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September 17, 2010

BY COURIER

Ms. Kirsten Walli
Secretary
Ontario Energy Board
2300 Yonge Street
Suite 2700,
Toronto, ON.
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Dear Ms. Walli:

EB-2010-0249 – OEB Consultation on Distribution System Reliability Standards – Hydro One Networks' Response to Attachment A

In response to the Ontario Energy Board's August 23, 2010 letter to licensed electricity distributors, and other interested parties, I am providing a written response with Hydro One's Response to Attachment A - Questions to Discuss - For Electricity Distributors.

Current Practices.

Question #1 - In addition to SAIDI, SAIFI and CAIDI, what, if any, other system reliability measures do you use?

SAIDI, SAIFI and CAIDI are the primary measures used for the assessment of system reliability. Hydro One Networks also examines reliability measures that take into account the rural nature of its distribution system. These measures take into consideration interruptions and circuit length:

- Customer hours of interruption/km
- Customer interruptions/km

Circuit length is taken into account by normalizing the customer interruptions by distance in circuit kilometres. Additional measures are applied at lower levels to provide more detailed assessments which are used as an input to planning, investment and maintenance expenditure decisions. This will be explained in the response to Question #3 below.

Question #2 - Provide a detailed description of your methodology utilized to record SAIDI and SAIFI. Please include information such as:

- ***The degree of use of automated event tracking from SCADA systems, as well as reliance on manual observations.***
- ***Whether planned outages are tracked separately.***
- ***The level of detail captured throughout a stepped restoration process to record the total customer duration impact.***

The method to determine the system reliability measures begins with the recording of interruption events and is aligned with the processes involved in the detection of customer interruptions and load restoration. This involves a series of communications from customers and Hydro One Networks line maintainer staff along with the use of ORMS (Outage Response Management System) to estimate the location and extent of the interruption so that crews can be dispatched to expedite load restoration.

A detailed description of the process utilized to assess system reliability measures SAIDI and SAIFI and CAIDI is included in Appendix A.

- ***The degree of use of automated event tracking from SCADA systems, as well as reliance on manual observations.***

At this time, Hydro One Networks relies on customer calls and information provided by power line maintainers to identify the location, extent and duration of a power outage on the distribution system. Therefore, assessments of distribution reliability are primarily based on manual observations, both by the customers themselves and by Hydro One Networks power line maintainers. The transmission Network Management System (NMS) has status monitoring at the transformer station bus level including the feeder breaker connected to the station bus. However, the NMS does not have visibility into the distribution system and therefore will not be able to detect outages that occur on the distribution system. Most distribution faults that occur are cleared by fuse or distribution recloser. There is presently no status monitoring on these parts of the distribution system. Hydro One Networks must rely on customers who are out of power to call in by telephone. These calls are tracked by ORMS (Outage Response Management System) to estimate the location of the power outage. This information along with information from power line maintainers are used to determine the actual location and extent of power outage.

- ***Whether planned outages are tracked separately.***

Yes. Planned outages are tracked separately because they are initiated through Hydro One Networks' outage management system. The planned outages are identified with a separate outage cause code and can therefore be filtered in the data analysis as required. Planned interruption events are included in the distribution system reliability measures. This is done in accordance with the Distribution System Code requirements.

- ***The level of detail captured throughout a stepped restoration process to record the total customer duration impact.***

ORMS is used to capture stepped restoration and records the resulting total customer duration impact. Each stage of restoration is recorded by its starting date and time when the outage occurred, its ending date and time when the customer service was restored, the number of customers whose service was restored by this stage, and cause of interruption. The difference of the ending time and the starting time yields the outage duration in minutes. This value is multiplied by the number of customers affected by this outage duration period (outage stage). The sum of these stages represents the total customer duration impact. Also, ORMS is able to combine multiple locations under a single incident, therefore allowing us to capture different restoration times for each location. This is especially advantageous during storm events because it takes into account the benefits of restoring outages to a large number of customers first.

Question #3 - Do you use system reliability performance results in planning, investment and maintenance expenditures, as well as establishing operation and maintenance procedures? Please explain.

