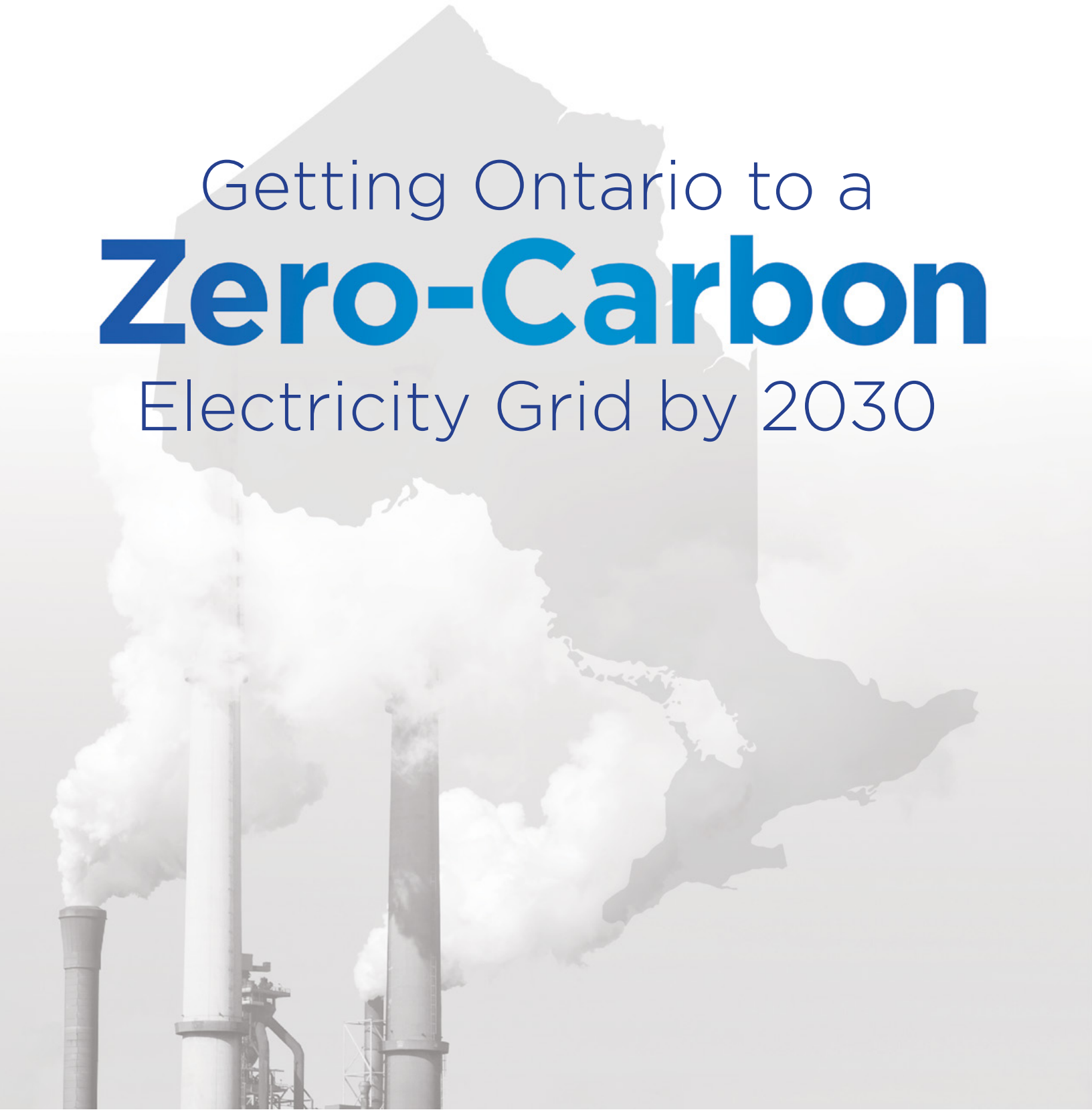
December 2021

Revised and
Updated February 2022

Updated May 2022

Getting Ontario to a Zero-Carbon Electricity Grid by 2030



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Acknowledgments

Thanks to:

The M.H. Brigham Foundation

The Echo Foundation

The Green Sanderson Family Foundation

The Taylor Irwin Family Fund at **The Toronto Foundation**

for their generous financial support.

