

Environmental Registry – Response

IESO Pathways to Decarbonization Study

ERO – 019-6647

Green Ribbon Panel

May 14, 2023

Overview

This submission is being made on behalf of the [Green Ribbon Panel](#)—a collection of environmental and economic leaders from across Canada committed to advancing practical and executable solutions to climate change. The panel was established in 2020 and, in that same year, released a [framework](#) and supportive set of policies that sought to enable the transition to a clean economy as the world moves toward a net-zero future.

Last year (2022), the panel released [an additional report](#) that builds on the work conducted by the panel in 2020 while acknowledging not only the economic challenges resulting from Covid-19 but the renewed sense of urgency placed upon meeting our climate change targets.

Throughout its work, the panel has been clear: clean economic growth needs a clean energy mix that uses all clean sources of electricity generation. The panel has adopted an ‘all tools in the decarbonization toolbox’ approach when it comes to the energy systems that will power a net-zero economy. It will take a robust mix of wind, solar, hydro-electric, energy storage, hydrogen, and certainly nuclear to create the net-zero grids that are critical to an electrified economy.

The pages that follow will connect some of the Green Ribbon Panel’s key recommendations with goals, targets, outcomes, and questions posed by the [Independent Electricity System Operator’s \(IESO\) Pathways to Decarbonization report](#). The IESO’s ‘no-regrets’ scenario in the *Pathways to Decarbonization* report is in line with several Green Ribbon Panel recommendations. As such, the Panel recommends pursuing policies that enable this course of action while maintaining key system attributes such as affordability and reliability which serve as a competitive advantage for Ontario.

Protecting our progress and following a proven path.

Ontario's coal phase-out program continues to stand out as one of the largest and most successful greenhouse gas (GHG) and pollution reduction policies worldwide. To phase out the use of coal-fired electricity generation in the province, Ontario added 35 TWh of low and zero GHG-emitting sources of generation to its supply mix. Nuclear power accounted for 32 TWh of that mix. The correlation between large-scale nuclear generation coming online and the reduction in GHG emissions is clear. Quite simply, when nuclear output goes up, emissions come down (as seen in Figure 1).

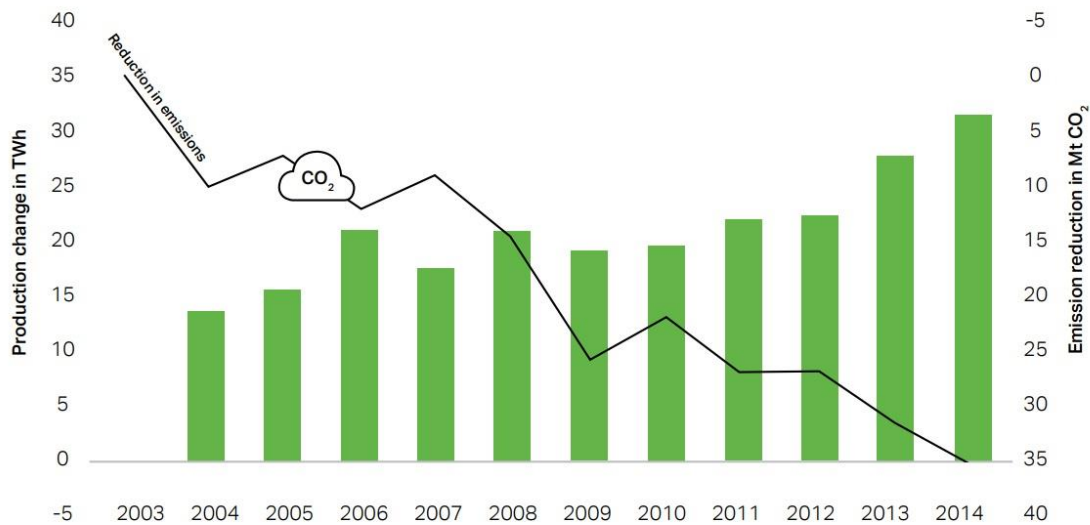


Figure 1- Changes in nuclear supply and GHG emissions (Ontario)

This monumental effort had a dramatic impact on the air that we breathe. All told, Ontario's GHG emissions decreased by 35 megatons (MT) and air quality improved significantly. The number of smog days in Ontario declined from 53 in 2005 to zero in 2015. This benefit cannot be overstated. Air quality can have severe effects on public health. The World Health Organization (WHO) estimates that approximately seven million people die each year from exposure to fine particles in polluted air that lead to diseases such as stroke, heart disease and lung cancer.

Ontario's clean electricity grid has also become a significant part of economic development efforts in the province to attract new businesses. For example, Ontario's robust manufacturing sector knows that it can rely on clean, reliable, and affordable electricity supply as a competitive advantage. This will be even more significant as a greater emphasis is

placed on Environmental, Social and Governance (ESG) practices and elimination of emissions in supply chains around the world.

Ontario has achieved significant levels of decarbonization in its electricity grid in the past. The same level of ambition to phase out the use of coal-fired electricity generation will be needed once again as the province seeks to achieve a fully emissions-free grid.

Getting more out of what we've already built.

The Green Ribbon Panel's 2022 report advanced the following recommendation:

- Prioritize the innovation, optimization, and extension of existing baseload generation assets such as nuclear and hydroelectric to secure emissions-free generation and system reliability.
 - Recognizing that 2030 targets are less than eight years away, these assets can provide the highest volume and shortest lead-time opportunities for emissions-free electricity.
 - This can be achieved by ensuring the focus of funding, regulatory and other policy considerations reflect the urgency of creating a net-zero grid.
 - This work will provide a solid foundation for greater energy storage capacity, enable electrification and support other clean energy sources (wind, solar, etc.) all while reducing the demand for gas-fired electricity generation.

The recommendation holds true for the purposes of this consultation. Investing in the emissions-free electricity-generating assets that are already adding value to our economy and climate today must be an integral part of any net zero strategy. Further investment in proven technologies and existing assets will: 1) ensure that sources of clean electricity generation remain online for years to come; and 2) enable increased output from these sources—one of the most cost-effective and efficient means of new clean energy production.

The pathway to net zero by 2050 has no room for backsliding. We simply cannot afford to lose clean sources of electricity on our grids. Refurbishment projects at Bruce Power and Ontario Power Generation's (OPG) Darlington Nuclear Generating Station are well underway and will ensure that these sites continue to provide clean electricity for decades to come.

Furthermore, the Government of Ontario recently directed OPG to update its feasibility assessment for refurbishing nuclear units at Pickering Nuclear Generation Station “based on

the latest information as a prudent due diligence measure to support future electricity planning decisions.”¹ The potential refurbishment at Pickering could add an additional 30 years of reliable and clean electricity from the site.

Refurbishment projects at large-scale nuclear sites in Ontario are critical. Not only will these projects keep our net zero targets within reach, increased investment in existing assets can also enable these sites to do more. For instance, in October 2021, Bruce Power announced that it had achieved a new site generation peak of 6,550 MW, an increase from the previous site peak of 6,300 MW achieved in 2016. This additional electricity output is enough to power up to 250,000 more homes, businesses, and hospitals. And more can and will be done.

‘Project 2030’ is an initiative at Bruce Power focused on achieving a goal a 7,000 MW peak output from the Bruce site through continued asset optimization, innovations and leveraging new technologies—including potential integration with energy storage assets and other forms of clean energy.

By maximizing the benefits and contributions of those clean generation assets already powering Ontario’s grid, the IESO can access new supply that is already grid-connected, proven, safe, reliable, affordable and clean. It is a simple solution that allows existing assets to contribute even more while improving lengthy siting and procurement processes and expediting the construction of new assets, including transmission infrastructure.

Unlocking the potential of energy storage.

The Green Ribbon Panel’s 2022 report advanced the following recommendation:

- Support greater deployment of energy storage assets. To provide large volumes of reliable, clean electricity there must be foundational, reliable, core generating assets with both longevity and reliability. This will require the IESO to consider how energy storage systems, when paired with clean generation sources, can provide reliability as a clean flexibility mechanism to meet peak demand.
 - Evaluation of large storage projects, such as the Ontario Pumped Storage Project in Meaford, ON should be streamlined, while ensuring an open engagement process and considering the input of communities.

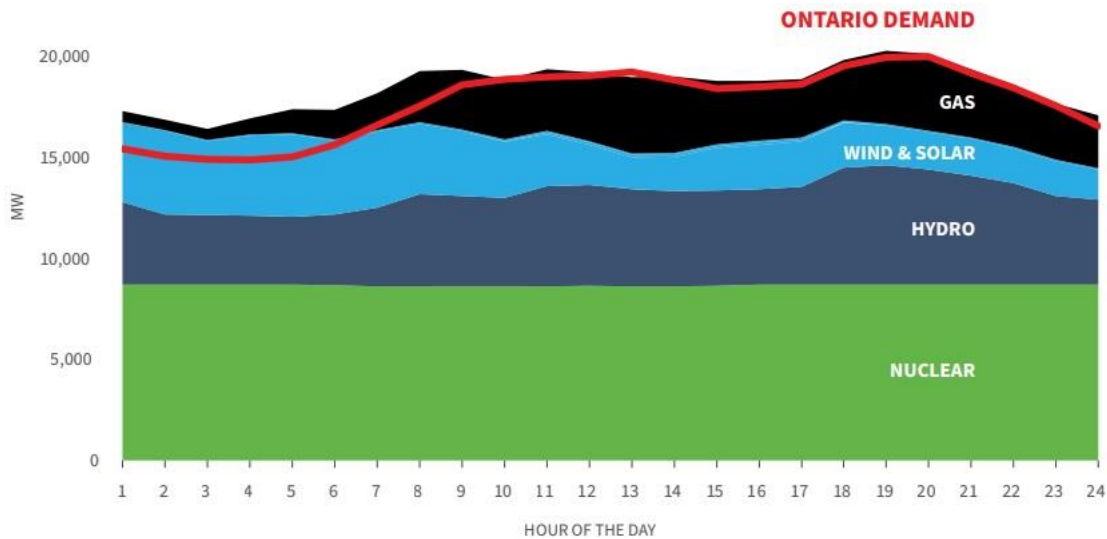
¹ Government of Ontario, 2022: [Ontario Supports Plan to Safely Continue Operating the Pickering Nuclear Generating Station | Ontario Newsroom](#)

- In support of this initiative, the IESO should continue to advance its *Pathways to Decarbonization* initiative to create a fully net-zero electricity grid in the province and place urgency on progressing these large-scale projects.

Ontario will need all sources of clean electricity generation to contribute to a decarbonized grid, as well as new technologies that will help the IESO manage the peaks of demand that come with our electricity system.

The way Ontarians use electricity does not always match the ideal forms of generating electricity (e.g., we use most of our electricity during the daytime, putting significant pressure on our grid during so-called ‘peak hours’). Currently, the most common mechanism for meeting peak demand is to use gas-fired electricity generation (see Figure 2: How do we meet peak demand?).

