

BC Hydro 2008 LTAP Hearing

BC HYDRO UNDERTAKING NO. 17

HEARING DATE:

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TRANSCRIPT REFERENCE:

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REQUESTOR: Commission Counsel (Mr. Fulton)

QUESTION:

Please compare the cost of the proposed Fort Nelson Generating Station (FNG) Upgrade plus a second Combined Cycle Gas Turbine (CCGT) versus the cost of installing a single larger CCGT unit.

RESPONSE:

The question refers to an alternative to the option in the 73 MW Fort Nelson Resource Plan (FNRP) (Appendix N1, Exhibit B1-10) called Fort Nelson Upgrade 3 (FNU3) + a second CCGT, a nominal 56 MW CCGT set out at section 6.2 of Appendix N1, Exhibit B-1-10 and called C57. Together, this combination was called FNU3C57 in the analysis.

There are two alternative assumptions to this response, specifically:

1. Replace the full FNG (existing plant plus FNU3) and the C57 expansion with a single larger CCGT unit; and
2. Replace the 26 MW of capacity provided by FNU3 plus C57 with one larger CCGT unit; and FNG is retained.

Alternative 1:

Replace the full FNG (existing plant plus FNU3) and the C57 expansion with a single larger CCGT unit. The alternative replaces the above two units with one CCGT of approximately 129 MW.

Alternative 1 is not practical for, among other things, the following reasons:

- It would add virtually no firm capacity over that which would be provided by FNU3 to BC Hydro's supply available to meet its firm customer demand. BC Hydro depends on backup supply from the AESO and as long as it is reliant on the AESO is subject

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to its operating rules. Any capacity from the larger single unit above the 75 MW available from the AESO would provide no capacity value to BC Hydro.

- It presumes the full replacement of the existing FNG, resulting in effectively no use of existing infrastructure.
- It would have a higher minimum operating load, reducing the operating flexibility moving forward.

Due to the impracticality of this alternative, no cost estimate is provided.

Alternative 2:

The 26 MW of capacity provided by FNU3 plus a second FNU3 unit are replaced with one larger CCGT unit; and FNG is retained.

Risk Comparison

Maintaining FNG and proceeding with a single larger CCGT is an alternative solution that entails additional reliability, development and cost risks relative to proceeding with FNU3 first. These risks include the following:

- A new CCGT development would require re-initiating BC Hydro's development process resulting in the capacity not being available any earlier than 2014, at least two years later than FNU3, thus not available to meet the expected load starting in December 2011 (current expected earliest in-service date (ISD) of FNU3).
- The alternative solution assumes there will be future load growth beyond that which would be met by the FNRP Base Resource Plan, a Plan set forward to meet the load requirements as set out by the 2007 Low Scenario. As such:
 - BC Hydro would be committing to meet substantially more load growth for which there is currently no firm customer commitments. Consequently, the stranded investment risk is greater relative to proceeding with FNU3 first and then making subsequent investment decisions once future load growth becomes more certain.
 - If proceeded with at this time, this alternative would also likely require AESO A2. As noted in Section 6.5.1 of Appendix N1 of Exhibit B-1-10, AESO A2 has increased cost and development risk relative to AESO A1 because it includes the construction of a new 230 km 144 kV transmission line.
 - BC Hydro may also need to twin the 209 km 144 kV transmission line from Fort Nelson to Rainbow, which entails both additional cost and development risk.
- Unless FNG is converted to a CCGT, there is not enough water available to run both FNG and a CCGT plant under the current water supply contract. BC Hydro would need to find and arrange for a new source of water supply, which would at a minimum entail additional costs.

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- If FNG is not converted to a CCGT, there will also be an overall increase in air emissions including greenhouse gases (GHG) that could lead to additional permitting concerns. The increased GHG emissions may not be in line with any Provincial objective of electrifying the Northeast as part of reducing overall GHG emissions.
- The FNRP demonstrates that it is economic from an energy efficiency perspective to convert FNG from simple cycle to combined cycle (FNU2) operations in its own right. Even if Alternative 2 were selected, BC Hydro may choose to continue with the conversion of FNG.
- If proceeded with at this time, Alternative 2 is pre-selecting additional natural gas-fired generation in Fort Nelson in preference to the BCTC transmission alternative. Given the potential load growth indicated by BC Hydro's 2008 load forecast or the 2008 CAPP forecast, the BCTC transmission alternative may well be required in any event which puts in question any pre-selection of generation beyond the FNU3 upgrade.

Cost Comparison

As identified in section 2.8.4 of Exhibit B-10, BC Hydro is currently studying alternative configurations for a second CCGT at Fort Nelson. One of these options is a CCGT based on a GE 6FA or equivalent gas turbine. Such a machine, when combined with FNG, would provide approximately 150 MW of capacity. This is reasonably comparable to the combined capacity that would be provided by FNU3 and C57.

Based on conceptual level cost estimates for the GE 6FA, 90 per cent capacity factor and excluding overhead (13 per cent), the cost comparison is as follows:¹

Configuration	Capital Cost (\$2008 M)	Unit Costs (\$2008 / MWh)
2a FNU3C57 (129 MW)	262	118
2b FNG+6FA (151 MW)	218	117

Risk assessment issues with respect to Alternative 2 and identified above would apply.

As part of its investigative phase work, BC Hydro is assessing a range of options in addition to the 6FA option. Some of these options provide less generating capability, but may be more economically efficient relative to the 6FA, while providing greater reliability benefits. However, for each option BC Hydro expects that upgrading the existing FNG through the FNU3 project remains cost-effective and maintains the greatest flexibility to respond to future load growth; and is therefore the most appropriate first step.

¹ Based on preliminary order of magnitude estimates provided by AMEC, adjusted for IDC and owner's costs, with a +65 per cent/-35 per cent estimating range for the C57 and 6FA plants, and current estimate with +35 per cent / -15 per cent range for FNU3.

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In summary, forgoing the upgrade project (FNU3) in favour of adding a second larger CCGT at the existing FNG facility is unlikely to result in any cost or reliability advantages.

In addition, this alternative development strategy has greater:

- Scheduling risk (i.e., any CCGT expansion would not be available any earlier than 2014, at least two years later than FNU3, thus not available to meet the expected load starting in December 2011 (current expected ISD of FNU3)).
- Development/capital cost risk (i.e., existing water supply constraints by precluding future CCGT expansion unless the existing FNG is converted from a SCGT to a CCGT).
- Stranded investment risk (i.e., committing to additional generation beyond what FNU3 provides exposes BC Hydro to increased stranded investment risk if future load does not materialize; or if future load materializes in a way that is better served via transmission line to the B.C. integrated system).

Upgrading FNG first does not preclude further cost-effective expansion should load increase beyond the current plan to meet the load requirements as set out by the 2007 low scenario.