

1 Q. Please describe the criteria employed during 2013 that required the Hardwoods CT
2 to remain available while a Holyrood unit was unavailable.

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5 A. The Holyrood Thermal Generating Station (HTGS) (490 MW) and the Hardwoods
6 Gas Turbine (HWDGT) (50 MW) are critical generation assets on the Island
7 Interconnected System and supplement Hydro's hydraulic generation and power
8 purchases to meet system load requirements under normal or contingency
9 conditions.¹

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11 The HTGS has a three-fold purpose:

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- 13 • It supplements the energy capability of the hydroelectric plants as inflows to
14 the reservoirs will vary;
- 15 • It is used to meet customer demands on the Island Interconnected System
16 during periods of high consumption; and
- 17 • It is used to support transmission voltages and security on the Avalon
18 Peninsula portion of the Island Interconnected System where the loads are
19 high and there is little other generation.

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21 The HWDGT, while not normally utilized as an energy source, is called upon to
22 supply customer demand requirements on the Island Interconnected System or on
23 the Avalon under contingency conditions.

¹ Hydro manages and operates the power system to be able to withstand the loss of a single power system element (or a single contingency) without experiencing sustained customer interruption. Examples of contingencies are the loss of a major generating unit or 230 kV transmission line.

From a reliability standpoint, Hydro manages and plans the operation of each of the three large units at the HTGS and the HWDGT during the year to ensure it can meet customer's needs under worst-case single contingencies. From an efficiency perspective, Hydro also strives to ensure that HTGS units are not online when they are otherwise not required.

When considering the support required for supply point voltages and transmission to the Avalon Peninsula, Hydro has determined progressively increasing levels of Avalon loads (or "triggers") at which HTGS units must be started and operated in order to maintain reliability under worst-case single contingencies.² Currently these triggers are as follows:

No. of HTGS Units Required	Avalon Load ³ (MW)	Worst Case Contingency
One	330	Trip of transmission Line TL202 or TL206 from Bay d'Espoir Terminal Station (TS) to Sunnyside TS
Two	495	Trip of a HTGS Unit
Three	630	Trip of a HTGS Unit

The delay in the startup of HTGS units until these load thresholds are reached requires that the generation at Hardwoods (50 MW) be available to respond quickly in the event of a contingency.⁴ For example, under the contingency of a loss of transmission line TL202 or TL206, the HWDGT is required to keep the remaining 230 kV line below its thermal rating. Otherwise, HTGS units would have to be placed on-

² The worst-case contingency affecting the supply on the Avalon is a loss of a HTGS unit or a loss of one of the parallel 230 kV transmission lines from Bay d'Espoir TS to Sunnyside TS.

³ Gross Avalon load supplied by transmission lines TL203 and TL237 into the Western Avalon TS and any on-line generating units at the HTGS and Hardwoods.

⁴ With the HWDGT available, there are no HTGS units required to operate when the Avalon load is less than 330 MW.

1 line sooner and run at inefficient levels of generation in order to be able to respond
2 to a contingency.⁵ If the load exceeds these triggers and a contingency occurs
3 while the appropriate amount of generation is not on-line (in the case of the HTGS)
4 or available (in the case of the HWDGT), customer interruption would be required
5 to maintain supply point voltages at acceptable levels or to keep transmission lines
6 below their thermal ratings.

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8 In January 2013, following the assessment by Brush, the original equipment
9 manufacturer (OEM), it was determined that the Hardwoods unit should be
10 operated in emergency conditions only. Since the unit was still operable during
11 emergencies, it was planned to be available for contingency support until the
12 commencement of the outage required for its repair/refurbishment. As indicated
13 in Hydro's response to PUB-NLH-072, there were two options evaluated for the
14 repair/refurbishment of the unit. Hydro proceeded with the option to replace the
15 alternator, as this afforded the shortest outage window; the least disruption to the
16 HTGS planned work and was the lowest cost option for customers. The earliest
17 possible start date under this alternative was October 1, 2013 due to the timing of
18 the delivery of the replacement alternator from Brush.

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20 With this schedule for alternator replacement, the HWDGT unit was available for
21 the period when the HTGS is normally shut down, usually occurring from late spring
22 to early fall. This helped to avoid HTGS unit operation during this period, where it
23 otherwise would have been required to ensure reliability of the Avalon power
24 system for a transmission line outage contingency. In addition, it facilitated the

⁵ The HTGS units have a longer startup time and thus cannot be quickly turned on and off like gas turbine units to respond to a system problem. Therefore, to provide the same response as a gas turbine, a HTGS unit must be placed on-line and operated at its minimum output level of 70 MW in order to be available to quickly respond to a problem. As problems are unpredictable, this would result in the HTGS unit being on for many days at inefficient levels of generation, at a time when there would otherwise be no requirement for them to operate.

1 required planned maintenance and capital upgrades at the HTGS which took place
2 during the shutdown period.

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4 The HWDGT outage began on October 3, 2013, once the first HTGS unit was placed
5 into service and established. Hydro had incorporated the unavailability of the
6 HWDGT unit in the scheduling and outage planning of the remaining generation,
7 from early October to mid-December, to continue to provide for safe and reliable
8 operation of the power system. This included the assessment of the operating load
9 forecast for December, which indicated at the time there was appropriate
10 generation reserves on the system to accommodate the outage and still meet
11 forecast demand.