections, and geomagnetic disturbances. These current cost challenges either did not exist or had far lower cost ramifications in the 1990s than now. Therefore, a sample that does not include and is not influenced by these systemically dissimilar observations from the 1990s provides a more accurate model and result when benchmarking 2023 to 2027 CIR cost projections.

In the current Régie de l'énergie proceeding on incentive regulation for Hydro-Québec Transmission, that company's witness (the Brattle Group) recently proposed a -1.04% MFP growth target that is based on their estimate of the multifactor productivity ("MFP") trend of the industry from 1995 to 2019.[2]

The full sample period considered by PEG in its study for the HQT proceeding was 1996–2019.

Question(s):

a) In a proceeding to design a rate or revenue cap index, in Clearspring's view, should an MFP study ideally calculate: 1) the MFP trend that is most likely to occur *in the industry* during the term of a utility's multiyear rate plan; 2) a trend that is commensurate with the external productivity growth challenges that the *subject utility* will face during the plan; or 3) something else? If the answer is 3), please explain this alternative goal carefully.
b) Clearspring discusses several possible reasons for the negative productivity growth of sampled transmitters. What has been the relative importance of these drivers on transmission sector MFP?
c) Please provide a table that details the MFP growth trends of each transmitter in Clearspring's study, identifying each transmitter. Is it fair to say that many of the sampled utilities had MFP trends well below the -1.66% sample average? How many firms had MFP trends less negative than the 1.88% average annual decline in cost efficiency of Hydro One that Clearspring forecasts in the last four years of its proposed CIR?
d) Which of the cost pressures Clearspring describes will be addressed by variance accounts proposed by Hydro One in this application?
e) Please discuss how the pressure on Hydro One Transmission from each of the four cost challenges that Clearspring discusses in the quotation above compare to those of the sampled U.S. transmitters.

[2] Régie de l'énergie/R-4167-2021/B-0012/p. VI-53

f) Granted that increasingly challenging business conditions in recent years have been one reason for the negative MFP growth of sampled transmitters, what evidence is available that Hydro One's external business conditions were equally unfavorable on balance to those of sampled utilities during the years of its current CIR plan, when its average cost performance decline has been 1.80% annually, or in the next five years, when Clearspring predicts the Company's cost performance to average an even larger decline?
g) Are reliability enhancements and NERC requirements likely to intensify at the same pace in the next four years as in the last 19 years?
h) What has been the impact on the productivity growth of U.S. transmitters of formula rates or the special incentives for transmission capital expenditures provided by the Energy Policy Act of 2005?

**A-CLS-Staff-340**

Ref: Exhibit A/Tab 4/Schedule 1/Attachment 1/pp. 5, 36, 66

Preamble:

On page p. 5 of 84 of its report, Clearspring states:

> The lead researcher of the study is Mr. Steven A. Fenrick. Mr. Fenrick provided research reports and expert witness testimony on behalf of Hydro One in the Company's most recent transmission and distribution rate applications, and has extensive experience conducting these types of studies. A copy of Mr. Fenrick's summary *curriculum vitae* is attached as Appendix D.

In footnote 53 on page 36 of 84 of its report, Clearspring states:

> Our team, while at PSE, produced the report in EB-2018-0165.

Similarly, on page 66 of 84 of its report, Clearspring states:

> The asset price deflator (*WKA*) is an index of the price of capital assets in each year used in either transmission or distribution. In several CIR applications, this has been an area of contention between PEG and our research team.

Question(s):

a) Please provide the names, CVs, and roles of other researchers that participated in this current project.

