

1 Q. What level of control during a system emergency does Hydro have over generation  
2 that it does not own on the Island?

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5 A. As indicated in Hydro's response to PUB-NLH-070, Hydro has a Generation Shortage  
6 Protocol that it follows for normal generation loading sequences and in the event  
7 that there is a generation shortage on the Island Interconnected System. This  
8 Protocol has been updated and is attached as CA-NLH-008 Attachment 1 (Revision  
9 1).

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11 Under the normal generation loading sequence, Hydro will first maximize its own  
12 hydroelectric generation and the generation at the Nalcor facilities on the Exploits  
13 River and Star Lake<sup>1</sup>. Hydro will then request that Newfoundland Power (NP) and  
14 Deer Lake Power (DLP) maximize their hydroelectric generation. Hydro has this  
15 ability through the respective generation credit arrangements with each of these  
16 Customers.<sup>2</sup> Following requests to NP and DLP, Hydro will then call on all other  
17 hydroelectric Non-Utility Generators (NUGs)<sup>3</sup> to maximize their generation to the  
18 extent that it may be available. These steps occur early in the sequence and are  
19 taken prior to increasing Holyrood generation to levels higher than what would  
20 otherwise be required for transmission support for the Avalon Peninsula.

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22 Following the steps of loading Holyrood its maximum capability and calling on  
23 customers to interrupt non-firm (Industrial Customers) and curtailable (NP) load,

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<sup>1</sup> Hydro monitors and has full control to dispatch the generation at Exploits and Star Lake as if it were owned by Hydro.

<sup>2</sup> Deer Lake Power is owned and operated by Corner Brook Pulp and Paper Limited.

<sup>3</sup> The non-hydroelectric NUGs (the wind farms and the Corner Brook Pulp and Paper Co-gen) are non-dispatchable.

1 Hydro will then dispatch standby generation. As the protocol indicates, Hydro and  
2 NP standby units are started and loaded in order of increasing average energy  
3 production cost with due consideration for unit start-up time. Again, Hydro has the  
4 ability to call on NP standby generation through the generation credit arrangements  
5 with that Customer.



**SYSTEM OPERATING INSTRUCTION**

<b>STATION:</b> GENERAL	<b>Inst. No.</b> T-001
<b>TITLE:</b> GENERATION RESERVES *, **	<b>Page</b> 1 <b>of</b> 5

**INTRODUCTION**

In order to ensure that customer service is maintained, the Energy Control Centre (ECC) shall exercise its authority to reduce risks to the generation supply and maintain sufficient generation reserves to meet current and anticipated customer demands. The ECC shall be prepared to deal with generation shortages and take appropriate actions in order to maintain the reliability of the Island Interconnected System.

*Generation reserve*<sup>1</sup> is required to replace generation capacity lost due to an equipment forced outage, to cover performance uncertainties in generating units or to cover unanticipated increases in demand. Sufficient generation reserve is required to meet current and forecasted demands under a contingency of the largest generating unit.

**PROCEDURE**

A. Calculation of *Available Generation Reserve*<sup>2</sup>

Available generation reserve shall be calculated for the current day and the following six days in the manner as indicated below:

$$\begin{aligned}
 &\text{Available Generation Reserve for each day} = \\
 &\text{Available Generation of NLH (Hydro + Thermal + Standby}^3 + \text{Purchases}^4); \text{ plus} \\
 &\text{Available Generation of NP (Hydro + Standby); plus} \\
 &\text{Available Generation of DLP (60 Hz Hydro); plus} \\
 &\text{Capacity Assistance of Vale (Standby)}^5; \text{ less} \\
 &\text{Forecasted Island Peak Load (adjusted for CBPP Capacity Assistance}^6 \text{ and Voltage} \\
 &\text{Reduction}^7)
 \end{aligned}$$

<sup>1</sup> *Generation Reserve* is defined as the quantity of available generation supply that is in excess of demand, and includes spinning reserve<sup>8</sup>. It is equal to Available Generation Supply less Current / Forecasted Demand.

<sup>2</sup> *Available Generation Reserve* is associated with generation that is in service or standby generation that can be placed in service within 20 minutes. NP's mobile generation may take up to 2 hours to place in service.

<sup>3</sup> *Standby* generation includes combustion turbine / diesel generation.

<sup>4</sup> *NLH Purchases* includes wind for the current day based on actual wind output, but assumes no wind generation for the following six days.

<sup>5</sup> *Capacity Assistance* (when available) from Vale through operation of standby diesel units with a combined capacity of 10.8 MW.

<sup>6</sup> *Capacity Assistance* (when available) from CBPP through load interruption in 20, 40 or 60 MW blocks.

<sup>7</sup> Up to 20 MW of load reduction (on peak) is expected to be achieved through the *Voltage Reduction* strategy.

<sup>8</sup> *Spinning reserve* is defined as unloaded generation that is synchronized to the power system and ready to serve additional demand.



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**PROCEDURE** (cont'd.)

B. Assessment and Notification of Available Generation Reserve

The available generation reserve will be calculated for the current day and the following six days and an assessment will be made against the criteria in the table below and a notification will be issued to stakeholders when available generation reserve is below the stated thresholds.

