ONTARIO ENERGY BOARD

# Staff Report to the Board

## Electricity Distribution System Reliability Standards

EB-2010-0249

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# A. INTRODUCTION

The Ontario Energy Board (the "Board") has on a number of occasions emphasized the importance it places on system reliability as an important measure of a distributor's service quality and performance. In its March 12, 2008 Notice of Proposal to amend the Distribution System Code to establish customer service quality standards for electricity distributors, the Board reaffirmed its commitment to the establishment and codification of distribution system reliability standards. The Board's 2010-2013 Business Plan identified the development of electricity distributor system reliability standards as a key initiative.

By letter dated August 23, 2010, the Board invited interested parties to participate in a consultation process regarding the further development of regulatory requirements associated with electricity distribution system reliability. The consultation involved the review of existing practice in Ontario regarding the collection and use of system reliability performance information by distributors; the issuance of reports detailing the results of consumer and jurisdictional research conducted by consultants retained by the Board for that purpose; a stakeholder conference; and the filing of written comments on the issues discussed at the stakeholder conference.

Over 30 stakeholders participated in the stakeholder conference, and fifteen filed written comments.[1] Those written comments are available on the Board's website on the project webpage.[2]

This staff Report provides an overview of the research conducted as part of this consultation and summarizes the issues and stakeholders' views on the issues as expressed in their written comments. This Report also sets out Board staff's recommendations in relation to the subject-matter of the consultation.

[1] Two distributors made a joint filing.
[2] The written comments and all other materials relating to this consultation are available at http://www.ontarioenergyboard.ca/OEB/Industry/Regulatory+Proceedings/Policy+Initiatives+and+Consultations/System+Reliability+Standards.

# B. BACKGROUND

Distributors are currently required to monitor and report to the Board on their performance against four reliability indicators, namely:

i. a System Average Interruption Duration Index ("SAIDI"), an indicator of the length of interruptions that customers experience in a year on average (both inclusive and exclusive of loss of supply);

ii. a System Average Interruption Frequency Index ("SAIFI"), an indicator of the average number of sustained interruptions that each customer experiences (both inclusive and exclusive of loss of supply);

iii. a Customer Average Interruption Duration Index ("CAIDI"), an indicator of the speed at which power is restored (both inclusive and exclusive of loss of supply); and

iv. a Momentary Average Interruption Frequency Index ("MAIFI"), an indicator of the average number of momentary interruptions that each customer experiences.

The Board's policy pertaining to the monitoring and reporting of performance against SAIDI, SAIFI and CAIDI has been in place since 2000. The policy was initially contained in Chapter 7 of the Board's *First Generation PBR Electricity Distribution Rate Handbook,* and subsequently in Chapter 15 of its *2006 Electricity Distribution Rate Handbook*. The system reliability monitoring and reporting requirements pertaining to SAIDI, SAIFI and CAIDI are now set out in section 2.1.4.2 of the Board's *Electricity Reporting and Record Keeping Requirements* (the "RRR"). The system reliability monitoring and reporting requirements pertaining to MAIFI were added to the RRR effective May 1, 2010, although distributors that do not have the systems capability that enables them to capture or measure MAIFI are exempted from reporting on MAIFI performance. Except where otherwise noted, all subsequent references in this Report to Ontario system reliability indicators should be understood as being limited to the three historical indicators; namely, SAIDI, SAIFI and CAIDI.

Distributor performance against the system reliability indicators is reported annually in the Board's *Yearbook for Electricity Distributors*. In accordance with section 2.3.7 of Chapter 2 of the Board's *Filing Requirements for Transmission and Distribution*

*Applications*, distributors must include a report on their performance against system reliability indicators as part of their cost of service rate applications.

The Board's expectation in relation to performance against the system reliability indicators, as expressed in the two *Rate Handbooks*, is that a distributor with at least 3 years of data on a given index should, at minimum, remain within the range of its historical performance.

In January 2008, the Board initiated a consultation to assist in the development of a service quality regime for electricity distributors (EB-2008-0001). That consultation culminated in the codification of service quality requirements, which are now set out in the Distribution System Code.

The Board chose not to implement mandatory system reliability standards at that time, for the following reasons set out in the Board's March 12, 2008 Notice of Proposal to amend the Distribution System Code: [3]

> …the Board is of the view that the reliability data reported to the Board does not provide a true representation of a distributor's performance. Therefore, the Board is not convinced that this data is suitable to use as a basis for setting a performance standard.
>
> The Board also believes that research must be completed in order to determine the level of reliability that is appropriate; what other system reliability measures maybe be considered; the potential impact on distributor costs and rates that will result from setting a standard and the nature of any transitional measures that may be needed.

