Orangeville Hydro Limited

OEB Staff Questions

EB-2021-0049

**Orangeville Hydro Limited**

**2022-2026 Distribution System Plan**

**EB-2021-0049**

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Thank you for submitting Orangeville Hydro’s 2022-2026 Distribution System Plan. OEB staff has reviewed the plan and observed the following items that it seeks clarity on.

**OEB Staff-12: Reliability**

In Table 2-5 of the DSP, Orangeville Hydro states its 5-year target for System Average Interruption Duration Index (SAIDI) as 0.55 and System Average Interruption Frequency Index (SAIFI) as 0.65.

From Table 2-6 of the DSP, the SAIDI and SAIFI excluding loss of supply and major event days is over the target for 2016 and 2020.

From Table 2-10 and Table 2-11 of the DSP, the main contributors for customers interruptions and customer minute interruptions are: defective equipment, loss of supply and foreign interference.

1. What measures is Orangeville Hydro taking to maintain and/or reduce SAIDI and SAIFI values for the forecast period?

Response

As per 2.3.1.3.3 Performance Trend in the DSP, Orangeville Hydro has implemented the following measures to maintain the SAIDI and SAIFI values for the forecast period:

* Planned renewal of end-of-life assets such as poles and cables.
* Proactive vegetation management.
* Inspection of the plant to identify potential problems.
* Testing of wood poles with a resistograph
* Design and construction of distribution circuits to meet CSA-Heavy standards

These activities and measures are explained in further detail within Appendix D of the DSP – OHL’s Distribution Maintenance Program. Also, examples of detailed measures taken are described in the response to OEB Staff-12 b) & d).

1. What action is Orangeville Hydro taking to reduce the impact of a defective equipment outages on customers?

Response

The Defective Equipment Cause Code has six Sub-Cause Codes:

* Electrical Failure
* Mechanical Failure
* Defective Equipment/ Material
* Corrosion
* Moisture Ingress
* Other Equipment Failure

Orangeville Hydro is taking a variety of actions to reduce the impact of defective equipment outages on customers:

* To reduce the **frequency** of defective equipment outages:
  + Annual infrared inspection of all overhead infrastructure
  + Annual infrared inspection of all pad-mounted switching cubicles
  + Resistograph pole testing
  + New construction built to current USF construction standards
  + Actively replacing porcelain equipment
  + Continuous standardization and improvement of approved equipment list
  + Reviewing historical outages to determine trends and plan for capital replacements when required
    - Examples of this include conductor upgrades & automatic sleeve removal under B109, B114, & B119
  + Eliminate use of equipment related to outage trends
    - Example of this include switching to:
      * dead-front pad-mounted equipment
      * stainless steel for single phase pad-mounted transformers
      * polymer cutouts (instead of porcelain cutouts)
      * compression tension sleeves
      * fiberglass switch brackets
      * strand-blocked primary cable
  + Investigate root cause of equipment failure with supplier, manufacturer, and other LDCs.
* To reduce the **duration** of defective equipment outages:
  + Monitor inventory levels of critical spares of essential distribution equipment
  + Standardization of equipment to increase opportunity for like-for-like replacements
  + Outage Monitoring System in use to notify Orangeville Hydro staff of outages prior to customer calls
  + 24/7/365 call center and on-call lines staff
  + System designed to allow for switching procedures to isolate outage area and restore power to majority of customers.

1. Please clarify the significant increases in foreign interference contribution to customer interruptions and customer minute interruptions in 2019 and 2020.

Response

The significant increase in foreign interference in 2019 was due to a motor vehicle incident on June 14, 2019 @ 2:40PM. A drunk driver drove a pickup truck off the road and destroyed a pole supporting the 44kV M5 Feeder and the 27.6kV M26 Feeder. Further details can be read here: [Crash destroys hydro pole, causes 'large' Orangeville power outage](https://www.orangeville.com/news-story/9437003-crash-destroys-hydro-pole-causes-large-orangeville-power-outage/)

The significant increase in foreign interference in 2020 was due to a dig-in incident on November 6, 2020 @ 12:51PM. A private contractor was excavating on an industrial property. The private contractor dug into customer-owned 27.6kV primary cables. The customer-owned fuses did not clear the fault before the M26 Feeder breaker operated. This caused an outage to 4,170 customers. The feeder was locked out until Orangeville Hydro staff isolated the customer-owned faulted cables and restored power to the feeder @ 1:30PM (39 minutes). Orangeville Hydro worked with the customer to improve the customer-owned fuse coordination. Orangeville Hydro has also been working with Hydro One to improve the protection settings in the Hydro One owned Transformer Station to avoid similar issues re-occurring.

