

# We have better choices:



## It's time to close the aging Pickering Nuclear Plant

By closing the Pickering Nuclear Station when its licence expires in August 2018, the Government of Ontario can increase public safety, eliminate money-losing electricity export sales, lower our electricity costs, create jobs and return most of the station's waterfront site to the local community for redevelopment and new park land.

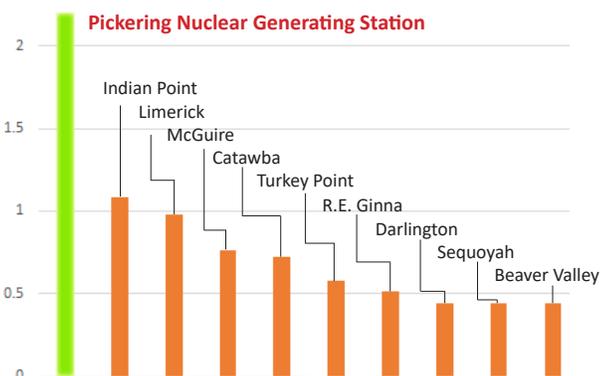
### Public Safety

The Pickering Nuclear Station is the 4<sup>th</sup> oldest nuclear station in North America and one of the largest. It was originally designed to operate for 30 years, but it is now 47 years old. It is surrounded by more people (2.2 million within 30 km) than any other nuclear station on the continent.

According to a report by radiation biologist Dr. Ian Fairlie, a Fukushima-level accident at Pickering could cause 26,000 cancers, lead to the decades-long evacuation of more than 650,000 people and result in a \$125 billion loss in the value of single-family homes.<sup>1</sup> In fact, Dr. Fairlie found that consequences would be much more severe around Pickering due to its location in a dense urban area compared to what occurred in Fukushima, which is in a largely rural location.

Nuclear plants are by their very nature high risk. Accident probability may be low, but consequences are almost unimaginably high, which is why no private insurer will underwrite a nuclear plant or provide homeowner coverage for a nuclear-related event. As it is, Ontario Power Generation's accident liability is limited to \$1 billion – a fraction of the actual potential costs of a severe accident.

10 North American nuclear plants with the highest surrounding populations (in millions within 30 km.)



## Eliminating Money-Losing Electricity Export Sales

During many hours of the year (e.g., at night and during weekends) Ontario's nuclear reactors produce more electricity than is consumed in Ontario. Since the inflexible Pickering and Darlington reactors cannot lower their output during off-peak hours, we are required to export our surplus nuclear generation to the U.S. These exports are typically sold at prices that are below the cost of production. In fact, sometimes we actually have to pay our American neighbours to take our surplus nuclear power.

Only roughly half of Pickering's output is needed to keep the lights on in Ontario.<sup>2</sup> By closing Pickering we can avoid the loss of \$737 million per year racked up by exporting the plant's surplus power at less than its cost of production.<sup>3</sup>

**POWER  
EXPORT  
LOSSES:**

**You owe:  
\$737 MILLION**

**Cost of nuclear power  
in 2017:**



**Cost of Quebec Water  
Power in 2017:**



## Buying lower cost water power from Hydro Quebec

Pickering's operating costs (9.2 cents per kWh) are higher than those of any other nuclear station in North America.<sup>4</sup>

Hydro Quebec has offered to provide us with water power for the next 20 years at a cost of 5 cents per kWh.<sup>5</sup> By buying Quebec water power, to displace Pickering's power that is used in Ontario, we can save an additional \$407 million per year.<sup>6</sup>

