

**Board of Commissioners of Public Utilities
Report on Regulatory Performance Measures
for Newfoundland and Labrador Hydro**

Grant Thornton 

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Introduction

Background

Newfoundland and Labrador Hydro (“Hydro”; “the Company”) currently reports several performance indices to the Public Utilities Board (“the Board”) on both a quarterly and an annual basis as part of their ongoing regulatory reporting requirements. The quarterly reports currently include statistics for System Average Interruption Frequency Index (SAIFI), System Average Restoration Index (SARI) and System Average Interruption Duration Index (SAIDI). In addition, the indices reported on an annual basis include Derating Adjusted Forced Outage Rate (DAFOR), Weighted Incapability Factor and Customer Satisfaction Index. These performance measures primarily focus on the reliability of the Company’s service and, while the Board receives financial information from Hydro on a quarterly and annual basis which it uses to monitor financial performance, there are other financial performance measures/statistics available which can be of additional benefit to the Board.

The Board has certain legislated responsibilities for oversight and monitoring of the Province’s electrical utilities as set out in the Public Utilities Act and the Electrical Power Control Act. As per Section 3 (b) of the Electrical Power Control Act, the Board is responsible for ensuring that *“the production, transmission and distribution of power in the province should be managed and operated in a manner: (i) that would result in the most efficient production, transmission and distribution of power, (ii) that would result in consumers in the province having equitable access to an adequate supply of power and (iii) that would result in power being delivered to consumers in the province at the lowest possible cost consistent with reliable service.”* With respect to the *adequacy of the supply of power*, the reliability performance measures described above can assist the Board in monitoring how Hydro is performing. However, with regard to the *most efficient production, transmission and distribution of power or the delivery of power at the lowest possible cost*, there are additional performance measures available which can be reported to the Board and used to monitor how Hydro is performing. This issue became more apparent during

the 2001 general rate hearing, when there was considerable attention devoted to the level of controllable expenses at Hydro and the degree to which those expenses reflected efficiencies in the Company's operations.

After hearing and reviewing the evidence on operating efficiencies and performance measures in the 2001 general rate hearing, the Board identified certain concerns and findings which are expressed in P.U. 7 (2002-2003) at pages 73 and 74. It is in this context that the Board requested Grant Thornton LLP to work with Hydro to recommend suitable regulatory performance standards to be used to measure operating efficiencies at Hydro. These measures would then be incorporated as part of the Company's ongoing reporting to the Board.

Scope of review

Our approach to the identification and review of regulatory performance measure for Hydro was as follows:

- review performance measures currently reported to the Board and other background information;
- meet with Hydro to obtain information on their activity and plans with respect to monitoring and reporting key performance indicators (KPI's);
- review suitability of KPI's proposed by Hydro; and
- research other industry performance measures to determine whether appropriate for regulatory reporting.

With respect to research on industry performance measures, our primary source of information was a Canadian Electrical Association (CEA) database report which was provided for reference purposes to us by Hydro. This database report was prepared by a CEA Committee on Corporate Performance and Productivity Evaluation (COPE). The COPE database includes a significant number of industry KPI's that can be used to assess operational efficiency and performance.

Hydro's KPI Initiative

Prior to the commencement of the 2001 hearing, Hydro had initiated an internal project dealing with key performance indicators (KPI's). This internal project continued through the fall of 2001 while the hearing was in progress, however, it had not progressed to the stage where information could be brought forward to the Board.

The Company's study of key performance indicators originated from its Strategic Planning Process. In the strategic plan one of the Company's goals is to "optimize corporate performance". In July, 2001, Hydro formed an Ad Hoc KPI Committee to facilitate and lead the KPI project. This committee was chaired by Christine Stratton (Manager, Financial Services) and consisted of six other employees from various parts of the Company. The key terms of reference and objectives of the Ad Hoc Committee included:

- minimize the number of KPI's to allow a focus on a smaller number of key measures;
- ensure that the Company is COPE compliant and that its KPI's are consistent with the information provided in the Canadian Electrical Association study, to the extent possible; and
- encompass and balance all critical aspects of the Company's operations, including operational, financial, safety and environmental measures.

