

Peter Ottensmeyer delegation to Pickering City Council meeting, January 27, 2020.

F.P. Ottensmeyer, PhD FRSC, Professor Emeritus, University of Toronto
peter.ottensmeyer@utoronto.ca

Mayor Ryan, Council members, and particularly Councillor Ashe and Councillor Brenner.

I would like to persuade you to withdraw, or defeat, the motion calling for the immediate dismantling of the Pickering CANDU reactors once the last six reactors are shut down.

However, instead of merely being against something, one should offer an alternative that has the power to replace at least what is being lost.

So my suggestion is to put in place new power plants that can consume and actually eliminate that 15,000 ton stockpile of highly radioactive used CANDU fuel “waste” that is at the Pickering site.

The CANDU plants will shut down in 2024 or so, and I would think that Pickering City Council would move heaven and earth to find a substitute.

But this motion indicates to the Province, which owns OPG, that Pickering is happy or at least has resigned itself to OPG leaving the City,
resigned itself to the loss of \$ 1 billion in revenue to the Pickering region each year
resigned itself to the loss of about 10,000 direct and indirect jobs
resigned itself to the potential reduction of the Pickering population of some 30,000 people
as those families seek their livelihood elsewhere

The direct dismantling may provide 16,000 man-years of work.

But it does so only once, either now or later.

In contrast, right now OPG’s presence provides 10,000 man-years of work each and every year.

There are two questions that should be topmost in our minds:

For Ontario - how do we replace the non-carbon electricity from the Pickering reactors?

For Pickering - how do we retain, replace or even increase those highly skilled jobs?

One of the proponents at the December council meeting, proposed that the foregone 3,000 MWe of electricity can easily be replaced by hydroelectricity from Quebec, a province that actually has to import Ontario electricity in the winter months, when it does not produce enough for its own use.

Even if we wanted to do this, we can’t. There is not enough transmission line capacity left between the two provinces to accommodate and replace an additional 3,000 MWe of electricity generated in Pickering. According to the IESO, the interprovincial connections permit a flow of only 2,775 MWe between Ontario and Quebec, of which 2,000 MWe are already used up.

But the total picture is worse than that for Pickering and for Ontario.

Losing Pickering's local CANDU power still means

the loss of 10,000 jobs

the potential loss of 30,000 people out of the region

and

the loss of the \$ 1 billion annual revenue to the Pickering region

But in addition

Ontarians would still have to find the \$ 1 billion to ship out of the Province to buy and import the non-carbon electricity that we do need for Ontario's economy.

I would think that the Pickering City Council would therefore be fighting tooth and nail and leaving no stone unturned to retain or replace the electrical output and the highly skilled jobs that OPG now provides here in Pickering.

Instead we are being side-tracked by an unproductive proposal that at best suggests that the 600 acres of OPG lands would become prime waterfront for redevelopment for 30,000 fewer people. And it does not even do that.

The immediate dismantling of the CANDU reactor hulks on that waterfront creates local radioactive rubble and debris that, even if carefully confined, has nowhere to go. There is no repository for such radioactive material anywhere in Ontario. Yes, OPG has planned for one for years, but there is nothing concrete there; for years.

In addition you know that the Pickering waterfront site already has a stockpile of over 15,000 tons of highly radioactive used nuclear fuel waste that has been accumulating since that plant started operating some 50 years ago. It is stored in concrete silos. But it won't be moved either for many years, if ever.

Therefore I want to suggest a better path for the City of Pickering by proposing an alternative approach.

First, let the eight radioactive empty CANDU reactor hulks just sit in what OPG calls SafeStore mode. Dismantling them creates no permanent work. Moreover, one of the prime characteristics of radioactivity is that it decays --- it gets less with time. So dismantling the reactors some time later, as OPG proposes, is safer, less radioactive, and therefore less costly while still providing the additional one-time number of person-years of work at that time.

Second, and more importantly to retain jobs
to maintain revenue
and to continue generating non-carbon electricity

replace the old CANDU reactors with a set of new smaller modular reactors that can be fueled with and eliminate the existing 15,000 ton stockpile of highly radioactive used CANDU fuel waste on the Pickering site.

I'll repeat that, since most people are not aware of this: "build reactors that can be fueled with and eliminate the existing 15,000 ton stockpile of highly radioactive used nuclear fuel at the Pickering site".

