Summary of Findings

## Replacing Pickering:

# The Next Step in the GTA's Clean Energy Transition

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### The Problem

In 2010, the Ontario government announced the planned closure of the Pickering Nuclear Generating Station (NGS), judging the cost to refurbish the stations to be prohibitive. Yet, a decade after deciding to close Pickering, there has been no plan on how to replace it with non-emitting solutions. This problem will be made worse by the overlapping nuclear refurbishment of two 900 MW Darlington units and two 825 MW Bruce units in 2022 as well.

Based on forecasts by the Independent Electricity System Operator (IESO), it is foreseen that increased natural gas-fired generation will replace the energy services that Pickering currently provides and lead to an increase in approximately 10-15 TWh of natural gas use per year from current levels. The GHG emissions for the province associated with the additional 10 TWh of gas-fired generation per year after Pickering closes would be about an additional 4.5 Mt CO<sub>2</sub>eq a year. With Pickering's output heavily supplying the GTA, the GTA's share of the increase in provincial gas-fired generation due to the closure is about 50%, roughly 2.25 Mt CO<sub>2</sub>eq.<sup>1</sup>

While the Greater Toronto Area (GTA) cannot and should not go alone, given its high share of provincial demand the people in the region needs to take more responsibility for their energy needs and in deploying non-emitting solutions. At the same time provincial policy, market and regulatory barriers are limiting the potential for the region to implement non-emitting solutions for 2025 that could help retain Ontario's clean electricity grid. This also reduces the other multiple benefits to the region from deploying new non-emitting solutions, such as lower costs, resiliency and economic development.

To help us identify barriers and potential solutions, Pollution Probe held an Expert Workshop in January 2020 of over 30 stakeholders, which included representatives from all major utilities, government, industry and civil society.



## Part 2

### The Solutions

At our Expert Workshop, the one comment we got from nearly everyone was that technology is not the barrier – the solutions are there.

The non-emitting solutions that can help meet Toronto's energy needs with the closure of Pickering generally fall into three main areas:

- ◆ the **demand side**, which is controlling customer loads and increasing conservation and energy efficiency so that less generation is required after the Pickering closure
- the supply side, which are non-emitting (or potentially lower-emitting) solutions to meeting energy needs
- storage, which can include both demand and supply characteristics.

But these three areas are not distinct and combining non-emitting solutions that target the demand and supply sides, potentially also including storage, in a single project could have even greater impact.

#### **Demand side**

It was generally agreed that in a dense urban area, demand side solutions are the most practical given the lack of available space for large-scale energy production. These solutions include:

- ◆ Demand-side measures such as conservation and energy efficiency which can reduce the gap between energy used now and what could be needed by 2024.
- ◆ Demand response (DR) programs provide incentives in the forms of payments or reduced energy costs for customers that are willing to reduce their use during peak periods.
- ◆ Strategic Demand Reduction (SDR) is a new system that uses energy efficiency and demand response to provide system resources. SDRs reduce system costs by reducing demand at specific times to optimize the electricity system and to reduce emissions.

#### Supply side

Dense urban areas have limited non-emitting supply options, but is still potential for development in the GTA. Some possibilities include:

- Distributed energy resources (DER): Non-emitting DERs, such as solar PV, was identified as a good option given the declining costs of the technology.
- ◆ District energy: The City of Toronto has a target to connect 30% of the city's gross floor area to low-carbon district energy.<sup>2</sup> District energy can also be used to cool buildings, thereby reducing peak demand in the summer.

#### Storage

Energy storage, be that chemical batteries, compressed air, mechanical or other forms, can be both a source of demand response – altering charging based on grid conditions – and a form of supply. Also, the storage doesn't have to be stationary. Electric vehicles (EVs) have large potential to supply energy storage services, to the grid or to buildings.



## The Barriers

Technological barriers are not what's stopping us. We have the means to develop local non-emitting solutions in an economic and cost effective manner if we can overcome the policy, regulatory and business barriers. While there is a range of existing barriers, we've grouped the results from our workshop into five sections: market signals, planning, policy uncertainty, cost and information.