By October 2001 this Ad Hoc Committee had identified a short list of KPI's. Around the same time the Information Systems department had developed a prototype intranet site for reporting and monitoring the KPI information (KPI Dashboard).

In April 2002 Hydro established a KPI Steering Committee to facilitate review of the project and provide feedback to the Ad Hoc Committee. This Steering Committee was chaired by Mark Bradbury (Director, Finance) and originally included three other senior employees. This committee was later expanded to eight members when the Ad Hoc Committee was wound up.

The mandate of this committee was to act as a liaison for the respective divisions in reviewing the KPI's as identified and recommended by the Ad Hoc Committee. The key terms of reference for the Steering Committee included:

- prepare KPI definitions;
- assess whether KPI's presented by the Ad Hoc Committee are value added;
- ensure consistency with the CEA COPE database;
- prioritize any new KPI's;
- update Senior Management Group on the status of the KPI project;
- establishing accountability framework;
- consider communication implications; and
- guide the activities of the Ad Hoc Committee.

The mandate of the KPI Steering Committee was later revised to include responsibility for facilitating development of new KPI's and to include responsibility for CF(L)Co. The terms of reference were also revised to include:

- develop guidelines for use by line management to assess whether KPI's are value added; and
- promote and prioritize the development of new KPI's.

The Ad Hoc KPI Committee and the KPI Steering Committee made significant progress on this project through 2002 and early 2003. The work of these committees was extensive and detailed. It included identification of appropriate KPI's, an in-depth review of certain performance measures, development of definitions and reporting and accountability frameworks, etc. Based on our review and discussions with Hydro staff we conclude that the work undertaken on this project was comprehensive.

In October of 2002 Grant Thornton met with the senior management of Hydro and were given a briefing on the KPI project and the progress which had been made to that date. It was following

this meeting that we began working with Hydro staff on the identification of suitable regulatory performance standards to be used to measure operating efficiencies at Hydro. Obviously, as part of the work completed to that point, the Company had considered which performance measures or KPI's may be suitable for the Board versus which were more suitable for use internally by management.

Review of Key Performance Indicators

As part of their identification and assessment process, Hydro had broken down the KPI's into three categories:

1. performance measures currently reported to the Board;
2. performance measures which may be suitable for the Board from a regulatory perspective (these would also be relevant for internal use by management); and
3. performance measures which would be more relevant for internal use.

As the objective of our report is to identify and recommend performance measures suitable for regulatory purposes, we have not reviewed in detail nor commented on the KPI's which are considered more relevant for internal use. The following sections of our report deal with the KPI's currently reported to the Board and the proposed new KPI's.

KPI's Currently Reported to the Board

As noted in the introduction, the performance measures currently reported to the Board include:

- SAIDI (System Average Interruption Duration Index)
- SAIFI (System Average Interruption Frequency Index)
- SARI (System Average Restoration Index)
- DAFOR (Derating Adjusted Forced Outage Rate)
- Weighted Incapability Factor
- Customer Satisfaction Index

These performance measures or indices are described in more detail in Appendix A. These measures are widely used within the industry and consequently lend themselves to inter-utility comparisons. We recommend that these performance measures continue to be reported in the manner and frequency in which they have historically been provided to the Board.

KPI's Proposed to be Reported to the Board

Hydro had identified a number of KPI's which they suggested would be of value and interest to the Board from a regulatory perspective. The KPI's originally proposed were:

- Thermal conversion factor
- Hydraulic conversion factor
- Corporate OM&A per MWh

In the course of our review we considered the above measures as well as the fairly extensive list of KPI's included in the CEA COPE study. Within the COPE database there are a number of KPI's which are either not relevant or inappropriate for Hydro. Of the remaining KPI's, the ones we believe are most appropriate and suitable from a regulatory perspective are certain departmental OM&A performance measures. Based on this assessment, we held additional discussions with Hydro staff and after further consideration they have agreed to the following additional KPI's:

- Generation OM&A per MWh
- Transmission OM&A per km of transmission line
- Distribution OM&A per rural customer (or per km of distribution line)

A brief summary of each of the recommended KPI's follows.