Energy storage technologies (like pumped storage and batteries) provide the system operator with the flexibility mechanisms needed to manage supply in a clean, carbon-free way. Energy storage allows the system operator to shift the use of clean electricity from when it’s generated to when it’s needed—allowing sources of generation to do what they do best (produce electricity), no matter the time of day or environmental circumstances (in the case of wind and solar).



Source: Energy Supply Outlook IESO APO 2021.
Nuclear Innovation Institute, 2022.⁸

Figure 2 - How do we meet peak demand?

Several projects have been proposed to increase the amount of energy storage capacity in Ontario. TC Energy's proposed Ontario Pumped Storage project near Meaford is a prime example of the kind of energy infrastructure initiatives that must be considered on our pathway to net zero. With the ability to deliver 1,000 MW over an eight-hour period, this asset could power one million Ontario homes for eight hours of the day when electricity demand is at its highest. And because the asset is a carbon-free method of storing electricity (as most proposed energy storage projects are), the electricity delivered by the project is as clean as the electricity that powers it. The project presents an opportunity to build a once-in-a-generation clean energy asset in the Clean Energy Frontier region of Bruce, Grey, and Huron counties.

Therefore, pairing baseload generation from Ontario's clean energy assets with clean methods of storing electricity, like pumped storage, presents a clear pathway to creating a net-zero grid in the province.

Smarter and more inclusive siting processes.

The Green Ribbon Panel's 2022 report advanced the following recommendations:

- Federal and provincial governments should enable policy and regulatory mechanisms wherein siting processes may take place to support the readiness for future clean energy sites. Long timeframes are driven by the long-duration Federal Impact Assessment process. This process must be commenced immediately as a planning tool for future sites for clean energy assets. This would enable a practical approach while continuing to have an open engagement process that considers the input of communities, Indigenous peoples, and key stakeholders from civil society in shaping projects.
- Recognize that early, ongoing, and collaborative engagement with Indigenous communities is a key element in the success of any energy production project. Policy and implementation tools in government programs and regulatory frameworks must place a higher priority on loans and grants for Indigenous communities to participate directly or indirectly in projects related to new energy development.
 - These mechanisms should also place a priority on supporting the establishment of Indigenous-owned, community-based projects or

developments on traditional territories with a priority focus on environmental services, construction, and ongoing services to ensure both greater community engagement and sustainable benefits.

The *Pathways to Decarbonization* report states that in order to achieve a fully net-zero electricity grid, Ontario will require the siting of projects on land 14 times the size of Toronto, an increased focus on Indigenous partnerships (going well beyond the current 20% participation rate in electricity projects), and for streamlined siting and regulatory processes that keep local perspectives at the core.

The Green Ribbon Panel's 2022 report advances key recommendations (listed above) that connect directly to these goals. The regulatory landscape in Canada and Ontario presently places significant and often duplicative burdens on potential clean energy project proponents. Robust processes that allow for Indigenous, community, and public participation in assessing the viability of projects are important. Overly restrictive and time-consuming processes however will have the effect of regulating Ontario into inaction.

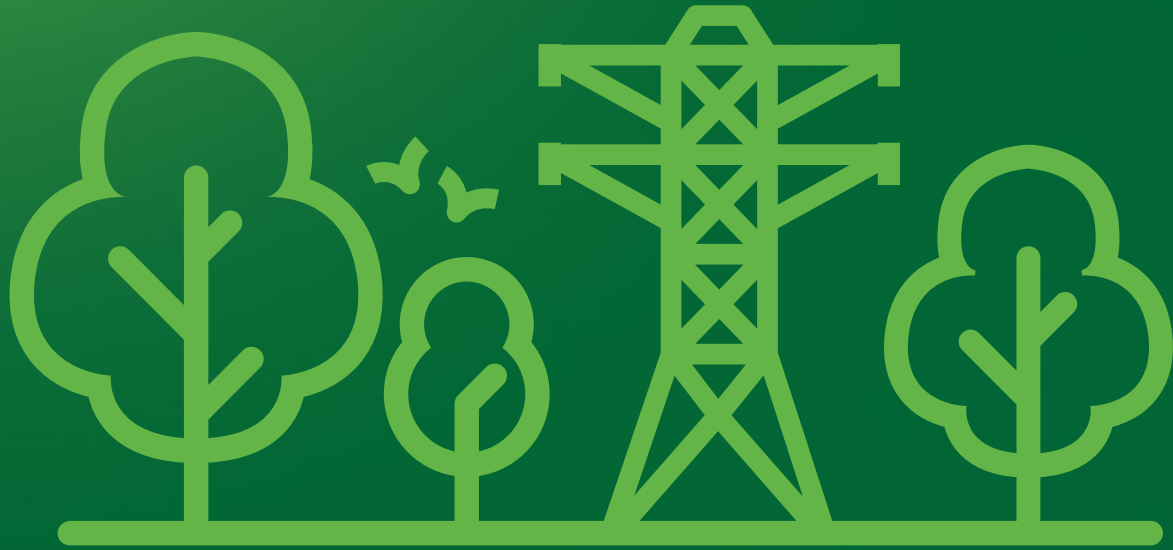
Where possible and achievable, provincial, and federal levels of governments must harmonize duplicative practices and requirements for clean electricity projects. Furthermore, governments at all levels must recognize the significant pressures that these processes place on Indigenous communities and on project proponents. Ensuring access to funding to enable Indigenous communities are fully able to participate in regulatory processes and potentially support clean electricity projects should be a priority for all levels of government. Further still, project proponents must have policy certainty that they will be able to recover costs associated with lengthy regulatory processes that place significant pressures (time, personnel, early investments) on their businesses should their projects proceed.

Conclusion

At its very core, the Green Ribbon Panel is motivated by a commitment to creating a clean economy that works for all – workers, businesses, Indigenous communities, governments, etc. The *Pathways to Decarbonization* report provides a roadmap for laying the groundwork for such an economy. The path to net zero runs through the powerlines that criss-cross our province. Ensuring that those lines draw their electricity from sources of generation that are clean, reliable, and affordable will be among the challenges of our time. That said, by advancing the recommendations listed in this response, the Green Ribbon Panel believes that not only is this goal achievable, it will also spur new opportunities for growth across Ontario.



GROWING ECONOMY.
SUSTAINABLE ENVIRONMENT.
REAL SOLUTIONS.



GREEN RIBBON PANEL

More clean power.

How Ontario can build a clean economy that works.



**GROWING ECONOMY.
SUSTAINABLE ENVIRONMENT.
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CONTENTS

The Green Ribbon Panel	5
GRP recommendations	6
CREATING A CLEAN ECONOMY THAT WORKS	8
SECTION 1	
The impact of a changing climate is driving a desire for action.	11
Climate change, electrification and energy security matter to Ontarians	12
SECTION 2	
What does Ontario's GHG emissions profile look like?	15
We have done this before	16
SECTION 3	
The challenge of electrification.	19
All tools in the toolbox	22
Dynamic regulatory environment for clean energy projects	28
Hydrogen must be used where electricity cannot	30
Made-in-Ontario integrated solution.	32
SECTION 4	
Meeting this challenge is critical to our future.	35
THE WORK STARTS NOW	39
ENDNOTES.....	40



THE GREEN RIBBON PANEL

In February 2020, a collection of environmental and economic leaders came together to create the Green Ribbon Panel (the Panel) as an avenue to advance practical and executable solutions to climate change. The 2020 Green Ribbon Panel Report provided a framework and supportive set of policies to enable the transition to a clean economy as the world moves toward a net zero future. This report, the final product of the Panel, builds upon the 2020 Panel report and activities over the last two years while recognizing the increased focus on achieving net zero at the international and domestic level.

Policies were advanced using four guiding principles that the Panel believes are necessary to change the conversation around climate change, energy and the economy in Ontario and across Canada.

These principles include:

1. Embracing the urgent need to address climate change is the foundation for action.
2. Recognizing that Ontario is well positioned to build the clean electricity system that can be a cornerstone of Canada's future low-carbon economy.
3. Understanding that low-cost, low-carbon emission energy represents a competitive economic advantage for Ontario and Canada.
4. Committing to enabling policy frameworks that are diverse and seek participation from all levels of government and public-private partnerships.

While the world has changed dramatically since 2020, these guiding principles remain more accurate than ever. The goal of reaching net zero by 2050 is accelerating our ambition to advance clean solutions. But, as the Panel sets out in this updated report, these solutions must be practical, realistic—and they must capitalize on our present advantages.

This report presents several practical and achievable recommendations from the economic and environmental leaders that serve as members of the Green Ribbon Panel. It provides policymakers as well as Ontarians and Canadians with an overview of the policies and direction needed to create a clean economy that works for everyone.

The Panel is comprised of:

- **James Scongack**, Bruce Power – Chair
- **Vanessa Foran**, Asthma Canada
- **Mitch Twolan**, Bruce County
- **Andrew Thiele**, Bruce Power Net Zero
- **Terry Young**, Bruce Power Net Zero, former President & CEO of the Independent Electricity System Operator (Ontario)
- **Dennis Darby**, Canadian Manufacturers and Exporters
- **Mathew Wilson**, Canadian Manufacturers and Exporters
- **Mark Fisher**, Council of the Great Lakes Region
- **Robert Stasko**, Hydrogen Business Council
- **Bruce Wallace**, Nuclear Innovation Institute
- **Claudia Desanti**, Ontario Chamber of Commerce
- **Rocco Rossi**, Ontario Chamber of Commerce
- **Cara Clairman**, Plug'n Drive
- **Chris Hilkene**, Pollution Probe
- **Steve McAulay**, Pollution Probe
- **Jeff Parnell**, Power Workers' Union
- **John Sprackett**, Power Workers' Union
- **Michelle Johnston**, Society of United Professionals

GRP RECOMMENDATIONS



1. Prioritize the innovation, optimization and extension of existing baseload generation assets such as nuclear and hydroelectric to secure emissions-free generation and system reliability. Recognizing that 2030 targets are less than eight years away, these assets can provide the highest volume and shortest lead-time opportunities for emissions-free electricity. This can be achieved by ensuring the focus of funding, regulatory and other policy considerations reflect the urgency of creating a net-zero grid. This work will provide a solid foundation for greater energy storage capacity, enable electrification and support other clean energy sources (wind, solar, etc.) all while reducing the demand for gas-fired electricity generation.

2. Advance a pilot project to enable the sale of offset/clean energy credits from carbon-free nuclear power generation, which displaces fossil fuels, so customers and organizations can achieve their net zero goals by purchasing these credits. This can be enabled through the innovative Clean Energy Credit (CEC) Program currently being developed by the Independent Electricity System Operator (IESO) as directed by Ontario's Minister of Energy.

3. Support greater deployment of energy storage assets. To provide large volumes of reliable, clean electricity, there must be foundational, reliable, core generating assets with both longevity and reliability. This will require the IESO to consider how energy storage systems, when paired with clean sources, can provide reliability by acting as a clean flexibility mechanism to meet peak demand. Evaluation of large storage projects, such as the Ontario Pumped Storage project in Meaford, ON, should be streamlined, while ensuring an open engagement process and considering the input of the communities. In support of this initiative, the IESO should continue to advance its Pathways to Decarbonization initiative to create a fully net-zero electricity grid in the province and place urgency on progressing these large-scale projects.

