Feedback Form

Gas Phase-Out Impact Assessment – May 27, 2021

Feedback Provided by:

Name: Eric Stark

Title: Click or tap here to enter text.

Organization: Click or tap here to enter text.

Email: [redacted]

Date: June 16,2021

To promote transparency, feedback submitted will be posted on the Gas Phase-Out Impact Assessment webpage unless otherwise requested by the sender.

Please provide feedback by June 17, 2021 to engagement@ieso.ca. Please use subject:

Feedback - Gas Phase-Out Impact Assessment

Questions

Topic	Feedback
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?	Please see attached Word document.

General Comments/Feedback

Please see attached Word document.

Mr. Chuck Farmer
Senior Director, Power System Planning
Independent Electricity System Operator (IESO)
Toronto, Ontario

Re: Gas Phase-Out Impact Assessment

Firstly, it is becoming increasingly clear that the cost of not addressing climate change is much greater than the cost of phasing-out fossil fuel use. [1][2][3][4]

Not acting swiftly and decisively to end our use of fossil fuel use is inconsistent with our need and commitment to keep global temperature rise below 1.5 C. [5][6]

Therefore, any scenario that does not clearly state binding targets that correspond to our national and international obligations to keep global temperature rise below 1.5 C should be expunged or redefined.

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[1] **Charting Our Course:** ***Bringing clarity to Canada's climate policy choices on the journey to 2050.***
Canadian Institute for Climate Choices - January 2020
Canada faces risk from the physical impacts of a changing climate, including floods, heatwaves, wildfires, and sea-level rise. By 2050, under current trends, the impacts of climate change are expected to reduce global GDP by three percent, or US$7.9 trillion, according to a recent estimate by the Economist Intelligence Unit. Canada will not be immune.
https://climatechoices.ca/reports/charting-our-course/

[2] **Tip of the Iceberg:** ***Navigating the Known and Unknown Costs of Climate Change for Canada***
Canadian Institute for Climate Choices - December 3 2020
Over the past five decades, the costs of weather-related disasters like floods, storms,and wildfires have risen from tens of millions of dollars to billions of dollars annually in Canada. Insured losses for catastrophic weather events totalled over $18 billlion between 2010 and 2019, and the number of catastrophic events was over three times higher than in the 1980s.
https://climatechoices.ca/wp-content/uploads/2020/12/Tip-of-the-Iceberg-_-CoCC_-Institute_-Full.pdf

[3] **The Health Costs of Climate Change** ***How Canada can adapt, prepare and save lives***
Canadian Institute for Climate Choices - June 2, 2021
The challenge ahead is profound. Our analysis shows that the impacts of climate change could cost Canada's healthcare system billions of dollars and reduce economic activity by tens of billions of dollars by later this century. Adding the value of lost quality of life and premature death, the societal costs of climate change impacts on health could amount to hundreds of billions of dollars.
https://climatechoices.ca/wp-content/uploads/2021/06/ClimateChoices_Health-Report_-Summary_June2021.pdf

[4] **Mark Carney:** ***Climate crisis deaths 'will be worse than Covid'***
Sharanjit Leyl - BBC News - February 5, 2021
The world is heading for mortality rates equivalent to the Covid crisis every year by mid-century unless action is taken, according to Mark Carney. The former central banker said the investment needed to avert millions of deaths was double current rates. But with governments ploughing billions into keeping economies afloat, a question mark hangs over whether the recovery will be green enough. The answer lies in smarter investment, Mr Carney said... "When you look at climate change from a human mortality perspective, it will be the equivalent of a coronavirus crisis every year from the middle of this century, and every year, not just a one-off event. So it is an issue that needs to be addressed now."
https://www.bbc.com/news/business-55944570

[5] **Emissions Gap Report 2019**
United Nations Environment Programme
"Our collective failure to act strongly and early means that we must now implement deep and urgent cuts. This report tells us that to get in line with the Paris Agreement, emissions must drop 7.6 per cent per year from 2020 to 2030 for the 1.5°C goal ... We have to learn from our procrastination. Any further delay brings the need for larger, more expensive and unlikely cuts. We need quick wins, or the 1.5°C goal of the Paris Agreement will slip out of reach. The intergovernmental Panel on Climate Change (IPCC) has warned us that going beyond 1.5°C will increase the frequency and intensity of climate impacts, such as the heatwaves and storms witnessed across the globe in the last few years. We cannot afford to fail."
wedocs.unep.org/bitstream/handle/20.500.11822/30797/EGR2019.pdf

