How we can close the Pickering Nuclear Station and lower bills

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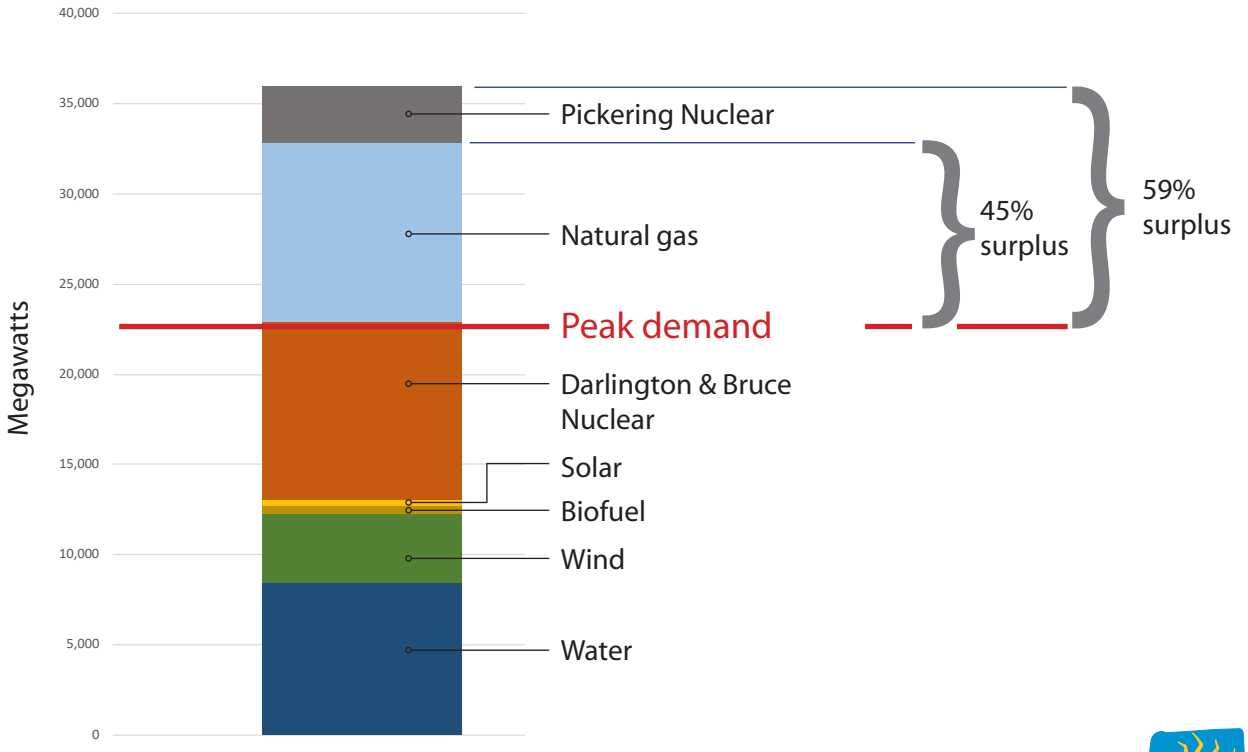
Ontario has a large electricity surplus

Ontario's peak-hour demand for electricity has declined by 17% between 2006 and 2015.[1] In addition, our electricity supply increased by 25% between 2005 and 2015.[2] As a result of this falling demand and rising supply, Ontario now has a large electricity surplus. As Figure 1 shows:

1. The total capacity of Ontario's renewable and gas-fired generation and the Bruce and Darlington Nuclear Stations now exceeds our forecast peak day demand during the summer of 2017 by 45%; and
2. Adding the Pickering Nuclear Station, Ontario's total generation capacity exceeds our forecast peak day demand during the summer of 2017 by 59%.[3]

Figure 1: Ontario's Electricity Surplus



Data source: IESO, *18 Month Outlook: An Assessment of the Reliability and Operability of the Ontario Electricity System from July 2016 to December 2017*, (June 21, 2016), pages 4 & 9.

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Ontario, therefore, does not need to keep the Pickering Nuclear Station running beyond 2018 (when its operating licence expires). Even if one or more units at the Darlington Nuclear Station are offline for rebuilding, Ontario can meet its electricity needs without Pickering by increasing the output of its surplus gas-fired power plants; by importing water power from Quebec; and/or by investing in energy efficiency.