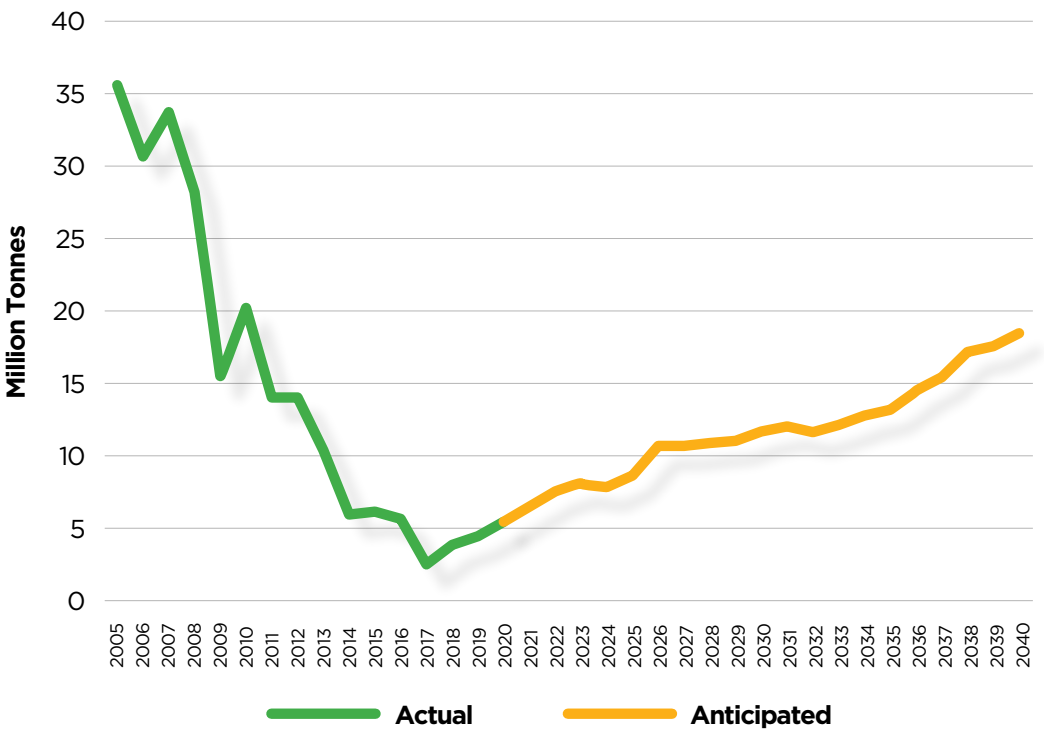
Introduction

According to Ontario's Independent Electricity System Operator (IESO), the greenhouse gas (GHG) pollution from Ontario's gas-fired power plants will increase by 375% by 2030 and by more than 600% by 2040 as the province uses fossil gas to replace aging nuclear reactors and to meet growing demand for electricity driven by population growth and the increased electrification of homes, buildings and transportation systems. If this occurs, Ontario will lose almost half (48%) of the pollution reduction benefits that it achieved by phasing-out its dirty coal plants.

As **Figure 1** shows the GHG pollution from our electricity system fell by 93% between 2005 and 2017 due to the phase-out of Ontario's coal plants, dropping from 35.4 million tonnes in 2005 to 2.5 million tonnes in 2017.

Figure 1

Ontario's Historic and Forecast GHG Pollution from its Electric Power Plants[1]



Greenhouse gas (GHG) pollution from Ontario's gas-fired power plants will increase by

375%

by 2030

Unfortunately, as **Figure 1** reveals, in 2018 the GHG pollution from Ontario's power plants started to rise again – a rise that the IESO is forecasting will continue for the next 20 years. Specifically, the IESO is forecasting that the GHG pollution from Ontario's gas-fired power plants will rise by 375% by 2030 and more than 600% by 2040, relative to the 2017 baseline.

This trend is contrary both to achieving the emission reduction targets in Ontario's own climate plan and the federal government's commitment to achieving a zero-emissions electricity system across Canada by 2035.

High-Cost Nuclear Projects

As **Table 1** shows the Government of Ontario is supporting three high-cost nuclear projects with a total capital cost of $28.8 billion.

Table 1 | High-Cost Nuclear Projects[i]

Darlington Re-Build	**$12.8 Billion**
Bruce Re-Build	**$13 Billion**
New GTA Reactor	**$3 Billion**
Total	**$28.8 Billion**

Ontario's Municipalities

Thirty-two Ontario municipalities, representing almost 60% of the province's population, have passed resolutions calling on the Government of Ontario to phase-out gas power.[2]

Ontario municipalities have asked the Government of Ontario to:

1. Return the gas plants' GHG pollution to their 2017 level ASAP; and
2. Completely phase-out gas-fired electricity generation by 2030.

The IESO's Report

In October 2021, the IESO released its response to Ontario's municipalities, namely, *Decarbonization and Ontario's Electricity System: Assessing the impacts of phasing out natural gas generation by 2030.*

According to the IESO's report, it would be impossible to phase-out gas power by 2030. Furthermore, according to the IESO, if we attempt to do so, our electricity rates will skyrocket and we will experience blackouts.[3]

As we will show below, all of these claims are false.

