

**Background**

**May 31 2016**

*There are eight nuclear reactors at the Pickering site, all connected to a single vacuum building that serves as a common "containment structure" in the event of any major nuclear accident. The vacuum building is designed to suck up the radioactive steam and gases in the event of extensive core damage to one of the reactors. It wasn't designed to handle the malfunctioning of two or more reactors, as occurred at Fukushima Daiichi in 2011, where there were three simultaneous core meltdowns.*

*The core of a CANDU reactor is a horizontal cylindrical vessel called a "calandria", containing hundreds of coaxial "fuel channels", running horizontally from one end of the calandria to the other. Each fuel channel consists of an inner "pressure tube" surrounded by an outer "calandria tube". When the reactor has operated for 30 years at full power, the fuel channels are so weakened by heat, pressure, corrosion and radiation, that they need to be replaced -- along with the hundreds of "feeder pipes" connected to the hundreds of fuel channels at each end of the calandria.*

*If any of the pipes in the primary cooling system were to break, there would be a "loss-of-coolant accident" or LOCA. If the LOCA is a large one, there could be core damage and consequently radioactive releases. So the integrity of the pressure tubes, the calandria tubes, and the feeder pipes, as well as the thousands of tubes in the "steam generators" or boilers, is of great importance not only to the plant, but to the surrounding population.*

*The operation of "rebuilding" the primary heat transport system in a CANDU reactor by replacing all the pressure tubes, calandria tubes and feeder pipes, is called "refurbishment". It is a very expensive and time consuming operation that has to be carried out in high radiation fields with airborne contamination a constant threat to the workers. In 2007, over 500 workers (mostly tradesmen) carrying out a refurbishment operation at the Bruce nuclear complex, right beside Lake Huron, inhaled plutonium-laden dust for a period of several weeks because they were told there was no need for them to wear respirators. No one was ever held to account for this inexcusable safety lapse.*

*At one point around 2000, four of the Pickering reactors (the "A" units) were supposed to be refurbished at a total cost of \$1.3 billion. Only two were actually refurbished -- units 1 and 4 -- at a unit cost four times greater than the original estimate, and in a time frame more than three times longer than planned. The other two "A" reactors -- units 2 and 3 --*

*have been permanently shut down, and it was decided NOT to refurbish the other four reactors (the "B" units).*

*Now Ontario Power Generation (OPG) -- the crown corporation that owns all the operating Ontario reactors -- is "pushing the envelope" by operating the "B" units beyond their design lifetime, WITHOUT having replaced the deteriorating pipes. Here is what the CEO of Hydro Quebec said about this questionable practice, testifying to a Legislative Committee in Quebec City in January of 2013:*

**"I can tell you that Hydro-Québec's management in no way would have considered to go beyond [the prescribed lifetime limit]. I would no more operate Gentilly-2 beyond [the prescribed lifetime limit] than I would climb onto an airplane that does not have its permits and that does not meet the standards. So, it is out of question to put anyone, i.e. us, the workers, the public, and the company, in a situation of risk in the nuclear realm."**

*Indeed, Quebec actually shut down its only operating CANDU reactor, Gentilly-2, in December of 2012, having decided not to spend the enormous sum of money needed to refurbish it. OPG, on the other hand, has decided to run the four Pickering B reactors beyond the prescribed lifetime limit without the benefit of refurbishment.*

*In Quebec, the government had to step in and order the Gentilly-2 reactor shut down. In Ontario, the government could step in and order the Pickering reactors shut down, but apparently they are in a gambling mood. Unfortunately, they are gambling not only with rate payers' money, but with their lives -- as well as the fate of the entire Ontario economy. One (or more) catastrophic reactor accident at Pickering could make large parts of Toronto uninhabitable for many decades, and contaminate Lake Ontario and the St. Lawrence River with radioactive poisons.*

*Homeowners and private businesses cannot buy insurance against such a catastrophe. Every private insurance policy has a "nuclear exclusion" clause that voids all coverage in the event of radioactive contamination from a nuclear accident. The Government of Canada has a law on the books to provide for a tribunal that will adjudicate any insurance claims, without the benefit of any individual insurance policies. It's a heck of a way to run an industry.*

*Gordon Edwards.*

## Ontario's misguided love affair with nuclear power

*Instead of seeing principled leadership in Ontario, we are seeing the opposite – a stealthy effort to keep an old and uneconomic nuclear dinosaur on life support.*

By JACK GIBBONS, *Toronto Star*, May 30, 2016

<http://tinyurl.com/gso5ryu>

The Wynne government in Ontario is considering spending more than \$300 million to patch up Canada's oldest nuclear generating station in hopes of keeping it running for another eight years or more. It's kind of like deciding to buy new tires, a new transmission and a new windshield for your 20-year-old Buick LeSabre, except this mechanical dinosaur is a giant nuclear plant located in the heart of our largest urban area.

