Can water power from Quebec avoid the need for the Darlington Re-Build?

ONTARIO CLEAN AIR ALLIANCE RESEARCH | www.cleanairalliance.org

APRIL 7, 2015

The Ontario Clean Air Alliance (OCAA) is recommending that Ontario sign a long-term electricity contract with Hydro Quebec to lower the province's electricity bills and permit the cancellation of the proposed Darlington Nuclear Station Re-Build Project.

According to our analysis, a long-term electricity supply contract with Hydro Quebec at a price of 6 cents per kWh would reduce our electricity costs by at least $14 billion over 20 years by permitting the cancellation of the higher cost Darlington Re-Build Project.[1]

In this context, it is important to note that in 2010 Hydro Quebec signed a 26-year electricity export deal with Vermont at a price of 5.8 cents per kWh.[2]

However, in its October 2014 report, *Review of Ontario Interties*, the Independent Electricity System Operator (IESO) has suggested that water power imports from Quebec may not be a viable option to replace Darlington's aging nuclear reactors since "Quebec has a winter peaking system and is currently capacity limited in the winter".[3]

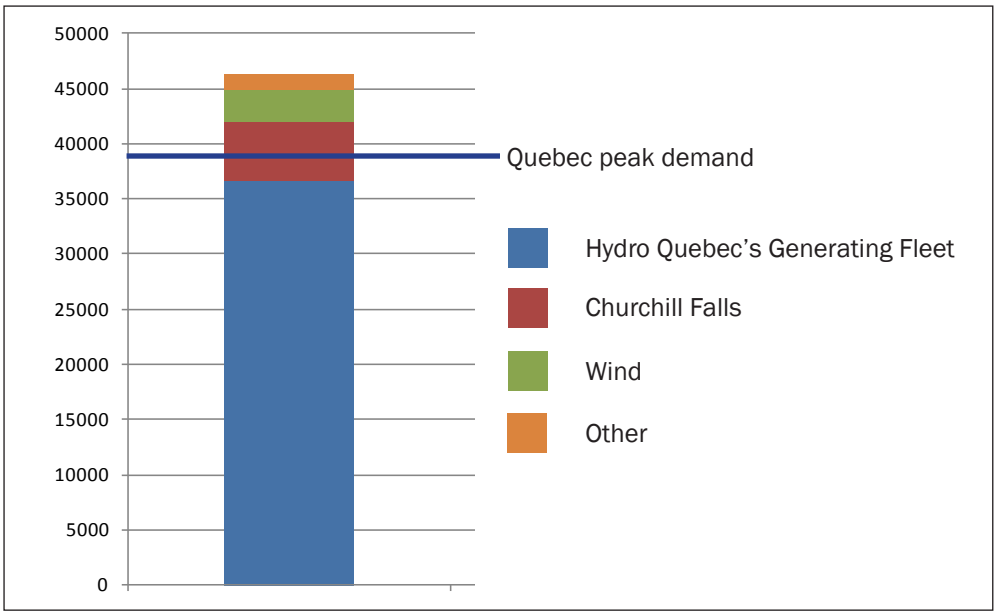
This concern was re-iterated by Kim Warren, Chief Operating Officer of the IESO, on the CBC Radio show, *Ontario Today*, on March 25, 2015.

Hydro Quebec's Capacity and Peak Winter Demand

As Figure 1 reveals, in 2014, Hydro Quebec's total generation capacity [46,314 megawatts (MW)] exceeded its winter peak day demand [38,743 MW] by 20%.[4]

Hydro Quebec's generation capacity includes its own generating fleet, which has a capacity of 36,643 MW, plus an additional 9,671 MW under contract to Hydro Quebec, including 5,428 MW from Churchill Falls.[5]

Figure 1: Hydro Quebec's Capacity and Demand, 2014

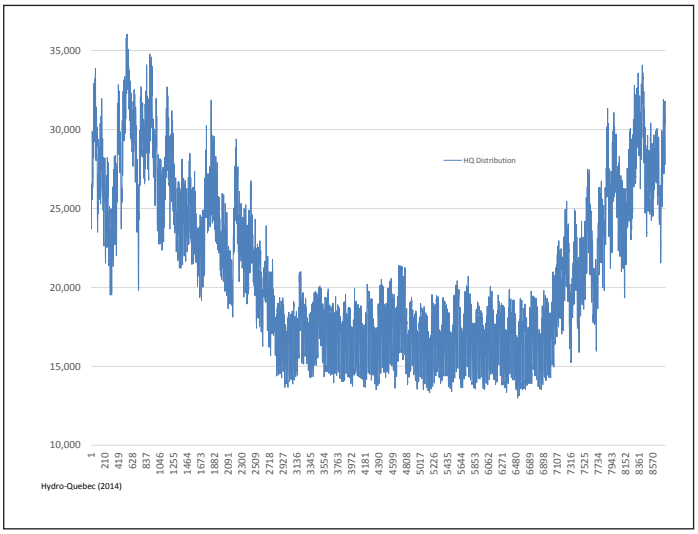


Hydro Quebec's Annual Hourly Demand Profile

Figure 2 plots Quebec's demand for electricity during each hour of 2013. It reveals three key facts.

- First, Quebec's demand for electricity spikes on cold winter days.
- Second, these spikes in demand are needle peaks which only last for brief periods.
- Third, Quebec's annual *peak* hour demand for electricity is more than 80% greater than its *average* annual hourly demand.[6]

Figure 2: Hydro Quebec's 2013 Hourly Demand for Electricity[7]



Analysis

While Quebec may not wish to export power to Ontario during some very cold winter days, a review of Figures 1 and 2 strongly suggests that Quebec has surplus generation capacity for at least 99% of the hours of the year. During the 1% of the year when Quebec water power may not be available, Ontario could meet its electricity needs by increasing the output of its natural gas-fired power plants. As the IESO has noted, "Ontario, by comparison, is a summer-peaking province, which means the province has spare capacity in the winter".[8]

In this context, it is important to remember that nuclear generating stations are also **not** available for 100% of the hours of the year. In fact, the Darlington Nuclear Station's average annual capacity factor since it commenced operation in the 1990s has been only 83%.[9]

In conclusion, Ontario's base-load electricity needs can be met at a lower economic and environmental cost by an integrated combination of water power from Quebec (99%) and natural gas-fired generation (1%) than by re-built nuclear reactors (83%) and natural gas-fired generation (17%).

Endnotes

1 Ontario Clean Air Alliance Research Inc., *Ontario's Long-Term Energy Plan: A One Year Review*, (November 2014).

2 Hydro Quebec, *Press Release*, "Vermont and Quebec reach new energy agreement", (August 12, 2010).

3 IESO, *Review of Ontario Interties*, (October, 2014), page 22.

4 Hydro Quebec's reported peak demand includes the demands of their "interruptible" customers which Hydro Quebec is not obliged to serve during peak demand periods. Hydro Quebec, *Annual Report 2014*, page 2.

5 Hydro Quebec, *Annual Report 2014*, page 2.

6 Hydro Quebec, *Annual Report 2014*, page 2.

7 Pierre-Olivier Pineau, Professor, HEC Montreal, "Can Ontario and Quebec benefit from more electricity market integration? A long-term perspective", Power Point Presentation for York University Conference, January 9, 2015.

8 IESO, *Review of Ontario Interties*, (October, 2014), page 22.

9 Ontario Energy Board Docket No. EB-2013-0321, Undertaking J14.3.

Thanks to the Echo Foundation and the Taylor Irwin Family Foundation for their support

ONTARIO CLEAN AIR ALLIANCE RESEARCH

CleanAirAlliance.org