Replace Pickering with gas-fired generation

Pickering is Ontario's oldest and highest-cost nuclear station. According to an Ontario Power Generation (OPG) benchmarking study, Pickering's operating costs per kWh are higher than those of any other nuclear station in North America.[4] In 2014, Pickering's fuel and operating costs *alone* were 8.16 cents per kWh.[5] OPG is forecasting that Pickering's fuel and operating costs will range from 8.3 to 9.2 cents per kWh between 2017 and 2020.[6]

This means that Pickering's fuel and operating costs alone are more than **three times** greater than Ontario's average wholesale market price of electricity. In 2015, Ontario's average wholesale market price of electricity was 2.36 cents per kWh.[7] This is approximately equal to the fuel and operating costs of our surplus gas-fired generation capacity.[8]

Quebec has sufficient excess water power during 99% of the hours of the year to replace all the power supplied by Pickering for use in Ontario

Therefore, by closing Pickering and increasing the output of our surplus gas-fired generating stations, Ontario could reduce its electricity costs by approximately $1 billion per year.[9] This is equivalent to 5% of our $20 billion total annual electricity bill.[10] But this is not Ontario's best option since it will lead to a rise in our greenhouse gas emissions.

Impact on Greenhouse Gas Emissions

As a result of Ontario's large electricity surplus, a high percentage of Pickering's output is exported to the U.S. Therefore, even with one Darlington reactor shutdown for re-building, the Independent Electricity System Operator (IESO) estimates that only 54% of Pickering's output would be needed to meet the demands of Ontario's domestic consumers.[11] Therefore we would only need to increase the output of our gas-fired plants by 10.3 billion kWh per year to replace Pickering's power that is consumed by Ontarians.[12] This would increase Ontario's greenhouse gas (GHG) emissions by three megatonnes per year or 1.7%.[13]

A better option: Import water power from Quebec

With our *existing* electricity transmission interconnections with Quebec, we can import 16.5 billion–18.5 billion kWh of water power per year from Quebec.[14]

According to Quebec's Energy Commission, approximately two-thirds of Hydro Quebec's exports are sold at an average price of only 3 cents per kWh. And according to the Commission, Hydro Quebec's low-price electricity exports will grow by 50% between 2014 and 2022, from 20.1 billion to 31.1 billion kWh per year.[15] This low-price export power is currently available on the spot market rather than under long-term contracts.

Therefore, by importing 10.3 billion kWh per year from Quebec, at a cost that is certain to be less than Pickering's fuel and operating cost (8.3 to 9.2 cents per kWh), we can close Pickering and lower our electricity bills without increasing our GHG emissions.

Quebec has sufficient quantities of power available for export during at least 99% of the hours of the year.[16] During the remaining 1%, Ontario can use its gas plants, pay for demand reductions or increase its made-in-Ontario renewable energy capacity. Quebec

can also easily increase the power it has available for export by implementing peak demand reduction measures.

Investing in Energy Efficiency

According to the IESO, the cost of saving electricity is only 3-5 cents per kWh.[17] Furthermore, according to a recent report prepared for the IESO, energy efficiency investments can cost-effectively reduce Ontario's electricity consumption by 31% by 2035.[18] This is equivalent to more than twice the entire output of the Pickering Nuclear Station.

Continuing to increase our energy efficiency can help us to lower our bills, reduce the need for expensive rebuilt reactors, reduce the need for new transmission infrastructure, and reduce our GHG emissions.

Thus by importing water power from Quebec and by pursuing all of our cost-effective energy efficiency opportunities, we can close Pickering and lower our electricity bills without increasing our GHG emissions.

Studies undertaken for the IESO show that Ontario's efficiency potential is more than double Pickering's output

Jobs

We can create 16,000 person-years of employment by completely decommissioning and dismantling the Pickering Nuclear Station by 2030.[19]

The estimated cost of decommissioning and dismantling Pickering by 2030 is $4.1 billion. This cost will be paid from the "Nuclear Decommissioning Fund," a special savings fund OPG is required to maintain and which, as of January 2015, had a balance of more than $7 billion.[20]

The best people to deal with dismantling the plant are current employees who understand the systems and modifications of this 45-year-old plant. However, OPG currently intends to wait 30 years before beginning to dismantle the plant, long after the current workforce is gone.

