



North Slave Hydro System

Resiliency Study

The 28 megawatt (MW) Snare Hydro System, including 4 run of river power plants approximately 140 kilometres west of Yellowknife and the 7 MW Bluefish plant at the north end of Prosperous Lake serve the communities of Yellowknife, Behchoko, Dettah and N'Dilo. The Bluefish Plant is fed by water from the Yellowknife River system. The Snare hydro plants are fed by the Snare River and Big Spruce Lake.

Low water conditions were evident in the 2014 and 2015 calendar years. In 2016, Snare River water levels have shown signs of recovery, while the Yellowknife River system remains below average. June is a critical month for understanding the water situation in each of the water systems. Real time water gauging data is publicly available from the Water Survey of Canada website at: <https://www.ec.gc.ca/rhc-wsc/>

Public Works and Services (PWS) engaged Manitoba Hydro International (MHI) to look into the resiliency of the hydro system and investigate hydro system management options. MHI Reviewed 65 years of hydrology data on the Snare and Yellowknife River Systems and found that water flows in the North Slave system have usually produced more hydropower than customers currently use. At current demand levels, there would have been 3 significant low water events in the past 31 years, and much water would have been spilled during 28 of 31 years. In addition, hydropower met most customer needs during previous low water years.

Climate Change

Experts accept that the climate has changed over the past 50 years and will continue to change in the future. Available information indicates that while low water conditions on the North Slave hydro system are relatively common, the most recent event was relatively severe. Planning for future low water events is a necessary part of the hydropower system.

Key Findings

- Surplus hydro will be available about 90 percent of the time for at least the next 20 years.
- A significant mining load would need to be connected to the North Slave system for this surplus to disappear.
- Thermal generation such as diesel or possibly LNG is a low cost back-up fuel that would ensure adequate supply during occasional low water conditions.

- Any new generation, including biomass, wind, and solar, will go unused most of the time and will add unnecessary expenses to customers' bills through rate increases.

Three key recommendations are:

- Focus on improving hydrology monitoring on the North Slave Hydro system;
- Examine options to enhance the aging infrastructure on the North Slave Hydro system; and
- Consider options to offset electricity rate shock due to periodic low water events such as establishment of a low water fund.

The GNWT has accepted the recommendations and has committed to:

- Enhance data gathering for water forecasting and power generation planning purposes. Resources for this are included in the proposed 2016-17 budget.
- Working with the Northwest Territories Power Corporation, investigate options to enhance the aging hydro infrastructure in the North Slave while ensuring that there is no substantial impact on electricity rates.
- Consider rate structure and government funding options to address periodic low water events in the hydro system.

PWS will partner with NTPC and Canadian Universities to enhance historical precipitation data in the Yellowknife & Snare River Basins, examine snow pack measurement techniques and hydrology forecasting.