4. Federal and provincial governments should enable policy and regulatory mechanisms wherein siting processes may take place to support the readiness for future clean energy sites. These long timeframes are driven by the long-duration Federal Impact Assessment process. This process must be commenced immediately as a planning tool for future sites for clean energy assets. This would enable a practical approach while continuing to have an open engagement process that considers the input of the communities, Indigenous peoples and key stakeholders from civil society in shaping the projects.

5. Recognize that early, ongoing and collaborative engagement with Indigenous communities is a key element in the success of any energy production project. Policy and implementation tools in government programs and regulatory frameworks must place a higher priority on access to loans and grants for Indigenous communities to participate directly or indirectly in projects related to new energy development. These mechanisms should also place a priority on supporting the establishment of Indigenous-owned, community-based projects or developments on traditional territories with a priority focus on environmental services, construction and ongoing services to ensure both greater community engagement and sustainable benefits.

6. Include integrated projects such as those that combine clean electricity—like that produced by nuclear, hydro, wind and solar power—with hydrogen production, electric vehicles and pumped and battery storage as a distinct stream within the Federal Canada Infrastructure Bank and Strategic Innovation Fund (SIF). Additionally, all clean forms of electricity, including nuclear, should be included in future Federal Green Bond Frameworks and tax treatments, ensuring all emissions-free sources receive the same treatment around accelerated capital depreciation.

7. Continue to position Ontario as a global leader in the development of small modular reactor (SMR) technology by leveraging the leadership position of Ontario Power Generation (OPG) for this first technology deployment at their Darlington site.

8. Develop a Green Collar Jobs Strategy through high-school and post-secondary programs to build upon Ontario's major strength in its skilled, diverse labour force to underpin and develop, innovate and execute critical activities and projects. This is a critical, long-term skill set that will be vital to delivering the large volumes of capital projects required to achieve net zero goals.

9. Prioritize the health of Canadians, air quality and a credible path forward to climate stabilization by investing in clean, low-carbon energy sources including nuclear, hydro, solar, wind and geothermal power and continue to quantify, as Ontario did through the phase-out of coal, the cost savings to the health care system of pursuing these policies.

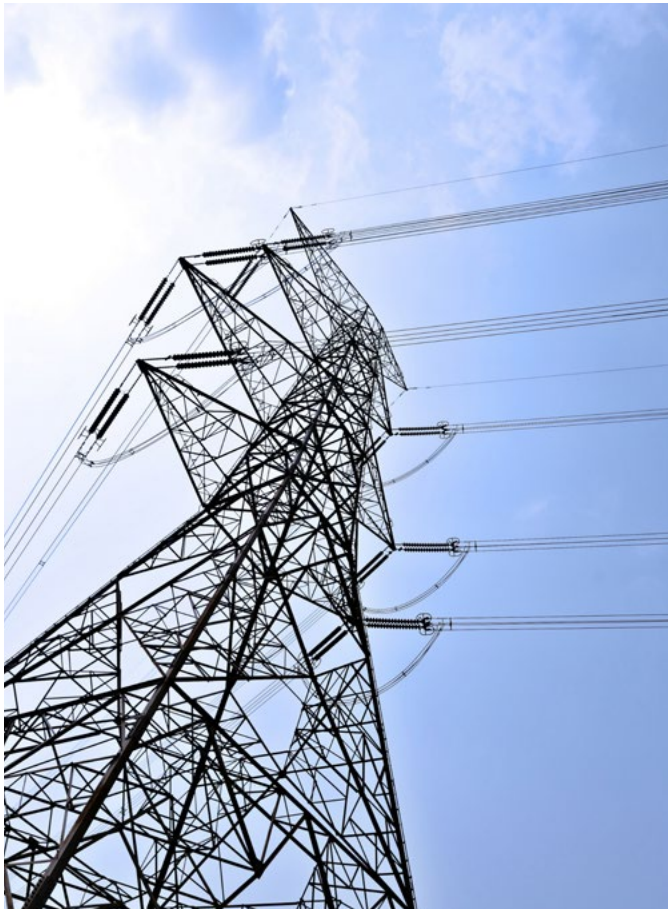
10. Establish Ontario's brand within the Great Lakes economic region, particularly with clean automotive, advanced manufacturing and electricity generation, as a clean jurisdiction known for sustainable products and net zero leadership.

CREATING A CLEAN ECONOMY THAT WORKS

The imperative of reaching our net zero by 2050 ambitions is changing our economy. How will we power our homes and businesses in a decarbonized world? Who will work the clean jobs of the future? Do we have the skillsets required to create this economy? Can we afford this future? Can we afford *not* to create this future?

While these topics are complex, the truth of the matter is simple: we have an opportunity to create a clean economy that will work for everyone. If we pursue the right initiatives and advance policies that enable clean growth—the essence of a ‘Just Transition’.

These efforts start by recognizing our clean energy advantages. In Ontario, thanks in large part to clean power from the province’s nuclear sector, the electricity grid that supplies our homes and businesses with power is more than 90% carbon free. This presents the province with a strategic advantage in comparison to other jurisdictions.



Our electricity system will be the backbone of a clean economy—cleanly powering homes and businesses and enabling other sectors to decarbonize (like transportation and manufacturing). However, this does not come without challenges. As Ontario moves toward net zero, significant questions around meeting future electricity demand must be answered.

A clean economy that works must also empower people. Ontarians will be asked to change fundamental elements of their lives. Change is on the horizon—from the kinds of vehicles we drive to finding different ways to power our homes. The success of this transition requires policies that enable everyone to participate fully.

Full participation in a clean economy also means creating jobs that support a clean economy. Today’s jobs may not be those of the coming decades, but with supportive policies and a commitment to initiatives that empower and employ, Ontario can create a clean economy that genuinely works for workers.

This document will demonstrate that Canadians and Ontarians are ready to act when it comes to creating a clean economy, as well as provide insight into their clean energy priorities. The report will also outline our progress toward creating a clean economy and strategic advantages that can be built upon in comparison to other jurisdictions. The final sections will focus on the imperative of building a clean economy as well as the clean energy tools we need to get us there.

In short, this report makes it clear that, with the right direction, a clean economy that works is within reach.



SECTION 1

READY TO ACT.

The impact of a changing climate is driving a desire for action.



THE IMPACT OF A CHANGING CLIMATE IS DRIVING A DESIRE FOR ACTION

Countries around the world recognize that climate change is a pressing concern that demands action. The COP26 conference in Glasgow, Scotland underscored this point. Every signatory to the Paris Agreement is required to establish what is known as a Nationally Determined Contribution (NDC)—essentially a country’s climate action plan—and update it every five years.¹ However, at COP26 in the fall of 2021, the Glasgow Climate Pact called on all countries to revisit and strengthen climate targets contained within their NDCs in 2022.² This was a clear indication of the public pressure on global leaders to act.

The public interest here in Canada is no different than that being seen on the global stage. A national consensus that we can and must do more to address the realities and impacts of climate change is growing. This is made clear by Figure 1: Canadians’ opinions on climate change, below.

With more than three quarters of Canadians believing that we not only need to do more than what is currently being done but, in fact, that we have an obligation to lead on climate change globally, the call for action is clear.

Figure 1: Canadians’ opinions on climate change
(% of Canadians surveyed)



Source: Ipsos

CLIMATE CHANGE, ELECTRIFICATION AND ENERGY SECURITY MATTER TO ONTARIANS

In Ontario, that story is much the same. Ontarians are ready to move forward with creating a decarbonized electricity grid. A recent poll led by the [Bruce Power Centre for New Nuclear & Net Zero Partnerships](#), in partnership with Innovative Research Group, asked Ontarians about their energy priorities. Some of the results included:

1 Ontarians believe in the importance of addressing climate change.

- 87% of Ontarians believe that it is very important or somewhat important to address climate change.

2 Ontarians believe that electrification of the economy is crucial to meeting our climate change goals.

- One in three (33%) Ontarians strongly support using increased levels of electricity to shift away from fossil fuels.
- Adding those who somewhat support this concept, general support for electrification grows to 69%.

3 Ontarians favour energy self-reliance over relying on imports of electricity from other jurisdictions.

- Seven in 10 Ontarians stated that they believe it is important for Ontario to be self-sufficient in electricity supply.
- Meanwhile, only 14% stated that they are comfortable relying on other jurisdictions, like Quebec, to provide electricity to Ontario.

Ontario has done much to reduce its electricity system's GHG emissions, but there is more to do in the wake of increased levels of electrification resulting in increased demand. Advancing practical and executable solutions that meet the clear desire of Canadians and Ontarians to tackle climate change requires action today.

To act and deliver tangible results on climate change, Ontario must continue to play a leadership role and encourage the rest of Canada to pursue a reliable, affordable and diverse supply mix that supports both existing needs and the immense amount of forecasted demand.

The desire to act is clear. And as the next section of this report will illustrate, Canada (and specifically Ontario) has an advantageous starting point.



SECTION 2

A GOOD STARTING POINT.

Ontario's clean energy advantage provides a significant head start.

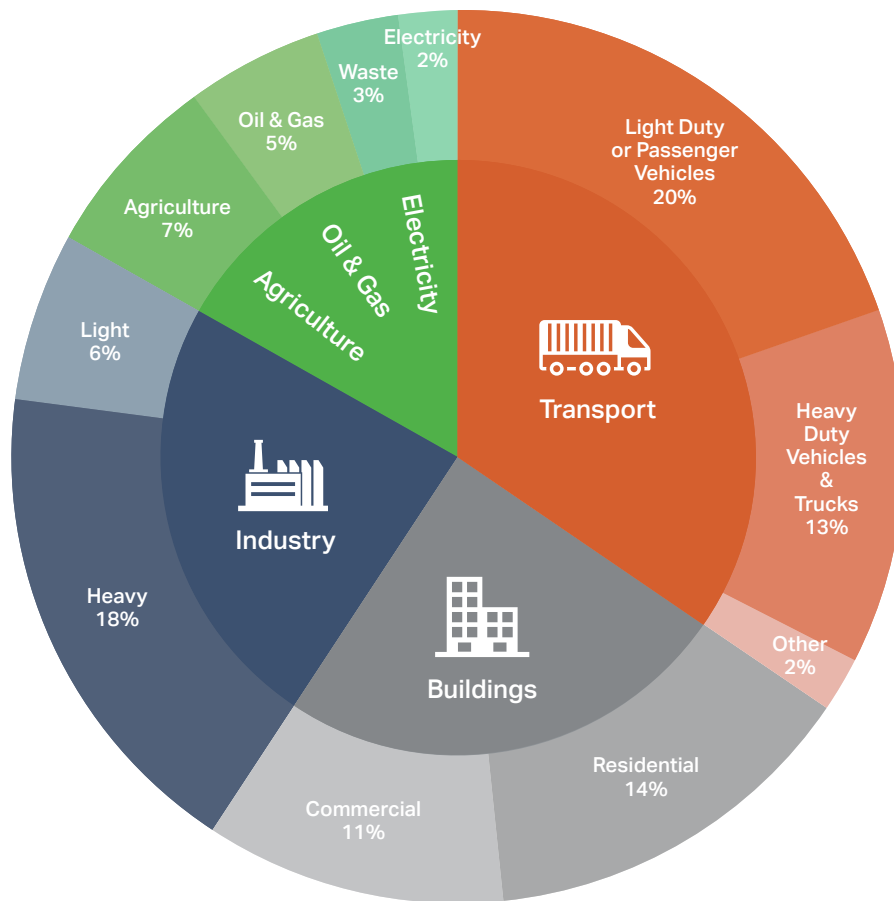


WHAT DOES ONTARIO'S GHG EMISSIONS PROFILE LOOK LIKE?