Municipalities representing almost

60%

of the province's population, have passed resolutions calling on the Government of Ontario to phase-out our gas-fired power plants

[i] Annual Planning Outlook, (January 2020), page 11; *Ontario's Long-Term Energy Plan 2017*, pages 45 & 46; and IESO, *Decarbonization and Ontario's Electricity System*, page 16; and see "Data Tables" at https://www.ieso.ca/en/Learn/Ontario-Supply-Mix/Natural-Gas-Phase-Out-Study.

IESO's Report is Fundamentally Flawed

Phasing-Out Gas-Fired Electricity Generation by 2030

Despite its claim that it would be impossible to achieve a complete phase-out of gas-fired electricity generation by 2030, the IESO's report actually outlines a plan to achieve a 99.7% carbon-free electricity grid by 2030.[4]

Nevertheless, it asserts (without any supporting analysis) that it would be impossible to meet the remaining 3/10ths of 1% of our electricity needs (500 GWh) in 2030 from carbon-free resources.[5] The IESO's assertion is not credible since Ontario could easily obtain an additional 500 GWh of electricity supply over the next nine years by making additional investments in wind and solar energy; by expanding our transmission links with Quebec and/or Manitoba; and by harnessing our electric vehicles' batteries to provide power back to the electricity grid during peak demand hours.

Fearmongering: Blackouts

Based on its forecast that our carbon-free electricity supplies will only be able to meet 99.7% of our electricity needs in 2030, the IESO asserts that we will experience blackouts when our electricity demand exceeds our carbon-free electricity supplies.

This assertion is irresponsible fearmongering since on Jan. 1, 2030 approximately 33% of our existing gas-fired electricity generation capacity will still be under contract to the IESO. By Jan. 1, 2040, approximately 10% of our existing gas-fired electricity generation capacity will remain under contract with the IESO.[6]

As a result, if there is a shortfall in our carbon-free electricity supplies in 2030 or 2037 or 2040, the IESO will fire up our gas-fired power plants to keep the lights on.[7] It will not subject Ontarians to blackouts.

Fearmongering: Higher Electricity Rates

According to the IESO, raising Ontario's carbon-free electricity supply from 93.7% in 2020[8] to 99.7% in 2030 would lead to a 60% rise in residential electricity rates[9] despite the fact that its report estimates that Ontario's electricity costs would rise by only 20%.[10]

The IESO's report does not explain why it believes that the rise in residential rates should be three times greater than its forecast rise in Ontario's electricity costs. In addition, the IESO's report does not provide a forecast of the price impact that a gas power phase-out would have on commercial or industrial rates.

The IESO's report actually outlines a plan to achieve a

99.7%

carbon-free electricity grid by 2030

If Ontario's electricity costs were to rise by 20% by 2030, this rise in costs could be paid for by raising residential, commercial and industrial electricity rates by 2% per year during each of the next nine years. However, as we outline in the next section, the IESO's assertion that costs would rise to this degree is without merit.

Fearmongering: Higher Electricity Costs

The IESO report falsely claims that a gas power phase-out would raise our electricity costs by 20% by:

1. Underestimating the carbon tax savings from a gas-power phase out;
2. Ignoring our two lowest-cost storage options; and
3. Including the costs of a $3 billion new GTA reactor as part of its phase-out plan.

1 Carbon Taxation

The IESO's report assumes that gas-fired electricity generation will be subject to a carbon tax of only $50 per tonne in 2030 despite the fact that the Government of Canada has announced that it will be raising the carbon tax to $170 per tonne in 2030.[11]

In addition, the IESO's report assumes that only 5% of the gas plants' carbon pollution will be subject to carbon taxation in 2030[12] despite the fact that Ontario residents are already subject to carbon taxation on 100% of the carbon pollution created by their consumption of fossil gas for home heating and the federal government is committed to achieving a zero-emissions electricity system by 2035.[13]

As a result, the IESO's report estimates that phasing-out gas power in 2030 would reduce our electricity system's carbon tax costs by only $30.5 million per year.[14]

On the other hand, if 100% of our gas plants' carbon pollution is subject to a carbon tax of $170 per tonne, the carbon tax savings from phasing-out gas power in 2030 would be $2 billion per year.[15]

If 100% of our gas plants' carbon pollution is subject to a carbon tax of $170 per tonne, the carbon tax savings from phasing-out gas power in 2030 would be

$2 billion per year

2 Storage Costs

Since the wind doesn't always blow and the sun doesn't always shine, new wind and solar electricity supplies must be combined with storage resources.