#### Market signals

One of the most prominent barriers is that time-of-use rates for residential customers are not reflective of the true market cost and the set standardized rates are not as extreme as they ought to be. Another major barrier is the lack of locational values in rates for DERs. Ontario uses postage stamp rates, and the problem with this is that the rate value is not dependent on the local needs and conditions. There are also more barriers that are restricting the access and use of distributed energy resources. This includes regulatory barriers to virtual net metering, permitting, and a lack of standards to allow connection.



#### **Planning**

Currently planning is very top-down focused and does not transparently assess where DERs can play a role, which often removes local options from even being considered. What is needed is a better planning system and market design that includes transparent tools and processes around valuing local non-wires solutions (NWS) and DER options that promote value stacking, the capability to perform and be compensated for multiple energy services at the same time. Another problem is that regulations differ depending on different projects, creating regulatory silos. When assessing the interplay between conservation and generation, regulatory silos makes it difficult to plan effectively.

#### **Policy uncertainty**

When it comes to energy, policy uncertainty is always a challenge. Too often emphasis is put on decisions being made on short-term political cycles and long-term planning is not prioritized. This sends mixed market signals and deters investment.

#### Cost

Cost is always critical. With a number of fixed costs involved upfront for customers to install local DERs, such as rooftop solar, it can be hard to have high levels of buy in. What also continues to be a challenge is a lack of consideration of multiple benefits. A business case for options that puts value on all of the benefits, climate, resiliency, economic and environmental, needs to be considered instead of just the cost.

#### Information

The problem with having energy silos, when it comes to technology, policy, and regulations, is that information is disseminated and decentralized, making it difficult to holistically assessopportunities. This leads to information gaps and a lack of education surrounding the trade-offs between options. Working in silos also creates inconsistencies from differing methods of data analysis and modelling, causing the energy sector to be more divided than united. What is also missing is a lack of data and data governance surrounding energy data usage.



Once the Pickering NGS closes in the coming years, there will be a large gap in Ontario's non-emitting electricity generation. But as we have seen, there are actions that can be taken by 2025 to reduce the need for additional natural gas-fired electricity generation and retain Ontario's low-emissions electricity system. The actions can be bundled into two areas:

#### Promote conservation and energy efficiency

Conservation and other demand-side measures are key, and the continuation of Ontario's conservation program is required. But the conservation also needs to change so that it can reduce the need for additional generation and reduce electricity use at times when the grid is particularly carbon-intense.

However, the current conservation and demand management program is due to end in December 2020, and no replacement has been announced. As such, this could be the ideal time to move to location-targeted strategic demand reduction (SDR) system that integrates conservation into system planning where the value to the system is higher. SDR can target specific system needs, such as deferral of new grid infrastructure or reducing electricity use when the emissions-intensity of the system is high. Many of these system needs will be location and time specific, and that needs to be included in any redesign.

In addition, optional new time-of-use rates should incent electricity use when the carbon intensity of the grid is at the lowest, such as at night or even during summer days when solar generation is at its highest. These new rates could be targeted at consumers who have switched to an electric vehicle or heat electrification to provide value for both them and the system for reducing the impact on the entire grid

#### **Develop value-based DER programs**

The sector is changing rapidly, and any new market design has to have flexibility at its core to ensure we don't lock ourselves into carbon intensive long-term contracts. DER facilities can provide significant value to the grid and in replacing Pickering's output if they are sited in the right place and provide the needed energy services. Pickering generally is required primarily to meet peak needs in Ontario (although the nuclear refurbishment schedule will change that slightly). Therefore, reducing peak demand could reduce the amount of additional natural gasfired generation on the margins, allowing Toronto to continue to benefit from a low-carbon electricity system.

A value-based DER compensation system could encourage building owners to optimize the use of storage and renewable generation to provide the needed energy services, where and when they are needed, to help reduce peak demand in Toronto and hence the associated increased emissions. Combining DER with conservation programs could provide even greater impact.

There are interesting challenges for how and where to charge EVs and how that fits in to local infrastructure development. Changing tariffs to encourage charging when demand is low or large amounts of renewable electricity is on the grid could help with managing peak times.