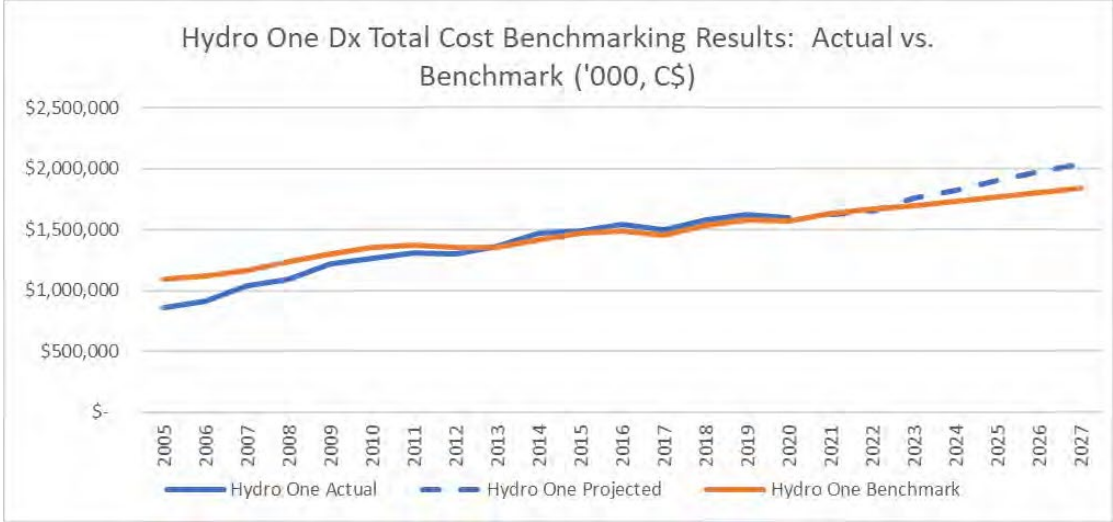
**A-CLS-Staff-341**

Ref: Exhibit A / Tab 4 / Schedule 1 / Attachment 1 / pp. 8, 36, 39 of 84

Preamble:

On page 4 (page 8 of 84) of its evidence, Clearspring provides the following graph showing the results of its total cost benchmarking for Hydro One Distribution:

**Figure 4 Hydro One Distribution Total Cost Benchmarking Results**




On page 32 (p. 36 of 84), Clearspring notes that it has included a time trend variable in its distribution cost benchmarking model, and provides the following description:

> The time trend variable captures a general industry total cost level trend over the studied period. Time trend variables are often found in translog cost functions and econometric total cost benchmarking research. In the present study, the variable is calculated by taking the current year of the observation and subtracting 1,999. For observations in the year 2000, the time trend variable equals 1. In 2019, the variable equals 20 (2,019 – 1,999). The coefficient value shows how adding an additional year increases or decreases total costs.

From Table 6 on page 35 (p. 39 of 84), the estimated coefficient of the Trend variable is -0.0041 with a *t*-statistic of -3.72.

Examination of the orange line (Hydro One benchmark) in Figure 4 shows it above the blue line (Hydro One actual) in the early years (2005 to about 2012) but below the blue line (Hydro One actual and projected) in the latter period (starting around 2020-2022 and through the 2023-2027 plan period), and pivoting in the middle. It appears that the difference between Hydro One actual/projected and the benchmark line could be accounted for by allowing the Trend variable to have a different coefficient for Hydro One than for the U.S. utilities in the sample.

Question(s):

a) Did Clearspring examine the possibility of a different time trend coefficient for Hydro One in its analysis?
b) What is the basis, both theoretical and empirical, for Clearspring assuming that the time trend variable is the same for Hydro One and all U.S. utilities?
c) What analysis did Clearspring conduct to test the hypothesis that the time trend coefficient should be the same for all of the U.S. utilities in its sample?
d) While noting that time trend variables are frequently included in these models, Clearspring has not provided any explanation as to what temporal changes in the business conditions of the sampled utilities the time trend variable is proxying. Please provide additional explanation, with support, for the inclusion of the time trend variable, and why it might have a different slope (coefficient) compared to the sample of U.S. utilities.