[6] **G7 Climate and Environment Ministers' Meeting Communiqué**
London, United Kingdom 20 – 21 May 2021 Section 33
"We commit to promoting the increased international flow of public and private capital toward Paris Agreement-aligned investments and away from high-carbon power generation to support the clean energy transition in developing countries. In this context, we will phase out new direct government support for carbon-intensive international fossil fuel energy, except in limited circumstances at the discretion of each country, in a manner that is consistent with an ambitious, clearly defined pathway towards climate neutrality in order to keep 1.5 C within reach, in line with the long-term objectives of the Paris Agreement and best available science."
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/988551/g7-climate-environment-communique.pdf

The risks of GHG induced climate change have been known for several decades. [7][8]

The motion passed by the Canadian Parliament's House of Commons on June 17, 2019 declaring a 'National Climate Emergency' should have been a clarion call for immediate action to phase out fossil fuel use by all responsible actors. [9]

A May 2021 report by the International Energy Agency underscores the urgency and enormity of the task at hand. [10]

Any contract commitments in Ontario for use of fossil fuels beyond 2030 should be viewed as faulty management decisions by our Energy regulators and operators, lacking due diligence and negligent in fiduciary responsibility. Those responsible for these decisions should be held accountable for any charges related to breaking those contracts and decommissioning stranded assets. The inquiry should be looking at legal means to recoup these charges from the responsible parties. [11]

This statement by the IESO is completely unacceptable: *"Once the contractual term ends, natural gas generation is expected to compete with other resources to meet system needs."* [12]

It must include the proviso: *"provided all GHG emissions are captured from gas plant operations."*

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[7] **The carbon dioxide theory of climatic change**
Gilbert N Plass - Tellus, 1956 - Wiley Online Library
The Johns Hopkins University, Baltimore, Md. (Manuscript received August 1955)
The extra CO, released into the atmosphere by industrial processes and other human activities may have caused the temperature rise during the present century. In contrast with other theories of climate, the CO2 theory predicts that this warming trend will continue, at least for several centuries.
https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.2153-3490.1956.tb01206.x

[8] **Man-made Carbon Dioxide and the "Greenhouse" Effect**
J.S. Sawyer - Nature, Volume 239, Issue 5366, pp. 23-26 (1972).
In spite of the enormous mass of the atmosphere and the very large energies involved in the weather systems which produce our climate, it is being realized that human activities are approaching a scale at which they cannot be completely ignored as possible contributors to climate and climatic change.

[9] **Parliament of Canada** - Government Business No. 29 (**National climate emergency**)
VOTE NO. 1366 42ND PARLIAMENT, 1ST SESSION Sitting No. 435 - Monday, June 17, 2019
The Minister of Environment and Climate Change — That the House recognize that: (a) climate change is a real and urgent crisis, driven by human activity, that impacts the environment, biodiversity, Canadians' health, and the Canadian economy; (b) Canadians are feeling the impacts of climate change today, from flooding, wildfires, heat waves and other extreme weather events which are projected to intensify in the future; (c) climate change impacts communities across Canada, with coastal, northern and Indigenous communities particularly vulnerable to its effects; and (d) action to support clean growth and meaningfully reduce greenhouse gas emissions in all parts of the economy are necessary to ensure a safer, healthier, cleaner and more prosperous future for our children and grandchildren; and, therefore, that the House declare that Canada is in a national climate emergency which requires, as a response, that Canada commit to meeting its national emissions target under the Paris Agreement and to making deeper reductions in line with the Agreement's objective of holding global warming below two degrees Celsius and pursuing efforts to keep global warming below 1.5 degrees Celsius.
SUMMARY Results: Agreed To
https://www.ourcommons.ca/Members/en/votes/42/1/1366/

[10] **Net Zero by 2050** ***A Roadmap for the Global Energy Sector***
International Energy Agency (IEA) Flagship report — May 2021
The path to net-zero emissions is narrow. Staying on it requires the massive deployment of all available clean energy technologies – such as renewables, EVs and energy efficient building retrofits – between now and 2030. For solar power, it is equivalent to installing the world's current largest solar park roughly every day. Most of the reductions in CO2 emissions through 2030 come from technologies already on the market today. But in 2050, almost half the reductions come from technologies that are currently at the demonstration or prototype phase. Major innovation efforts must take place this decade in order to bring these new technologies to market in time.
https://www.iea.org/reports/net-zero-by-2050

[11] See table below for contracts signed with term end dates beyond 2030 - taken from the **IESO Active Contracted Generation List**, November 12, 2020.