At present, emissions in Ontario come from all sectors of the provincial economy. Our long-standing reliance on fossil fuels has permeated into nearly every aspect of the way we power our lives—both at a household and business level. The largest source of emissions is from the transportation sector—accounting for 35% of Ontario’s GHG emissions and serving as the primary source of air contaminants affecting our health (underscoring the point that climate policy is also health policy).

Figure 2: Ontario’s GHG emissions breakdown – 2018 provides a clear depiction of where emissions in the province come from. To enact policies that will result in significant emissions reductions, it is important to first understand where the problem lies. Understanding that transportation, buildings and industry are the largest contributors to the provincial emissions profile allows policymakers to advance initiatives that enable these sectors to decarbonize.

Figure 2: Ontario’s GHG emissions breakdown – 2018
 (% of GHG emissions by sector, 165 Mt total)



Source: Government of Canada, 2019b
 Plug'n Drive, 2020.

WE HAVE DONE THIS BEFORE

Ontario's coal phase-out program that cleaned our province's air stands out as one of the largest and most successful GHG and pollution reduction policies worldwide. To achieve this clean energy transformation, Ontario added 35 TWh of low GHG-emitting sources of generation to its supply mix. Nuclear generation accounted for 32 TWh of that new energy supply. Because of this contribution, between 2003 and 2008, coal was gradually replaced by clean energy from nuclear. Figure 4: Changes in nuclear supply and GHG emissions provides a clear picture of how Ontario achieved its phaseout of coal-fired electricity generation between 2003 and 2014.

And this new clean electricity supply had a dramatic impact on the air we breathe. All told, Ontario's GHG emissions decreased by 35 Mt and air quality significantly improved—the number of smog days declined from 53 in 2005 to zero

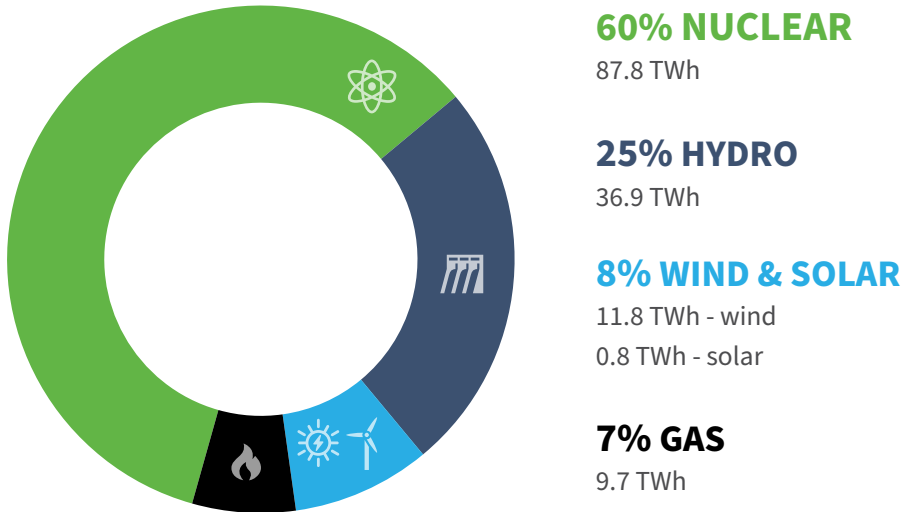
in 2015. This benefit cannot be overstated. Air quality can have severe effects on public health. The World Health Organization (WHO) estimates that approximately seven million people die every year from exposure to fine particles in polluted air that lead to diseases such as stroke, heart disease and lung cancer.³

These efforts have culminated in a provincial electricity grid that is more than 90% GHG emissions free. Ontarians are breathing healthier air and benefitting from a clean grid.

The work does not stop here, though. Just as we've done this before, we must continue to meet future demand with clean, reliable sources of electricity. This will include optimizing our current fleet of clean assets, building new sources of clean generation and significantly expanding the energy storage capacity of the electricity grid in the province.

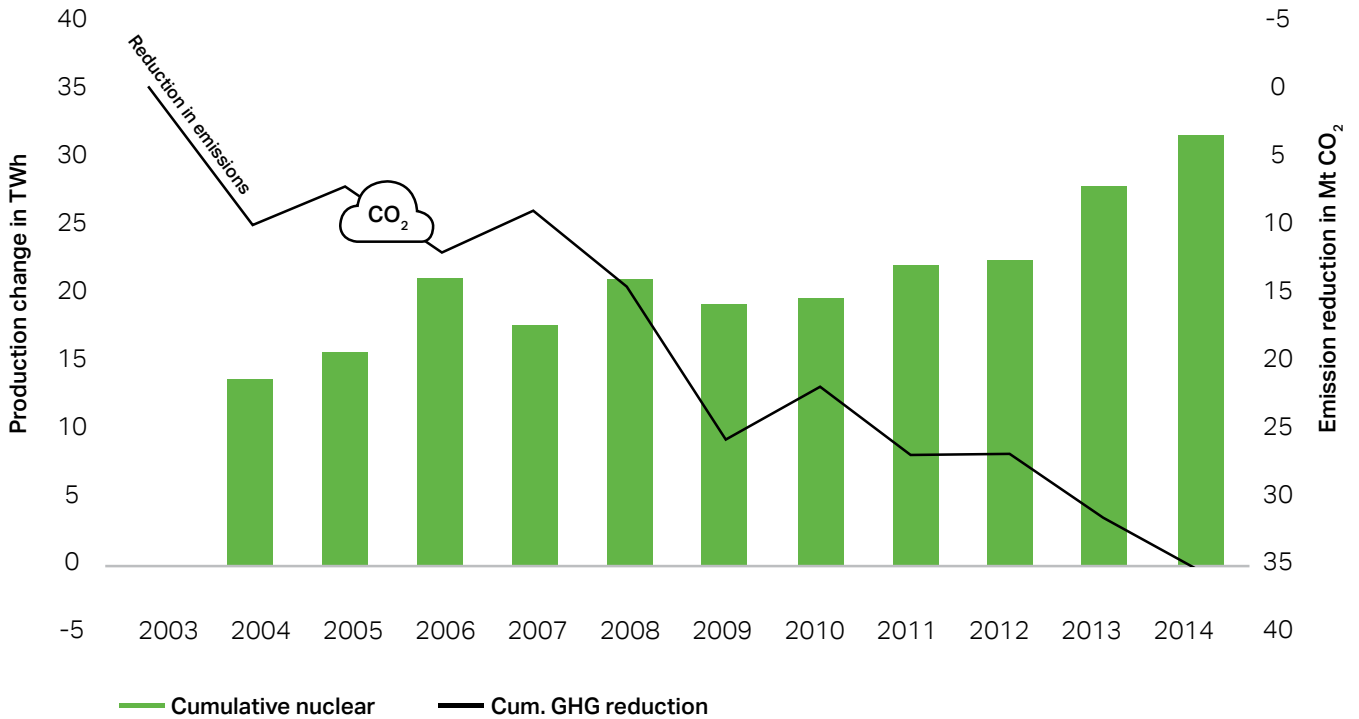


Figure 3: Ontario's electricity supply & demand
 % grid supply; Total = 132 TWh



Source: IESO data, 2020.

Figure 4: Changes in nuclear supply and GHG emissions
 (Production change in TWh vs. emission reduction in CO₂ in Mt; Indexed to 2003)



Source: IESO data; Strapolec, 2015; Strapolec analysis.

Note: After coal was fully retired, Ontario power sector GHG emissions only reduced by 0.5 Mt from 2014 to 2016 as renewables were rolled out.

SECTION 3

POWERING A CLEAN ECONOMY.

More clean electricity and more energy storage will power a clean economy.



THE CHALLENGE OF ELECTRIFICATION

As the previous section of this report noted, electrification provides a clear path to the decarbonization of the economy. With that opportunity comes a significant challenge, however. Electrification creates an even greater demand for clean electricity: potentially almost triple what Ontario has today.

As per Figure 5: Electrification demand implied by GHG-emission reduction, the amount of electricity required to meet the challenge of electrifying significant portions of the economy is roughly 1.66 TWh per every Mt of GHGs reduced.

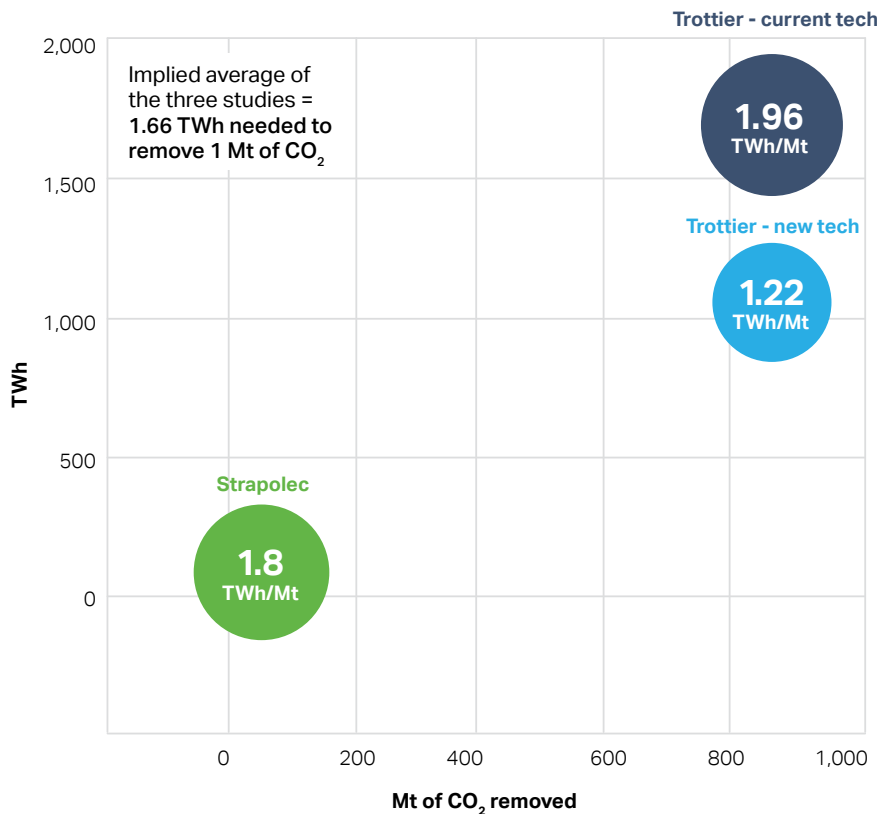
Therefore, to fully electrify Ontario’s economy, an estimate of 280 TWh of additional electricity would be required.