The IESO's report assumes that we would need to invest $5.7 billion to build 6,000 megawatts of new high-cost stationary storage facilities by ignoring our two lowest-cost storage options, namely Hydro Quebec's reservoirs and our electric vehicles' batteries.[16]

Hydro Quebec's Reservoirs

According to a Massachusetts Institute of Technology (MIT) report, Hydro Quebec's existing reservoirs are the lowest-cost storage option for wind and solar energy.[17] When our wind or solar power production is above average, our surplus green energy can be exported to Quebec to keep the lights on in Montreal and Hydro Quebec can store more water in its reservoirs. Conversely, when our wind or solar power generation is below average, Hydro Quebec can use the extra water in its reservoirs to produce electricity for export back to Ontario. In short, by integrating our wind and solar generation with Hydro Quebec's reservoirs, we can convert intermittent wind and solar energy into a firm 24/7 source of baseload electricity supply for Ontario.

Electric Vehicle Batteries

Currently, almost all of our electric vehicle (EV) chargers are unidirectional. That is, they allow our electricity grid to charge our EVs' batteries, but they do not allow our EVs to send power back to the grid during peak demand hours.

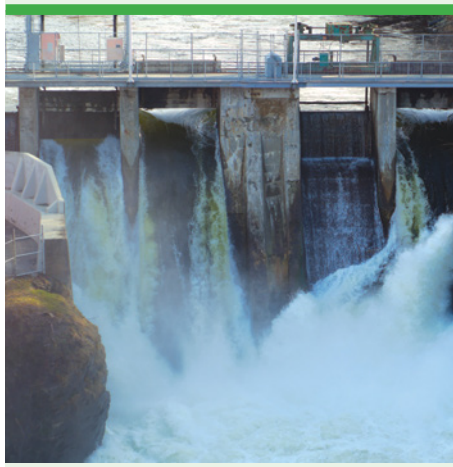
Bidirectional chargers allow our electricity grid to charge our EVs' batteries and also allow our EVs' batteries to send power back to the grid during peak demand hours.

By 2030 the total capacity of our EVs' batteries will be more than double the capacity of our gas-fired power plants.[18] Therefore, the installation of bidirectional chargers can allow our EVs' batteries to make a major contribution towards phasing-out Ontario's gas-fired electricity generation.

This is urgent matter since it is cheaper to incentivize bidirectional charging now before millions of one-directional chargers are purchased.

3 A New GTA Nuclear Reactor

The IESO report includes a $3 billion new 300 MW GTA nuclear reactor as part of its phase-out strategy[19] despite the fact that energy efficiency, wind and solar and Quebec waterpower can phase-out gas power at less than half the cost.



We can convert intermittent wind and solar energy into a firm

24/7

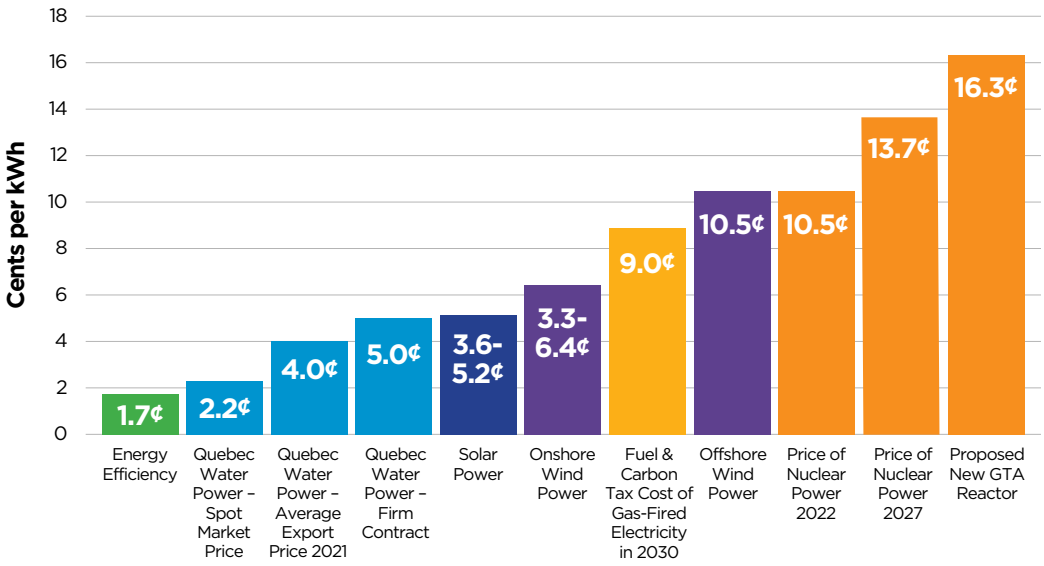
source of baseload electricity supply for Ontario

According to a telephone survey conducted by Oraclepoll Research, only 16% of GTA voters support building a new GTA reactor before we have a permanent safe storage facility for nuclear waste.[20]

Figure 2 shows the costs of Ontario's electricity options.

Figure 2

Ontario's Electricity Options: A Cost Comparison



As Figure 2 reveals, the cost of electricity from a new GTA reactor (16.3 cents per kWh) is more than eight times greater than the cost of saving a kWh (1.7 cents per kWh) and three to seven times greater than the cost of Quebec waterpower.