Contract Capacity (MW)	Facilty Name	Supplier Legal Name	Term Start Date	Term End Date
314	Green Electron Power Plant	Greenfield South Power Corporation	15-Mar-2017	14-Mar-2037
900	Napanee Generating Station	Portlands Energy Centre L.P.	13-Mar-2020	12-Mar-2040

https://www.ieso.ca/en/Power-Data/Supply-Overview/Transmission-Connected-Generation

[12] **Gas Phase-Out Impact Assessment** - Chuck Farmer, Senior Director, Power System Planning - May 27, 2021 page 17
file:///C:/Users/Owner/Downloads/gpia-20210527-presentation.pdf

Litigation threats for failures in pursuing required emissions reductions in the near and long term are becoming more prevalent. [13][14][15]

The negligence in not addressing the issue until now is striking when the IESO's own forecasts for many years have predicted a more than a 300% increase in GHG emissions from Ontario's gas fired electricity generating plants to compensate for nuclear refurbishments and the Pickering nuclear plant shutdown. Clearly, cleaner energy generating options were available to energy regulators and operators - options they chose not to pursue to the necessary extent. [16][17][18] Of course some of this lack of initiative can be attributed to political factors. [19][20]

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[13] **JULIANA v. UNITED STATES**
In 2015, 21 youth, and organizational plaintiff Earth Guardians, filed their constitutional climate lawsuit, Juliana v. United States, against the U.S. government. Their complaint asserts that, through the government's affirmative actions that cause climate change, it has violated the youngest generation's constitutional rights to life, liberty, and property, as well as failed to protect essential public trust resources.
https://www.ourchildrenstrust.org/juliana-v-us

[14] **Youth climate case forges ahead after court affirms historic decision**
EcoJustice Press Release Posted on March 26, 2021
A court has dismissed Ontario's attempt to overturn a key decision in a youth-led climate lawsuit, solidifying a historic legal victory and paving the way for seven young people to have their day in court. This case is a Canadian first — the first of its kind to clear key procedural hurdles and move full steam ahead toward a full hearing on its merits. On Thursday, the Ontario Divisional Court dismissed the province's request for leave to appeal a November decision, in which a judge rejected the government's motion to strike down the Mathur et. al. climate lawsuit before it reached a full hearing. That landmark ruling marked the first time in history a Canadian court has ruled climate change can threaten Canadians' fundamental rights. It further affirmed that citizens have the ability to challenge a government's climate actions under the Charter of Rights and Freedoms.
https://ecojustice.ca/pressrelease/youth-climate-case-forges-ahead-after-court-affirms-historic-decision/

[15] **In A Landmark Case, A Dutch Court Orders Shell To Cut Its Carbon Emissions Faster**
Jeff Brady - NPR - May 26, 2021
Climate change activists have won a big legal victory against oil giant Royal Dutch Shell. A Dutch court ruled Wednesday that the company must reduce its greenhouse gas emissions 45% by 2030, based on 2019 levels. The case could set a precedent for similar lawsuits against huge oil companies that operate across the globe. "Our hope is that this verdict will trigger a wave of climate litigation against big polluters, to force them to stop extracting and burning fossil fuels," said Sara Shaw from Friends of the Earth International.
https://www.npr.org/2021/05/26/1000475878/in-landmark-case-dutch-court-orders-shell-to-cut-its-carbon-emissions-faster

[16] **World's Largest Grid-Storage Project Comes Online in California**
International Brotherhood of Electrical Workers May 11, 2021
Local 234 members installed 400 megawatts of batteries in a shuttered oil generation plant, enough to power 250,000 homes for four hours. Battery storage at this scale helps to address some of the challenges intermittent renewable generation create for the grid. At 400 megawatts, Moss Landing became the largest grid-scale storage facility in the world when it was commissioned by PG&E in December.
https://www.ibew.org/media-center/Articles/21Daily/2105/210510_World

[17] **A Smart Way To Provide Long-Term, Grid-Scale Storage: Hydrostor**
Erik Kobayashi-Solomon - Forbes - April 30, 2021
Canadian company, Hydrostor, has done a brilliant re-think of a decades-old system called Compressed Air Energy Storage (CAES) and come up with its own Advanced-CAES technology that makes it a very attractive option for long-term (8-12 hours), grid-scale storage. Hydrostor just announced that it's building 1,000 megawatts of storage at two locations in Kern County, California.
https://www.forbes.com/sites/erikkobayashisolomon/2021/04/30/a-smart-way-to-provide-long-term-grid-scale-storage-hydrostor/

[18] **Renewables as baseload energy: Form Energy's multi-day storage seeks to replace gas and coal**
Andy Colthorpe - Energy Storage News - April 27, 2021
Last May, Energy-Storage.news reported on Form Energy's 1MW pilot project for Great River Energy, an electric cooperative utility in Minnesota which is retiring its 1,151MW coal power plant and adding over a gigawatt of wind energy purchases. The pilot, which could have up to 150MWh, or 150 hours, of storage, won't be built for another two years, but the promise of Form Energy's "low-cost, long-duration" proprietary energy storage technology caught the attention of many across the industry.
https://www.energy-storage.news/blogs/renewables-as-baseload-energy-form-energys-multi-day-storage-seeks-to-repla