**A-CLS-Staff-342**

Ref: Exhibit A/Tab 4/Schedule 1/Attachment 1, pp. 17-18, 28, 39
EB-2019-0082/Exhibit A-4-1/Attachment 1, pp. 27, 35
EB-2018-0218/Exhibit D-1-1/Attachment 1, pp. 26, 34

Preamble:

In its transmission cost model, Clearspring used the monthly peak load variable reported on page 401 b of FERC Form 1 when a transmission peak load variable was available and it had used that variable in its prior transmission study.

Clearspring's new transmission cost model used the number of substations as a business condition variable. The analogous model in the prior transmission benchmarking study for Hydro One filed in EB-2018-0082 used the number of substations per km of line.

Clearspring has used a "distribution work" variable in its distribution cost model defined as "% of transmission lines classified as being served by transmission that are above 50 kV)".

Question(s):

a) Why did Clearspring not use the transmission system peak variable that Mr. Fenrick had used in the prior transmission cost benchmarking study for Hydro One? Doesn't that variable provide a better match for Hydro One's reported peak load than monthly peak load?
b) Please re-estimate the transmission total cost model using ratcheted transmission peak load instead of Clearspring's chosen peak load variable and use it to benchmark Hydro One for the years that variable is available. If Clearspring desires, it may also do a run using a rolling average for the values of the transmission peak variable.
c) Why did Clearspring use the number of substations in its new model rather than the number of substations per KM of line? Is the number of substations variable now time-variant?
d) Please explain why the model filed in the current evidence doesn't include a construction standards variable like that included in the prior model.

**A-CLS-Staff-343**

Ref: Exhibit A/Tab 4/Schedule 1/Attachment 1/p. 20 of 84

Preamble:

Clearspring states on page p. 20 of 84 of its report that

> Despite our continued opinion that the capital benchmark year is a minor issue and that 1989 was a sufficient capital benchmark year, we have nonetheless collected all the necessary data to begin the capital benchmark year in 1947 for most of the U.S. utilities, and in 1959 for the rest that were missing data between 1947 and 1959. We have therefore used the actual transmission or distribution plant addition data for the U.S. sample for the years 1948 to 2019 in the perpetual inventory capital method to calculate capital quantities and costs. This is over 70 years' worth of actual plant addition data.

Question(s):

a) Please provide a brief description of how Clearspring identified companies that had experienced mergers in its older capital data and how those mergers were addressed in compiling the dataset.

**A-CLS-Staff-344**

Ref: Exhibit A / Tab 4 / Schedule 1 / Attachment 1 / pp. 25, 58 of 84
Clearspring Working Papers, "Tx Modeling and Tables.xlsx", Sheet "Modeling Dataset"

Preamble:

Clearspring's sample for its Total Factor Productivity and cost benchmarking analyses includes a sample of U.S. utilities providing electricity transmission services.

Clearspring has included in its Transmission cost benchmarking analysis a binary ISO variable whose value is 1 for years in which the utility was subject to oversight by an ISO or a Regional Transmission Operator (RTO). Clearspring provides a description of the ISO variable on page 25 of 84 of its report, and states:

> While the ISO may take on some planning costs that the utility would have engaged in otherwise, the transmission utility may still be required to undertake some planning costs as well as added investments that the ISO may request to encourage a more efficient energy market.

In bullet 1 on page 58 of 84 of its evidence, Clearspring provides the following reasons for declining TFP in the U.S. transmission business based on its analysis:

1. The increasing of "outputs" that are not being measured within the TFP calculation. While Clearspring's output measure incorporated two key outputs of a transmission utility, there are other valued utility functions that are difficult, if not impossible, to incorporate and quantify. These other valued functions could include reliability, cybersecurity, safety, meeting increased regulatory requirements, increasing generation interconnections from wind or solar, providing enhanced environmental stewardship, geomagnetic disturbances, and increasing other aspects of power quality and security.