Thermal Conversion Factor

The thermal conversion factor is a measure of how efficiently oil is converted to electricity in a thermal plant. In Hydro's case this is the same as the "Holyrood efficiency factor" which was reviewed and discussed during the 2001 hearing. This factor is calculated as the mega-watt hours generated per barrel of oil (MWh/barrel). This KPI is a good indicator of the efficiency of the Company's thermal power plant at Holyrood. The COPE study does not include a similar key performance indicator for the industry, consequently no data would be available for inter-utility comparisons. However, considering the importance of the Holyrood plant to Hydro's operations, this KPI would be of value to the Board in monitoring thermal generating efficiency.

We recommend that Hydro report its Thermal Conversion Factor to the Board on an annual basis.

Hydraulic Conversion Factor

The hydraulic conversion factor is a measure of how efficiently water is converted to electricity at a hydro generating facility. This factor is calculated as the mega-watt hours generated per million cubic metres of water (MWh/MCM). This KPI is a good indicator of the efficiency of the Company's various hydro generating facilities. Similar to the thermal conversion factor, this measure is not noted in the COPE study and therefore inter-utility comparisons would not be available. However, we believe this KPI would be beneficial to the Board in monitoring efficiency of Hydro's hydraulic generating plants.

We recommend that Hydro report its Hydraulic Conversion Factor to the Board on an annual basis.

Corporate OM&A per MWh

This KPI quantifies the overall corporate controllable operating, maintenance and administration expenses per MWh delivered to customers. The definition of “controllable operating, maintenance and administration expenses” does not include power purchases, fuel, depreciation and interest. The COPE database includes a KPI measuring OM&A per GWh delivered to customers, consequently inter-utility comparisons would be possible. An adjustment for the difference in measurement base (i.e. MWH vs. GWh) would be straight forward.

As previously noted, one of the responsibilities of the Board is to ensure that power is being delivered to consumers in the province at the lowest possible cost consistent with reliable service. This KPI will be beneficial to the Board in monitoring efficiency from a cost perspective keeping with the premise of delivery of power at lowest possible cost.

We recommend that Hydro report its Corporate OM&A per MWh to the Board on an annual basis.

Generation OM&A per MWH

The generation OM&A unit cost quantifies the operating, maintenance and administration costs for generation business units per MWh generated. This calculation does not include depreciation, interest or fuel. In the COPE study, there is a measure under “power supply” called the generation unit cost. This also measures generation costs per MWh generated and should provide for industry comparisons.

In our discussions with Hydro on this measure we initially requested they consider breaking down this category further between thermal generation and hydraulic generation. They advised that this breakdown would not be meaningful because of complications arising from decisions relating to the hydro/thermal generation mix. Fluctuations in production levels can impact the

KPI measured at the plant level, yet those fluctuations will have little to do with productivity or efficiency. We accept Hydro's concerns and agree that distortions in the KPI caused by generation mix would diminish the value of such a measure in assessing efficiency.

We recommend that Hydro report its Generation OM&A per MWh to the Board on an annual basis.

Transmission OM&A per km of transmission line

The transmission OM&A unit cost quantifies the operating, maintenance and administrative costs for transmission business units per kilometre of transmission line. In the COPE study there is a similar measure known as the OM&A cost per 230 kV equiv km. This is calculated by taking the total operations and maintenance cost and dividing it by the total 230kV equivalent circuit in kilometers. This measure is noted in the study as a significant industry measure. It indicates the amount of OM&A dollars that are used to support the transmission plant.

We believe that this departmental OM&A performance measure would be of value to the Board in monitoring the efficiency of Hydro's transmission business units.

We recommend that Hydro report its Transmission OM&A per kilometre of transmission line to the Board on an annual basis.

Distribution OM&A per customer (or per km of distribution line)

The distribution OM&A unit cost quantifies the operating, maintenance and administrative cost for TRO distribution units per number of rural customers. Hydro was considering whether to calculate the distribution KPI on a per customer basis or per kilometre of distribution line. In the COPE database there is a performance measure called Distribution Cost per Customer which measures the total distribution cost (excluding taxes) per the number of distribution customers

that are less than 60kV. This is noted as a significant industry performance measure, however it includes capital costs in the calculation which lessens its effectiveness as a measure of operational efficiency. There is also a KPI in the COPE database called Distribution OM&A cost per circuit km which measures the distribution operations and maintenance costs per distribution circuit length in kilometers. This indicator is a gauge of the maintenance costs relative to the size of the distribution system. The problem with both of these measures is that Hydro's distribution system serves rural areas and customers only and therefore the industry data available from COPE database may not be useful in either case for comparative purposes.