[19] **Ontario cancelling 758 'unnecessary and wasteful' renewable energy contracts**
Elizabeth McSheffrey | Canadian Press | July 13th 2018
Ontario's new Progressive Conservative government is cancelling 758 renewable energy contracts... Green Party Leader Mike Schreiner said the cancellation means the province is turning its back on the global renewable industry, which he said is worth billions and is a proven job creator. Schreiner added the decision also sends a number of negative signals about the province to business.
https://www.cbc.ca/news/canada/toronto/758-renewable-energy-cancelled-1.4746293

[20] **Ford government seeks to deprioritize green energy**
Emma McIntosh | National Observer | April 27th 2021
The Ford government is seeking to deprioritize renewable energy, repealing measures that made it easier to build new green power projects. The proposed changes were embedded in Bill 276, which the government introduced earlier this month, saying it would "help businesses rebound" from the economic fallout of COVID-19.
https://www.nationalobserver.com/2021/04/27/news/ford-government-seeks-deprioritize-green-energy-renewable

The IESO has proposed three scenarios to frame its inquiry.

Scenario 1: Complete phase-out of gas by 2030 with a supply mix approach of new resources, in response to municipal city council resolutions

Scenario 2: A market-based approach that examines the potential for higher gas prices to reduce the utilization of the gas fleet to reduce emissions by 2030 and to provide market signals to clean energy projects

Scenario 3: Reduce emissions by 2030 with a supply mix approach of new resources

The question it must ask first and foremost is:

How much of a reduction in GHG emissions from Ontario's electricity generation sector by 2030 and beyond should be targeted?

a. Complete phase-out by 2030
b. 60% reduction by 2030 and complete phase-out by 2035

Scenario 1 makes it clear - a complete phase-out by 2030. The other scenarios say nothing about the extent of the reduction. So they are in dire need of such targets.

"The United States has set a goal to reach 100 percent carbon pollution-free electricity by 2035..." [21] [22] [23] [24]

Why would we not able to reach the same goal here in Ontario?

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[21] **FACT SHEET: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies** April 22, 2021
The United States has set a goal to reach 100 percent carbon pollution-free electricity by 2035, which can be achieved through multiple cost-effective pathways each resulting in meaningful emissions reductions in this decade.
https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies/

[22] **US Sets Target to Reduce Emissions by 50-52% Below 2005 Levels in 2030**
International Institute for Sustainable Development SDG Knowledge Hub April 28, 2021
In the energy sector, responsible for 25% of 2019 GHG emissions in the US, the NDC sets the goal to reach 100% carbon pollution-free electricity by 2035. The federal government will work with state, local, and tribal governments to support the rapid deployment of carbon pollution-free electricity-generating resources, transmission, and energy storage, and leverage the carbon pollution-free energy potential of power plants retrofitted with carbon capture and existing nuclear.
https://sdg.iisd.org/news/us-sets-target-to-reduce-emissions-by-50-52-below-2005-levels-in-2030/

[23] **Will Biden's Climate Blitz Sack the Climate Crisis?**
Dan Lashof - World Resources Institute - February 2, 2021
Biden Made Progress Towards All of WRI's Top 10 Priorities to Tackle the Climate Crisis[one of these being]
Ramp up clean electricity standards to 55% by 2025, 75% by 2030, and 100% by 2035.
The day before President Biden's inauguration, the DC Circuit Court of Appeals vacated the Trump Administration's so-called Affordable Clean Energy Rule (also known as the "Dirty Power Plan") and ordered EPA to write new standards for carbon dioxide emissions from power plants. The tightly reasoned majority opinion strongly endorses the electricity system-wide approach to setting standards used in the Obama administration's original Clean Power Plan. That clears the decks for EPA to write a stronger version given the dramatic reductions in the cost of solar, wind and batteries seen over the last six years. The fate of a new Clean Power Plan will likely be decided by the Supreme Court, so it would be even better if Congress enacted a clean electricity standard to quickly provide regulatory certainty. Meanwhile, President Biden directed the federal government to use all available procurement authority to help achieve a carbon-free electricity sector no later than 2035, as well as to take steps to increase renewable energy generation on federal lands and offshore.
https://www.wri.org/insights/will-bidens-climate-blitz-sack-climate-crisis