1. Please explain any steps Orangeville Hydro is planning to take to mitigate the contribution of foreign interference.

Response

Foreign interference is a very broad Cause Code with a large variety of Sub-Cause Codes including:

* Wildlife (Bird/Animal)
* Vehicle
* Crane
* Agricultural Equipment
* Dig-In
* Customer Equipment
* Foreign Objects
* Customer-Cut Trees
* Vandalism/Sabotage
* Other Utilities
* Other foreign Interference

Orangeville Hydro continues to complete diverse list of mitigation activities:

* To reduce the **frequency** of foreign interference outages:
  + Installation of animal guards in areas of common contacts
  + Installation of fiberglass switch brackets
  + Promotion of electrical safety information
  + Promotion of Call Before You Dig
  + Completion of locates at no cost to the excavator
  + Completion of locates within the prescribed timeframe
  + New construction built to current USF construction standards
    - conductor clearances
  + Working with Hydro One to improve protection settings at Hydro One-owned Transformer Station.
* To reduce the duration of foreign interference outages:
  + Monitor inventory levels of critical spares of essential distribution equipment
  + Standardization of equipment to increase opportunity for like-for-like replacements
  + Outage Monitoring System in use to notify Orangeville Hydro of outages prior to customer calls
  + 24/7/365 call center and on-call lines staff
  + System designed to allow for switching procedures to isolate outage area and restore power to majority of customers

1. Defective Equipment is a significant contributor to customer interruptions and customer hour interruptions during the historical period. Please explain any steps Orangeville Hydro is planning to take to reduce defective equipment interruptions?

Response

Please refer to answer to OEB Staff 12-b)

In addition to the OEB Staff 12-b), the increase in defective equipment outages during the historical period were because of very distinct outages with unique and mostly unrelated root causes:

March 3rd, **2015**: Insulator failure in Municipal Substation #5 causing outage to 44kV M5 Feeder. Insulator replaced in 2016. MS5 was subsequently eliminated in 2020. There are no other similar insulators within Orangeville Hydro’s distribution system.

September 29th, **2017**: Porcelain cutout failure during windy weather causing drop lead sway in the wind. As the drop lead swayed, arcing occurred causing fault current and multiple breaker operations on the M26 27.6kV feeder. Polymer cutouts are used to avoid this type of failure method for new installations. Orangeville Hydro makes an active effort to replace porcelain cutouts with polymer cutouts when possible.

September 26th, **2018**: Porcelain cutout failure led to a pole fire causing an outage to the Grand Valley F2 12.5kV feeder. Polymer cutouts are used to avoid this type of failure method for new installations. Orangeville Hydro makes an active effort to replace porcelain cutouts with polymer cutouts when possible.

August 4th, **2020**: Automatic Tension Sleeve connector on 4/0 ACSR conductor failed causing an outage on the M26 27.6kV feeder. All similar 4/0 ACSR conductor has/will be removed under projects B109, B114, & B119 to eliminate recurrence. Transitioning to compression tension sleeve for new installation will also eliminate a similar failure mode on other conductors.

1. Does Orangeville Hydro anticipate a reduction in defective equipment caused interruptions as a result of System Renewal capital expenditure increases during the forecast years, compared to historical years?

Response

Orangeville Hydro’s Distribution Maintenance Program, System Renewal projects, and System Service projects are all part of Orangeville Hydro’s efforts to continuously improve. This is in conjunction with the continuous improvement in design best practices, inspection/testing best practices, and improved equipment availability.