Question(s):

a) Please explain why Clearspring assigned Hydro One a value of 1 for this variable.
b) Baltimore Gas and Electric Company has no data shown for 2001. Please provide an explanation for the missing data.

c) What, if any of the unmeasured "outputs" (and hence associated costs) listed under bullet 1 on page 58 of 84 are associated with or due to oversight by an ISO or RTO of a transmission utility?
d) Is Clearspring concerned about potential reverse causality in the ISO variable? Was, and if so, what, analysis was performed to gain confidence that this variable correctly reflects the effects of ISO membership on costs and does not capture other, unintended effects or cost drivers?
e) Please confirm that 24 of the 59 U.S, electric utilities in the transmission sample were not in a jurisdiction controlled by an ISO/RTO during the sample period from 2000 to 2019.
f) Does Clearspring consider that utilities not subject to ISO/RTO oversight were also not also subject to similar pressures on operations, investments, and associated costs for increased safety standards and cyber-security as faced by transmitters under ISO/RTO oversight? If so, what is the ISO binary variable capturing in terms of these pressures for utilities subject to ISO/RTO oversight (i.e., where the ISO binary variable has a value of 1)?
g) For the binary ISO variable, for two utilities, Louisville Gas and Electric Company and Kentucky Utilities Company, the ISO binary variable has a value of 1 for the years 2002 to 2006. Please provide an explanation for what occurred with respect to the RTO oversight of those two utilities.
h) In Clearspring's view, does Hydro One's relationship with Ontario's Independent Electricity System Operator impose cost burdens (or inducements to report costs idiosyncratically) that are comparable to those of U.S. transmitters that are members of independent system operators or regional transmission organizations? What is the basis for Clearspring's view?

**A-CLS-Staff-345**

Ref: Exhibit A / Tab 4 / Schedule 1 / Attachment 1 / pp. 25, 28-30 of 84
Clearspring Working Papers, "Tx Modeling and Tables.xlsx", Sheet "Modeling Dataset"

Preamble:

Clearspring includes a business condition variable it describes as the percentage of electric plant that is transmission on page 25 of 84 of its evidence:

> The **percentage of transmission plant in total electric plant** uses gross plant in service information from FERC Form 1s. The variable measures the ability for a transmission utility to reduce costs through economies of

scope: if the utility is also a generation and/or distribution utility, there may be cost savings to the transmission utility because of this added scope. The coefficient on the variable is expected to be positive: the higher the percentage of transmission plant in total electric plant, the higher we would expect total costs to be.

Economies of scope are possible for common, often corporate services, such as executive management, administration, human resources, legal, finance and accounting. While acknowledging that some economies of scope may be possible for utilities with multiple lines of business, such as generation, transmission and distribution, it is not clear if these are limited or are offset, in whole or in part, by specialization in transmission businesses. For example, technicians must be qualified to work on higher voltage plant. It is not clear why concentration in and specialization for high voltage transmission services in staff (engineers, technicians) and equipment should necessarily result in higher transmission costs, all else being equal.

As shown in Table 2 on page 28 of 84, the % Tx Plant variable has an estimated coefficient of 0.3731 and a $t$-statistic of 9.01 and is highly statistically significant.

Question(s):

a) Please confirm that this variable is labelled as "pcttx" in Clearspring's working papers.
b) Please confirm that Hydro One has the highest values of pcttx of the utilities included in Clearspring's transmission sample.
c) Please provide analysis that Clearspring has done, or external evidence that it has relied on to determine that, a priori, the percent Transmission should be positive and that the estimated coefficient value is reasonable for the model specification that Clearspring has used.

**A-CLS-Staff -346**

Ref: Exhibit A/Tab 4/Schedule 1/Attachment 1/p. 29 of 84

Preamble:

Table 3 presents Hydro One cost transmission performance scores for the historical period and a projection to 2027. The reported cost performance was -64.8% in 2003 and -46.1% in 2020 and is forecasted to be -42.5% in 2022, -38.4% in 2023, and -30.9% in 2027.