[24] **NextEra backs Biden's clean energy push as renewables power profit**
Shariq Khan - Reuters – April 21, 2021
NextEra Energy Inc will back the U.S. government's push for utilities to tap carbon-free sources, the country's most valuable electricity provider said as capacity growth in renewable energy pushed its quarterly profit above expectations. A clean energy standard would put the country on course to deliver on President Joe Biden's campaign promise to decarbonize the power sector by 2035, an aggressive goal that U.S. utilities have supported thanks to the low cost of renewables like wind and solar... the support of NextEra, the world's largest solar and wind energy provider, is seen as important for the administration.
https://www.reuters.com/business/energy/nextera-energy-adjusted-profit-rises-14-strong-renewables-demand-2021-04-21/

The UK has a similar target: A 95% reduction over 2020 levels by 2035, and a 99% reduction by 2050. [25]

Canada, along with the other G7 nations has committed to phase-out support for fossil fuel energy so as to create a "clearly defined pathway towards climate neutrality in order to keep 1.5 C within reach." [26]

'Fair share' analysis suggests Canada should be reducing its GHG emissions 60% by 2030 in order to keep global temperature rise below 1.5 C. [27][28]

The baseline year for these targets is usually 2005. That would not be a reasonable baseline year for Ontario, since it predates the Coal Plant phase-out. A more reasonable baseline year would be 2017 when emissions from gas-fired power plants were about 4 Mt CO2e. [29] So a fair share target would be about 60% of 2017 level getting us down to ~1.6 Mt by 2030 and ~0 Mt by 2035 matching the US commitment.

The second question that must be answered is:

How are the agreed to reductions to be achieved?

a. Through various policy tools implemented through government directives, regulation, and subsidies
b. Solely thru carbon pricing and market mechanisms
c. A hybrid model

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[25] **The Sixth Carbon Budget - Electricity generation**
UK Climate Change Committee December 2020 page 57
a) Deploying low-carbon electricity at scale
Our Balanced Pathway involves a reduction in the emissions intensity of electricity generation from around 200 gCO2/kWh today to 10 gCO2/kWh in 2035, and 1-2 gCO2/kWh in 2050.
https://www.theccc.org.uk/wp-content/uploads/2020/12/Sector-summary-Electricity-generation.pdf

[26] **G7 Climate and Environment Ministers' Meeting Communiqué**
London, United Kingdom 20 – 21 May 2021 Section 33
"We commit to promoting the increased international flow of public and private capital toward Paris Agreement-aligned investments and away from high-carbon power generation to support the clean energy transition in developing countries. In this context, we will phase out new direct government support for carbon-intensive international fossil fuel energy, except in limited circumstances at the discretion of each country, in a manner that is consistent with an ambitious, clearly defined pathway towards climate neutrality in order to keep 1.5 C within reach, in line with the long-term objectives of the Paris Agreement and best available science."
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/988551/g7-climate-environment-communique.pdf

[27] **What is Canada's "Fair Share" of the Global Emissions Burden?**
An Examination of Fair and Proportional Emissions Reduction Targets
Christie McLeod, Supervised by: David Estrin
A Major Paper submitted to the Faculty of Environmental Studies in partial fulfillment of the requirements for the degree of Master in Environmental Studies York University, Toronto, Ontario, Canada March 25, 2020
Every "fair" target suggested by the three studies included in this paper (as well as the two "outdated" studies) is significantly larger than Canada's present emissions reduction target. At minimum, these proposed targets call for Canada to nearly double its emissions reduction target, however, multiple suggested targets call for Canada to reach net-zero emissions by 2030 and undertake mitigation efforts to further reduce emissions beyond its own borders
https://sei.info.yorku.ca/files/2020/05/CMcLeod-MajorPaper-SEI.pdf

[28] **TOWARDS CANADA'S FAIR SHARE:** *NEW RESEARCH ON ACHIEVING A STRONGER CLIMATE TARGET*
commissioned by Climate Action Network, Conservation Council of New Brunswick, Ecology Action Centre, Environmental Defence, Equiterre, Stand.earth and West Coast Environmental Law April 2021
*The modeling being presented here shows Canada can do the hard work required to achieve our fair share of carbon emissions reductions – **60% reductions by 2030**. Not only is this worth doing, Canadians will be better off. Household energy bills would fall; there would be more good, green, stable jobs; communities would be healthier; and there would be a lower risk of extreme weather events fuelled by increasing carbon emissions in the atmosphere. To do our fair share on climate action, Canada needs more stringent policies that will fundamentally shift every emission source away from fossil fuels and towards zero-emitting technologies. At the same time, we need stronger policies so that the zero-emitting technologies that are both available and affordable can be accessed by every Canadian family.*
https://environmentaldefence.ca/report/fair_share_canada_model/

