

Non-Treaty Storage Agreement Renegotiations Performance Measure: Total Power Gain

1.0 Background

The combined power generation facilities at Mica and Revelstoke facilities produce approximately 38 percent of BC Hydro’s annual energy. Constraints on reservoir elevations and river flows may affect the revenue that can be generated by these projects. Given that BC Hydro is owned by the Province of British Columbia, lost energy production represents losses in revenue for the provincial government.

As well as direct energy and capacity value from these plants, the facilities also support a variety of ancillary services that could be affected by operational constraints. If a significant loss of service occurs in one part of the system, the service must be replaced or obtained elsewhere. The most important services include voltage control, supplemental reserves and dynamic scheduling.

2.0 Performance Measures

Table 2.1 summarizes the power generation performance measure used to evaluate the Non-Treaty Storage utilization scenarios. No performance measure was developed for ancillary services, as historic modelling results have suggested that it would not be affected by the scenarios considered.

Table 2.1: Power Generation Performance Measures

Location	Performance Measure	Unit of Measure	Description	MSIC
Columbia River Generating Facilities and downstream US Plants	Total Value of Power	\$M per year	Average annual gain/(loss) in value of electricity relative to Base Case. Value is determined from the sum of: <ul style="list-style-type: none"> ○ Total value of BC Hydro system generation ○ The value of incremental water passing through the US system, from NTS transactions assumed to be made by BC Hydro. 	0.5 M / yr

The *total value of power* performance measure is calculated from the summation of *BC Hydro system value based on market transactions*, the *value of Non-Treaty water operated by BC Hydro*, passing through the US system, and *Columbia system head loss compensation delivered from US*.

BC Hydro system value is estimated from the combined gain or loss of annual power values from energy production within the entire BC Hydro system, as a result of the NTS scenario considered. This is calculated using the two methods described in the NTSA Modeling Documentation. The first method includes an operational analysis utilizing the BC Hydro HYSIM operations model, which simulates the operation of the power system on a monthly time step, with the objective of minimizing the cost of meeting system load. In the second method, a component of the results from HYSIM were analysed in greater detail through the BC Hydro

Generalized Optimization Model (GOM). Both methods of analysis were considered equally valid, and thus the results of the two methods were average to provide the *BC Hydro system value* component of the *total value of power*.

The *value of Non-Treaty water operated by BC Hydro*, passing through the US system is estimated based on the product of:

- incremental energy gains or losses facilitated by NTS flow changes that are projected to occur at Arrow, and
- The value of market electricity that is projected for the Pacific Northwest markets.

Generation efficiency estimates for the US system is derived from Columbia Treaty model results from AOP 2012. Market prices are obtained from those used in the September 2007 BC Hydro gas and electricity price forecast as used in the LTAP 2008.

The *total value of power* performance measure is reported as the relative difference between the scenario considered, and the operation that is provided by the 4.5 MAF Base Case.

3.0 Performance Measure Results

Table 3.1 summarizes the results of the power generation performance measure used to evaluate the Non-Treaty Storage utilization scenarios.

Table 3.1: Power Generation Performance Measure

NTSA Utilization Scenario	Change in Power Value (\$M/yr)
Scenario A: High Volume Utilization (Base Case). Draft of accounts limited to 4.5 MAF. Scenario approximates the operation that would be expected in the 1990 Non-Treaty Storage Agreement.	Zero
Scenario B: Moderate Volume Utilization. Draft of accounts limited to 3.0 MAF. Spring/summer release rights of 0.5 MAF for BPA in lower volume water years. Trigger for 0.5 MAF release is an Apr-Aug volume of less than 72 MAF at The Dalles (lower 15% of HYSIM water years). Scenario approximates a desirable outcome for US fisheries operations, as specified in the draft 2008 Biological Opinion.	(\$0.1M)
Scenario C: Low Volume Utilization. Draft of accounts limited to 2.0 MAF. Scenario approximates a restrictive volume operation. This operation could be achieved through either limited account volumes (via contract), or through BC Hydro restricting usage of larger accounts.	(\$0.6M)
Scenario D: No NTS Utilization Maximum Utilization	(\$11.8M)

The above Table 3.1 provides total estimated power value associated with the various Non-Treaty scenarios. Scenarios range from a Base Case of 4.5 MAF (Flexibility modeled in the Columbia Water Use Plan), through to no utilization of Non-Treaty Storage. Costing of these scenario suggest that there is modest financial impact associated with reduced volumes of utilization, however there is a significant impact (\$11.8M/yr) associated with a scenario that does not operate Non-Treaty Storage.