Hydro One uses reliability performance results as an input to establishing its investment and maintenance programs. Currently, SAIDI and SAIFI metrics are used along with other metrics in the prioritization of investments.

Progress has been made to align prioritization of investments and operational decisions that affect system reliability with the corporate strategy, performance measurement. Operational and maintenance decisions are moving from an engineering based, system perspective to an increased focus on the impact of the interruptions on customers and customer satisfaction. For example, through improved analysis methods, certain "hot-spots" (geographic areas with above average interruptions) can be identified and addressed rather than just utilizing overall system reliability results.

While the measures SAIDI, SAIFI and CAIDI are used for the assessment of system reliability, additional measures are applied at lower levels to provide more detailed assessments which are used as an input to planning, investment and maintenance decisions. Hydro One Networks also examines reliability measures that take into account the rural nature of its distribution system. These measures take into consideration customer interruptions and the circuit length:

- Customer hours of interruption/km
- Customer interruptions/ km

Additional measures are applied at lower levels to provide more detailed assessments which are used as an input to planning, investment and maintenance expenditure decisions. Hydro One Networks also reviews the performance of the system based on:

- The trend or rate of change of time between interruptions on feeders. The trend and the magnitude are combined to determine relative reliability of feeders based on when the interruptions are occurring and the impact the number and duration of interruptions have on customers. For example, two separate feeders may exhibit the same number of interruptions within a period of time.

However, one feeder may exhibit a higher degree of deterioration than the other feeder e.g. greater number and longer duration of customer interruptions.

- A trend process in combination with magnitude or impact of interruptions affecting customers through the CEMI (Customers Experiencing Multiple Interruptions) and CELID (Customers Experiencing Long Interruption Durations) metrics.
- Customer reliability targets, to achieve customer satisfaction, include the use of feeder specific reliability measures: Customer Interruptions by number of customers on the feeder and Customer Hours by number of customers on the feeder. Also interruption causes are tracked so that they can be assessed at the feeder level to develop more specific and effective solutions.
- Other factors, besides reliability, such as asset criticality, asset demographics, asset condition, local customer impacts, etc. These factors are increasingly becoming a part of the decision process to identify feeders requiring further investigation. For example, we are beginning to include asset condition assessments, and other factors listed above, to prioritize feeders in the vegetation management program.

A feeder vulnerability index, presently under development, relates the Number of Customers served on the feeder, energy distributed (MWh), distance (circuit km), and trend in Customer Interruptions, Customer Hours of Interruption, CEMI and CELID into a common measure for evaluation.

As presented above, a number of performance measures are used to address and identify worst performing feeders and Large Distribution Accounts (LDA's). Along with the interruption cause information, the root causes for the top 50 worst prioritized feeders are investigated and appropriate action taken. Hydro One Networks actively monitors the interruptions that affect our LDA's by having established a LDA database with shared access to allow both the Planning and Operation staff to document reliability issues associated with specific LDA accounts.

Question #4 - Do you identify and track the impacts of extraordinary events?

Yes Hydro One Networks identifies and tracks extraordinary events which are called *force majeure*. Hydro One Networks' definition of *force majeure* is:

> "Hydro One Networks Distribution deems a *force majeure* to have occurred when 10% or more of Hydro One Networks customers have been interrupted by an event. An event may be a storm (usually the case), the August 14, 2003 blackout or any other problems that interrupt 10% or more customers and cause a change in the normal restoration business processes. All Hydro One Networks Distribution customers interrupted throughout the duration of the event while normal restoration business processes are suspended are counted in the determination of the numerator of the percent interrupted. The denominator is the total number of customers served at the end of the month when the *force majeure* occurred."

Hydro One Networks believes that given the scope and nature of operations of its distribution system it is appropriate for it to report on the reliability indices (e.g. SAIDI, SAIFI, CAIDI) with and without including Force Majeure events. This has been the procedure in previous Hydro One Networks rate proceedings.