Construction on Pickering began in the 1960s and its first reactors were powered up in 1971 – the same year Led Zeppelin released Stairway to Heaven. Despite 45 years of operation, its owner, Ontario Power Generation (OPG), only recently decided to see if the millions of people living around the plant are aware of its plans for what they should do in the event of an emergency at the plant. It quickly found out that (a) local residents had no clue what they were supposed to do; and (b) they weren't buying OPG's plan to "shelter in place" (stay put) during a high-level emergency.

No other nuclear plant in North America even comes close to having as many people on its doorstep as the Pickering Nuclear Generating Station. The Indian Point nuclear plant outside New York City is No. 2 and has half as many people living within 30 kilometres. That has not stopped New York Gov. Andrew Cuomo from calling for Indian Point to be closed, especially in the wake of revelations that the aging plant is suffering from serious "embrittlement" of key components, including bolts that hold critical cooling system components in place.

Sadly, instead of seeing this kind of principled leadership in Ontario, we are seeing the opposite – a stealthy effort to keep an old and uneconomic nuclear dinosaur on life support. Pickering is already sucking up \$900 million per year in out-of-market subsidies for its power. As one of the highest-cost nuclear plants on the continent, keeping Pickering running means higher electricity rates.

And it's not like we need its power: In 2015, Ontario exported more power than Pickering produced – and lost money doing it.

So why after promising to close Pickering by 2020 at the latest are the Liberals now working to keep it limping along? It could be like your Buick: You bit the bullet on that costly new transmission and just can't admit it was a big mistake. Repairs to Pickering's reactors in the late 1990s went massively over budget and were years late in being completed.

The truth is, however, that "fixing" Pickering is like fixing your aging Buick – it is an ongoing and costly battle. One reactor has recently been offline for months for repairs and breakdowns and "incidents" are regular occurrences at North America's fourth oldest nuclear station. Pickering was the site of the worst loss of coolant accident at a Canadian reactor, during which workers had to siphon heavy water off the floor of the containment building and back into the reactor in 1984.

Designed in the 1950s and '60s, Pickering is an unusual nuclear facility: It has multiple reactors sharing a single containment building and has no secondary fast shutdown system. Separate containment for individual reactors and redundant fast shutdown systems have been standard issue for most nuclear plants for years.

The real reason the government wants to keep Pickering going is that our energy planners remain some of the last people on the planet who still believe that nuclear energy is the best way to meet our need for a brightly lit home or a cold drink. Only France outranks us for dependence on nuclear energy.

It's a highly irrational belief, particularly when our neighbours to the east have a large and growing surplus of low-cost & safe water power available for export. But tapping into the power Quebec has available right now would mean admitting there are many better options than continuing to operate three aging – and gigantic – nuclear plants to meet our electricity needs. And just like with your Buick, some of our leaders just can't seem to let go.

The problem is, we are all going to pay the price for their love affair with this outdated technology.

*Jack Gibbons is Chair of the Ontario Clean Air Alliance.*

# Pickering nuke plant extension to cost \$307M, may prove 'uneconomical': OPG

*Environmental groups have also pointed out that OPG's Pickering nuclear plant, just east of Toronto, is no spring chicken.*

*By Geoff Zochodne, QP Briefing, Queen's Park, Toronto, May 20, 2016  
<http://tinyurl.com/jg6r32q>*

The plan to keep the province's oldest nuclear power plant humming until 2024 is being budgeted to cost more than \$300 million, yet Ontario Power Generation is hedging in case sticker shock strikes, according to recent financial filings. The Liberal government said in January <sup>1</sup> it had approved OPG's pursuit of another four years of operation for the Pickering station, from 2020 to 2024. The provincially-owned power company is performing "component condition assessments" to determine what work must be done - or if the plan is even practical."