At the same time, the Board emphasized that its decision to defer the introduction of mandatory system reliability standards in no way diminished the importance that the Board places on system reliability.

[3] Notice of Proposal to Amend a Code, Proposed Amendments to Amend the Distribution System Code, March 12, 2008 (EB-2008-0001).
http://www.ontarioenergyboard.ca/OEB/Industry/Regulatory+Proceedings/Policy+Initiatives+and+Consultations/Archived+OEB+Key+Initiatives/Electricity+Service+Quality+Regulation

# C. RESEARCH RESULTS

As part of this consultation, the Board retained the services of expert consultants to undertake research into the implementation of service reliability regimes in other jurisdictions, and to ascertain the views of consumers on the level of reliability they currently receive from their respective distributors.

## C.1 – Jurisdictional Review

Pacific Economics Group Research, LLC ("PEG") was retained to prepare a report outlining the electricity distribution reliability regimes in place outside of Ontario. The report, "System Reliability Regulation: A Jurisdictional Survey" (the "PEG Report"), posted on the Board's website on August 23, 2010, summarizes the distribution system reliability regimes implemented in an number of other jurisdictions, including other Canadian provinces and within the United States and Europe.

The PEG Report identifies three different approaches to system reliability regulation: (i) "monitoring" regimes, where utilities are required to report on their performance on defined indicators; (ii) "target" regimes, where utilities are expected to achieve established, targeted levels of performance on defined performance indicators; and (iii) "penalty/reward" regimes, where utilities are automatically penalized, and sometimes rewarded, depending on their performance against established benchmarks, including through the operation of "performance guarantees" where the distributor must pay individual customers if certain performance standards (or benchmarks) are not met.

PEG characterizes Ontario as having "a type of service target regime". Of the 75 jurisdictions reviewed in the PEG Report, 47% use the "monitoring" approach, 17% use the "target" approach and 36% use the "penalty/reward" approach.

According to the PEG Report, 40% of the surveyed jurisdictions use the same three system reliability indicators as does Ontario, while 48% use just two of three (SAIDI and SAIFI). Only 23% of the jurisdictions surveyed use a momentary outage indicator (MAIFI), none of which are in Canada (as noted above, a requirement to monitor and report on MAIFI was introduced into the RRR effective May, 2010).

PEG's research indicates that, in jurisdictions where performance targets are used, the majority set their targets on an individual distributor basis rather than on a sector wide basis.

Other elements of system reliability that are regulated in at least some other jurisdictions but not in Ontario include:

- SAIDI and SAIFI measures that are 'normalized' to exclude severe events
- Circuit indicators
- Severe Storm/restoration indicators
- "Energy Not Supplied" indicator
- Engineering and/or econometric-based benchmarks

## C.2 – Consumer Survey

An important consideration when establishing system reliability standards is the degree to which consumers are willing to pay for a certain standard of reliability. To help ascertain consumer views on this issue, the Board engaged a consultant, Pollara, to conduct two telephone surveys in the summer of 2010, which solicited the opinions of consumers from across the province regarding electricity outages and other reliability-related issues. The first survey polled 905 residential consumers. The second survey polled 301 business consumers falling into the General Service < 50kW, General Service ≥ 50kW and Large User rate classes. Reports on the results of the two surveys were posted on the Board's website on October 7, 2010.

The surveys indicate that the majority of consumers are generally satisfied with current levels of system reliability, with 89% of residential consumers and 92% of business consumers reporting that they are "somewhat satisfied" or "very satisfied" with the reliability of electricity supply. However, over 75% of respondents in both groups indicated that, despite being generally satisfied, they still believe it is important for distributors to continue to work to reduce the number of outages.

Based on the Pollara survey results, most consumers do not favour increasing their rates in order to fund improvements in system reliability. The survey results show that 58% of residential consumers and 84% of business consumers are unwilling to pay any more on their electricity bill in order to fund reliability improvements. However, 57% of

the residential consumers and 62% of the business consumers surveyed indicated that they would not be willing to trade less reliability for a lower bill.

Despite the general satisfaction expressed by respondents, the survey results do indicate that consumers expect to see better reliability than they are currently receiving in terms of the number and duration of outages. Residential consumers anticipated that there would be 28% fewer outages and that outages would be 29% shorter than was reported to actually have been the case. Business consumers expected that there would be 46% fewer outages and that outages would be 62% shorter than was reported to have been the case.