Considering the impact that out-migration may have on the population and customer base in rural Newfoundland, using a KPI based on the number of rural customers may not produce good data for monitoring Hydro's performance and efficiency. A KPI based on distribution circuit length should eliminate any distortion and produce a more consistent result for monitoring purposes.

We recommend that Hydro report its Distribution OM&A per kilometre of distribution line to the Board on an annual basis.

Benchmarking

Hydro is using KPI's as developed to date as a measure of current performance against historical performance in keeping with their goal of continuous improvement. We agree that comparing current performance to past performance can be very useful and effective for purposes of monitoring efficiency and targeting improvements. However, this approach has its limitations in that it focuses inwardly and ignores what may be happening in the industry overall in terms of productivity improvement. We believe that some benchmarking of KPI's to industry data or specific inter-utility comparisons would be appropriate and could provide value to the Board from a regulatory perspective. We have discussed this issue with Hydro staff who have indicated that they are not opposed to benchmarking but caution that such comparisons can be misleading

due to significant differences in operating constraints between utilities, coupled with differences in cost driver components comprising the actual measurement base. Hydro suggests that any proposed comparisons would require a careful analysis to ensure such anomalies have been properly accounted for.

We agree with Hydro's comments with respect to the risk that certain comparisons may be misleading unless any anomalies are properly considered and accounted for. However, we believe that industry or inter-utility comparisons combined with internal benchmarking would provide better data for purposes of monitoring performance and targeting continuous improvement.

We recommend that Hydro review and propose to the Board the industry or inter-utility comparisons it considers appropriate for all recommended KPI's.

Summary

After reviewing the performance measures currently reported to the Board, the measures proposed by Hydro and other industry performance measures included in the CEA COPE database and also discussing the appropriateness of these measures with Hydro, we recommend that the following key performance measures be reported to the Board:

• SAIDI (System Average Interruption Duration Index)	• Thermal conversion factor
• SAIFI (System Average Interruption Frequency Index)	• Hydraulic conversion factor
• SARI (System Average Restoration Index)	• Corporate OM&A per MWh
• DAFOR (Derating Adjusted Forced Outage Rate)	• Generation OM&A per MWh
• Weighted Incapability Factor	• Transmission OM&A per km of transmission line
• Customer Satisfaction Index	• Distribution OM&A per customer (or per km of distribution line)

Historical data on the recommended KPI's should be reported to the Board along with performance targets that may be set by Hydro from time to time in order to facilitate the Board's monitoring of operational efficiencies. This process of comparing current information to historical data and targets is in effect internal benchmarking.

We believe that external benchmarking of Hydro KPI's to industry data or specific inter-utility comparisons would be of value to the Board from a regulatory perspective. Therefore, we recommend that Hydro review and propose to the Board the specific industry or inter-utility comparisons it considers appropriate for all recommended KPI's.

KPI's Currently Reported To The Board

SAIDI (System Average Interruption Duration Index)

The Company currently reports SAIDI based on the average duration of the delivery point interruptions (bulk power system delivery performance) by voltage class and the average interruption duration (in hours) per customer for the isolated and interconnected systems Rural Systems. The index for the Rural Systems is reported in several variations; it is reported by area (Central, Northern and Labrador); by origin (ie loss of supply from transmission, loss of supply from Newfoundland Power, etc); and by type (scheduled vs unscheduled).

According to the 2000 COPE study, this measure is quantified in average minutes per year or average hours per year. In addition, it is noted as being one of the key indicators in evaluating performance in the transmission, distribution and customer service business units. It is a measure of the reliability of the Company's service and it is currently reported to the Board on a quarterly basis.

This key performance indicator is used by the electrical utility industry across Canada and we recommend that Hydro continue to report this to the Board on a quarterly basis.

SAIFI (System Average Interruption Frequency Index)

The Company also reports this index for the bulk power system delivery points and for the performance of the Rural Systems. For the bulk power system, SAIFI measures the average number of interruptions per delivery point. The index for the Rural Systems measures the average number of interruptions per customer, and as indicated above the Company reports this index in three different categories.