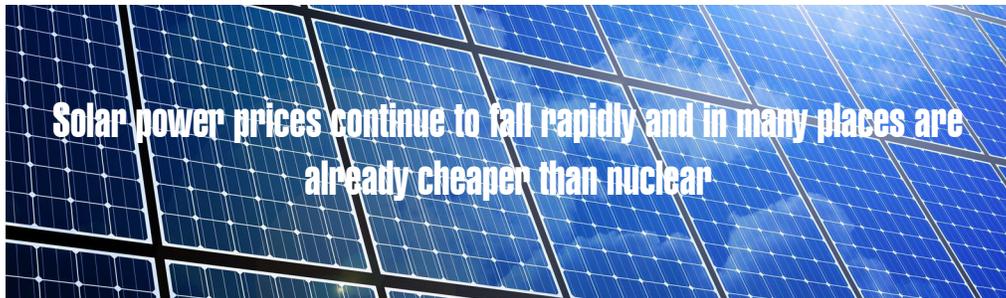
Ontario's current transmission connections with Quebec can carry sufficient power to replace the power produced by Pickering that is used by in Ontario. According to the Independent Electricity System Operator (IESO), our current system is sufficient to import 16.5 to 18.5 TWh per year from Quebec.<sup>7</sup> Currently, we use roughly 10 TWh of power from Pickering in Ontario. For just \$220 million, we could make these connections even more robust by increasing our peak hour import capacity with Quebec by 2,050 MW<sup>21</sup> (by comparison, OPG is paying \$500 million to build a radioactive water storage facility at Darlington<sup>11</sup>).

Quebec has sufficient power available for export at least 99%<sup>8</sup> of the time (a far higher level of availability than Pickering, which is offline approximately 30% of the time<sup>9</sup>). During the handful of coldest hours of winter when Quebec may not have power available, Ontario can use its gas-fired generation stations, as it does when one or more of Pickering reactors are offline now.

During the second half of 2017, OPG's price for nuclear power was 8.1 cents per kWh.<sup>12</sup> In contrast Hydro Quebec's average price of its export sales in 2017 was only 4.7 cents per kWh.<sup>13</sup> Nuclear prices are certain to continue rising (OPG has told the Ontario Energy Board that it must raise its price for nuclear power to 16.5 cents per kWh by 2025 to pay for the re-building of Darlington's reactors<sup>14</sup>) while Quebec Hydro has offered to lock in low rates in 20-year contracts.<sup>10</sup> This means the price difference between nuclear and Quebec imports is only going to grow.

## Cost effective renewable energy

Of course, we can also tap into increasingly low-cost power from the sun and wind to help replace these aging nuclear stations. In the last round of Ontario's Large Renewable Procurement program, the average cost of wind power was 8.6 cents per kilowatt hour (kWh)<sup>15</sup> – less than the cost of producing power at Pickering. But both Quebec (6.3 cents/kWh<sup>16</sup>) and Alberta (3.7 cents/kWh<sup>17</sup>) have recently received even lower bids for wind power – part of a worldwide trend toward ever lower prices for renewable sources. Experts suggest that the cost of solar power will fall to 5-6 cents (U.S.) per kWh by 2025.<sup>18</sup> By combining these sources with water power from Quebec, we can create a much more efficient and responsive energy system that provides zero carbon, waste-free power 24/7.



## Creating jobs

According to the International Atomic Energy Agency, immediate dismantling of reactors after they are shut down is the preferred approach.<sup>19</sup>

However, Ontario Power Generation is planning to **delay dismantling** until 30 years after the plant is shutdown. A 30-year delay will have little impact on radioactivity levels in the plant or the complexity of dismantling it, but will allow OPG to defer expenditures while laying off much of the current workforce.

By immediately dismantling and decommissioning Pickering after it closes, we can create 32,000 person-years of direct and indirect employment by 2032.<sup>20</sup> This will permit most of the 300 hectare Pickering waterfront site to be revitalized and returned to the local community by 2032.

The full cost of the decommissioning can be funded by money that is already in Ontario Power Generation's Nuclear Decommissioning Fund.

## Conclusion

By closing the Pickering Nuclear Station on August 31, 2018, the Government of Ontario can increase public safety, save Ontario's electricity consumers \$1.1 billion per year, create 32,000 person-years of employment and return most of the station's site to the local community by 2032. This is a far better option than continuing to operate an unneeded nuclear plant long past its original life expectancy in the midst of our largest urban area.