# D. STAKEHOLDER COMMENTS

In the initial stages of this consultation, distributors were asked to provide information on their current practices relating to the monitoring of system reliability performance and the use of performance information. A stakeholder conference was held subsequent to the posting of the PEG Report and the Pollara survey reports to provide a forum for discussion on issues related to the implementation of a system reliability standards regime in Ontario.

## D.1 –Current Distributor Practices

Attached to the Board's August 23, 2010 letter was a list of questions designed to elicit information from distributors in relation to their current system reliability practices. 22 distributors responded to the information request.

The responses from distributors indicate that the tracking of outage information and system reliability performance is done either manually or through a combination of manual and automated methods. One quarter of the responding distributors indicated that they did not have or use a SCADA system. A number of the responding distributors that do have a SCADA system indicated that this system helps track only certain outages, such as those involving auto-reclosures or high voltage feeders. Most distributors rely on their Customer Information System or their Geographic Information System to determine the number of customers that have been affected by an outage.

All but one distributor reported having a formal process for using system reliability performance as a criterion for evaluating and prioritizing capital and maintenance projects. Of the responses received, the practice appears to be a yearly review of reliability trends and statistics to help determine where to direct expenditures.

One of the common ways to monitor and track reliability performance is to adjust a distributor's performance to remove the impact of "major events". Major events are those events that occur rarely but have a significant impact on the operation of a distribution system, like ice or wind storms. By normalizing the reliability data to remove the impact of major events, distributors are better able to determine year to year comparison of their reliability performance. There are different approaches for normalizing data for major events. These include the IEEE standard 1366, or individual distributor approaches. Only four of the 22 distributors are using the normalization methodology set out in the IEEE standard for taking extraordinary events into account when assessing reliability. Two other distributors reported developing their own approach for considering extraordinary events or using the Canadian Electrical Association's criteria for major events. Most distributors stated that they record that a major event occurred and track the costs related to that event, but do not use this information to adjust their reliability performance results.

In regards to other measures of reliability used by distributors beyond SAIDI, SAIFI and CAIDI, the tracking of momentary outages was the most common among the reporting distributors. In addition, a number of the reporting distributors track metrics related to the performance of individual feeders.

## D.2 – Written Stakeholder Comments

Attached to the Board's October 7, 2010 letter was a list of issues for discussion at the stakeholder conference. Participants were invited to file written comments on those issues, as well as on the PEG Report, the Pollara survey reports and the distributor responses to the Board's information request. The following is a brief overview of the written comments filed by stakeholders.

There was a strong consensus amongst many participants that the Board should focus on ensuring that system reliability levels are maintained. These participants believe that the current regime is adequate for the purposes of ensuring continued sustainability and reliability. Representatives of distributors generally encouraged the Board to refrain from pursuing comprehensive and potentially expensive changes to the regulatory

framework at this time. Some representatives of ratepayers expressed a similar concern to the effect that any additional regulatory standards imposed by the Board would simply result in increased electricity prices.

Several participants expressed concern about how reliability results will be affected by the introduction of smart meters. Certain stakeholders also identified as a concern the lack of consistent and accurate reliability data on which system reliability targets could be set. These stakeholders cited the need for improvements in distributor processes for defining, tracking, monitoring and calculating performance results, and suggested that the implementation of a mandatory reliability regime should wait until more consistent and accurate data is available through the use of smart meters. They noted that more robust data could, when available, be used to determine appropriate reliability measures and performance targets.

Ratepayer groups that supported the development of a new reliability regime were in the minority. Some ratepayer representatives suggested that reliability has declined almost continually over the last 8 years. A concern was also expressed that the Pollara survey results could be misinterpreted as meaning that all customers are satisfied with the level of reliability that they currently receive. At minimum, these groups recommended that the Board amend the service reliability guidelines immediately to preclude any interpretation that the guidelines set out in the two *Rate Handbooks*, (that a distributor with at least 3 years of data on a given index should, at minimum, remain within the range of its historical performance), allow for the deterioration of service reliability standards.

There was general agreement amongst stakeholders that that SAIDI and SAIFI would be adequate for measuring changes to overall reliability performance in the event that the Board were to proceed with the introduction of a mandatory reliability standards regime. Some participants commented that CAIDI is unnecessary, as it is a ratio of the other two indicators and can lead to misleading conclusions. It was noted by these participants that SAIFI and SAIDI can both be improving, but whenever SAIFI improves at a more rapid rate than SAIDI there will be an increase in CAIDI. While it was acknowledged that using MAIFI would add perspective on the impact of short duration outages, some participants expressed the concern that it would be costly and impractical to implement.[4]

[4] As noted earlier, distributors are now required to monitor and report on MAIFI, but only to the extent that their systems are capable of doing so.