There is a risk that the station's extended operation to 2024 may be determined to be uneconomical to pursue," stated OPG's first-quarter financial results <sup>2</sup>, which were released last Friday. Nuclear projects in the province also have a history of running over-budget, including work done at the Pickering plant. The price of restarting two mothballed reactors at the station earlier this century was \$2.6 billion <sup>3</sup>, after it was initially estimated that it would cost \$1.3 billion to put four of the units back in service.

Environmental advocates have pointed out the Pickering facility, just east of Toronto, is no spring chicken. The province's most recent long-term energy plan <sup>4</sup> expected the station to operate until 2020, and even allowed for an earlier shutdown; OPG says the 2020 date was built around conservative estimates, and that there's an opportunity for a longer life.

A recent inspection also found issues with two of the 12 steam generators in the plant's Unit 4. The reactor had been taken offline in January for scheduled maintenance, and was anticipated to return to service on Friday, although it had not as of *QP Briefing's* deadline.

Meanwhile, the work required to grant Pickering a stay of decommissioning is expected to cost \$307 million, OPG says. That does not include the daily costs of running the facility.

"We have estimated additional funding of \$307 million from 2016-2020 over and above normal operating costs, to enable extended operations to 2024," said OPG spokesman **Neal Kelly** in an email.

The plant provides about 13 per cent of Ontario's electricity while producing little to no greenhouse gas emissions – indeed, extending its life could contribute to the Liberal government meeting its climate change goals. And while Environment and Climate Change Minister **Glen Murray** has been pilloried by the Progressive Conservatives<sup>5</sup> for seemingly questioning whether nuclear would be needed later this century, Premier **Kathleen Wynne** has reiterated that the power source is indeed part of the government's long-term energy plan.

However, there are concerns about the staying power of the aging Pickering plant. Four of its reactors began producing electricity in the early 1970s, and two of its eight units have been shut down since 1997.

In the foreword to a March, 2016, report arguing for the immediate decommissioning of the plant, the Ontario Clean Air Alliance said <sup>6</sup> Pickering "is operating beyond its original 'design lifetime' which came to a close in 2015.

"In other words, systems are being pushed past the operational period for which they were originally designed despite the materials problems caused by the intensely inhospitable environment inside the reactor cores that have taken their toll over years of operation," added the group.

But OPG has faith in its plan: "OPG is still confident that extending Pickering operations to 2024 is safe, technically feasible and will be economic," said Kelly.

Greenpeace senior energy analyst **Shawn-Patrick Stensil** told *QP Briefing* that the "only way Pickering can continue operating is if the Wynne government and the federal nuclear regulator [Canadian Nuclear Safety Commission] allow OPG to forgo needed safety upgrades and inspections."

"Keeping Pickering running is not only dangerous but a huge waste of money," Stensil added. "The government rubber-stamped running these

reactors without full cost estimates from OPG and knowing full well the station is the cause of ongoing surplus generation."

OPG and the province – the company's sole shareholder – are backing a plan to run all six of Pickering's operating reactors until 2022, when two units would shut down and four would continue pumping out power to 2024. Doing so, they say, would save electricity customers up to \$600 million, prevent eight million tonnes in greenhouse gas emissions, and save 4,500 jobs in Durham Region.

Under Wynne's watch, the province has also committed to a \$12.8-billion refurbishment of OPG's Darlington nuclear plant – which begins later this year – and a \$13-billion rebuild by Bruce Power at the facility it leases from OPG (with the latter project's upfront costs to be borne by Bruce Power, recouped through the electricity rates it receives). Keeping Pickering running longer would bridge the gap in base-load electricity during those overhauls, OPG says.

A case for keeping Pickering open past 2020 started to come into focus last year, including arguments made by the Power Workers' Union <sup>7</sup> (whose members work at the facility), stating that a life-extension for the plant was a lower-cost option that could plug the hole in base electricity supply.

There are no guarantees OPG will receive regulatory approval from the Canadian Nuclear Safety Commission to operate the Pickering facility past 2018, when the current licence expires. The same goes for the Ontario Energy Board, which sets electricity rates and establishes what costs are eligible to be recovered. OPG said in its first-quarter filing that it is aiming to file a five-year rate application with the OEB this quarter.

In answering questions about electricity rates, Energy Minister **Bob Chiarelli** said last week that the government is "assuming" the Pickering life-extension plan will be approved, "but we can't 100 per cent assume that at this point."