[29] **Annual Planning Outlook Ontario's electricity system needs: 2022-2040**
IESO December 2020 pg 67-68
7.4 Greenhouse Gas Emissions
Electricity sector emissions are forecast to increase to 12.2 megatonnes CO2e by 2030 in Scenario 1 and 10.9 MT CO2e in Scenario 2, [compared to below 4 Mt in 2017], as shown in Figure 37. This expected increase is due to reduced nuclear production and growing demand, resulting in increased production from gas-fired generation.
file:///C:/Users/Owner/Downloads/Annual-Planning-Outlook-Dec2020.pdf

It is generally agreed by economist that carbon pricing and utilizing market mechanisms result in least cost solutions in achieving emissions reductions. Rather than prescribing which technologies are best pursued, we should let the market decide this. That means ensuring gas-fired electric plants should receive no shielding from the full price on carbon. If insufficient progress is made by the market in supplying non-carbon sources of energy, then Ontario and its energy regulators should impose the necessary surcharge onto the federal carbon price. All such revenue should be returned to residents in Ontario in the same way the federal Carbon rebate system works. This would mean costs will come up front to electricity consumers, but will be compensated for to Ontario residents in the form of rebates, while providing incentives for energy efficiency and conservation.

This approach would need to incorporate electricity exports to and imports from jurisdictions that generate electricity from fossil fuel sources. This would primarily apply to Ontario's electricity trade with the United States. Although a Border Carbon Adjustment between the US and Canada by 2030 seems likely, it is currently unclear how this would be implemented. [30][31] An equivalent Ontario fuel charge applied correspondingly to electricity imports should be considered.

From the 'Gas Phase-Out Impact Assessment' presented by Chuck Farmer, Senior Director, Power System Planning on May 27, 2021, we learn that "*The assessment is not intended to:... Consider emission impacts resulting from other jurisdictions.*" [32]

Since Ontario exports electricity to and imports electricity from other jurisdictions including those in the United States, these impacts should not be excluded from the study. Clearly, the importation of more electricity from jurisdictions that generate it with high GHG emitting resources runs counter to the intent of the Gas phase-out in Ontario.

And the third question that must be answered is:

How much will it cost? How much will it benefit?

a. Looking at current technology options and cost/benefit projections
b. Projecting upcoming technology choices and their costs and benefits

Costs and Benefits must be looked at in two ways. One is purely monetary. The other is in the reduction of GHG emissions. What we are seeking is a least cost pathway to net zero emissions by 2030 or 2035.

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[30] **Fear of climate change rust belt has governments considering carbon border levy**
Don Pittis · CBC News · May 10, 2021
Federal budget shows Canada looks to back European push for global carbon tax
https://www.cbc.ca/news/business/carbon-adjustment-column-don-pittis-1.6016074

[31] **Carbon and Controversy: Why we need global cooperation on border carbon adjustment**
Nathalie Bernasconi-Osterwalder, Aaron Cosbey - International Institute for Sustainable Development - May 18, 2021
BCA (or CBAM for "carbon border adjustment mechanism," as it's called in the EU) involves imposing charges or regulations at the border to mirror the costs that climate pricing policies impose on domestic firms. The current flurry of interest is driven most acutely by the European Commission's mandate to propose such an instrument by July 14 this year, with the intent to bring it into force by 2023. However, more broadly, the interest is a consequence of increasing climate ambition; the EU announced its CBAM intentions as an integral part of the highly ambitious European Green Deal. In a similar vein, Canada announced federal consultations on BCA soon after announcing a legislated carbon price that will rise to USD 140 per tonne by 2030. The US has included BCA in the USTR's 2021 Trade Policy Agenda, in parallel with the Biden Administration's ramped-up climate ambition.
https://www.iisd.org/articles/carbon-border-adjustment-global-cooperation

[32] **Gas Phase-Out Impact Assessment** - Chuck Farmer, Senior Director, Power System Planning - May 27, 2021 page 23
file:///C:/Users/Owner/Downloads/gpia-20210527-presentation.pdf

When looking at technology options we need to avoid bias. Carbon Capture, Utilization/Storage (CCUS) [33], Small Modular Reactors (SMRs) [34][35], and non-green Hydrogen [36][37] employment scenarios must be examined with a critical eye, uninfluenced by advocacy from the nuclear and fossil fuel sectors. This includes technical reports sponsored by parties with vested interests. [38] Their perspectives should not be given priority over Renewable and Energy storage technologies [39], along with energy efficiency and conservation strategies, many of which are already proven and cost effective. [40][41]

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[33] **Carbon Capture and Storage: An Expensive and Unproven False Solution**
Food & Water Action Europe - November 19, 2020
A central false solution to climate change is Carbon Capture and Storage (CCS), which describes a set of technologies for fossil fuel companies to capture carbon dioxide either at the smokestack or in the atmosphere, then transport the CO2 in pipelines and inject it underground. CCS is popular with energy giants because it enables corporations to keep doing business as usual, while pretending to fight climate change. In reality, CCS is unproven and faces insurmountable technical, financial and environmental barriers. It has also faced public opposition and concerns about efficacy.
https://www.foodandwatereurope.org/wp-content/uploads/2020/05/FSEU_2011_CarbonCapture-FINAL.pdf