Pickering's retirement in 2024 or 2025 is fast approaching. To achieve those actions, we have created a roadmap of the best options for the next steps. This roadmap has been broken down into three sections, the short-term actions (2020-2022), medium-term actions (2022-2024) and the long-term actions (2024-2030). While the GTA can help push these recommendations, much will have to be done at the provincial level and include the government, the IESO and the OEB to allow for effective integration with the Ontario electricity system.

Roadmap for replacing Pickering and integrating more local-energy planning and resources

## Short-Term Actions 2020-2022

- Allow virtual net metering and aggregation
- Continue current conservation and develop an SDR framework
- ◆ Implement optional peak pricing
- Mandate inclusion of community energy plans into utility planning
- Require utilities to transparently consider non-wires solutions to infrastructure needs, and allow utilities to hold RFPs to find NWS
- Set long-term policy targets

## Medium-Term Actions 2022-2024

- Ensure all stakeholders contribute to allenergy regional plans
- Allow for innovative energy efficiency offerings
- ◆ Integrate SDR into system planning
- ♦ Flexibility in future market reforms
- Develop comprehensive cost-benefit calculator for DERs
- ◆ Create a value of DER tariff
- Criteria for consideration of multiple benefits, such as cost, environmental and resiliency

## Long-Term Actions 2024-onwards

- ◆ Update long-term policy commitments
- ◆ Evaluate new provincial solutions for meeting energy needs
- Implement long-term energy planning framework with targets
- ◆ Future market designs to include non-emitting DERs

Replacing Pickering with non-emitting solutions over the next half decade is an ambitious goal. But what we heard is that technology is not barrier. The technology exists.

It will not be easy. The barriers we heard were around how these new solutions could be applied in Toronto, and how their value can be recognized. While people in the GTA can start the changes, energy is larger than just the GTA, and the provincial government, system operators and regulators will need to be partners in creating a future energy system that can benefit everyone.

Improving the planning process is key to making these changes. The IESO has made great improvements in its planning processes over the past decade. More can be done, and it is crucial that those who live there and their representatives are made an integral part of planning. Reducing our demand has the added benefit of lowering costs in the long term as less energy, and less costly infrastructure to provide that energy, is required in the future. We need to continue to support conservation, while at the same time shifting to a strategic demand reduction system that can provide value to the system as well as the customer.

We need to ensure we don't lock high emitting generation into the system. Non-emitting generation technologies, including district energy, are available, and storage can provide significant value – if they are integrated properly, and if the rates they receive properly compensate them for both the costs and benefits of their solution. The hope is that by providing proper price signals, developers and building owners – residential and commercial – will make efforts to unlock these benefits. We need to ensure that the market has the flexibility to take advantage of cost-effective non-emitting solutions.

To replace Pickering, the real need is in the full integration of the demand and supply sides. New techniques of integrating strategic demand management with non-emitting DERs, and managing the resources so they provide value to the electricity system, can not only reduce costs and improve service, it can help reduce emissions from our electricity sector.

Of course, for all of this to happen effectively, there needs to be clear long-term policy. Policy inconsistency and uncertainty hampers innovation and investment.<sup>3</sup> While the GTA and its residents can do a lot, they cannot do it alone, and political commitment from the province is required for a sustained and effective transition.<sup>4</sup>

We can develop non-emitting solutions – both on the demand and supply side – to help Ontario retain its clean electricity system, and prepare for an even cleaner future.

For more information the full report is available on the Pollution Probe website at: https://www.pollutionprobe.org/replacing-pickering/

<sup>3.</sup> See Bruce Cameron, Richard Carlson, and James Coons, Canada's Energy Transformation: Evolution or Revolution?, Pollution Probe and QUEST, April 2019. At https://www.pollutionprobe.org/wp-content/uploads/QUEST\_Pollution-Probe-Policy-Innovation-Report.pdf

<sup>4.</sup> World Economic Forum, Fostering Effective Energy Transition, 2019 edition, March 2019. At http://www3.weforum.org/docs/WEF\_Foster-ing\_Effective\_Energy\_Transition\_2019.pdf

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## **About Pollution Probe**



Pollution Probe is a national, not-for-profit, charitable organization established in 1969 that exists to improve the health and well-being of Canadians by advancing policy that achieves positive, tangible environmental change. Pollution Probe has a proven track record of working in successful partnership with industry and government to develop practical solutions for shared environmental challenges.