Figure 2 also shows that the fuel and carbon tax costs of operating our gas plants in 2030 will be 9 cents per kilowatt-hour (kWh) assuming that all of the gas plants' GHG pollution is subject to a carbon tax of $170 per tonne. As the bar graphs to the left reveal, energy efficiency, Quebec waterpower and wind and solar can keep our lights on at a much lower cost.

In addition, Figure 2 reveals that Ontario Power Generation will need to raise its price of nuclear electricity by 30% (to 13.7 cents per kWh) by 2027 to pay for the rebuilding of the Darlington Nuclear Station's aging reactors.

If the IESO really wants to reduce Ontario's electricity rates, it would be aggressively promoting energy efficiency and renewables to phase-out gas power and reduce our need for much higher cost nuclear power.

If the IESO really wants to reduce Ontario's electricity rates, it would be aggressively promoting energy efficiency and renewables

References for Figure 2 are provided at the end of this report

Ontario's Energy Minister Todd Smith Has Sent The IESO Back to the Drawing Board

On October 7, 2021, after reading the IESO's report, Ontario Energy Minister Todd Smith directed the IESO to go back to the drawing board and develop a new report on how to phase-out Ontario's gas plants.

Unfortunately, Minister Smith failed to specify that the IESO should develop a least-cost climate-responsible plan to:

1. Return the gas plants' pollution back to their 2017 level ASAP; and
2. Achieve a complete gas power phase-out by 2030 as requested by Ontario's municipalities

Minister Smith's directive simply asked the IESO to develop a plan to achieve a gas power phase-out by an unspecified date.[21]

Minister Smith failed to request a gas power phase-out by

2030

Ontario Can Return its Gas Plants' Pollution Back to their 2017 Level by Taking the Following Actions

1. Banning gas-fired electricity exports to the U.S[23]
2. Doubling our spot market purchases of Quebec waterpower using our existing transmission links with Quebec[22]
3. Purchasing all energy efficiency savings and solar and wind power that can keep our lights on at less than today's price of nuclear electricity (10.5 cents per kWh)[24]

Achieving a Complete Phase-Out of Gas Power by 2030

Our need for gas-fired generation is greatest on our hottest summer and coldest winter days. For example, in the summer of 2020 and the winter of 2020/21, we needed 6,845 megawatts (MW) and 5,269 MW of gas generation during our peak summer and winter demand hours respectively.[25]

We can eliminate the need for gas power during our peak demand hours by expanding our transmission links with Quebec and by harnessing our electric vehicles batteries to provide power back to the grid during peak demand hours.

Expanding Our Transmission Links With Quebec

The IESO has identified how we can increase our import capability by an additional 7,500 MW by upgrading our transmission links with Quebec at Chats Falls (2,000 MW), Ottawa (2,000 MW), Beauharnois (2,000 MW) and Cornwall (1,500 MW).[26]

Since all of these upgrades can use existing Hydro One transmission corridors, they can be completed by 2030.[27]

The average price of Hydro Quebec's exports (spot market and long-term) during the first nine months of 2021 was 4 cents per kWh.[28] New transmission lines would increase the cost of Quebec imports by approximately 0.5 cents per kWh[29] for a total cost of 4.5 cents per kWh or less than half OPG's current price for nuclear electricity (10.5 cents per kWh).

Vehicle-to-Grid (V2G) Integration

In 2030, the capacity of our electric vehicles' batteries will be more than double the capacity of our gas-fired power plants.[30]

We need to install bidirectional chargers for our cars, school buses and fleet vehicles so that they can play a major role in helping Ontario achieve a complete gas power phase-out by 2030.

Putting OPG's Gas Plants on Standby Reserve Between 2030 and 2040

To avoid any risk of blackouts as we transition to a zero-carbon electricity system the Government of Ontario can direct OPG to put its five large gas-fired power plants on standby reserve from 2030 to 2040 so that they can provide emergency back-up power to our electricity grid if we temporarily have insufficient carbon-free electricity resources to meet our needs due to extreme events.

The total capacity of OPG's five gas plants is 4,674 MW.[31]

We need to install bidirectional chargers for our cars, school buses and fleet vehicles

Conclusion

The IESO report reflects what appears to be a largely predetermined view of the feasibility of a gas plant phase out. It relies on outdated ideas about electricity system structure at a time when renewable energy costs continue to rapidly fall, new technologies are making renewable integration and efficiency efforts even more effective (technically and financially) and jurisdictions around the world are demonstrating the ability to integrate very high levels of renewable power into their systems.

It also reflects blinkered thinking about the supposed superiority of producing most of our electricity within Ontario's borders using fracked gas and uranium that is imported from western Canada and Pennsylvania. In particular, the IESO failed to meet with Hydro Quebec to discuss the mutual benefits of integrating Ontario's electricity grid with the fourth largest producer of waterpower in the world and the owner of massive hydro-electric reservoirs which can act like a giant battery for our wind and solar energy.