That’s almost triple the amount of electricity consumed in the province today.

This puts significant pressure on the Independent Electricity System Operator (IESO) in Ontario to create a decarbonized supply source while also meeting the increase in forecasted demand for electricity. The Government of Canada has moved forward with policies to create a Clean Electricity Standard in Canada to build a net-zero electricity system nationwide by the year 2035.⁴ Ontario has also begun seeking pathways to create a fully net-zero electricity grid through its ongoing [Pathways to Decarbonization](#) study that is examining “a moratorium on the procurement of new natural gas generating stations in this decade [by 2030].”⁵

Figure 5: Electrification demand implied by GHG-emission reduction

(TWh of new electricity consumption needed to remove 1 Mt of CO₂)



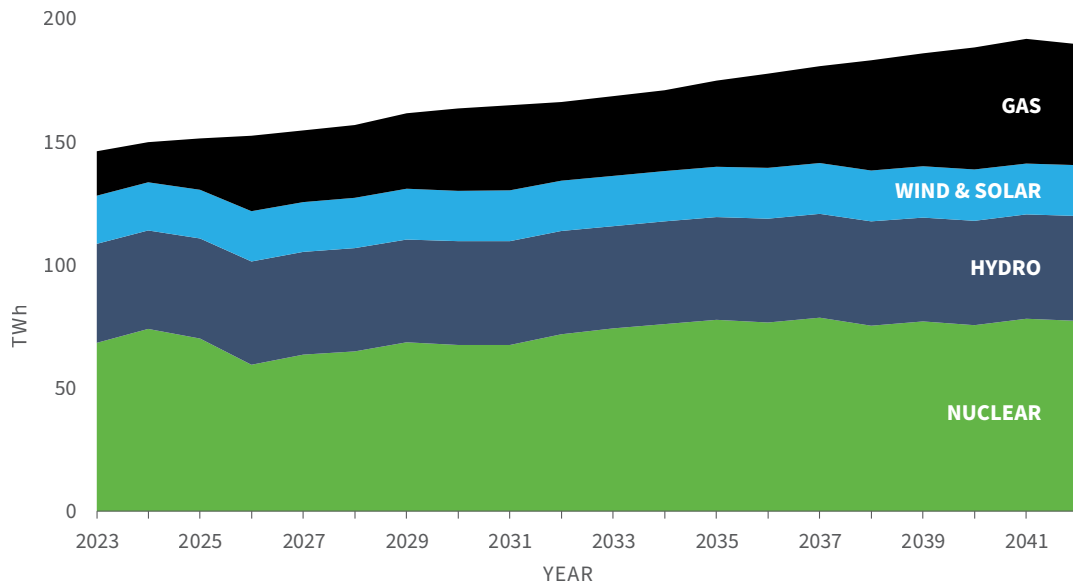
Sources: Strapolec, 2016a; Trottier Energy Futures Project, 2016; Strapolec analysis. Note that Trottier - New Tech includes the use of biomass with carbon capture and storage, while Strapolec and Trottier - Current Tech do not employ any carbon capture technologies.

These policies will be critical to charting a path toward the electricity grids of the future. But, without a significant change in policy, forecasts show that Ontario will end up burning more gas to meet future demand (see Figure 7: Without more clean assets, we will keep burning gas).

This does not have to be the case, though, as Ontario has met similar challenges before. As described above, one of the single-greatest decarbonization efforts in North America was the phase-out of coal-fired electricity generation in Ontario. And nuclear did much of the heavy lifting then, as it will now. Despite the introduction of renewables in 2011 and 2012, further emissions reductions were not realized until Bruce Power Units 1 and 2 were restarted and came fully online in 2013.

Ontario needs this kind of commitment to decarbonization once again as we face the present challenge of creating a fully decarbonized grid.

Figure 6: Without more clean assets, we will keep burning gas



Source: *Energy Supply Outlook IESO APO 2021*.
 Nuclear Innovation Institute, 2022.⁶



ALL TOOLS IN THE TOOLBOX

CLEAN GENERATION + ENERGY STORAGE CAN MEET PEAK DEMAND.

Ontario will need all sources of clean electricity generation to contribute to a decarbonized grid, as well as new technologies that will help the IESO manage the peaks of demand that come with our electricity system. The way Ontarians use electricity does not always match the ideal forms of generating electricity (e.g. we use most of our electricity during the daytime, putting significant pressure on our grid during so-called ‘peak hours’). Currently, the most common mechanism for meeting peak demand is to use gas-fired electricity generation (see Figure 7: How do we meet peak demand?).

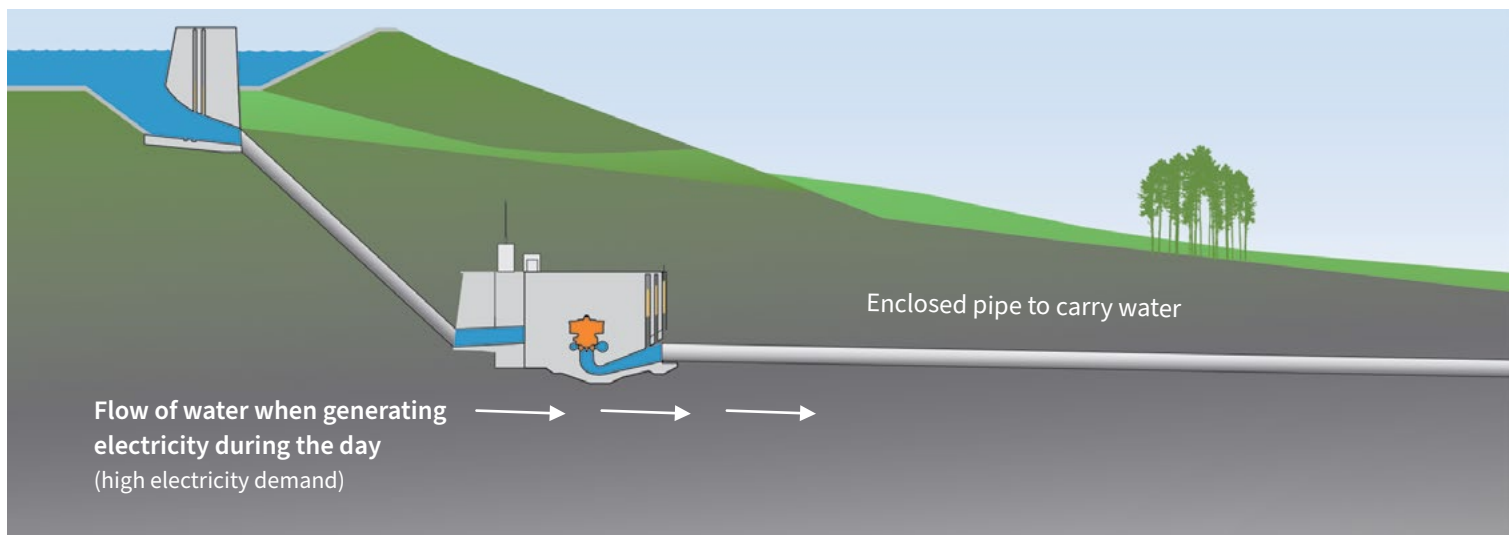
Energy storage technologies (like pumped storage and batteries) provide the system operator with the flexibility mechanisms needed to manage supply in a clean, carbon-free way. Energy storage allows the system operator to shift the use of clean electricity from when it’s generated to when it’s needed—allowing sources of generation to do what they do best (produce electricity), no matter the time of day or environmental circumstances (in the case of wind and solar).

Several projects have been proposed to increase the amount of energy storage capacity in Ontario. TC Energy’s proposed

Ontario Pumped Storage project near Meaford is a prime example of the kind of energy infrastructure initiatives that must be considered on our pathway to net zero. With the ability to deliver 1,000 MW over an eight-hour period, this asset could be able to power one million Ontario homes for eight hours of the day when electricity demand is at its highest. And because the asset is a carbon-free method of storing electricity (as most proposed energy storage projects would be), the electricity delivered by the project is as clean as the electricity that powers it. The more than \$4-billion project presents an opportunity to build a once-in-a-generation clean energy asset in the Clean Energy Frontier region of Bruce, Grey and Huron counties.

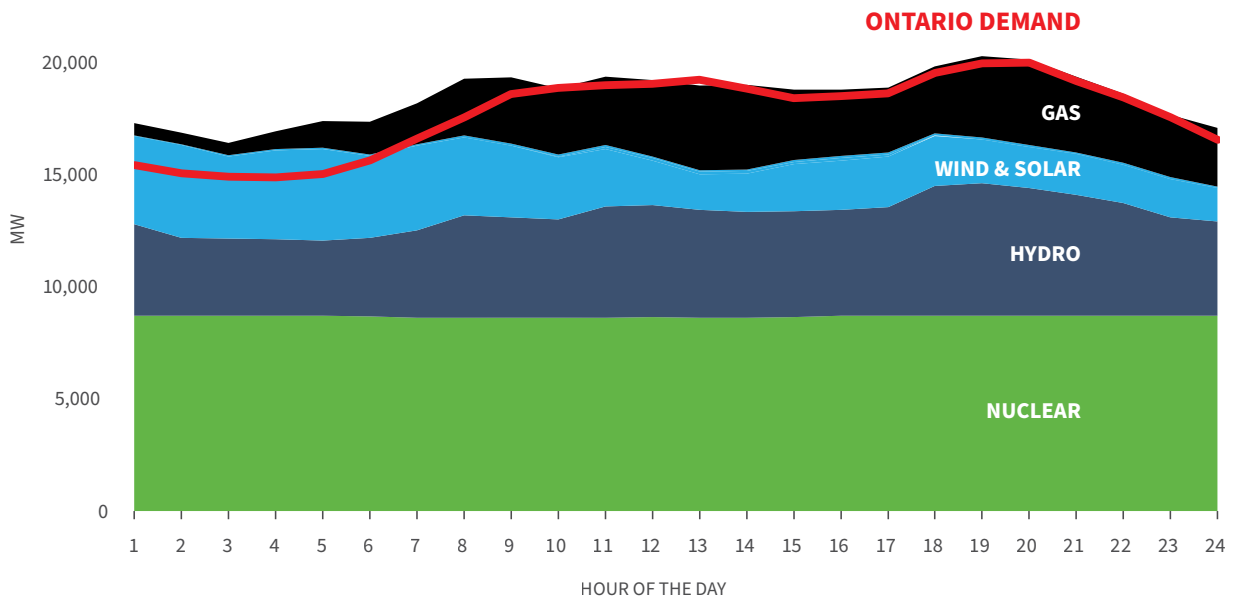
Therefore, pairing baseload generation from Ontario’s clean energy assets with clean methods of storing electricity, like pumped storage, presents a clear pathway to creating a net-zero grid in the province. This concept is the subject of a recent report from the Bruce Power Centre for New Nuclear & Net Zero Partnerships at the **Nuclear Innovation Institute**. Get the report [here](#).