The importance of tracking reliability performance without Force Majeure events included is that it provides valuable information regarding the performance of the distribution system under normal operating conditions on which basis Hydro One Networks identifies its investments needs for Sustainment and Operations activities. Force Majeure events are unpredictable as is their impact on the distribution system. It would be imprudent to plan investments on the basis of performance indices that include Force Majeure events because in most cases the level of investment would not match actual Force Majeure experience in any given year. Hydro One Networks considers Force Majeure events as outside the "day to day" operations of the utility and involve a change in normal restoration business processes. Details of all Force Majeure events that have occurred are documented in previous Hydro One Networks rate filings and are available at the time of each Electricity Reporting and Record keeping Requirements (ERRR) filing.

Question #5 - What other actions do you take to manage system reliability performance?

Hydro One Networks actively participates and provides leadership within key benchmarking communities which enables Hydro One Networks to assess its performance with other comparable utilities, develop improved performance measures, and adopt best and better practices within its own company.

Hydro One Networks recognizes the importance of reliability performance and is continually evaluating its existing processes and measures for improvement opportunities.

Sincerely,

ORIGINAL SIGNED BY SUSAN FRANK

Susan Frank

Attach

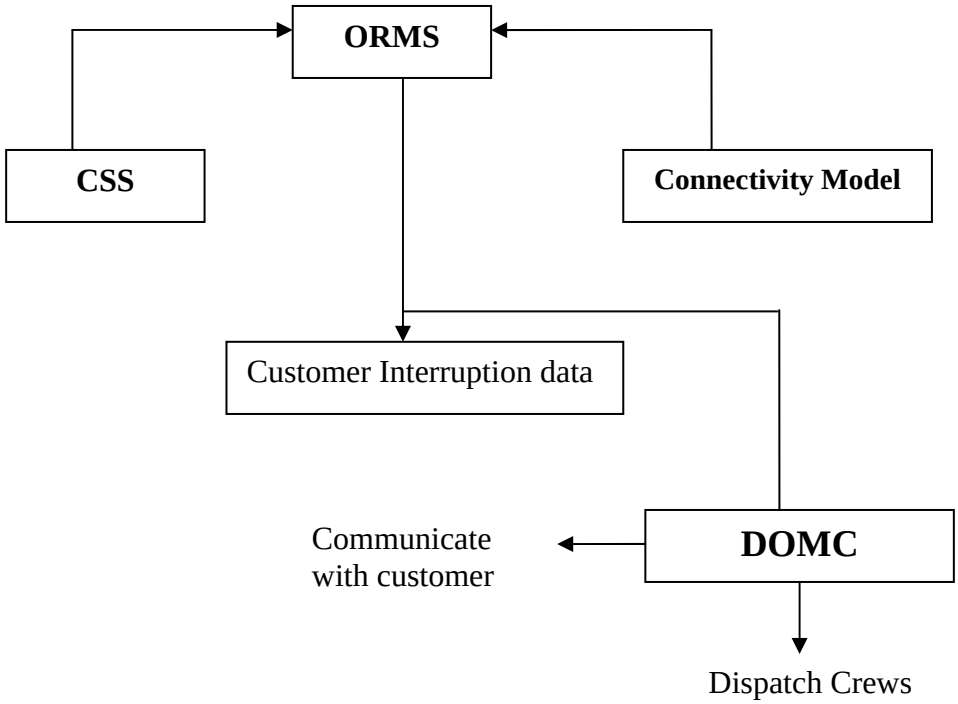
Appendix A: Process for Collecting SAIDI/SAIFI/CAIDI Data

Hydro One Networks' process was implemented in 2003 to consistently track data for calculation of SAIDI, SAIFI and CAIDI Service Reliability Indicators. This process continues to be used and is summarized below.

1.1 Initiation: - When an interruption occurs, customers call Hydro One Networks and speak with either a customer service representative or the Interactive Voice Responder (IVR). These calls are used to create incident reports in Outage Response Management System (ORMS) which the Distribution Outage Management Centre (DOMC) manages to dispatch work crews and communicate pertinent information to Hydro One Networks customers. The ORMS database links customers in the Customer Service System (CSS), using their transformer location number to a connectivity model which has the relationship of interruption device to all Hydro One Networks customers. This provides an accurate customer count of all interrupted downstream customers based on the device that is interrupted. An interrupting device may be any device on the electrical system including transmission supply points.