Instead, the IESO promotes the building of a new nuclear reactor in the GTA that would produce electricity that would cost two to five times more than solar, wind or hydropower imports and eight times more than efficiency efforts. It fails to explain how this option meets its own preference for acquiring new generation capacity on a fully transparent and competitive basis and why it would want to lock Ontario into one of the highest cost and slowest options available to reduce GHG pollution.

In conclusion, the IESO report is about protecting powerful vested interests. It is not an unbiased examination of the best ways to meet Ontario's climate goals while moving to a modern highly efficient and low-cost electricity system.

The IESO report reflects a largely predetermined view of the feasibility of a gas plant phase out

Sources

1 Independent Electricity System Operator (IESO), *Annual Planning Outlook: Ontario's electricity system needs: 2023-2042*, (December 2021); https://www.ieso.ca/en/Sector-Participants/Planning-and-Forecasting/Annual-Planning-Outlook

2 https://www.cleanairalliance.org/ontario-municipalities-that-have-endorsed-gas-power-phase-out/

3 IESO, *Decarbonization and Ontario's Electricity System: Assessing the impacts of phasing out natural gas generation by 2030*, (October 7, 2021), page 1; https://www.ieso.ca/en/Learn/Ontario-Supply-Mix/Natural-Gas-Phase-Out-Study

4 According to the IESO, Ontario's total demand for electricity in 2030 will be 165.1 TWh and we would only need an additional 0.5 TWh of generation in 2030 to prevent rotating blackouts. *Decarbonization and Ontario's Electricity System*, page 19; and https://www.ieso.ca/en/Sector-Participants/Planning-and-Forecasting/Annual-Planning-Outlook

5 *Decarbonization and Ontario's Electricity System*, page 1 and 19.

6 As of June 30, 2021 the IESO had approximately 9,520 MW of gas-fired generation capacity under contract. On January 1, 2030 approximately 3,150 MW of our existing gas-fired generation capacity will be under contract to the IESO. On January 1, 2040 approximately 950 MW will still be under contract. https://www.ieso.ca/en/Sector-Participants/Planning-and-Forecasting/Annual-Planning-Outlook

7 As noted in the previous endnote, on January 1, 2030 approximately 3,150 MW of gas generation will be under contract to the IESO. This gas-fired capacity will be able to produce up to 27,600 GWh per year. That is, more than 55 times the IESO's forecast shortfall of carbon-free electricity supplies (500 GWh).

8 Ontario's System-Wide Electricity Supply Mix: 2020 Data (oeb.ca)

9 *Decarbonization and Ontario's Electricity System*, page 1.

10 Jack Gibbons communication with Chuck Farmer, Vice President, Planning, Conservation and Resource Adequacy, IESO (October 15, 2021).

11 IESO, *IESO Response to Stakeholder Feedback: Gas Phase-Out Impact Assessment – June 14, 2021*, pages 7 and 8.

12 The *Decarbonization and Ontario's Electricity System* report assumes that the average emission rate of Ontario's gas plants in 2030 will be 390 tCO2e/GWH and that only emissions in excess of 370 tCO2e/GWH will be subject to carbon taxation. *IESO Response to Stakeholder Feedback: Gas Phase-Out Impact Assessment – June 14, 2021*, pages 7 and 8; and https://www.ieso.ca/en/Sector-Participants/Planning-and-Forecasting/Annual-Planning-Outlook

13 https://pm.gc.ca/en/mandate-letters/2021/12/16/minister-natural-resources-mandate-letter

14 The IES0's 2020 *Annual Planning Outlook* forecasts that the gas plants' GHG pollution in 2030 will be 12.2 million tonnes (Scenario 1). 12.2 million tonnes x $50 per tonne x 0.05 = $30.5 million. https://www.ieso.ca/en/Sector-Participants/Planning-and-Forecasting/Annual-Planning-Outlook

15 12.2 million tonnes x $170 per tonne = $2.07 billion.

16 See "Data tables" at https://www.ieso.ca/en/Learn/Ontario-Supply-Mix/Natural-Gas-Phase-Out-Study

17 Two-Way Trade in Green Electrons: Deep Decarbonization of the Northeastern U.S. and the Role of Canadian Hydropower (mit.edu)

18 https://www.cleanairalliance.org/wp-content/uploads/2021/11/Vehicle-to-Building-and-Grid-for-Peak-Needs-November-22-2021.pdf

19 *Decarbonization and Ontario's Electricity System*, page 16; and see "Data tables" at https://www.ieso.ca/en/Learn/Ontario-Supply-Mix/Natural-Gas-Phase-Out-Study