[34] **Small modular reactors aren't the energy answer for remote communities and mines**
Sarah Froese, Nadja Kunz, M. V. Ramana - Policy Options - August 26, 2020
The energy costs associated with small modular reactors exceed those of diesel-based electricity. Policy-makers should focus on renewables.
https://policyoptions.irpp.org/magazines/august-2020/small-modular-reactors-arent-the-energy-answer-for-remote-communities-and-mines/

[35] **Two's a crowd: Nuclear and renewables don't mix**
Neil Vowles - ScienceDaily - October 5, 2020
If countries want to lower emissions as substantially, rapidly and cost-effectively as possible, they should prioritize support for renewables, rather than nuclear power, the findings of a major new energy study concludes. That's the finding of new analysis of 123 countries over 25 years by the University of Sussex Business School and the ISM International School of Management which reveals that nuclear energy programmes around the world tend not to deliver sufficient carbon emission reductions and so should not be considered an effective low carbon energy source.
https://www.sciencedaily.com/releases/2020/10/201005112141.htm

[36] **The hydrogen hype: Gas industry fairy tale or climate horror story?**
Corporate Europe Observatory, Food and Water Action Europe, Re:Common - December 7, 2020
Failed 'carbon capture and storage/usage' (CCS/U) technology is being resurrected, and is receiving political, financial, and regulatory support so the EU can justify including fossil fuel-based hydrogen in its 2050 climate plans.
https://www.foodandwatereurope.org/wp-content/uploads/2020/12/HydrogenHype_Report2020.pdf

[37] **Statement on the federal government's new hydrogen strategy**
Julia Levin - Environmental Defense - December 16, 2020
With the release of the federal hydrogen strategy today, the government has missed an opportunity to position Canada as a global leader in pursuing renewable hydrogen. Not only does the strategy focus on promoting fossil-derived hydrogen, but the government has also committed to more huge handouts for the oil and gas sector.
https://environmentaldefence.ca/2020/12/16/statement-julia-levin-climate-energy-program-manager-federal-governments-new-hydrogen-strategy/

[38] **Implications of Shutting down Ontario's Gas-Fired Generators by 2030**
Power Advisory LLC - Prepared for the Ontario Energy Association - April 12, 2021
Replacing 11,300 MW of transmission-connected gas-fired generators will cost electricity customers tens of billions of dollars – we roughly estimate this additional cost to be at least $60 billion...
https://energyontario.ca/Files/PDF%20files%20to%20share/Power%20Advisory%20Ont%20Gas%20Fired%20Generation_14Apr2021.pdf

[39] **Unlocking Potential: An Economic Valuation of Energy Storage in Ontario**
Power Advisory LLC - commissioned by Energy Storage Canada - July 2020
Energy storage can provide immediate, tangible savings, and benefits across Ontario's power system. Some of the savings are attributed to the inherent characteristics of energy storage, while others are a result of several unique characteristics of Ontario's electricity market and regulatory structure. Over the next decade … the introduction of at least 1,000 MW of energy storage can provide as much as $2.7 billion in total savings for Ontario's electricity customers, and that the savings could reach upwards of $4 billion.
https://poweradvisoryllc.com/assets/UnlockingPotential.pdf

[40] **A Healthy, Happy, Prosperous Ontario?**
Dianne Saxe - Linkedin - March 27, 2019
Energy conservation allows families, businesses and public institutions to spend less on energy and more on what matters most. In fact, cost-effective conservation could cut Ontario's energy use by as much as 30%. For governments, conserving energy would reduce operating costs and save many millions of taxpayers' dollars.
https://www.linkedin.com/pulse/healthy-happy-prosperous-ontario-dianne-saxe

[41] **Unpacking the Climate Potential of Energy Efficiency**
Mark Winfield et al - York University Sustainable Energy Initiative - February 2020
Modelling by the International Energy Agency … suggests that under ambitious policy scenarios, Canada's GHG emissions could be reduced by approximately 200 million tonnes CO2e per year (28 percent of current emissions) and with cumulative savings of $1.1 trillion USD between 2017 and 2050. Changes in policy direction … have resulted in some cases wholesale dismantlings, of energy efficiency strategies in North America. The Government of Ontario's decision to terminate its "Conservation First" strategy in March 2019 was among the most dramatic of these developments, but far from unique.
https://sei.info.yorku.ca/files/2020/02/UnpackingTheClimatePotential-Feb22.pdf?x60126

While OPG and Enbridge have an interest in promoting electricity demand, and the continence of gas usage, this ethos runs counter to our need to reduce our GHG emissions. Furthermore, over-forecasting electricity demand in the past has led to contractual obligations that resulted in increased costs to energy consumers. [42]

We should emphasize that a large portion of electricity demand is related to heating and cooling requirements. Thermal energy storage technology solutions allow for the transfer of renewable energy into long duration energy storage systems (e.g. hot sand) that can efficiently transfer that energy into district heating and cooling systems obviating the need for much of gas plant demand requirements. [43][44] These options should be studied intensely.

