Q. Further to the response to PUB-NP-036, explain in detail the implications of Newfoundland Power having to run its generation more frequently in the future than the past to meet the Island Interconnected system load.

A. ***General***

In the response to Request for Information PUB-NP-036, Newfoundland Power advised that during December 2013 and January 2014, Newfoundland Power was required to run its generation plants more frequently.[1] This is an increase from historical experience.[2]

Increased use of Newfoundland Power generation during the winter season potentially affects the Company's management of these facilities in at least three ways. The first relates to the management of the water resources associated with hydroelectric generating plants. The second relates to fuel storage for thermal generating plants. The third relates to system expectations for availability of some of the Company's thermal generating plants.

Hydroelectric Generation

Newfoundland Power's hydroelectric generating plants have a limited amount of storage. Throughout the winter season there are generally fewer inflows to the storage and river systems than at other times of the year. As a result of these dynamics, greater use of the available storage early in the winter season will practically mean there is less water available to operate the hydroelectric generating plants later in the winter season.[3]

If Newfoundland Power is to run its hydroelectric generation plants more frequently in future winter periods, then it will be required to re-examine its water management practices. For example, the Company currently manages its water resources to avoid spills. Higher storage levels prior to the winter season will provide increased plant availability and capacity but will also increase the risk of spill. Increasing the water storage available (ie. by increasing the number of dams or the height of existing dams) would also increase plant availability and capacity. Evaluating options such as these will be the purpose of the re-examination of water management practices.

[1] Newfoundland and Labrador Hydro ("Hydro") requested Newfoundland Power to run its generation resources on 29 days in December 2013 and January 2014. Hydro typically requests Newfoundland Power to run its generation for a number of reasons. One is economic dispatch for the Island Interconnected System. Another is peak management. A third is to relieve short-term system limitations (i.e. voltage support).

[2] Historically, Newfoundland Power has run its 97.5 MW of hydroelectric generation to support peaks in the December-March winter period. Without a change in water management practices for these facilities, the additional demands upon this generation imply a reduced future capacity to support peak system demand through the winter period.

[3] This reduction in available water has two consequences. Firstly, lower storage results in reduced plant availability to generate electricity. Secondly, lower storage results in lower power output as a result of lower head pressure. In a hydroelectric plant, the power produced from the flow of water depends on the difference in elevation between the water storage and the generator. This difference in elevation is called the *head*. The actual power produced from the flow of water is proportional to the head. Reduced storage results in a reduced head which, in turn, reduces the power produced by the generator.

For the remainder of the current winter season, Hydro has agreed to differentiate requests for Newfoundland Power's hydroelectric generation between (i) requests for economic purposes; and (ii) requests for additional capacity to support the Island Interconnected System.[4] When requested to provide hydroelectric generation for economic purposes, Newfoundland Power will review water storage levels to ensure its hydroelectric generation will be available to respond to requests to support the Island Interconnected System.

Thermal Generation

Newfoundland Power operates 3 gas turbine generators.[5]

During the January 2-8, 2014 period, Newfoundland Power's Greenhill gas turbine was unavailable for a period due to lack of fuel. The increased use of Newfoundland Power's thermal generating plants during this period justifies re-examination of the adequacy of current fuel storage capabilities.

Newfoundland Power's gas turbines range in age from 39 years to 45 years.[6] Historically, these plants have been used to support system peaks for very limited periods of time each year, to allow for system maintenance in their areas, and to provide backup in the event of localized outages. Increased use of the gas turbines in December 2013 and January 2014, is a significant change in usage.[7] Newfoundland Power's 2014 Five Year Capital Plan included budgetary cost estimates for the overhaul of the Greenhill gas turbine in 2017 and the Wesleyville gas turbine in 2018. The timing, estimated scope and cost estimates for these overhauls were based upon the historical level of usage of the units. Condition assessments for the Company's gas turbines in light of potential increased use will be necessary to ensure their continued availability to support the Island Interconnected System.

[4] By requesting Newfoundland Power to operate its hydroelectric generation, Hydro is able to minimize costs associated with using more fuel at its Holyrood Thermal Generating Station. Newfoundland Power and Hydro agreed to this arrangement on February 13, 2014.

[5] These include the Greenhill gas turbine located on the Burin Peninsula, the Wesleyville gas turbine located in the Bonavista North area, and the mobile gas turbine which is currently located at Hydro's Holyrood Thermal Generating Station.

[6] The Greenhill gas turbine is 39 years old, the Wesleyville gas turbine is 45 years old and the mobile gas turbine is 40 years old.

[7] The rate of wear in a gas turbine is significantly affected by the number of times the turbine is stopped and started as each stop/start cycle involves extreme temperature changes and material expansion and contraction within the turbine. See, for example, *Technology Characterization: Gas Turbines* prepared for the Environmental Protection Agency, Washington DC, December 2008 at page 18.