Gas Phase-Out Impact Assessment – May 27, 2021

Feedback Provided by:

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Feedback - Gas Phase-Out Impact Assessment

Questions

Topic

Feedbac Are there additional considerations the IESO has not identified in defining the scope of the assessment to examine the reliability, operability, timing, cost and wholesale market implications of reduced emissions on the electricity system?

Greetings, and thank you for this opportunity to present my inputs to the study.

Looking at the proposed study approach I would strongly urge that the model scenario(s) to be considered should include the refurbishment of the Pickering nuclear generating station (3100 MW) as the cheapest and safest option to avoid an increase in Ontario gas generation. Ontario could model this process after the success of the Bruce RFP to industry. Pickering is currently slated to be shut down in 2024, and OPG has purchased three gas plants presumably to replace the impending electricity shortfall. Phasing out nuclear in favour of gas is a problem for the environment. We have seen New York's CO2 intensity increase by 1/3rd immediately after the shutdown of the Indian Point reactor, mainly due to increased natural gas, erasing all of that state's clean power gains of the past decade. Ontario is on path to follow suit.

Pickering produced almost 23 TWh of carbon-free electricity in 2019, twice the amount produced by all of our windmills in the same period. Based on the success of the ongoing Bruce and Darlington refurbishments, it seems that Ontario currently has the necessary expertise to refurbish Pickering as well. CNSC had already approved a Pickering refurbishment plan many years ago. The costs are well understood and should be approximately $8.6 Billion CAD.

The 2020 edition of "Projected Costs of Generating Electricity", released every five years by the International Energy Agency (IAE) and the OECD Nuclear Energy Agency (NEA) under the oversight of the Expert Group on Electricity Generating Costs (EGC Expert Group), concludes that "Nuclear thus remains the dispatchable low-carbon technology with the lowest expected costs in 2025. Only large hydro reservoirs can provide a similar contribution at comparable costs but remain highly dependent on the natural endowments of individual countries,"

In terms of non-nuclear scenarios to provide low-CO2 power replacing gas one might consider wind, solar, or Quebec Hydro, but I would argue that the available data shows these are inferior options.

Wind turbines cost $1.3 - 2.2 million USD/MW, and have 34% availability in winter, 18% in summer in Ontario. We would need at least 9,700 MW of wind capacity to get the same average annual power output. Note that wind generation is out of phase with Ontario's demand for electricity that peaks in the summer. If you get the lowest cost in the range, that's about $12.6 Billion USD or $16 Billion CAD. Then you'll need about 2.6 GW of gas plants to back up the new wind turbines when the wind isn't blowing so that would be about another $1.4-2 Billion. Solar panels have an even lower capacity

factor at our latitude (~12% in Ontario) and much lower energy return on investment. Both of these intermittent technologies would still require Ontario to acquire sufficient dispatchable reliable base-load for when the sun is not shining and the wind is not blowing. Available grid-scale battery technologies are several orders of magnitude away from being able to fill the expected multi-day production gaps.

The Ontario Chamber of Commerce funded a study by the Canadian Centre for Economic Analysis looking at the economic impacts of extending the lifetime of the Pickering reactor to 2024. (https://occ.ca/wp-content/uploads/OPG-Report-FINAL.pdf) This study provides an excellent assessment of the economic impacts of Pickering's reliable power supply to Ontarians. On the possibility of using Quebec Hydro the study shows that "developing a new intertie to provide 2000 MW of capacity and the capability to deliver this energy to the GTA load centre would cost $1-1.4 billion, with a lead time of 10 years to carry out planning, design, local and indigenous consultations, and environmental studies". Another study shows that Quebec hydro is already reaching its export limits. "Of the non-GHG emission sources of new electricity capacity, the most cost-effective options are the planned refurbishments of Darlington and Bruce nuclear generating stations. According to the FAO [Financial Accountability Office of Ontario] estimates, the lowest priced option to generate new baseload capacity is a large new nuclear generating station, which is 25% less expensive than large scale firm imports from Quebec."
(https://d3n8a8pro7vhmx.cloudfront.net/thesociety/pages/4043/attachments/original/1612810633/21_02_08-Quebec_Imports_FINAL.pdf?1612810633).

In summary, Refurbishing Pickering would cost about $8.6 Billion, while replacing it with wind and gas costs about $17.5 Billion (and much more if you want to match capacity in the summer months when it is most needed.).Importing hydro from Quebec would be more expensive than building a new large-scale nuclear generating station. Refurbishing Pickering would be the cheapest option to support the gas phase-out by far.

General Comments/Feedback

I and most scientists believe that a gas phase-out is very important for the environment by decreasing both direct CO2 emissions, as well as leakage of methane from mining and distribution of gas. Based on a recent Environmental Defense Fund study, an average of 3% of all methane is leaked directly into the atmosphere. This would mean that the CO2 lifecycle intensity of gas plants is very similar to that of coal at about 975 gCO2/kWh.

Anti nuclear NGOs will argue that nuclear energy should be phased out due to the danger of radioactive releases, close to population centres, but this is not justified. The European Joint Research Committee was tasked to provide a scientific assessment of the risks posed by nuclear reactors, and their analyses (March 2021) "did not reveal any science-based evidence that nuclear energy does

more harm to human health or to the environment than other electricity production technologies already included in the Taxonomy as activities supporting climate change mitigation." (https://ec.europa.eu/info/sites/default/files/business_economy_euro/banking_and_finance/documents/210329-jrc-report-nuclear-energy-assessment_en.pdf)