Q. New Combustion Turbine: Please provide the orders, decisions, and other documents arising from or in response to the Board within the past ten years that set forth or describe the supply planning criteria to which Hydro has been expected by the Board or stakeholders to design and operate the Island Interconnected System and any such documents prior to ten years that Hydro believes continue to bear on such expectations and criteria through to the present.

A. Hydro has presented the supply planning criteria it uses to the Board many times in many documents, such as annual Generation Planning Issues reports, annual Capital Budget applications, many documents associated with the Muskrat Falls process and General Rate Applications. For example, from the Regulated Activities section of the 2006 General Rate Application, Page 28:

> **5.4 New Power Supply**
> In order to ensure the future capacity and energy requirements of the Island Interconnected System are met in a reliable and cost effective manner, Hydro regularly prepares long-term load forecasts for the provincial power grids and maintains a portfolio of projects with various levels of engineering feasibility.
>
> The Company's assessment on the timing for the requirement for new investment for the Island Interconnected power supply and associated facilities is based on previously established generation planning criteria. These criteria set the minimum level for reserve capacity and firm energy to ensure an adequate power supply to meet the grid's firm load requirements. These criteria are:
>
> > Energy: The Island Interconnected System should have sufficient generating capability to supply all of its firm energy requirements with firm system capability.

> Capacity: The Island Interconnected System should have sufficient generating capacity to satisfy a Loss of Load Hours ("LOLH") expectation target of not more than 2.8 hours per year.

Note that these are the exact same criteria for capacity and energy that Hydro presented in Volume I of the *Newfoundland and Labrador Hydro 2013 Amended General Rate Application*, filed November 2014. Section 2.5.4 New Power Supply, Page 2.6 states:

> **2.5.4 New Power Supply**
> In order to ensure that the future capacity and energy requirements of the Island Interconnected System are met in a reliable and cost effective manner, Hydro regularly prepares long-term forecasts for the provincial power system and maintains a portfolio of projects with various levels of engineering feasibility.
>
> The Company's assessment on the timing of the requirement for new investment for the Island Interconnected power supply and associated facilities is based on previously established generation planning criteria. These criteria set the minimum level for reserve capacity and firm energy to ensure an adequate power supply to meet the grid's firm load requirements. These criteria are:
>
> > Energy: The Island Interconnected System should have sufficient generating capability to supply all of its firm energy requirements with firm system energy capability; and
> >
> > Capacity: The Island Interconnected System should have sufficient generating capacity to satisfy a LOLH expectation target of not more than 2.8 hours per year.

These same criteria have been used for many years. Hydro's response to PUB-NLH-056 from the *Investigation and Hearing into Supply Issues and Power Outages on the Island Interconnected System* proceeding (attached as PR-PUB-NLH-005 Attachment 1) gives a history of the development of Hydro's supply planning criteria and indicates various reviews of the criteria by outside parties.

As noted in PR-PUB-NLH-005 Attachment 1, Hydro has engaged an outside consultant (Ventyx) to review its generation planning practices. Ventyx has provided its report and Hydro is operating under the recommendations provided.

PUB-NLH-056
Island Interconnected System Supply Issues and Power Outages

Q. Further to the response to PUB-NLH-008, state the date(s) the criteria used for generation source additions was last reviewed by Hydro. In the response state whether Hydro is of the opinion it should be reviewed in light of Hydro's aging infrastructure and when is the appropriate time to review this criteria.

A. Hydro's generation source additions criteria have been in use for over 35 years and in that period they have been reviewed on a number of different occasions and found to provide a good balance of reliability versus cost.

Before 1977, there were no approved long-term reliability criteria for generation planning in Hydro. The basis of the current criteria is a report, *Recommended Loss of Load Probability (LOLP) Index for Establishing Generation Reserve Additions*, System Planning Department, May 16, 1977. In that report, a LOLP of 0.2 days per year, or 1 day in 5 years was established. In 1997, when Hydro replaced the SYPCO generation planning software with ProScreen II (now renamed Strategist) generation planning software, it was necessary to switch to a Loss of Load Hours (LOLH) criterion. Benchmarking established that a LOLH of 2.8 hours per year was equivalent to a LOLP of 0.2 days per year, for Hydro's system. From that point onward, Hydro established the capacity criteria that the Island Interconnected System should have sufficient generating capacity to satisfy an LOLH expectation target of not more than 2.8 hours per year.

In 1991, at the direction of the Board, George C. Baker, a consultant working for Hiltz and Seamone Company Limited carried out a study and produced a report - *Report on the Technical Performance of Newfoundland & Labrador Hydro* - October 2, 1991. On page 9 of the report, in Section *7 System Planning,* it states:

Hydro uses two criteria for generation planning in its interconnected system.
(a) Sufficient production capacity to meet all needs under firm water conditions (lowest recorded flows), and
(b) A loss of load expectancy of one day in five years.

The first criterion is usual for utilities with significant dependence on hydraulic generation. The second differs from the one-day-in-ten-years LOLE[1] adopted by many utilities.

The main reason for permitting a higher LOLE is economic. Hydro, unlike almost every other major utility, is an isolated system. Other utilities can, and do, rely on capacity support from interconnected utilities in meeting the one-day-in-ten-years criterion. Hydro cannot do this, and would have to maintain a much higher generation reserve. Hydro believes the costs of doing so would not be justified by the difference in reliability. The Consultant agrees.

In 1999, at the direction of the Board, Quetta Inc. and Associates carried out a study and produced a report *Technical Review of Newfoundland and Labrador Hydro Final Report* March 17, 1999. On page 23 of the report, in Section *2.1.3.2 Capacity*, it states:

The Island Interconnected System should have sufficient generating capacity to satisfy a Loss of Load Expectation (LOLE) target of not more than 2.8 hours per year. This is equivalent to 0.2 days/year or 1 day in five years. It results in a capacity reserve requirement of 18%.

[1] Loss of Load Expectation. LOLE is another way of stating LOLP and the two are equivalent.

The LOLE capacity criterion is somewhat less stringent than that employed by large interconnected systems in the rest of North America (one day in 10 years or 0.1 days/year). Considering the non-interconnected status of the Island's electric utility system, (reserve sharing is not an option) the cost of providing higher reliability level is probably in excess of the benefits to be derived.

Quetta is of the opinion that the capacity and energy criteria are reasonable in the circumstance.

Most recently, the criteria were reviewed in the *Report on Two Generation Expansion Alternatives for the Island Interconnected Electrical System – Volume 2: Studies January 2012*. This report was prepared for the Board by Manitoba Hydro International. In the report, *Section 3 – Reliability Studies* runs from page 57 to page 71. *Section 3.11 – Conclusions and Findings*, page 70, states the following:

Available documentation for reliability assessment performed by Nalcor has been reviewed by MHI. The adequacy criteria of 2.8 hours/year of loss of load expectation for resource planning, which considers both generation resource availability and economics, appears reasonable when compared to practices of other operating utilities.

As part of its internal review of recent events, Hydro has engaged an outside consultant (Ventyx) to review its generation planning practices. One of the areas to be reviewed is the criteria used for generation source additions. As well, in light of Hydro's aging infrastructure, it is also appropriate to review the inputs to the generation expansion model, such as the current and expected forced outage rates of Hydro's generating units. These will also be reviewed.