Question(s):

a) Should the OEB be concerned that, whereas Clearspring calculated a -1.66% average decline in the MFP of sampled U.S. power transmitters over the period that it deems relevant, its econometric benchmarking indicates that Hydro One's transmission cost efficiency will decline at an average pace of 1.80% during the last two years of the Company's expiring Custom IR plan and at an average of 1.88% during the last four years of its proposed successor plan?
b) What reasons does Clearspring consider are accounting for Hydro One's transmission MFP declining at a rate exceeding the norm of the U.S. sample during Hydro One's current (2019-2022) and proposed (2023-2027) transmission Custom IR plans?

**A-CLS-Staff-347**

Ref: Exhibit A / Tab 4 / Schedule 1 / Attachment 1 / pp. 35-36 of 84
Clearspring Working Papers, "Dx Modeling and Tables.xlsx", Sheets "Company List" and "SST"

Preamble:

In its evidence, Clearspring points out that it has included a Congested Urban variable, "pctcu", as an explanatory business condition variable in its Hydro One Distribution cost benchmarking model, and explains that this variable is the same as that used in similar cost benchmarking analyses filed in earlier Custom IR applications in Ontario for Toronto Hydro Electric System Limited (Toronto Hydro) and Hydro Ottawa Limited (Hydro Ottawa).[3]

Question(s):

a) Please confirm that this is the first study in which Clearspring has used the Congested Urban variable "pctcu" for cost benchmarking of Hydro One Networks distribution.
b) Has Clearspring used this variable in other econometric studies that it has filed in regulatory proceedings in other jurisdictions than Ontario. If so, please identify, and file copies of Clearspring's evidence and of the decision in that proceeding.

[3] Exhibit A/Tab 4/Schedule 1/pp. 35-36 of 84, and footnote 53 in particular.

c) The Congested Urban variable is labelled "pctcu", for percentage congested urban. If a utility's value is defined as 0.000230, does that mean that the value is 0.000230% or 0.0230%?
d) Please confirm that Hydro One's value is 0 for all years.
e) Please confirm that pctcu is based on analysis of aerial photographs taken at a point in time to identify "congested urban" areas in a utility's service territory, per the methodology described in PSE's evidence filed in the Toronto Hydro Custom IR case EB-2018-0165. In the alternative, please explain.
f) Please identify the year that pctcu was based on.
g) Since pctcu is fixed in value for all years for any given utility, please confirm that pctcu does not capture the following:
    i. Changes over time in growth of urban centres served by the utility, particularly with respect to urban densification'
    ii. Changes in the service area of a utility as a result of mergers and acquisitions.

    If not confirmed, please explain.

h) Please confirm that, of the 81 U.S. utilities in the distribution sample, 38 of them have a 0 value for pctcu.
i) Since the restructuring of the former Ontario Hydro on April 1, 1999, Hydro One has applied for and been approved over 90 applications for Mergers, Acquisitions, Amalgamations and Divestitures (MAADs) to acquire, merge with and integrate assets and operations of former municipal electric utilities or their incorporated successors. The majority of these occurred from late 1999 to 2001, with completion and integration largely completed sometime in 2002. However, there have been a number since then, including acquisitions of Norfolk Power, Haldimand County Hydro and Woodstock Power in the mid-2010s, and the most recent acquisitions of Orillia Power and Peterborough Distribution Inc. These acquisitions involved acquiring the assets, service territories and customers in villages, towns and even certain smaller cities in Ontario. The acquisition of these former MEUs has increased the proportion of Hydro One's customers in more built-up urban and suburban areas. Further, growth through acquisitions is in addition to growth in Hydro One's legacy service area inherited from the former Ontario Hydro. Including subdivision expansion outside of boundaries of towns and cities served by municipally-owned LDCs (e.g., Windsor, London, Kingston)
    a. Are there U.S. distribution utilities in the distribution sample that have experienced growth through M&A similar to that of Hydro One in the past twenty-two years? If so, please identify and explain.
    b. How are the impacts of Hydro One's growth of customers in more built-up urban and suburban areas through mergers and acquisitions accounted

for in the distribution cost benchmarking model, and, in particular, with reference to the fact that the pctcu variable is 0 for all years for Hydro One?