<u>Available Reserve</u>	<u>Expected Action</u>	<u>Level</u>
> Largest Generating Unit + min. spinning reserve	none	0
< Largest Generating Unit + min. spinning reserve	Prepare for Potential Load Reduction	1
< Largest Generating Unit	Load Reduction	2
< ½ Largest Generating Unit	Conservation	3
Zero/deficit; hold f=59.8 Hz	Rotating Outages	4

Based on the assessment above, perform the following:

- Level 0 - If the available reserve is anticipated to be greater than the largest available generating unit capacity plus minimum spinning reserve, the ECC are not expected to perform any further actions, other than to advise the on-call Executive member (Exec On-call) of NLH's Corporate Emergency Response Plan (CERP), Corporate Relations and Newfoundland Power that available reserve has returned to normal following a prior Level 1, 2, 3 or 4 notice.
- Level 1 - If the available reserve is anticipated to be less than the largest available generating unit capacity plus the minimum spinning reserve, the ECC will notify Newfoundland Power's Control Centre, advising of possible requirements for load reduction to maintain sufficient spinning reserve, if the available generation reserve should decrease.
- Level 2 - If the available reserve is anticipated to be less than the largest available generating unit capacity, the ECC will notify Exec On-call (CERP)<sup>9</sup>, Corporate Relations<sup>10</sup> and Newfoundland Power, advising of load reduction strategies to maintain sufficient spinning reserve, if the generation shortfall is not corrected.

<sup>9</sup> As part of the CERP, the Exec On-Call makes the decision to activate the Corporate Emergency Operations Centre (CEOC) and issues alert notifications.

<sup>10</sup> Corporate Relations is responsible for activating the joint communication plan between NLH and Newfoundland Power.



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**PROCEDURE** (cont'd.)

- Level 3 - If the available reserve is anticipated to be less than half of the largest available generating unit capacity, the ECC will notify Exec On-call (CERP), Corporate Relations and Newfoundland Power, advising of customer conservation strategies to help maintain sufficient spinning reserve, if the generation shortfall is not corrected.
- Level 4 - If the available reserve is anticipated to approach zero or fall into a deficit, the ECC will notify Exec On-call (CERP), Corporate Relations and Newfoundland Power, advising of rotating outages to help maintain frequency near the 60 Hertz standard, if the generation shortfall is not corrected.

The following is the standard message that will be communicated if it is anticipated that a notification is to be made under Level 1, 2, 3 or 4; or a return to Level 0:

*“System Operations is advising that the available Island generation reserve is at a notification level [0-4] for [insert date here]. The available generation reserve is expected to be [insert reserve amount in MW], calculated from an available generation capacity of [insert available capacity in MW] and a peak load forecast of [insert peak forecast in MW].”*

C. Maintaining Spinning Reserve

The ECC shall maintain sufficient spinning reserve to cover performance uncertainties in generating units, especially wind and other variable generation, and unanticipated increases in demand. The ECC will take appropriate action to maintain a minimum spinning reserve level equal to 70 MW. Such actions include the following: placing in service all available generating capacity, cancelling outages to generating units that have a short recall, deploying all available standby resources, including CBPP and Vale Capacity Assistance, cancelling industrial interruptible load and reducing system load, through procedures such as public conservation notices, voltage reductions, curtailing interruptible loads and non-essential firm loads.



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**PROCEDURE** (cont'd.)

The following guideline shall be followed in the sequence outlined in order to maintain sufficient spinning reserve, maintain the reliability of the Island Interconnected System and minimize service impacts to customers:

Normal Sequence

1. Place in service all of Hydro's available hydroelectric generation.
2. Request Newfoundland Power to maximize their hydroelectric generation.
3. Make a Capacity Request of Deer Lake Power to maximize their hydroelectric generation.
4. Request Non-Utility Generators to maximize their hydroelectric and wind generation.
5. Maximize Holyrood thermal generation.
6. Start and load standby generators, both Hydro and Newfoundland Power units, in order of increasing average energy production cost with due consideration for unit start-up time, while holding the least efficient NLH standby combustion turbine unit in reserve. (At this point in time it is important to notify customers taking non-firm power and energy that if they continue to take non-firm power, the energy will be charged at higher standby generation rates.)
7. Request Newfoundland Power to curtail its interruptible loads (typically up to 10 MW and can take up to 2 hours to implement).
8. Request Corner Brook Pulp and Paper for Capacity Assistance (20, 40 or 60 MW).
9. Request Vale for Capacity Assistance (10.8 MW). [Agreement between Hydro and Vale has yet to be executed]
10. Start and load the remaining NLH standby combustion turbine unit.

Load Reduction

11. Cancel all non-firm power delivery to customers and ensure all industrial customers are within contract limits.
12. Inform Newfoundland Power of Hydro's need to reduce supply voltage at Hardwoods and Oxen Pond and other delivery points to minimum levels to facilitate load reduction. Implement voltage reduction.
13. Request Newfoundland Power to implement voltage reduction on their system.



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**PROCEDURE** (cont'd.)

Load Reduction (cont'd)

- 14. Request industrial customers to shed non-essential loads, informing them of system conditions.

Rotating Outages

If the spinning reserve continues to decrease below the minimum level, the system frequency should be watched closely. In order to minimize outages to customers, utilize the reserve as much as possible and maintain the system frequency at 59.8 Hz.

- 15. Request Newfoundland Power to shed load by rotating feeder interruptions. At the same time, shed load by rotating feeder interruptions in Hydro's rural distribution areas. Follow instruction for rotating outages, T-042.

\* Part of the Environmental Plan  
 \*\* Part of the Emergency Response Plan

**REVISION HISTORY**

<u>Version Number</u>	<u>Date</u>	<u>Description of Change</u>
0	1992-07-16	Original Issue
10	2014-12-02	Added Capacity Assistance for CBPP and Vale and other general revisions
<b>PREPARED: J. Tobin</b>		<b>APPROVED:</b>