For such reactors the long-lived radiotoxic heavy atom component in the used uranium is starting fuel.

These waste-burning small modular reactor (SMR) designs exist and have existed for a long time. Indeed the very first electricity created by nuclear power was with one of these types of reactors just before Christmas in 1951, using the EBR-I reactor in Arco, Idaho. It was built by a Canadian, Walter Zinn, from Kitchener.

Two of these reactor designs are already now being investigated by the Province of New Brunswick and its OPG-equivalent, New Brunswick Power, to use up the New Brunswick stockpile of radioactive used nuclear fuel waste from their Point Lepreau CANDU reactor. We, Pickering and OPG, should follow suit ---- or even better, lead.

The New Brunswick government has put \$ 10 million into that concept and those two companies, Moltex from the UK and Advanced Reactor Concepts from the USA, have matched that for a total of \$ 20 million.

There is at least a third waste-burning reactor design that would be even more appropriate for Pickering, the PRISM reactor from GE-Hitachi in the USA. It was investigated by OPG in 2014 and found to be quite suitable.

Ontario, and Pickering in particular, should go into a similar direction as New Brunswick. Our own Premier Ford has just signed a Memorandum of Understanding to share knowledge on small modular reactors with New Brunswick and Saskatchewan. That's indicative of a positive current political attitude towards nuclear matters.

But how to move forward?

I propose that:

**Council move to set up a task group immediately on
how to repurpose the Pickering nuclear site into an Advanced Recycling Centre
to eliminate the long-term, million-year radiotoxicity of its 15,000 ton stockpile of used fuel waste by recycling that used fuel with the generation of massive amounts of non-carbon electricity.**

I say "task group" rather than "study group", since the technology has developed past the stage of "study" and is ready for implementation implemented.

The existing Pickering site can easily accommodate, for example, ten such waste-burning reactors having a total power of 3000 MWe, similar to the current output of Pickering's CANDU reactors.

My calculations show that the long-term radiotoxicity of the fuel atoms in the entire 15,000 ton Pickering stockpile can be eliminated in about 20 years with the operation of a cluster of such small modular reactors (SMRs) at 3000 MWe. After those initial two decades the "detoxified" uranium left would power such reactors for many centuries without creating additional long-term waste.

A resulting residue of fission products would decay relatively quickly. Indeed, the current oldest Pickering used fuel bundles, starting out with several hundred types of radioactive fission product isotopes, by now contain only two such fission products of any importance, strontium-90 and cesium-137. The remainder have already decayed to stable valuable atoms and minerals containing platinum-group metals and scarce rare earths useful and needed for electronics, chemical catalysts, solar panels and wind turbine armatures.

Thus no long-term deep geological repository (DGR) would be needed, making it possible to redirect existing accumulating trust funds for nuclear waste management, e.g. the Ontario Nuclear Fund Agreement Trust currently stands at \$ 10 billion, from such an unnecessary DGR into seed funds for the Pickering Advanced Recycling Centre. The federal Nuclear Fuel Waste Act of 2002 permits redirection of such funds into a better process of nuclear fuel waste management in Paragraph 20(2) and associated paragraphs.

A suggested composition of such a task group could consist of any or all of:

- interested Councillors and City of Pickering staff
- selected OPG staff
- local provincial and federal government representatives
- selected outside experts
- young and very old interested knowledgeable staff from

AECL or seconded from CNL

CANDU Energy Inc.

CAMECO

- at least three manufacturers of waste-consuming SMRs
 - e.g. Advanced Reactor Concepts ARC-100 reactor
 - GE-Hitachi PRISM reactor
 - Moltex Energy SSR-W reactor

A suggested process might be:

- Initial meetings of a small local group to determine what questions to address,
 - e.g. reactor characteristics
 - recycling concepts
 - site requirements
 - finances

Then several meetings of the full group with one or more manufacturers to explore answers.

So in conclusion

**I would urge you to withdraw the demolition motion, or defeat it,
and instead
grab this bull of the future by the horns to preserve Pickering jobs and prosperity
with an extended role of OPG that also eliminates the high level nuclear waste
in a couple of decades of operation**

**Nobody else will do that for you,
nobody else has your urgency
and nobody else has your need.**

I would be happy to answer any of your questions.

And I thank you for the opportunity to present this before you.