Q. GENERATION HYDRO

PUB 60.0

Under what circumstances would NP consider a hydroelectric plant to be unworthy of refurbishment and incapable of providing further service?

A. ***General***

Newfoundland Power would typically consider a hydroelectric plant to be unworthy of refurbishment and incapable of providing further service when the cost of refurbishment would result in the plant's production being uneconomic.

The following provides an outline of how the economics of hydroelectric plant refurbishment is evaluated by Newfoundland Power.

Background: System Planning and Operations

Newfoundland Power's hydroelectric plants are part of the integrated island electric system (the "Island Grid") and decisions regarding the refurbishment of the plants are made in the context of the planning and operational economics of the Island Grid.

The key elements in generation planning and operations are the safe and reliable production of electricity; meeting the electricity requirements of customers at all times; and minimizing overall production costs.

Since the development of the Bay'D'Espoir hydroelectric project, the ongoing Island Grid planning process has been managed by Newfoundland and Labrador Hydro ("Hydro"). The starting point in the planning process is the forecast of energy and demand for the Island Grid which is updated on a regular basis. Hydro prepares the forecast based on information from its customers, including Newfoundland Power, and its own use. These forecasts extend over the period of the generation plan, typically 20 years or more. Hydro compares these forecasts with the existing generation capability on the Island Grid to meet energy and demand. When capacity to meet either is exceeded by the forecast, then new generation is planned to be added to the Island Grid at that time.

All generation on the Island Grid is operated so as to ensure customer demand is met on a least cost basis.

Hydro Plant Refurbishment: Short Term and Long Term Economics

A key economic principle underpinning least-cost operation of the Island Grid is the minimization of variable costs in the short term. This is because the fixed, or sunk, costs are not subject to change and are therefore not affected by operation of the system.

The variable costs of the Holyrood generating station are the appropriate benchmark of *short term* variable, or marginal, cost on the Island Grid. Under current circumstances, this cost is on the order of 5.8 cents per kWh.[1] As a general rule, oil costs are minimized by maximizing the hydroelectric generation production on the Island Grid.[2] For every kWh that is produced from existing hydroelectric resources, a corresponding kWh at Holyrood is not required and a reduction in thermal plant costs of 5.8 cents per kWh is achieved.

A key economic principle underpinning least-cost planning of the Island Grid is the minimization of long term costs.

In the longer term, if a relatively small hydroelectric plant were shut down instead of being refurbished, it would (i) increase the production requirement at Holyrood and (ii) at least conceptually, advance the need for new generation.[3] As a result, in the long term, refurbishing a hydroelectric plant will (i) avoid the cost of production at Holyrood and (ii) tend to delay the need for new generation.

If the cost associated with refurbishing a hydroelectric plant results in a higher unit cost than the cost of Holyrood fuel, then additional matters will come into the consideration of whether refurbishment of the plant is justified. A principal consideration will be the relative cost of refurbishing the hydroelectric plant compared to the cost of alternative generating capacity additions. If there are other more economic alternatives, the least cost alternative may be retirement of the hydroelectric plant.

Because the cost of new generation will normally exceed the cost of generation from existing facilities, assessing the viability of refurbishing an existing hydroelectric generator by comparing it to avoided cost of burning oil at Holyrood over the long term is conservative.

In summary, so long as the forecast levelized unit cost of refurbishing a hydroelectric plant is less than the forecast fuel cost at the Holyrood thermal plant, the refurbishment should be economic in both the short and long terms.

Other Considerations

Another consideration in addressing the possible retirement of a hydroelectric plant, is its value in improving reliability of supply to a local area. For example, in circumstances where a transmission link to the main grid fails, the plant may be capable of restoring service to some or all customers. The value of this consideration, which has obvious qualitative aspects, must be evaluated in the context of the additional cost involved.

[1] Based on a plant incremental efficiency of 630 kWh / bbl and current oil price in customer rates of C$36.85 bbl.

[2] In minimizing oil costs in ongoing Island Grid operations, Hydro will also have regard for ongoing water resources so as to ensure that sufficient water resources are available to meet both system peak and year round energy requirements on the Island Grid.

[3] Whether or not new generation is actually advanced will depend upon the planning horizon considered, the forecast annual increase in demand and energy, and the size of the hydroelectric plant being shut down.