Upstream and downstream costs and benefits need to be included in the analysis as well. For example, the cost of managing and storing nuclear waste from current nuclear generation, or proposed SMRs need to be included. In some cases there may be benefits as well. For example, if flue gas can be captured and converted into carbon nanotubes which are utilized in an array of products that mitigate GHG emissions such as in EVs and their batteries.

Whichever scenario is chosen and whichever method is chosen to achieve the GHG emissions reduction targets, we need careful evaluations of the emerging technologies. At the federal level, studies are being carried out which have relevance to the proposed IESO Gas Phase-out study. [45]

This ends my submission.

Eric Stark, [redacted]

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[42] **Ontario's Electricity Market Woes: How Did We Get Here and Where Are We Going?**
Brady Yauch - Energy Regulation Quarterly Volume 8, issue 2 2020 - June 2020
One of the biggest problems facing Ontario Hydro was that it overbuilt the grid on the assumption that electricity demand would continue to grow, as had occurred throughout the 20th century. In the late 1980s, Ontario Hydro forecast demand would hit 184 TWh by 2000 — nearly 20 per cent higher than actual demand of 153 TWh in that year and more than 50 TWh higher than demand in 2017. In the short-term, Ontario Hydro expected demand to reach 159 TWh in 1994, even though actual demand turned out to be 135 TWh. In short, the utility had too much supply and too little demand. Given that many of Ontario Hydro's costs were fixed, lower demand increased the average cost to be recovered for each unit of power generated. The result was Ontario Hydro asking for a 40 per cent rate hike in the midst of a recession. A public reckoning on the fate of public power took hold.
https://energyregulationquarterly.ca/articles/ontarios-electricity-market-woes-how-did-we-get-here-and-where-are-we-going

[43] **Thermal Energy Storage**
Celsius Aug 17, 2020
The importance of TES in future energy systems with high amounts of intermittent renewable energy sources is due to the fact that half of the total final energy consumption worldwide can be attributed to heat (International Energy Agency, 2013). Thermal energy storage is much cheaper than electricity storage and it has high potential of integrating intermittent RE sources such as wind and solar into the heating or cooling sector, via e.g. heat pumps or electric boilers (Sandia Energy Storages Systems, u.d.). TES provides several benefits to heating and cooling networks (DHC), including reducing peak thermal demands, increasing efficiency of the system and integrating other heat sources as industrial waste heat or seawater.
https://celsiuscity.eu/thermal-energy-storage/

[44] **Innovation Outlook: Thermal Energy Storage,**
International Renewable Energy Agency (IRENA) 2020
TES technologies offer unique benefits, such as helping to decouple of heating and cooling demand from immediate power generation and supply availability. The resulting flexibility allows far greater reliance on variable renewable sources, such as solar and wind power. TES thereby reduces the need for costly grid reinforcements, helps to balance seasonal demand and supports the shift to a predominantly renewable-based energy system.
https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Nov/IRENA_Innovation_Outlook_TES_2020.pdf

[45] **Natural Resources Canada probes net-zero 'affordability'**
By Carl Meyer | National Observer | May 26th 2021
The "impacts of various net-zero pathways" on the "oil and gas sector" and other sectors is one of the "key questions" that Natural Resources Canada (NRCan) expects to address as part of its work supporting the government-appointed Net-Zero Advisory Body, wrote Mollie Johnson, assistant deputy minister for NRCan's Low Carbon Energy Sector, in a six-page memo addressed to Deputy Minister Jean-François Tremblay. The advisory body, announced by Environment and Climate Change Canada Minister Jonathan Wilkinson in February, has a mandate to examine "the most likely pathways" to net-zero. The body's terms of reference allow for it to request "economic analysis and emissions modelling" from various federal departments. Johnson said the department expects to support Environment and Climate Change Canada (ECCC)'s own modeling system — called the Energy, Emissions and Economy Model for Canada, or E3MC — to help it improve baseline projections related to the declining costs of renewables.
https://www.nationalobserver.com/2021/05/26/news/natural-resources-canada-probes-net-zero-affordability