20 Oraclepoll Research, *Perceptions of a New GTA Nuclear Reactor: Telephone Survey Repor*t, (October 2021), page 9; https://www.cleanairalliance.org/wp-content/uploads/2021/11/Oracle-Poll-Report-October-2021.pdf

21 See "Minister Issues Letter to IESO Regarding the Future of Natural Gas Generation", (October 7, 2021) at https://www.ieso.ca/en/Corporate-IESO/Ministerial-Directives

22 Using our existing transmission lines, Ontario can import 16.5 to 18.5 billion kWh per year from Quebec. In 2021, Ontario's electricity imports from Quebec were only 7.5 billion kWh. As a result, Ontario can increase its electricity imports from Quebec by up to an additional 11 billion kWh per year using existing transmission lines. The IESO's 2021 *Annual Planning Outlook* is forecasting that the cost of gas at Dawn will be $3.38 per mmbtu (Real 2021$ CDN) from 2023 onward. This entails that the fuel cost of a combined-cycle gas power plant will be approximately 2.4 cents per kWh. Assuming Ontario would be required to pay a 10% price premium over the fuel cost of a gas plant for spot market purchases of Quebec waterpower, the incremental cost of increasing our imports of Quebec waterpower by 11 billion kWh would be $26.4 million per year. The IESO is forecasting that Ontario's gas-fired generation in 2030 will be 30.7 billion kWh. IESO, *IESO Response to Questions from the Ontario Clean Air Alliance*, (November 2014); https://www.ieso.ca/en/Power-Data/Supply-Overview/Imports-and-Exports; and https://www.ieso.ca/en/Sector-Participants/Planning-and-Forecasting/Annual-Planning-Outlook

23 In 2019 Ontario exported approximately 3.4 billion kWh of gas-fired electricity. This represents 35% of the total output of Ontario's gas plants in 2019. https://www.cleanairalliance.org/wp-content/uploads/2020/04/OCAA-2019-GFG-Export-Est-Apr-2020-v4.pdf

24 According to the IESO's 2021 *Annual Planning Outlook*, in 2030 Ontario's gas plants will produce 30.7 billion kWh and 11.9 million tonnes of GHG pollution. If 100% of the gas plants' GHG pollution is subject to a carbon tax of $170 per tonne, the carbon tax will be 6.6 cents per kWh. As noted in an endnote above, the IESO is forecasting that the gas plants' fuel cost will be approximately 2.4 cents per kWh. Therefore, under this scenario, the total incremental costs of operating the gas plants in 2030 will be approximately 9 cents per kWh. https://www.ieso.ca/en/Sector-Participants/Planning-and-Forecasting/Annual-Planning-Outlook

25 IESO, Stakeholder Advisory Committee, *Summer Operations Review*, (August 11, 2020); and email to Jack Gibbons from David Barrett, IESO (May 5, 2021).

26 IESO, *Ontario-Quebec Interconnection Capability: A Technical Review*, (May 2017) and IESO, *Review of Ontario Interties*, (October 14, 2014).

27 Quebec's demand for electricity peaks in the winter. As a result, Hydro Quebec has more than 10,000 MW of surplus electricity generation during the summer. By expanding our transmission links with Quebec, we could import this power to meet our electricity needs during the hottest summer days.

While Quebec's demand for electricity peaks during the coldest winter days, these peaks are needle peaks with short durations. As a result, Quebec has surplus power available for export during at least 99% of the hours of the year. In this context, it is important to remember that nuclear generating stations are not available for 100% of the hours of the year either. In fact, the Darlington Nuclear Station's average annual capacity factor is only 83%.

Quebec's electricity consumption per person is the highest in the world. By investing in energy efficiency (e.g., heat pumps), load control (e.g., thermal storage) and wind power, Hydro Quebec could increase its electricity exports to Ontario during every single hour of the year. Ontario Clean Air Alliance Research, *Phasing-Out Ontario's Gas-Fired Power Plants: A Road Map*, (Updated January 29, 2021), pages 9 and 10. https://www.cleanairalliance.org/wp-content/uploads/2021/02/GAS_REPORT_2021_WEB.pdf

28 https://www.hydroquebec.com/about/financial-results/quarterly-bulletin.html?utm_content=quarterly-report

29 According to the IESO, the cost of a new 2,000 MW intertie with Quebec could be up to $1.4 billion. A new intertie could enable Ontario to import an additional 17.52 billion kWh per year from Quebec. Hydro One amortizes the costs of transmission projects over 55 years. Assuming a cost of capital of 5% and a 55 year amortization period, the incremental transmission cost of importing an additional 17.52 billion kWh per year from Quebec would be 0.42 cents per kWh. IESO, *Ontario-Quebec Interconnection Capability: A Technical Review*, (May 2017), page 24; and Hydro One, *Annual Report 2020*, page 62.