**Immediate  
decommissioning =  
32,000 person years of  
employment**

## Endnotes

- 1 Ian Fairlie, *A Fukushima-Level Nuclear Disaster at Pickering: An Assessment of Effects*, Ontario Clean Air Alliance Research Inc., (March 2018).
- 2 Independent Electricity System Operator, *Assessment of Pickering Life Extension Options: October 2015 Update*, (October 30, 2015), page 12.
- 3 According to Ontario Power Generation, Pickering's total output in 2019 will be 19.4 billion kWh and its operating cost will be 9.2 cents per kWh. In 2017 Ontario's average electricity export price was 1.6 cents per kWh (Hourly Ontario Energy Price or HOEP). [19.4 billion kWh x 50% x (9.2 - 1.6 cents per kWh) = \$737 million.] Ontario Energy Board Docket No. EB-2016-0152, Exhibit E2, Tab 1, Schedule 1, Table 1 and Exhibit L, Tab 6.5, Schedule 7 ED-018; and <http://www.ieso.ca/en/power-data/data-directory>.
- 4 Ontario Power Generation, *2015 Nuclear Benchmarking Report*, page 69.
- 5 In 2017 Hydro Quebec offered to sell Ontario 8 billion kWh per year for 20 years at a price of 5 cents per kWh. [www.BuyQuebecPower.ca](http://www.BuyQuebecPower.ca). According to the Eric Martel, CEO of Hydro Quebec, his company can provide Ontario with up to 14 billion kWh per year. As Mr. Martel noted: "We can be a solution for Ontario. Thankfully, the interconnections already exist. There's nothing to build." Frederic Tomesco, "Chinese Demand Thwarts Hydro-Quebec Plans to Add Foreign Assets", *Bloomberg*, (March 1, 2018).
- 6 [19.4 billion kWh x 50% x (9.2 - 5 cents per kWh) = \$407 million.] See also endnote #3.
- 7 IESO, *IESO Response to Questions from the Ontario Clean Air Alliance*, (November 2014).
- 8 Ontario Clean Air Alliance Research, *Can water power from Quebec avoid the need for the Darlington Re-Build*, (April 7, 2015).
- 9 Ontario Energy Board Docket No. EB-2016-0152, Exhibit A1, Tab 4, Schedule 3, Page 2; and Exhibit E2, Tab 1, Schedule 1, Table 1.
- 10 <http://nationalpost.com/pmnl/news-pmnl/canada-news-pmnl/hydro-quebec-awarded-major-20-year-electricity-deal-from-massachusetts>
- 11 <https://globalnews.ca/news/3795843/darlington-refurbishment-contractors-low-estimates/>
- 12 Ontario Power Generation Inc., *Management's Discussion and Analysis*, (December 31, 2017), page 5.
- 13 Hydro Quebec, *Annual Report 2017*, page 76.
- 14 Ontario Energy Board Docket No. EB-2016-0152, Exhibit N3, Tab 1, Schedule 1, Attachment 2, Table 14 (Filed: 2017-03-08).
- 15 <http://www.ieso.ca/corporate-ieso/media/news-releases/2016/03/ieso-announces-results-of-competitive-bids-for-large-renewable-projects>
- 16 <http://news.hydroquebec.com/en/press-releases/697/call-for-tenders-for-the-purchase-of-450-mw-of-wind-power-hydro-quebec-distribution-accepts-3-bids-totaling-4464-mw/>
- 17 <http://www.cbc.ca/news/canada/calgary/renewable-energy-program-electricity-alberta-bidders-contracts-1.4446746>
- 18 [https://www.pv-magazine.com/2016/06/15/irena-forecasts-59-solar-pv-price-reduction-by-2025\\_100024986/](https://www.pv-magazine.com/2016/06/15/irena-forecasts-59-solar-pv-price-reduction-by-2025_100024986/)
- 19 Ralph Torrie, Torrie Smith Associates, *Direct Decommissioning of the Pickering Nuclear Station: Economic and Other Benefits*, (March 2016), page 4.
- 20 Ralph Torrie, Torrie Smith Associates, *Direct Decommissioning of the Pickering Nuclear Station: Economic and Other Benefits*, (March 2016), page 6.
- 21 Independent Electricity System Operator, *Ontario-Quebec Interconnection Capability*, (May 2017), page 23.



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**Ontario Clean Air Alliance Research gratefully acknowledges the support of the M.H. Bringham Foundation, the Echo Foundation and the Taylor Irwin Family Fund at the Toronto Foundation**