**OEB Staff-13: System Access**

In Section 4.4.1.1, Orangeville Hydro explains the forecast average System Access is 20% lower than the historical average.

1. How will Orangeville Hydro manage the planned increase in system renewal and system service projects, particularly voltage conversion, if system access projects do not continue to decrease as forecast?

Response

If System Access projects significantly increase beyond the forecasted amount, there is the possibility that financial and labour resources could be constrained. This is a consistent risk that Orangeville Hydro manages every year. Orangeville Hydro manages this risk by prioritizing projects and allocating resources appropriately. One potential outcome would be the requirement to defer a planned system service project or part of a planned system service project to a future year. Another potential outcome would be the requirement to complete the projects or part of the projects by increasing labour resources through either the use of overtime for internal staff or the use of external contractors.

**OEB Staff-14: Voltage Conversion**

From section 2.1.1, Orangeville Hydro states that feeder conversion work remains a key focus of Orangeville Hydro’s investment program throughout the forecast period.

OEB staff notes that the System Service expenditure during the forecast period is 88% more than historical period. From section 4.3, Orangeville Hydro states that the primary reason for increase in System Service budgets for forecast years is the fact that most of the assets remaining in voltage conversion are underground cable and pad-mounted transformers, in which underground infrastructure costs more to replace than the overhead infrastructure.

1. Please explain the original plan and current progress in the voltage conversion program in terms of kilometers of line converted.

Response

Orangeville Hydro’s voltage conversion program began in the late 1980’s. Up until the late 1980’s the Town of Orangeville was fed by one 44kV feeder. The 44kV served customer-owned substations as well as five OHL-owned 44kV to 4.16kV substations. Over the last 30+ years, the 4.16kV distribution system has been replaced with the 27.6kV distribution system. The original plan was to ensure new subdivisions and developments were connected to the 27.6kV distribution system. As the 4.16kV infrastructure was replaced, it was upgraded to 27.6kV.

Orangeville Hydro’s Circuit Length by Location & System Voltage, as of December 31st, 2021, can be seen in the below table.

**Circuit Length by Location & System Voltage**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Circuit Length (km)** | | | | |
|  | **4.16kV** | **12.47kV** | **27.6kV** | **44kV** |
| **OH** | 10 | 7 | 41 | 12 |
| **UG** | 25 | 16 | 108 | 0 |
| **Total** | **35** | **23** | **149** | **12** |

1. What criteria does Orangeville Hydro use to determine which part of the system to address as part of the voltage conversion program?

Response

The remaining 4.16kV distribution system consists of three substations, 35km of primary conductor and 176 transformer locations. At this stage of the voltage conversion program, the main criteria Orangeville Hydro uses to determine which part of the system to convert is the geographical and electrical location of the infrastructure. Orangeville Hydro will also consider other factors such as age, cost, reliability performance, municipal road reconstruction, as well as load growth in the area.

1. How does Orangeville Hydro prioritize the different capital projects that are part of the voltage conversion program?

Response

Please see response to OEB Staff-14 (b).

**OEB Staff-15: System Renewal**

From the Business Plan, the 2021 System Renewal expense was $329,867. A major project in 2021 was 5 to 39 Main St. South Pole Line Rebuild costing $98,327. However, from Table 4-6 in the Distribution System Plan, the actual System Renewal cost in 2021 was $790,000.

1. Why was the actual System Renewal expense during 2021 approximately 239% higher compared to planned?

Response

The main driver of the increase in System Renewal expenses during 2021 was the purchase of transformers and switching cubicles for stock replacements and future projects. This accounted for $250,362 of the $782,000 System Renewal expenses.

Additional drivers were more transformer failures, pole replacements, and meter purchases than planned.

The B115 5 to 39 Main Street South Pole Line Rebuild project was completed under the planned cost.

1. Please provide a list of projects, their costs per year in 2021 and their total costs for System Renewal.

Response

Please see the table below for System renewal costs for 2021.



**OEB Staff-16: System Renewal**

For test year 2022, the System Renewal expense is $541,000. The System Renewal cost in 2021 was $790,000.