Some ratepayer representatives supported the use of a “worst performing circuit” metric. However, representatives of distributors cautioned that automated distribution systems can be reconfigured on a regular basis such that the concept of a fixed feeder for which performance can be usefully monitored would not be relevant.

Several stakeholders noted that normalization of performance data (i.e., the exclusion of data related to major events like severe storms) would help standardize reported reliability measures across the province. Many participants suggested that using IEEE Standard 1366 would be appropriate for this purpose. However, other participants were not supportive of using this IEEE Standard, as they would prefer to use an approach similar to that used by Hydro One Networks Inc., which defines a major event as that which effects more then 10% of their customers.

Stakeholder comments indicated strong support for setting performance targets on an individual distributor basis. However, one participant argued that there is value in creating provincial-wide reliability targets to ensure that customers receive similar service in similar circumstances regardless of the service area in which they are located.

Most participants suggested that targets should be based on an average of five years of historic data.

A number of participants suggested that the Board make greater use of reported information on the cause of outages. Some stakeholders suggested that an outage should be measured not only so as to understand its duration but also to understand its origin (controllable, non-controllable, loss of supply, planned).

Both ratepayers and distributor groups suggested that in the future, there should be a move towards indicators and standards that are focused on the impact of outages on individual customers rather than system wide impacts.

There was some support for a restoration standard among representatives of ratepayers. Distributors that commented on this issue were generally opposed to the introduction of such a standard. They commented that the length of an outage can vary considerably based on local circumstances, and that response time is currently reflected in SAIDI (and, by definition, CAIDI) statistics.

A number of participants questioned whether the Board should introduce a penalty/reward system as part of the further development of the Board's system reliability regime. Some ratepayer representatives argued that distributors need to have an incentive to continually improve their systems. However, other ratepayer representatives and distributors expressed the concern that incenting distributors to focus only on a few measures, such as SAIFI and SAIDI, could incent behavior that is inconsistent with good utility practice.

A number of participants, both distributors and ratepayer representatives, suggested that reliability performance relative to established benchmarks should be addressed in rate applications rather than by means of the codification of standards. According to these participants, under a rate-setting approach distributors would be encouraged to look beyond simple statistics in assessing reliability performance and ratepayers would be provided with the opportunity to scrutinize a distributor's capital program with the goal of working towards a constructive approach to resolving any system reliability issues.

# E. DISCUSSION AND RECOMMENDATIONS

## E.1 – Overall Direction

A majority of stakeholders believe that the Board's current reliability regime is adequate for the purpose of maintaining appropriate system reliability levels, at least for the time being, and that the Board should therefore not move to codify reliability standards or performance targets at this time.

Based on the results of this consultation, it appears that there is no widespread sense that consumers are being provided with poor service, and it also appears that consumers prefer the status quo rather than risking an increase in rates for the purpose of funding reliability improvements.

However, Board staff believes that the Board should nonetheless pursue efforts to establish and codify system reliability measures and performance targets. Staff does not agree that system reliability performance should be the exclusive purview of rates proceedings. Staff notes, in this regard, that the manner in which a distributor manages

its system reliability performance has been a topic of review in rates proceedings, especially in terms of the review of asset management plans and capital budgets, and staff expects this to continue to be the case. Staff also expects that the establishment of a formal reliability regime, with consistent and comparable performance data from year to year, will assist the Board in making judgments as to whether a distributor's capital expenditure for reliability purposes is reasonable and justifiable.

The codification of system reliability standards will ensure that distributors maintain an appropriate focus on service quality and on areas where capital investment and improved asset management are most needed. It would also address stakeholder concerns over what they in some cases perceive to be diminishing reliability. In addition, mandatory system reliability standards could alleviate the concern of some stakeholders that incentive regulation provides opportunities to maximize profit at the expense of customer service.

Board staff is mindful of the risk that implementation of a reliability standards regime will continue to be delayed in the face of new priorities that will always be evolving. However, Board staff agrees with stakeholders that the Board will be in a better position to establish reliability measures and performance targets once issues relating to the quality and consistency of system reliability data have been resolved. It appears that, at the present time, there are material inconsistencies in the manner in which distributors interpret the existing reliability indicators and in which they calculate performance results. In addition, there is also some question as to whether all distributors have adequate practices and protocols in place to ensure that reliability data is being collected and recorded properly.

Considerable work has already been done to improve the quality of much of the data that is being reported under the RRR. Staff believes that similar efforts should be undertaken, in consultation with stakeholders, with respect to system reliability data.