Figure 8: TC Energy’s proposed storage facility

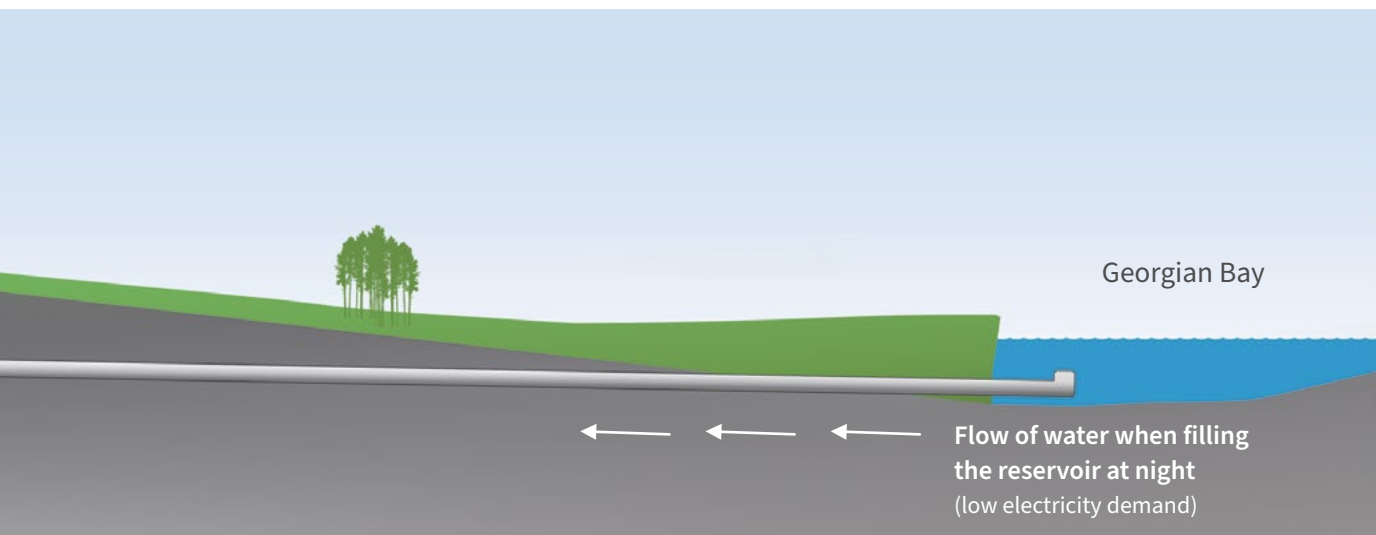


Source: TC Energy
Nuclear Innovation Institute, 2022.⁷

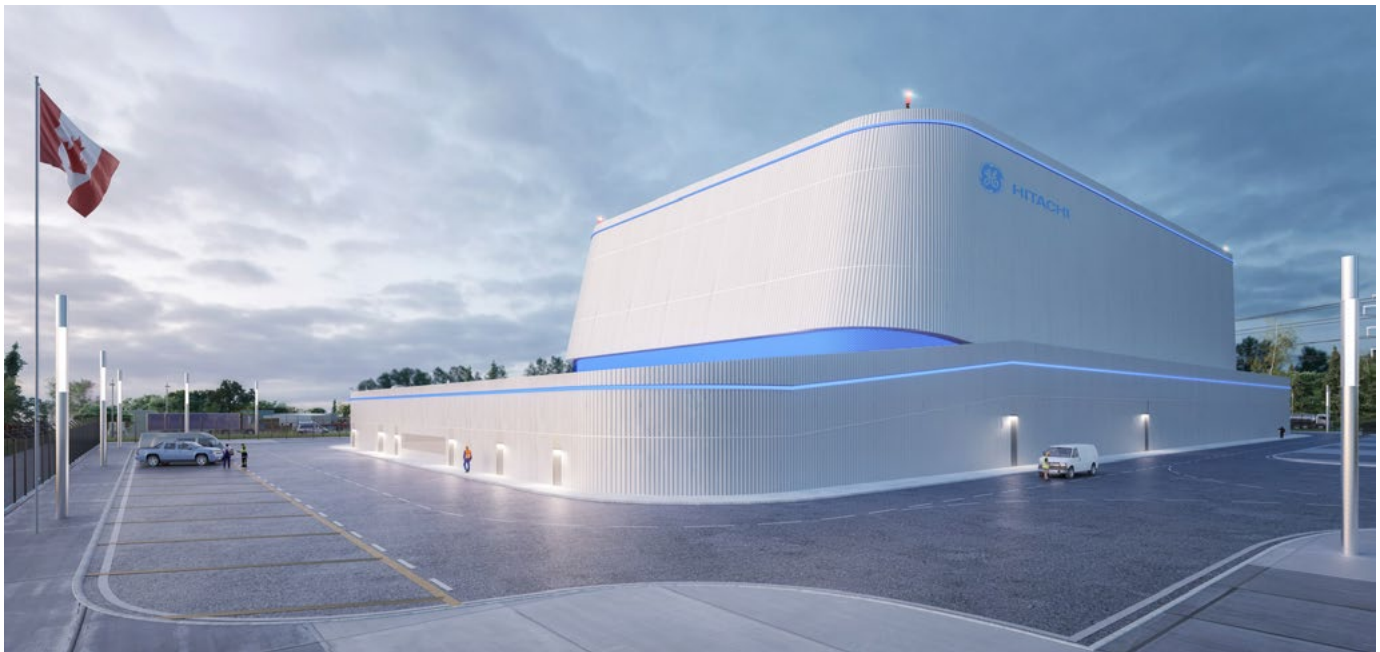
Figure 7: How do we meet peak demand? Burn more gas? Or build more storage?



Source: Energy Supply Outlook IESO APO 2021.
 Nuclear Innovation Institute, 2022.⁸







Source: GE Hitachi Nuclear Energy

A LEADER IN SMALL MODULAR REACTORS

On December 2, 2021, Ontario Power Generation (OPG) announced that it would “work together with GE Hitachi Nuclear Energy to deploy a Small Modular Reactor (SMR) at the Darlington new nuclear site, the only site in Canada currently licensed for a new nuclear build.”⁹ This project is an exciting step forward in building Ontario’s clean energy future.

Already, OPG and GE Hitachi are working on the engineering, design and planning work for the SMR itself, as well as preparing licensing, permitting materials and performing site preparation activities at Darlington.¹⁰

With this project, all eyes are on Ontario. It is critical that this project succeed—not only for the essential new clean electricity capacity (300 MW with the ability to prevent between 0.3 MT to 2 MT of carbon dioxide per year, depending on what kind of power it is displacing¹¹)—but to demonstrate the effectiveness of new nuclear technologies.

In March of 2022, the governments of Ontario, Saskatchewan, New Brunswick and Alberta agreed on a joint strategic plan which outlines the path forward on SMRs.

The plan identifies five key priority areas for SMR development and deployment, including:

- “Positioning” Canada as an exporter of global SMR technology by propelling three separate streams of SMR development, covering both on-grid and off-grid applications.
- Promoting a strong nuclear regulatory framework that focuses on the health and safety of the public and the environment while ensuring reasonable costs and timelines.
- Securing federal government commitments on financial and policy support for new SMR technologies that would lead to vast economic benefits across the country and help meet our emissions reduction targets.
- Creating opportunities for participation from Indigenous communities and public engagement.
- Working with the federal government and nuclear operators on a robust nuclear waste management plan for SMRs.¹²

These priorities should be advanced with the full support of governments and industry.

OPTIMIZING EXISTING ASSETS

Often overlooked in conversations around building a clean energy future are those assets that are already powering our clean grid. Ontario has long been the world’s envy when it comes to a clean electricity system. With a grid that is more than 90% carbon free, investments to extend and optimize output from our proven sources of clean electricity must be a priority in building a clean economic future.

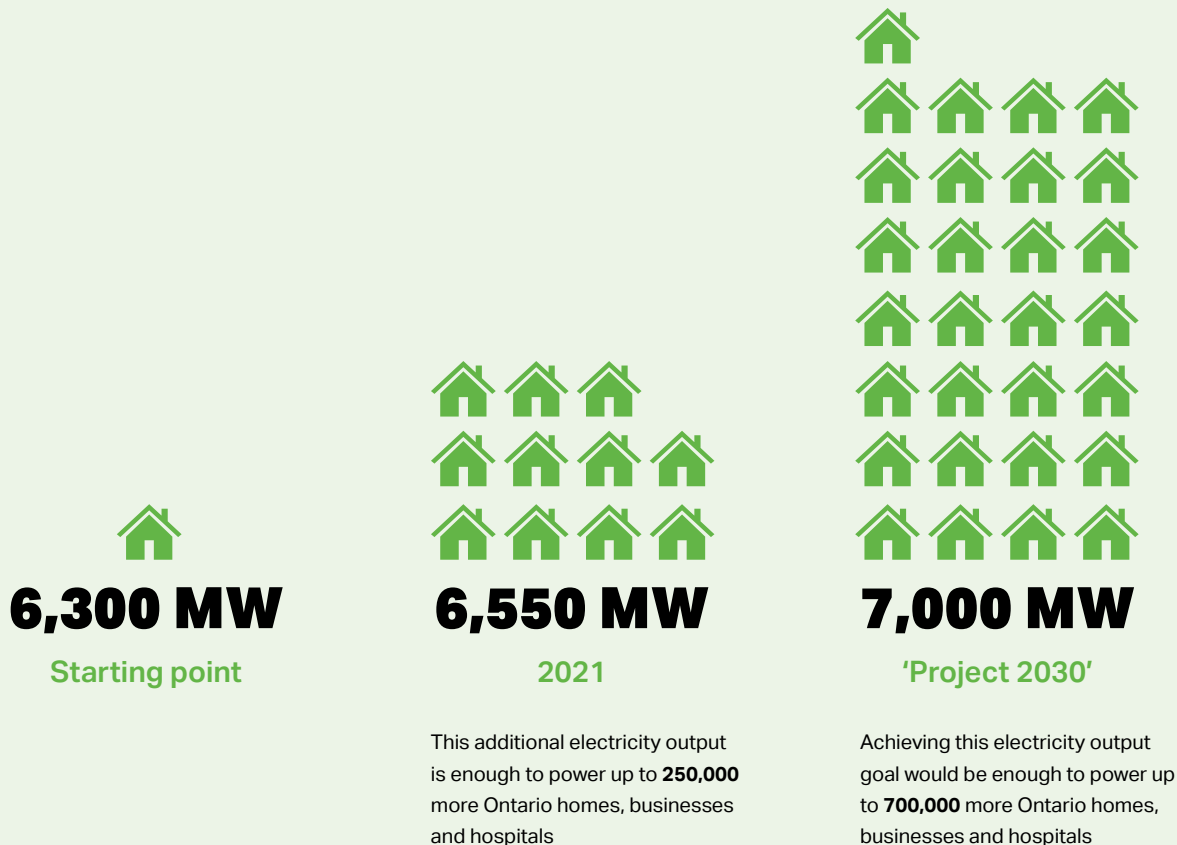
Refurbishment projects at OPG’s Darlington site and at Bruce Power are extending the life of Ontario’s nuclear generating stations. These are investments that will support clean, reliable baseload supply for the province into the future. But with demand for electricity expected to rise in the years to come, Ontario will need a vast new supply of clean electricity. One key tool is leveraging those assets that are already proven.

