

Newfoundland and Labrador Hydro Assessment of Hydraulic Resource Management Tools and Practices

Client:
Newfoundland and
Labrador Hydro

Location:
Newfoundland, Canada

Project Year:
2006 - 2007



Customer Environment

The Newfoundland and Labrador hydro model included the

- Series of lakes and reservoirs along the Bay D'Espoir river system including Victoria, Burnt, Granite, Meelpaeg, Upper Salmon and Long Pond reservoirs.
- The Hinds Lake River system.
- The Power plants at Granite, Upper Salmon, Long Pond and Hinds Lake.

Challenge

The NLH system is hydro-dominated with significant storage capability and large watershed drainage areas. In particular one-sixth of the inflow into the system is accrued from snow pack. Conceptually, short-term inflow forecasts over the next one week period could enable the short-term hourly scheduler/planner to anticipate incoming flows, and operate the reservoirs and plants appropriately to ensure minimal spill and maximize generation capability. These improved operations can correspondingly reduce thermal generation. In addition a short-term model can be used to possibly improve within plant or within system dispatch specifically with respect to generation timing and balance between plants. As such, significant gains may be achieved with the implementation of an inflow forecast system and a short-term model to guide operations decisions.

Solution

The study performed by SGI assessed the costs and benefits associated with implementing a Short-Term Scheduling Decision Support System (DSS).

The study included;

- A review of the company's existing water resource management practices.
- Quantifying the benefits of an inflow forecast and short-term optimization model.
- The costs of obtaining meteorological data and setting up and operations environment in support of such a DSS.

Short-term modeling and inflow forecasting of the NLH system was carried out using the *Vista* model. At present, NLH uses the long term LT *Vista* model to guide monthly/yearly operations. ST *Vista* works in conjunction with the long-term generation scheduling capability of LT *Vista*. LT *Vista* sets the target water levels for the end of the week and ST *Vista* optimizes the weekly operations based on those target water levels on an hourly basis.

The model was first verified using one year of SCADA water level, unit flow and spill flow history. Based on a successful verification of the model to actual 2005 operations, a benefits analysis was performed, using the verification run as a base case, to determine if any improvements to operations could be achieved through the use of short-term inflow forecasts and short-term modeling.

Hydro operations were assessed for two cases: one with known hourly inflow for the upcoming week and, one with known inflow volume for the



upcoming week.

Client Benefits

A study was carried out to assess the current water management tools and practices used by Newfoundland and Labrador Hydro (NLH) and to assess the costs and benefits associated with implementing a short-term scheduling decision support system (DSS) to improve NLH's water management effectiveness. The study also addressed how such a DSS would fit into the company's existing water resource management practices.

At the end of the study NLH was equipped with the knowledge of

- How their system reacts to forecasted inflows.
- The adequacy of the existing meteorological data collection network for the purposes of supporting a DSS.
- An estimate of the costs of implementing a short term model.
- An estimate of the costs of implementing an inflow model.

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