Staff also suggests that there are a number of issues that should be the specific focus of consultation with stakeholders in the near term for the purposes of improving the usefulness of reliability data and to assist the Board in its design of a robust and dynamic reliability standards regime. Those issues are discussed in the sections that follow.

## E.2 – Normalization of Data

In order for a system reliability standards regime to be most effective, staff suggests that it is important to establish a consistent approach for normalizing data in light of major events. Staff's review of the reported reliability data indicates that a fair portion of distributors experience a significant change in performance from one year to the next For example, in one case a distributor's SAIDI performance went from 1.69 to 2.29 to 0.89 over three reported years. Staff believes that this type of fluctuation is likely largely the result of a major event experienced on the distributor's system.

Fluctuations of this type make it difficult to determine an appropriate performance target, even one based on 5 years of historical performance. As a result, staff recommends that if the Board establishes a mandatory regime of reliability measures and performance targets, such targets should be based on statistics which exclude major events through the methodology set out under IEEE Standard 1366. The IEEE Standard 1366 is recommended as it is an established methodology that is well recognized in jurisdictions around the world. It is also staff's view that the methodology used in the IEEE standard, (which determines a major event based on an outage which exceeds the average outage duration by certain percentage), to be a more reliable methodology then others that have been purposed.

It should be noted that use of IEEE Standard 1366 would not ultimately 'eliminate' the impact of any outage on reliability performance results, but rather would group outage events into two categories. The first would be performance results which exclude the impact of major events, which would be used to compute the reliability targets. The second category would be reliability performance statistics which include major event days. Distributors would be required to report their SAIFI and SAIDI values for each major event day, along with the cause(s) of major event day outages.

Staff also recommends that under a mandatory reliability regime distributors be required to measure and report their performance both inclusive and exclusive of the impact of major events. This information is still important for assessing a distributor's overall asset management program(s). However, for the ultimate purpose of assessing performance against a codified target, staff recommends that both the performance data and the performance target should be based on normalized data.

## E.3 – Cause of Outages

Staff agrees that the cause of an outage is an important feature of the outage. Staff also believes that outages caused by factors within the control of a distributor are deserving of greater attention from the Board in the context of its regulation of that distributor. Staff therefore recommends that any mandatory reliability standards regime established by the Board include a component that allows the cause of the outage to have some impact on evaluating the performance of the distributor.

Staff acknowledges that distributors have recently been required by the Board to report SAIDI, SAIFI and CAIDI exclusive of loss of supply. Building upon this approach, staff suggests that the Board consider establishing performance targets that are based on outages that are within the control of the distributor rather than targets that are based on all outages.

## E.4 – Customer Specific Measures and Performance Targets

Ontario's reliability regime currently measures *system* reliability, in other words reliability for the entire distribution system. Staff agrees that reliability measures that focus on the frequency and duration of outages experienced by individual customers may be more valuable than outage statistics based on the performance of the entire distribution system. Examples of such measures are "Customers Experiencing Multiple Interruptions" and "Customers Experiencing Long Duration Interruptions".

Staff believes that measures of this kind would be an important element of a robust reliability standards regime, provided that this can be accomplished without imposing a disproportionate burden on distributors. Based on the results of the surveys, reliability levels may have varying degrees of impact on customers depending on the type of customer, and in considering more customer focused types of reliability measures, staff suggest that consideration also be given to performance targets for different customer classes. Staff therefore recommends that these types of measures be explored further for eventual inclusion in a reliability standards regime.

### E.5 – Worst Performing Circuits

Staff recommends that the Board adopt a Worst Performing Circuit measure. This measure is common in other jurisdictions, and can help to focus distributor resources on groups of customers who are receiving service at a level of reliability that is below the system average.

A number of distributors have reported that they currently track their feeder performance through various methodologies. As such, staff does not believe that the introduction of this new measure would place an undue burden on the industry. However, staff does believe that prior to implementation, consultation with the industry would be required to both ensure that a consistent approach is being used to monitor feeder performance and to determine a reasonable performance target.

## F. NEXT STEPS

Board staff's principal recommendation above is that the Board proceed with the establishment and codification system reliability standards. In order to achieve that end, staff believes that the next step should be to engage stakeholders in further consultations aimed at:

1. resolving issues relating to the quality and consistency of reliability data gathered and reported by distributors; and

2. identifying any practical or other implementation issues associated with the introduction of the new elements recommended by staff as described in sections E.2 to E.5 above, as well as the means by which those issues can best be resolved.