For instance, in October of 2021, Bruce Power announced that it had achieved a new site generation peak of 6,550 MW,

an increase from the previous 6,300 MW achieved in 2016.¹³ This additional electricity output is enough to power up to 250,000 more Ontario homes, businesses and hospitals. And more can and will be done. ‘Project 2030’ is an initiative at Bruce Power focused on achieving a goal of a 7,000 MW peak from the Bruce site through continued asset optimization, innovations and leveraging new technologies—including potential integration with energy storage assets and other forms of energy.¹⁴

By maximizing the benefits of those assets already powering the grid, the IESO can access new supply that is already grid-connected, proven, safe, reliable and clean. It’s a simple solution that allows present assets to contribute even more while avoiding lengthy siting and procurement processes and the construction of new assets, including transmission infrastructure.

Figure 9: Peak electricity generation output at the Bruce Power site







DYNAMIC REGULATORY ENVIRONMENT FOR CLEAN ENERGY PROJECTS

Creating a clean economy that works will require significant amounts of new investment in clean energy infrastructure as well as a supportive regulatory environment that will enable the construction of this infrastructure in time to meet our net zero targets. There are several ways that governments can help create the economic and regulatory conditions needed for this to happen.

CLEAN ENERGY CREDITS

In January of 2022, the Hon. Todd Smith, Minister of Energy, wrote to the IESO asking the grid operator to: “assess options for the establishment and ongoing operation and management of a registry to support the creation and/or recognition, trading and valuation, and the retirement of voluntary clean energy credits (CECs) within the province.”¹⁵ The IESO was instructed in that letter to report back to the Minister’s office before July 4, 2022.

The creation of this CEC system is an important step forward and an innovative way to capitalize on the clean energy investments being made in the province. As noted in the Minister’s letter to the IESO, the credits offered through this system “should include existing non-emitting generation, including nuclear, waterpower, wind, solar, and bio-energy.”¹⁶

The CEC system could also result in ratepayer benefits, with the proceeds of credit sales expected to flow directly to ratepayers, while also appropriately recognizing the role that Ontario’s electricity plays in the effort to decarbonize the economy.

The CEC system outlined in the Minister’s January 2022 letter should serve as a model for future green financing models. The inclusion of all non-emitting sources of generation in this proposal is critical. Future initiatives should follow this lead, including future releases of green bonds from the Government of Canada.

REDUCING RED TAPE

The federal Impact Assessment Act is a piece of legislation that outlines a process for determining the impacts of major projects in Canada. The legislation requires these projects to complete an impact assessment—a planning and decision-making tool that determines the positive and

negative environmental, economic, health and social effects of proposed projects as well as the impacts to Indigenous groups and rights of Indigenous peoples.

Determining the impacts of major projects is an important exercise and must be done. That said, Canada’s current regulatory landscape often results in lengthy delays and duplication of similar processes at different levels of government—ultimately limiting the ability of project proponents to build the critical infrastructure needed to support a clean economy.

Where possible, governments in Canada must recognize the efforts made by project proponents at other levels of government. For instance, an environmental impact assessment done for a project in Ontario through the provincial environmental assessment process should also form the basis for approval at the federal level of government. Governments can support this by harmonizing similar regulations to avoid the overly repetitive nature of present regulations.

The impact assessment process should also be forward-looking rather than simply reactive. The process should allow for conversations and activities within the impact assessment framework to take place before a specific project is proposed. This would allow for the development of new site options for clean energy assets. This will be critical to advancing key infrastructure in a timely manner.

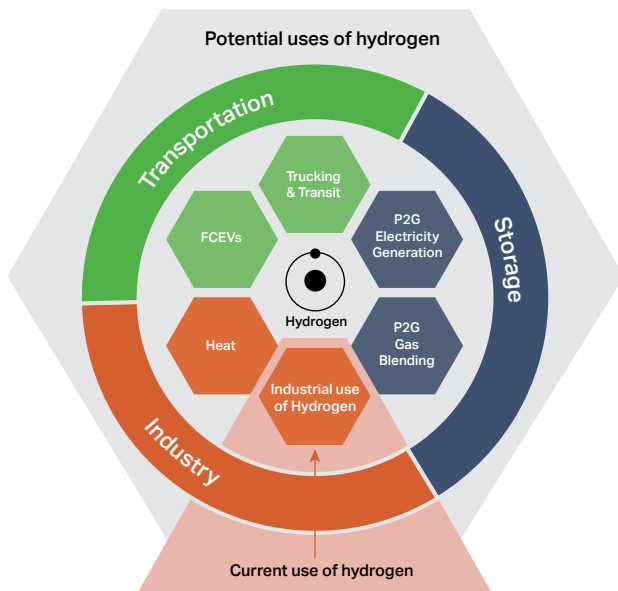
This is an area where provincial agencies responsible for electricity system planning and federal departments handling impact and environmental assessments will need to be in close alignment. For example, previously conducted environmental assessments and environmental monitoring should be recognized in future processes for existing generation sites.

HYDROGEN MUST BE USED WHERE ELECTRICITY CANNOT

Hydrogen is a clean fuel that can be produced using electricity. It can be used as an indirect electrification approach to reducing emissions in just about all sectors, as shown in Figure 10: Current and potential uses of hydrogen. Due to its many advantages and applications, some estimates suggest hydrogen could be used to eliminate up to 25 per cent of GHG emissions in Ontario.¹⁷

In April of 2022, the Government of Ontario released Ontario’s Low-Carbon Hydrogen Strategy—a foundational document that outlines the opportunity for Ontario to lead the transition to an electrified economy that enables greater deployment of hydrogen across sectors. The document highlights Ontario’s current advantages, including a highly skilled workforce, global hydrogen technology manufacturers based in the province, a clean and reliable electricity system for hydrogen production, existing storage and pipeline infrastructure and a regulatory approach focused on reducing red tape.¹⁸

Figure 10: Current and potential uses of hydrogen



Financial Accountability Office, 2017.
Source: Strapolec analysis

The commitments advanced within Ontario’s hydrogen strategy must be advanced and pursued with the full commitment of governments and industry partners alike.

Already, exciting pilot projects like Enbridge Gas Inc.’s hydrogen blending project in Markham, Ontario, are demonstrating what is possible. This project involves blending hydrogen gas into the present natural gas distribution system via the Markham Power-to-Gas facility. Through this pilot project, Enbridge Gas produced North America’s first successful hydrogen blending initiative and is reducing the carbon footprint of the natural gas distribution network for about 3,600 customers in the Markham region.¹⁹ All totaled, this pilot project will prevent up to 117 tons of carbon dioxide from being released into the atmosphere every year.²⁰ A significant achievement that demonstrates, yet again, Ontario’s ability to lead the transition to a clean economy.

HYDROGEN CAN HELP REDUCE THE IMPACT OF HEAVY TRUCKING

The trucking sector is a necessary catalyst for the economy, and efficient trucking is critical for many sectors. It allowed Canada to export over \$234 billion in goods in 2019, serving almost every sector of the export economy.²¹ It is also concentrated in Ontario, accounting for approximately half of Canada’s trucking jobs.²²

However, trucking is energy: it is GHG emissions intensive and a source of other air pollutants. Across Canada, on-road freight produced 60 Mt of GHG emissions in 2017, accounting for 34% of all GHG emissions from transportation.²³ It is also a major emitter of NOx’s, which have adverse effects on air quality.²⁴

Ontario can decarbonize its trucking fleet by converting to hydrogen-powered fuel cell electric vehicles (FCEVs). Trucks powered by fuel cells have lower weight penalties and better cold temperature performance compared to battery-powered equivalents. Lowering GHG emissions from trucking would reduce supply chain GHG emissions for other sectors, and conversion to FCEVs would reduce the need for imported fossil fuels.

Further, converting to FCEVs would create additional demand for made-in-Ontario electrolysers. In a new fuel distribution model, these could be built at gas stations to generate fuel on site. Ontario would need 5.5 GW of electrolyser capacity if it converted 80% of its heavy trucks to FCEVs, complementing the domestic hydrogen economy.

Innovative projects to enable long-haul trucking in Canada are already being advanced. For example, TC Energy recently announced that the company is evaluating a plan for a hydrogen production hub with a focus on serving long-haul

trucking as one of the off-taking industries for the hydrogen produced.²⁵

The proposed hub, located in Crossfield, Alberta would see an estimated 60 tons of hydrogen produced per day with the ability to 150 tons in the future.²⁶

Projects like TC Energy's project in Crossfield that enable a hydrogen economy that can decarbonize those sectors that are most difficult to electrify must become commonplace across Ontario.



Source: TC Energy

MADE-IN-ONTARIO INTEGRATED SOLUTION

All these initiatives culminate in the creation of a true, made-in-Ontario integrated energy solution, as depicted by Figure 11: Integration enabled by four paradigm shifts.

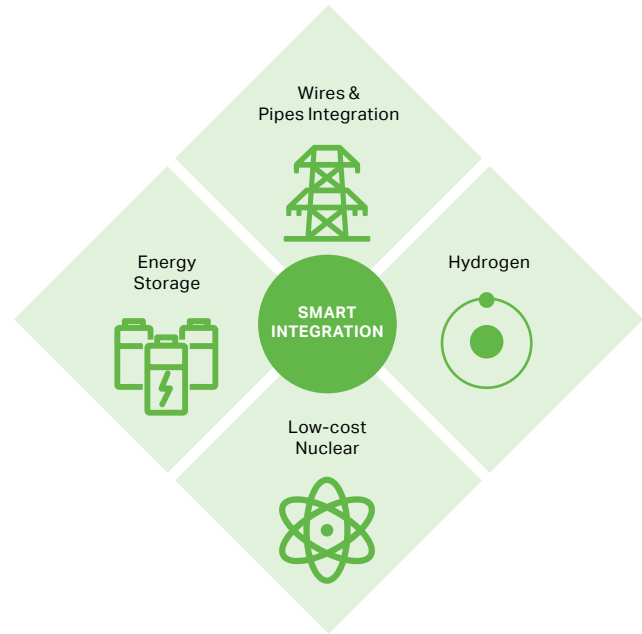
Bringing together different technologies with complementary features will be the key to low-cost electrification of the economy in Ontario. And, as has been made clear, Ontario has a suite of technologies that can be smartly integrated, all enabled by low-cost, baseload nuclear generation.

NUCLEAR

As a reliable, flexible and low-cost source of low-carbon electricity, nuclear can form the backbone of an integrated electrification solution. In Ontario, a \$26-billion infrastructure project will extend the operating lives of the Darlington Nuclear Reactor and Bruce Power Generating Station to 2055 and 2064, respectively, resulting in decades of low-cost electricity while simultaneously creating tens of thousands of direct and indirect jobs.