**A-CLS-Staff-348**

Ref: Exhibit A/Tab 4/Schedule 1/Attachment 1/p. 39 of 84

Preamble:

Table 6 presents parameter estimates for a power distribution total cost model. The value of the estimated parameter for the time trend is -0.0041.

Question(s):

a) Please confirm that a reasonable description of the value of the time trend parameter is that "it measures the growth in cost over time not accounted for by other variables in the model". If not, then please provide an alternative explanation.
b) If the trend variable parameter estimate indicates that cost should *decline* by 0.41% over time for reasons other than changes in the business condition variables, what are the implications for the appropriate MFP growth target for Hydro One Distribution?
c) Does Hydro One plan to improve its distribution system reliability during the new plan?
d) Setting aside prior OEB commentary on this issue, does Clearspring believe that an MFP growth target for an Ontario power distributor should reflect, in whole or in part, the MFP growth trend of U.S. power distributors?

**A-CLS-Staff-349**

Ref: Exhibit A/Tab 4/Schedule 1/Attachment 1/p. 56 of 84

Preamble:

Table 13 presents TFP results for the U.S. transmission industry.

Question(s):

a) Please provide tables that itemize the trends in the O&M and capital productivity of U.S. power transmitters.
b) Did Clearspring calculate the transmission and/or distribution productivity trends of Hydro One? If yes, why were these not reported?
c) Please report the OM&A, capital, and multifactor productivity trends of Hydro One's T&D services if available.

**A-CLS-Staff-350**

Ref: Exhibit A / Tab 4 / Schedule 1 / Attachment 1 / pp. 62-63 of 84
Electricity Distribution Licence ED-2003-0043
Ontario Electricity and Natural Gas Utilities - Service Area Map

Preamble:

On pages 62-63 of 84 of its report, Clearspring states:

> The service area used for each utility is based on variables derived from GIS mappings of each utility's service area. For the U.S. utilities, the values used correspond to what both Clearspring and PEG used in the last Hydro Ottawa application. In the Hydro One Distribution application, one of the concerns brought forth by the intervenors and OEB Staff and mentioned in the Board Decision was the service area value used for Hydro One. In response to those concerns, we have reduced Hydro One's service area to the value used by PEG in its Hydro Ottawa benchmarking research. This reduced the service area variable value from 961,498 square kilometers served to 651,974 square kilometers served.

The OEB has recently introduced an online interactive service area map to enable customers to identify the service territory of Ontario natural gas and electricity distributors. The service area is identified, although the size is not identified. This is available at Ontario Electricity and Natural Gas Utilities - Service Area Map (https://www.arcgis.com/apps/dashboards/c52d9395d41744fd8b7b74c0c6117395)

Question(s):

a) Why does Clearspring now consider 651,974 sq. km. an appropriate estimate of the area of Hydro One's distribution service territory?
b) Is the methodology that was used to develop the 651,974 estimate consistent with that used to estimate the service territory areas of the U.S. utilities?

c) Does Clearspring consider the 651,974 sq. km. estimate consistent with the OEB's new service territory map?
d) Please confirm that the methodology used to estimate the areas of U.S. power distributors focused on the area where power is actually distributed.
e) Have the data for any of the business condition variables Mr. Fenrick developed at Power Systems Engineering ("PSE") changed since he joined Clearspring Energy Advisors? If yes, please document the variables changed, the changes made and the rationale for each change.

**A-CLS-Staff-351**

Ref: Exhibit A / Tab 4 / Schedule 1 / Attachment 1 / p. 40 of 84 / Table 7

Preamble:

Table 7 presents Hydro One distribution cost performance scores for the historical period and a projection to 2027. The reported cost performance was -24.4% in 2005, +2.9% in 2018, and is forecasted to be -0.9% in 2022, +3.3% in 2023 and +10.3% in 2027.