The average per year System Renewal expense during 2023 to 2026 is forecasted to be approximately $298,750. The average per year System Renewal expense during 2014 to 2020 was approximately $265,000.

1. The System Renewal expenditure during 2021 bridge year and 2022 test year is significantly higher than other years. Please explain what Orangeville Hydro took into account when determining the pacing of System Renewal capital projects.

Response

System Renewal expenditures include replacement costs for unexpected major equipment failures such as transformers, poles, and switching cubicles. While Orangeville Hydro budgets costs for these potential equipment failures, the exact number of equipment failures and the exact units that will fail cannot be predicted. This unpredictability can affect the pacing of actual costs.

System Renewal expenditures include the recent purchase cost of major assets, such as transformers, switching cubicles, and meters, that have not been installed within a separate project. With the significant increase in price and delivery lead times, Orangeville Hydro has been required to order major assets much earlier than previously required. This can put upward pressure on actual System Renewal costs relative to budgeted since some of these assets are budgeted to be installed in a future System Service or System Access project.

1. Has Orangeville Hydro considered deferring some capital projects during 2021 and 2022 to reduce the high expenditure during 2021 and 2022.

Response

Orangeville Hydro has deferred projects historically based on the availability of financial and labour resources. If the resources become constrained in 2022, Orangeville Hydro will consider deferring some capital projects to future years.

**OEB Staff-17: System Renewal – Pole Replacement**

Under Material Investments, Orangeville Hydro summarized P00-Pole Replacement capital project. Orangeville Hydro states it is proposing to increase the pacing of this program to $130,900 per year. The average annual expenditure for this program were $39,612 from 2015 to 2020.

From Page 7 of the Asset Condition Assessment Report, 3.96% of distribution wood poles are in Poor condition and 3.31% are in Very Poor condition.

1. How many poles does Orangeville Hydro plan to replace every year under the Pole Replacement capital project for the forecast years? How many poles per year did Orangeville Hydro replace under the same capital project during the 2015 to 2020 period?

Response

Orangeville Hydro plans to replace approximately 17 poles every year under the P00-Pole Replacement capital project. The represents approximately 1% of the 1,685 Orangeville Hydro owned poles (as of December 31, 2021).

Orangeville Hydro replaced 50 poles under the P00-Pole Replacement Project during the 2015-2020. That is an average of 8.33 per year.

1. Is there an increasing trend in per unit pole replacement cost? If so, please explain the reason for the increase.

Response

Per unit pole replacement costs will vary significantly based on a variety of factors such as:

* + - Planned replacement vs after-hours emergency replacement
    - Live-line replacement vs de-energized replacement
    - Pole specifications
      * Height
      * Class
    - Infrastructure on pole
      * Single phase vs Three phase
      * Quantity of circuits
      * Infrastructure on pole
        + Risers
        + Transformers
        + Load break switch
        + Guying
        + Third party infrastructure
    - Roadside pole versus backyard pole

The above factors will cause the per unit pole replacement costs to fluctuate significantly from pole to pole. This significant fluctuation makes year to year comparison on a per unit cost difficult and nuanced.

There is an overall upward pressure on pole replacement costs due to the increased cost of wood poles.

1. Why does Orangeville Hydro want to increase pacing of the Pole Replacement capital project, even though only 3.96% of distribution wood poles are in Poor condition and 3.31% are in Very Poor condition?

Response

Orangeville Hydro wants to increase the pacing of the Pole Replacement capital project to approximately 1% per year to avoid a large increase in required replacements in the future. Orangeville Hydro has determined that a 1% replacement rate is a more appropriate replacement rate than the historically lower value. The P00-Pole Replacement capital project includes the replacement of poles that have failed resistograph pole testing, failed a non-testing pole inspection, or failed unexpectedly such as during a windstorm.

1. Please explain the effects of increased pacing of pole replacement on system reliability metrics and future asset condition assessment results.

Response

Orangeville Hydro expects the increase pacing of pole replacements will assist in maintaining system reliability metrics and avoid an unacceptable deterioration in future asset condition assessment results.