Not only will these refurbishments provide an economic boost to Ontario and Canada as a whole, but, as stated in 2017 by Ontario’s Financial Accountability Officer, “there are currently no alternative generation portfolios that could provide the same supply of low GHG emissions baseload electricity generation at a comparable price to the Base Case Nuclear Refurbishment Plan.”²⁷

Figure 11: Integration enabled by four paradigm shifts



Source: Bruce Power

HYDROGEN

Hydrogen performs best when matched with a reliable baseload supply for electrolysis, such as nuclear power. Electrolysis is the process of using electricity to split water into hydrogen and oxygen. This reaction takes place in a machine called an electrolyser and requires large amounts of electricity. This production can also be throttled, allowing it to be used as a flexible load. Many Ontario companies have pioneered hydrogen production and fuel cell technology, meaning it is a solution that supports both our climate change objectives and the local economy.

ENERGY STORAGE

Storage is a critical part of the supply mix in an integrated electrification solution. It can be used to shift generation from times when it is created to times when it is needed, presenting a “flattened demand” to the grid. This reduces the need for variable generation capabilities currently provided by gas-fired generation, as seen in Figure 7. Right now, storage holds great potential for cost savings and as a made-in-Ontario solution to combat climate change.

Some examples being piloted in Ontario include:

1. Lithium-ion batteries

Uses technologies being advanced in the EV industry and adapted to electricity system purposes, as well as second-life EV batteries.

2. Pumped hydro-electric storage

Uses electricity to pump water up to a reservoir for release through a turbine when needed.

3. Compressed Air Energy Storage (CAES)

Compresses air for storage in a pressurized vessel for release through a turbine when needed.

4. Power to Gas (P2G)

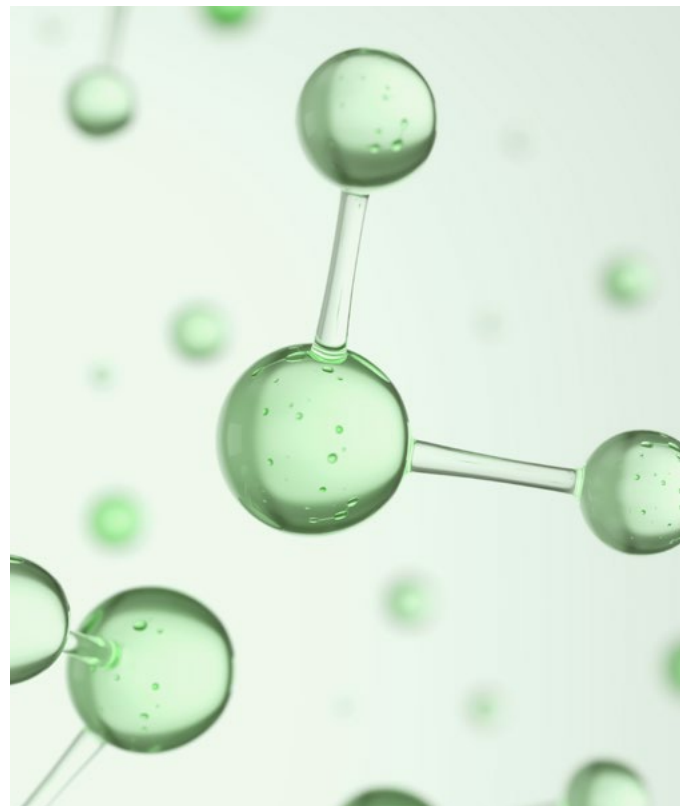
Uses electricity to produce hydrogen through electrolysis, which can then be stored for future use in many applications, including ancillary services and electricity generation using fuel cells.

INTEGRATING THE 'WIRES AND PIPES'

Integration of ‘wires and pipes’ means integrating the electricity and natural gas systems to make efficient use of natural gas infrastructure during the transition to electrification. For example, hybrid natural gas and electric heating solutions for buildings can be used as a new form of winter peaking capacity for the electricity system, where furnaces use electricity by default, but can switch to natural gas during peaks, saving the electricity system the need to build peak generation.

Ontario can also take advantage of its natural gas storage caverns by mixing in hydrogen, creating a less carbon-intensive fuel blend. This hydrogen-infused natural gas can then be transferred around the province or exported to the US using existing infrastructure. By integrating wires and pipes, Ontario can use its existing natural gas infrastructure to facilitate electrification and reduce emissions.

Only by deploying a smartly integrated energy solution, optimizing existing and proven assets, building new sources of clean electricity generation as well as investing in new methods of energy storage, will Ontario be able to maintain its position as a global leader in a clean economy.



SECTION 4

THE IMPERATIVE OF A CLEAN ECONOMY.

Clean growth will be essential to
Ontario's economic prosperity.

MEETING THIS CHALLENGE IS CRITICAL TO OUR FUTURE

“Inability to guarantee power supply dampens Windsor’s hopes for \$2.5B LG Chem plant”.²⁸ So reads a headline from the Windsor Star on May 10, 2022. The following article outlines the challenges associated with drawing an LG Chem factory—which would employ approximately 1,000 workers and supply cathodes to future battery production facilities in the region—to the Windsor area. The central challenge? Guaranteeing enough power to meet the plant’s intensive demands.

These conversations have long been hypothetical scenarios often dismissed as unlikely challenges due to our immense amounts of clean energy supply. Unfortunately, the days of hypotheticals are over: these challenges are real and are having an impact now.

Section 3 of this report outlined concrete actions that governments can take towards powering a clean economy. This section will outline why meeting this challenge is critical to Ontario and Canada’s future.

GREEN COLLAR JOBS— THE JOBS OF THE FUTURE.

Ontario’s manufacturing sector has been a critical pillar of the provincial economy. As noted by Canadian Manufacturers & Exporters in *Manufacturing Now: Ontario Manufacturers’ Platform for Prosperity*, the manufacturing sector in the province:

- Employs close to 775,000 Ontarians, directly supporting their families and communities with stable, high-skilled and high-wage jobs.
- Supports over 1.5 million more of the province’s workers through the integrated nature of the supply chain.
- Generates over 12% of the province’s GDP via the sector’s 36,200 manufacturing firms.
- Accounts for more than 30% of the province’s economic activity.²⁹

It’s clear that the manufacturing sector in Ontario must maintain its momentum and critical place in Ontario’s economy.

And there are opportunities for growth in the sector.

The transition to battery-electric vehicles (BEVs), plug-in hybrid vehicles (PHEVs), and zero-emissions vehicles (ZEVs) presents Ontario with a critical opportunity to create the green collar jobs of the future. A news release from the Province on May 2, 2022, states: “Ontario is quickly becoming a leader in developing and building the car of the future by attracting a \$3.6 billion investment from Stellantis in the automaker’s Windsor and Brampton plants.”³⁰

The Government of Ontario has made its ambitions clear to build the clean vehicles of the future in Ontario—marrying critical minerals expertise in the north with manufacturing prowess in the south of the province. These are crucial opportunities for Ontario and its workers.

But, as noted at the beginning of this section, securing the clean electricity supply needed to power these plants underpins these ambitions. This is why governments must continue to secure Ontario’s clean economic future. If Ontario is to maintain its robust manufacturing sector and seize on new opportunities, stable, clean, low-cost energy must be guaranteed.



THE ENTIRE GREAT LAKES REGION WILL BENEFIT

The Great Lakes region is a major global centre of industry and trade. With its population, GDP and employment rates, it would be the world's third largest economy if it were a country. More than half of US-Canada border trade happens here, accounting for more bilateral trade than the US has with Mexico, China, the UK or Japan.³¹

Ontario is deeply integrated within the Great Lakes region: 42% of its exports are to the Great Lakes states, including 54% of its manufacturing exports.³² As a result, the impacts of Ontario's strategies for GHG emissions reduction extend to the Great Lakes.

Nuclear energy is produced across the Great Lakes region, and the sector would benefit further from Ontario's investments. The region has its own large and deeply integrated nuclear supply chain. Ontario's nuclear-friendly environment is conducive to growing nuclear generation, and a Great Lakes regional approach could accelerate the development of new, leading nuclear technologies.

Development of a hydrogen economy may emerge on a regional basis. The Great Lakes region has a large industrial base that requires GHG emission reduction solutions. The regional economy provides large-scale hydrogen opportunities, with potential supply chain benefits that could be shared across Canada and the US. The Great Lakes region is known for its vehicle manufacturing capabilities and is effectively the world's fourth largest vehicle manufacturer behind China, the US (of which it is a large part) and Japan.³³ The vehicle manufacturing sector is significant for both Ontario and the Great Lakes region's economies. A Great Lakes regional approach could benefit the development of ZEVs in the region.

Trucking underpins US-Canada trade, and much of this occurs in the Great Lakes region: over half of all Canada-US road trade goes through border crossings between the US and Ontario.³⁴ Supporting a zero-emissions trucking corridor along just three bridges on Ontario's border could impact the economy, reduce GHG emissions and create demand for large amounts of hydrogen in the region. Regional synergies could grow trade and Ontario's exports within the world's third largest economic region but will require integrated planning across communities.

POLICIES IN PRACTICE: ARCELORMITTAL DOFASCO—MADE-IN-ONTARIO 'GREEN STEEL'

A prime example of the kinds of opportunities that can be created by pursuing the policies and direction listed above is the recent announcement of a project by [ArcelorMittal Dofasco](#) to see its facility in Hamilton be first of its global operations to replace coal-fed coke ovens and blast furnaces with new low-emissions technology.³⁵ The transition in operations will involve a move to a "hydrogen-ready direct reduced iron fed electric arc furnace (EAF)."³⁶

This is a true demonstration of the value of a low-carbon/ decarbonized grid. The clean energy advantage provided by Ontario's grid makes this transition much more impactful, leading to a significant reduction in GHG emissions (this project will see a reduction in emissions of about three million tonnes annually).

The project, worth a total of \$1.8 billion, was supported by the Government of Ontario via \$500 million in loan and grant support and investment from the Government of Canada to the tune of \$400 million.

The project demonstrates the value of:

- The pursuit of electrification of the economy supplemented by the application of hydrogen technologies to achieve GHG reductions
- Supporting Ontario's brand as a clean jurisdiction known for sustainable products
- Injecting green products into the Great Lakes region value chain
- Economic development through job creation and project spending; and
- The power of investment from government in supporting green projects.

The ArcelorMittal Dofasco project is good news for Ontarians, and similar announcements must be more commonplace. But, in order to maintain the momentum, the province must continue to advance supportive policies that enable these initiatives—policies that have been advanced in this report.

*ArcelorMittal Dofasco plant in Hamilton, Ontario
Photography: Mark Blinch*



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THE WORK STARTS NOW

The challenge of creating a clean economy that works is the challenge of our time.

And it is critical that we meet this challenge. Throughout this report, the Green Ribbon Panel has outlined the key steps that must be taken for Ontario and Canada to succeed in a clean economy future. From the willingness and desire of the public to act and find solutions to a changing climate, to the clean electricity that will power a future clean economy, or the challenges and opportunities that could result from this clean economic future, this report has made one thing clear: this work must start now.

By working together on these commonsense and practical solutions, governments at the municipal, provincial and federal levels of government can create the conditions to succeed in the years ahead.

ENDNOTES

The material in this report has drawn heavily upon the work of Strategic Policy Economics. www.strapolec.ca

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