Question(s):

a) Please confirm that Clearspring predicts that Hydro One's total distribution cost performance will average a 0.95% annual *improvement* during the last four years (i.e., 2019-2022) of its current Custom Incentive Rate-Setting ("CIR") plan (EB-2017-0049) but is forecasted to average a 1.75% annual *decline* over the last four years of its next plan.
b) Please explain the principal reasons for the improvement in the cost efficiency of Hydro One Distribution during the current plan. Why is this performance not sustainable?

**A-CLS-Staff-352**

Ref: Exhibit A / Tab 4 / Schedule 1 / Attachment 1 / pp. 8, 44, and 55 of 84

Preamble:

Clearspring speculates, on page 8 of 84 of its report, on the reasons for the accelerating decline in US transmission productivity after 2010, stating that:

> [t]he industry's most pronounced TFP decline occurred during the period when the capital age of the industry became younger. This is an expected result since it requires added capital investment to reduce the age of the system and this capital investment will also tend to lower the TFP trend.

On page 44 of 84 of its report, Clearspring states that

> Regarding the industry TFP trend, even when the transmission industry capital age remained at the same level during the years of 2000 to 2012, the TFP trend was still negative during that same period. This indicates that overall cost challenges for transmitters may be increasing over time. This negative TFP trend is more pronounced in the recent years when the industry has made investments to lower the capital age.

On page 59 of 84 of its report, Clearspring states that "We notice in the capital age research for the transmission industry that capital expenditures have been made in recent years to lower the capital age of the industry. These added capital expenditures have lowered the TFP trend of the industry."

Question(s):

a) Is Clearspring saying that replacement capital spending was the primary cause, or even one of the two or three leading causes, of the marked decline in the MFP growth of sampled U.S. transmitters after 2010? If so, please provide the evidence upon which Clearspring relied in making this statement. Does Clearspring's capital age research provide clear evidence?
b) Couldn't the decline in MFP reflect an increase in capital spending for various *other* reasons that resulted in a decline in average asset age, such as increased investment in technology-based equipment (SCADA systems, computer control, reliability, and security systems) or a buildout to generators using renewable resources?

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Ref: Exhibit A / Tab 4 / Schedule 1 / Attachment 1 / p. 69 of 84

Preamble:

Clearspring states on page 69 of 84 of its report that:

> Two common issues arise in multivariate regression using real world data: heteroscedasticity and autocorrelation. Neither of these issues causes the

coefficient values to be biased or less precise. This is important because it means the researcher does not need to worry about correcting the coefficient values: they are not misleading. However, both conditions render the standard error estimates which measure precision problematic.

Question(s):

a) In econometric model development is efficiency an important criterion for choosing an estimation procedure for model coefficients as well as bias? Please explain what the terms efficiency and bias mean in this context, preferably with the aid of a figure.
b) Please confirm that autocorrelation reduces the efficiency of OLS parameter estimates. In what sense then does autocorrelation not cause coefficient values to be "less precise"?
c) What is the extent of autocorrelation in the two Clearspring samples (i.e., the Transmission and Distribution cost benchmarking samples)?
d) Millo (2017) suggests that Driscoll-Kraay standard errors are accurate only in very large samples.[4] Is Clearspring's sample sufficiently large to produce reliable standard errors? Please explain the potential consequences of a too-small sample. How would one determine whether a sample might be too small to meet the requirements?
e) There is a substantial amount of double and triple-counting of substations and mva in Clearspring's variables. These errors appear to be systematic and not random. Could these mismeasurement errors introduce bias into the model coefficients?

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Ref: Exhibit A / Tab 4 / Schedule 1 / Attachment 1 / p. 24 of 84

Preamble:

On page 24 of 84, Clearspring states:

> Transmission OM&A and capital costs used in the benchmarking models for the U.S. transmission utilities are derived using FERC Form 1 filing data. United States investor-owned utilities are required to file FERC Form 1 data annually, which includes operation and maintenance expenses

[4] Millo, G. (2017). Robust Standard Error Estimators for Panel Models: A Unifying Approach. *Journal of Statistical Software*, 82(3): 1-26. doi:10.18637/jss.v082.i03

broken down into specific cost categories (e.g., distribution, transmission, customer billing, administrative and general). Form 1s also include information regarding plant in service additions that are used in constructing capital costs.