**OEB Staff-18: General Plant**

The forecast period (2022 to 2026) average General Plant capital expenditure of $329,000 is 32% higher than the average during the historical period (2017 to 2021).

The two largest General Plant expenditures during test year 2022 are Building and Computer Software.

From Page 26 of Orangeville Hydro Business Plan, the two largest General Plant expenditures during 2021 are Computer Equipment and Computer Software.

1. Please explain the significant increase in General Plant expenditure during the forecast period compared to the historical period.

Response

Many of the drivers of the increase in General Plant expenditure during the forecast period compared to the historical period are due to the items explained below in responses to b) and c) of this question. The building is getting older and is therefore requiring upgrades, including the roof upgrades mentioned below. The CIS and the financial system are on a cycle for upgrades, with additional changes required from time to time based on external factors, such as regulatory changes and improving the customer experience. Vehicles have a useful life and require replacement as they age, but due to the number of vehicles in the fleet, a vehicle is not replaced every year, therefore there are fluctuations year over year in the replacement of vehicles.

1. Please explain the high General Plant expenditure forecast during 2024, 2025 and 2026 compared to previous years.

Response

Please see the table below to show significant expenses that contribute to the high capital expenditure forecast during 2024, 2025 and 2026 as compared to previous years.



1. Please explain the significant expenses incurred under Building, Computer Software and Computer Equipment categories during 2021 and 2022.

Response

Please see the table below to show significant expenses incurred under Building, Computer Software and Computer Hardware during 2021 and 2022.



**OEB Staff-19: Asset Condition Assessment**

Many of the asset condition assessment results are largely based on age-based assessment.

From Orangeville Hydro Limited Asset Condition Assessment section 5.2, METSCO recommends that Orangeville Hydro continue collecting information related to data points for condition parameters with low data availability.

1. Please explain if Orangeville Hydro plans to include other test and inspection parameters in its asset condition assessment in the future to increase accuracy. If not, how does Orangeville Hydro plan to account for parameters that may affect asset condition other than age?

Response

Orangeville Hydro has continuously improved the asset records, testing procedures, and inspection parameters. This is evident when comparing the 2009 ACA to the 2021 ACA.

Orangeville Hydro will continue to improve the asset records, testing procedures, and inspection parameters into the future. As reliable, justifiable, and cost-effective testing procedures become available, Orangeville Hydro looks forward to their adoption with the goal of improving the accuracy of future asset condition assessments.

1. Does Orangeville Hydro anticipate any obstacles it may face when collecting information related to data points for condition parameters with low data availability? Does Orangeville Hydro anticipate any impact on its OM&A and capital expenditure?

Response

There are technological obstacles and resource constraints if Orangeville Hydro were to expedite the data collection process in the short term. These obstacles and constraints are minimized by allowing the data accuracy to continuously improve along with the steady pace of technological improvements and asset replacements.

1. Has Orangeville Hydro performed a cost-benefit analysis of including inspection and test parameters for its asset condition assessment?

Response

Orangeville Hydro has not completed a cost-benefit analysis of including inspection and test parameters for overhead and underground primary conductor asset condition assessments.

**OEB Staff-20: Asset Condition Assessment**

From Orangeville Hydro Limited Asset Condition Assessment section 5.2, METSCO states that the age extrapolation method used for Overhead Conductors and Underground Cables is a reasonable approach, but empirical age data is preferred. Moving forward, METSCO recommends Orangeville Hydro to record conductor installation year within its GIS system. It is expected that with every passing year, the inspection record database will continue to grow and be refined, allowing for this to be calculated more reliably.

1. Please explain if Orangeville Hydro plans to follow METSCO’s recommendation in regard to asset data for Overhead Conductors and Underground Cables.

Response

Orangeville Hydro followed many of the recommendations within the 2009 Asset Condition Assessment from Hatch. The recommendations were implemented throughout 2010 to 2021. Orangeville Hydro’s continuous improvement is evident by the high data availability for the majority of asset classes.

Orangeville Hydro plans to follow METSCO’s recommendation and record the installation year of overhead conductors and underground cables as they are installed in the future. Orangeville Hydro agrees that with every passing year, the asset record data will improve continuously.