Supply interruptions may also be initiated by remote operation for Transmission controlled equipment. With the Transmission interruptions, start and end time may occur before an interrupted customer calls in. These interruptions are also recorded based on information from the transmission Network Management System (NMS).For planned interruptions, Hydro One Networks crews provide start and end times.

The flow chart below illustrates the initiation procedure for any trouble call incident.



1.2 Validation: - Data is validated using a live web based data validation report as well as rules in the ORMS computer system e.g. checks on restoration times versus interruption times, automatic calculations of number of customers based on the interruption device as well as drop down lists for cause codes. Device status validation occurs in a web based report that is monitored daily to verify the correct status of distribution devices and connectivity model which helps to ensure correct customer count based on device status.

Daily customer interruption data is manually reviewed for completeness and reasonableness by Grid Operation Managers (Shift Managers) and Hydro One Networks staff at the Ontario Grid Control Centre who also manually review and correct data based on interruption causes, number of customers interrupted and duration, as well as daily reports of interruptions greater than 300 customers and/or over 4 hours.

The data correction process involves an internal report that checks for suspect/incomplete data in the system. These checks validate the required information to ensure it is correct and valid. For example, if a dispatcher fails to complete call backs to confirm power restoration, the Grid Operation Manager will see this has not been completed and request the dispatcher to complete the callbacks before archiving the incident.

1.3 Measurement

1.3.1 System Average Interruption Duration Index (SAIDI):- The ***duration*** of an interruption is recorded in hours from the time of initiation (See Section 1.1) until Hydro One Networks staff successfully complete restoration procedures and notify the DOMC stating that power has been restored to the customer(s). Data collected include interruption time, restoration time, total downstream customers that are interrupted and the cause of the interruption. Hydro One Networks defines SAIDI in accordance with the Ontario Energy Board's 2006 Electricity Distribution Handbook Section 15.2.1.

SAIDI - Average length of interruptions for all customers connected to the Hydro One Distribution system

$$= \frac{\textit{Total Customer Hours of Interruption}}{\textit{Total Number of Customers Served at the end of each month}}$$

where

$$\left[\begin{array}{c}\textit{Customer hours of Interruption} \\ \textit{for each interruption}\end{array}\right] = (\textit{Restoration time} - \textit{Interruption time}) \times \left[\begin{array}{c}\textit{the number of} \\ \textit{customers} \\ \textit{interrupted}\end{array}\right]$$

Total number of customers served each month is from TSO System Report CURST060 and is based on the total active service accounts minus the Remote Community active service accounts for each month.

The calculated SAIDI value is summed for each record to obtain the monthly and annual total SAIDI

1.3.2 System Average Interruption Frequency Index (SAIFI): The ***frequency*** of an interruption is based on the number of customer interruptions in ORMS with each interruption event. The data collected is based on the total number of customers interrupted at a device and includes all downstream customers that are interrupted. Hydro One Networks defines SAIFI in accordance with the Ontario Energy Board's 2006 Electricity Distribution Handbook Section 15.2.2.

SAIFI - Average Number of interruptions for all customers connected to the Hydro One Distribution system

$$= \frac{\textit{Total Customer Interruptions}}{\textit{Total Number of Customers Served at the end of each month}}$$

The calculated SAIFI value is summed for each record to obtain the monthly and annual total SAIFI.

1.3.3 Customer Average Interruption Duration Index (CAIDI):- Hydro One Networks Distribution defines CAIDI in accordance with the Ontario Energy Board's 2006 Electricity Distribution Handbook Section 15.2.3. Causes are determined based on the Ontario Energy Board's 2006 Electricity Distribution Handbook Section 15.3.

CAIDI - Average Duration that any interrupted customer on the Hydro One Networks Distribution System experiences

$$= \frac{\textit{Total Customer Hours of Interruption}}{\textit{Total Customer Interruptions}}$$

1.4 Reporting: Reliability Indices are analysed and reported monthly on internal scorecards. This internal performance reporting process allows Hydro One Networks to identify areas of concern in a timely manner so that issues can be addressed and brought in line with the performance requirement. Results are also provided annually to the Ontario Energy Board in accordance with the 2006 Electricity Distribution Rate Handbook.