Clearspring used a definition of "cost" for Hydro One that allowed us to achieve comparability with the definition used for the U.S. sample. The cost of transmission services purchased by U.S. utilities from other utilities is removed from the transmission cost definition for the U.S. sample. Subtracting "transmission of electricity by others" expenses (Uniform System of Accounts category 565, on page 321 of FERC Form 1) creates a more comparable cost definition to Hydro One and, if not removed, would yield an unfair advantage to Hydro One, since certain U.S. utilities would have inflated expenses without commensurate output values. Clearspring also subtracted pensions and benefit expenses from the cost definition for both the U.S. and Hydro One.

Question(s):

a) What steps did Clearspring take during its study to ascertain the effect of U.S. transmission industry structural change (e.g., the emergence of ISOs and RTOs) on the reported cost trends of sampled distributors?
b) Please discuss how changes in the transmission industry may have affected reported dispatch-related expenses of utilities (FERC accounts 561-561.8) and miscellaneous transmission expenses (account 566). Were utilities encouraged to allocate these transmission expenditures in consistent ways across the industry?
c) How did the trends in the dispatch-related expenses and miscellaneous transmission expenses of sampled utilities compare to the trend in the residual transmission expenses that Clearspring included in their productivity calculations?
d) With transmission by others expenses removed, how did the trend in the quantity of material and service expenses compare to the trends in the quantities of capital and labor during the sample period?
e) Please calculate O&M and multifactor productivity trends for the sampled transmitters excluding dispatch-related and miscellaneous transmission expenses as well as transmission by other expenses.

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Ref: Exhibit A / Tab 4 / Schedule 1 / Attachment 1 / pp. 44-49, 56, 71-80 of 84

Preamble:

Clearspring discusses the issue of capital age on productivity research on pp. 44-49 of 84 of its report. Research on system age which it undertook using FERC Form 1 asset value data is detailed. These data were used to compute the average capital age of each U.S. utility in its sample each year. The impact of capital age on OM&A expenses is discussed on page 56 and details are provided in an appendix.

Question(s):

a) Does Clearspring believe that the use of older assets, without undue growth in OM&A expenses or diminution in service quality, is an important dimension of utility operating performance that should ideally be captured in a benchmarking study?
b) Are replacement capital spending and OM&A expenses more likely to be a function of average asset age or of the share of assets that are approaching or exceeding replacement age?
c) Please recalculate Tables 8 and 9 using the estimated share of assets that are approaching or exceeding replacement age and provide working papers for these calculations
d) Please confirm that Clearspring's estimates of the impact of capital age on OM&A expenses are biased insofar as there is no control for the numerous other business conditions that affect these expenses.
e) Please reestimate these models using the estimated share of assets that are close to or exceeding replacement age.
f) Is it possible that the asymmetrical incentives to contain weak capex containment incentives that have been engendered by Hydro One's proposed Custom IR system and will in the future be engendered by its proposed new system are causing the Company to replace aged assets prematurely?

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Ref: Exhibit A / Tab 4 / Schedule 1 / Attachment 1 / p. 25 of 84

Preamble:

Clearspring states on page 25 of 84 of its report that:

> The number of transmission substations is based on FERC Form 1 data reported each year.

Question(s):

a) Please describe the procedure that Clearspring used to calculate the substation data provided in Substation1994_2019.dbf from the line by line information provide on the Form 1.
b) What steps were taken to clean these data to remove subtotals, identify the station as Transmission or Distribution where ambiguous, or address other issues that were present in the data?
c) Please provide working papers that document the calculation of Clearspring's substation variable.