Chiarelli told *QP Briefing* <sup>8</sup> in March <sup>9</sup> that OPG will ask the government for a "final" approval for the Pickering extension after all the regulatory hurdles have been cleared. "There's a fairly high confidence level, but we don't certainly take it for granted," said the energy minister.

OPG stated in a February, 2016, filing to the OEB that the Pickering life-extension plan is "a project that is yet to yield a high confidence result." The company said in its most recent financial statements that it is still doing

assessments to figure out what work needs to be done to keep the plant running to 2024. Initially, Pickering was slated to operate until 2020, but OPG says it must also do more technical work to back that up.

Furthermore, an April, 2016, status report from the Canadian Nuclear Safety Commission (CNSC) says an inspection conducted during a planned maintenance outage of the plant's Unit 4 reactor "showed significant steam generator tube thinning in a number of tubes since the last outage inspections in Steam Generators 11 and 12, winter 2014 and fall 2011 respectively."

"The extent of condition carried out by OPG did not show the same tube thinning in the rest of the steam generators," added the report. "OPG conducted a root cause assessment to determine the thinning mechanism and is working on a return to service plan."

At an April 7 public meeting <sup>10</sup>, CNSC president **Michael Binder** asked if the tube thinning would affect the Pickering life-extension plan. An OPG official responded that "we clearly have to address this issue," but that it doesn't affect the unit's operation. The issue, the CNSC was told, was "chemistry related." The OPG official said they were taking action.

Pickering's 500-megawatt Unit 4 had been out of service since Jan. 7, for the aforementioned planned maintenance. Kelly told *QP Briefing* earlier in May that the unit had been refurbished in the early 2000's, making it one of the plant's newer units, but that all outages are unique. Kelly said OPG had decided to widen the scope of its work during the maintenance outage because of the lower demand for electricity at this point in the year. The CNSC said it wouldn't come back online before mid-April, and OPG was expecting it to be up and running for Friday, although it was not online as of *QP Briefing's* publication deadline.

***To contact the reporter on this story:***

***gzochodne@qpbriefing.com***

***416-212-5913***

***Twitter: @geoffzochodne11***

## References

1. <https://news.ontario.ca/mei/en/2016/01/ontario-moving-forward-with-nuclear-refurbishment-at-darlington-and-pursuing-continued-operations-at.html>

## Pickering: An Uneconomic Nuclear Dinosaur on Life Support

---

2. [www.opg.com/about/finance/documents/160513combinednewsreleasemdaopgq12016final.pdf](http://www.opg.com/about/finance/documents/160513combinednewsreleasemdaopgq12016final.pdf)
3. [https://www.thestar.com/business/2014/07/04/darlington\\_nuclear\\_costs\\_rise\\_according\\_to\\_report.html](https://www.thestar.com/business/2014/07/04/darlington_nuclear_costs_rise_according_to_report.html)
4. [www.energy.gov.on.ca/en/ltep/achieving-balance-ontarios-long-term-energy-plan](http://www.energy.gov.on.ca/en/ltep/achieving-balance-ontarios-long-term-energy-plan)
5. [www.qpbriefing.com/2016/05/03/tories-accuse-liberals-of-beefing-over-nuclear-power](http://www.qpbriefing.com/2016/05/03/tories-accuse-liberals-of-beefing-over-nuclear-power)
6. [www.cleanairalliance.org/wp-content/uploads/2016/03/decomfinal.pdf](http://www.cleanairalliance.org/wp-content/uploads/2016/03/decomfinal.pdf)
7. [pwu.ca/news/news/post/report-outlines-benefits-of-extending-operations-of-the-pickering-gs#.vz9bnfkrkuk](http://pwu.ca/news/news/post/report-outlines-benefits-of-extending-operations-of-the-pickering-gs#.vz9bnfkrkuk)
8. [www.qpbriefing.com/2016/03/23/pickering-nuclear-plant-extension-still-a-work-in-progress](http://www.qpbriefing.com/2016/03/23/pickering-nuclear-plant-extension-still-a-work-in-progress)
9. [www.qpbriefing.com/2016/03/23/pickering-nuclear-plant-extension-still-a-work-in-progress](http://www.qpbriefing.com/2016/03/23/pickering-nuclear-plant-extension-still-a-work-in-progress)
10. <https://cncs-ccsn.gc.ca/eng/the-commission/pdf/2016-04-07%20-%20meeting%20corrected.pdf>