30 https://www.cleanairalliance.org/wp-content/uploads/2021/11/Vehicle-to-Building-and-Grid-for-Peak-Needs-November-22-2021.pdf

31 According to the IESO, the required reserve margin for Ontario's electricity grid is 3,030 MW in 2030 and 4,380 MW in 2040. The reserve margin is the amount of resources Ontario needs to have available over and above peak demand under normal weather conditions. https://www.ieso.ca/en/Sector-Participants/Planning-and-Forecasting/Annual-Planning-Outlook

Figure 2 Notes

Energy efficiency: In 2017 the Independent Electricity System Operator's (IESO) average levelized unit energy cost (LUEC) of procuring a kWh of electricity savings was 1.69 cents. Independent Electricity System Operator, *2017 Report on Energy-Efficiency Activities*, page 8.

Quebec waterpower – spot market price: In 2017 the average price of Ontario's spot market electricity purchases from Quebec was 2.2 cents per kWh. Financial Accountability Office of Ontario, *Electricity Trade Agreement: An Assessment of the Ontario-Quebec Electricity Trade Agreement*, (Spring 2018), page 7.

Quebec waterpower – average export price in 2021: During the first three quarters of 2021 Hydro Quebec's average electricity export price (firm and spot) was 4.0 cents per kWh. https://www.hydroquebec.com/about/financial-results/quarterly-bulletin.html?utm_content=quarterly-report

Quebec waterpower – firm contract: On June 22, 2017 Hydro Quebec offered to sell Ontario 8 billion kWh per year, for 20 years, at a price of 6.12 cents per kWh. In August 2017 Hydro Quebec lowered its proposed price to 5 cents per kWh, but the Government of Ontario still refused to accept the offer. Letter from Steve Demers, Vice President, Hydro Quebec to Peter Gregg, CEO, Independent Electricity System Operator, (June 22, 2017); and Pierre Couture, "Hydro Quebec l'Ontario en ligne de mire", *Journal de Montreal*, (August 16, 2017).

In 2017 the average price of Hydro Quebec's short and long-term electricity exports was 4.7 cents per kWh. Hydro Quebec, *Annual Report 2017*, page 76.

Utility Scale Solar: According to Lazard, the cost of utility scale solar PV is 2.8 to 4.1 cents per kWh (US $). We have converted these costs to Canadian dollars by multiplying them by 1.27. Lazard, *Lazard's Levelized Cost of Energy Analysis – Version 15.0* (October 2021) page 2.

Onshore Wind: According to Lazard, the cost of onshore wind is 2.6 to 5.0 cents per kWh (US $). We have converted these costs to Canadian dollars by multiplying them by 1.27. Lazard, *Lazard's Levelized Cost of Energy Analysis – Version 15.0* (October 2021) page 2.

Fuel & Carbon Tax Cost of Gas-Fired Power in 2030: The IESO's 2021 *Annual Planning Outlook* is forecasting that the cost of gas at Dawn, Ontario will be $3.38 per mmbtu (Real 2021$ CDN) from 2023 onwards. This entails that the fuel cost of a combined-cycle power plant will be approximately 2.4 cents per kWh. In 2030 the federal carbon tax will be $170 per tonne. If 100% of the gas plants' GHG pollution is subject to the carbon tax, their carbon tax will be 6.6 cents per kWh. https://www.ieso.ca/Sector-Participants/Planning-and-Forecasting/Annual-Planning-Outlook

OPG's Price of Nuclear Power in 2022: Ontario Energy Board Docket No. EB-2020-0290, Ontario Energy Board, *Payment Amounts Order Ontario Power Generation Inc.*, (January 27, 2022), pages 5 & 8.

Offshore Wind: According to Lazard, the cost of offshore wind is 8.3 cents per kWh (US $). We have converted this cost to Canadian dollars by multiplying it by 1.27. Lazard, *Lazard's Levelized Cost of Energy Analysis – Version 15.0* (October 2021) page 2.

OPG's Price of Nuclear Power in 2027: Ontario Energy Board Docket No. EB-2020-0290, I1-01-Environmental Defence-028.

Proposed New GTA Nuclear Reactor: Ontario Power Generation (OPG) is proposing to build a small modular reactor (SMR) near Oshawa. The Canadian nuclear industry is forecasting that the cost of electricity from a SMR will be 16.3 cents per kWh; however they note that if there is a 3% capital cost overrun the cost will rise to 21.5 cents per kWh. They are hoping that the first commercial SMR will be in-service by 2030. Canadian Small Modular Reactor Roadmap Steering Committee (2018), *A Call to Action: A Canadian Roadmap for Small Modular Reactors,* pages 35 and 54.

Notes

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THE ONTARIO CLEAN AIR ALLIANCE, established in 1997, successfully led the campaign to phase-out dirty coal power in Ontario.

We are now working to move our province towards a 100% renewable energy future.

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