International best practices, as recommended by the International Atomic Energy Agency, call for immediate dismantling on the basis that there are no safety advantages to waiting decades to start the process.[21] Reactors must be de-fueled and de-watered immediately after permanent shutdown in any case and radiation levels inside reactors will be little changed in 30 years. OPG wishes to delay dismantling simply to defer costs.

It will be better for the surrounding community and workers to begin work on dismantling the plant immediately and returning its prime waterfront site to a safe state as quickly as possible.

Endnotes

1 Independent Electricity System Operator (IESO), "IESO Releases 2015 Ontario Electricity Data: Sector-Wide Changes Continue to Impact Supply, Demand, Price", *News Release*, (January 12, 2016); and http://www.ieso.ca/Pages/Power-Data/demand.aspx.

2 IESO, *Data Tables for the OPO Technical Report*, (September 1, 2016), Page 3.

3 While only 10% and 30% of our wind and solar generation capacity respectively will be available at the time of the summer peak demand, Ontario can also import up to 6,513 MW of supply from neighbouring jurisdictions to meet its domestic needs. IESO, *Ontario Planning Outlook: A technical report on the electricity system prepared by the IESO*, (September 1, 2016), page 12; Ontario Ministry of Energy, *Achieving Balance: Ontario's Long-Term Energy Plan*, pages 40 and 41; and IESO, *Ontario Reserve Margin Requirements 2016 – 2020*, (December 21, 2015), page 2.

4 OPG, *2015 Nuclear Benchmarking Report*, page 69.

5 Ontario Energy Board Docket No. EB-2013-0321, Exhibit JT1.14 (Refiled: 2014-06-03).

6 Ontario Clean Air Alliance Research, *Closing the Pickering Nuclear Station in 2018: A Cost-Benefit Analysis*, (June 17, 2016), page 3.

7 http://www.ieso.ca/Pages/Power-Data/price.aspx

8 On September 16, 2016 the spot price of natural gas at Dawn (near Sarnia) was approximately $3 per MMBtu (U.S. $) or approximately $3.95 per MMBtu (CDN $). Assuming a heat rate of 6,770 Btu/kWh and a gas cost of $3.95 per MMBtu, the fuel cost of a combined-cycle gas-fired plant is 2.7 cents per kWh. http://www.naturalgasintel.com/data/data_products/daily?location_id=MCWDAWN&region_id=midwest1

9 OPG is forecasting that Pickering will produce 19.1 billion kWh in 2017. 19.1 billion kWh x (8.3 – 2.36 cents per kWh) = $1.135 billion. See Ontario Energy Board Docket No. EB-2016-0152, Exhibit E2, Tab 1, Schedule 1, Table 1.

10 IESO, *Ontario Planning Outlook: A technical report on the electricity system prepared by the IESO*, (September 1, 2016), page 40.

11 IESO, *Assessment of Pickering Life Extension Options: October 2015 Update*, (October 30, 2015), page 12.

12 OPG is forecasting that Pickering will produce 19.1 billion kWh in 2017. 19.1 billion kWh x 0.54 = 10.3 billion kWh.

13 The greenhouse gas emission rate of a combined-cycle natural gas-fired power plant is 290 kg/MWh. Ontario Power Authority, *Supply Mix Analysis Report*, Volume 2, (December 2005), page 213.

14 Email from Jordan Penic, IESO to Jack Gibbons, Ontario Clean Air Alliance, (November 21, 2014).

15 Commission sur les enjeux energetiques du Quebec, *Maitriser Notre Avenir Energetique,* (2 fevrier 2014), pages 176 – 183.

16 Ontario Clean Air Alliance Research, *Can water power from Quebec avoid the need for the Darlington Re-Build?*, (April 7, 2015).

17 IESO, *Ontario's Planning Outlook: A technical report on the electricity system prepared by the IESO*, (September 1, 2016), page 12.

18 Nexant, *Achievable Potential Study: Long Term Analysis*, (June 30, 2016), pages 3 & 4.

19 Torrie Smith Associates, *Direct Decommissioning of the Pickering Nuclear Station: Economic and Other Benefits,* (March 2016), page 3.

20 Torrie Smith Associates, *Direct Decommissioning of the Pickering Nuclear Station: Economic and Other Benefits,* (March 2016), pages 1 & 2.

21 International Atomic Energy Agency Safety Standards Series No. GSR Part 6, *Decommissioning of Facilities*, (2014), page 12.

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