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Consistent with the SAIDI measure, the use of SAIFI is one of the significant measures identified by COPE for evaluating performance of the customer service, distribution and transmission business units. This index is a measure of the reliability of the Company's service and it is currently reported to the Board on a quarterly basis.

This key performance indicator is used by the electrical utility industry across Canada and we recommend that Hydro continue to report this to the Board on a quarterly basis.

SARI (System Average Restoration Index)

This measure quantifies the average duration of each interruption experienced during the period. It is calculated by dividing the period SAIDI value by the period SAIFI value. The SARI index measures the average number of hours per service interruption. The Company only calculates this index for the bulk power system. Although it is not mentioned in the COPE study, it is a useful measure because it also evaluates the reliability of the Company's service. This indicator notes if the duration of the power outages of the Company is becoming excessive. The SARI index is currently reported to the Board on a quarterly basis.

We recommend that Hydro continue to report this performance measure to the Board on a quarterly basis. It is a simple calculation based on the SAIFI and SAIDI indices and it provides additional information on the reliability of the Company's service.

DAFOR (Derating Adjusted Forced Outage Rate)

This measure quantifies forced outage time relating to generation facilities and the Company currently calculates this index separately for hydraulic and thermal generation. It is reported to the Board on an annual basis along with the five year average from the Canadian Electricity Association (CEA). Again, this is another indicator of reliability of the Company's service as it measures the reliability performance of the generating units in the system with respect to forced outages and deratings. There is no provision in this indicator for the affect of planned outages or

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maintenance on the availability of a unit. This indicator is recommended by the COPE study as a significant measure of performance for the power supply business unit (generation). The measurement represents a percentage of time, and the lower the percentage, the more favorable DAFOR. The forced outages required by the Company can be impacted by the age of equipment, the company maintenance practices and the policy on unit refurbishment.

This performance indicator is recommended by the COPE study as a significant measure when reporting performance for the power supply business unit. We recommend that Hydro continue to report this on an annual basis because it can aid the Board when assessing the reliability of service.

Weighted Incapability Factor

This measure quantifies the percentage of time that a generating unit can not operate at maximum rating. The Company currently calculates this index for the hydraulic, thermal and gas turbine generation and it is reported to the Board on an annual basis along with the five year CEA average. This factor is the ratio of the total equivalent outage time over the total hours in a year. The total equivalent outage time is the sum of the forced outage time plus the planned and maintenance outages plus adjusted de-rating times. The adjusted de-rating times take into account the loss of capacity when a unit is operating below its normal operating capacity. A lower percentage means that there is less inefficiency or more efficiency in the Company's generating system because the number of outage hours is decreasing.

The COPE study makes reference to a Weighted Capability Factor which is defined as "1- the Incapability Factor", which would mean that the higher the percentage the more efficiency in the Company's generating system. Therefore, the outcome of both measures is providing similar information. The COPE study considers this indicator as a significant performance measure for power supply business units.

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The weighted capability factor is recommended by the COPE study as a significant measure when reporting performance for the power supply business unit. As indicated above, the factor used by COPE and the one used by the Company provides similar information and therefore we recommend that Hydro continue to report the weighted incapability factor to the Board as it provides useful information on the Company's generation performance.

Customer Satisfaction Index ("CSI")

This measure quantifies the weighted average of satisfaction ratings for each service attribute (Hydro's survey includes 16 attributes). Hydro started using the residential survey in 2000, and the first year for the commercial survey was 2002. According to the COPE study, this is a significant measure for overall corporate performance and it is measured on a scale of one to ten with one meaning not at all satisfied and ten meaning extremely satisfied. The customer satisfaction index is a strong indicator for the Board on how the Company is servicing its customers.

In Hydro's Quarterly Report for December 31, 2002, it was noted that the Company's CSI for residential customers for 2002 was 8.1, an improvement from 2001 of 7.9, and slightly above the CEA 2002 index for electric utilities of 7.9.

Based on the fact that the level of customer satisfaction is a key indicator of company performance, particularly as it relates to reliability of service, we recommend that Hydro continue to report to the Board on an annual basis the results of its customer satisfaction surveys.