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BRUCE POWER SUBMISSION
TO THE FEDERAL GOVERNMENT

Clean Electricity Standard (CES) Consultation

Minister Guilbeault,

Thank you for the opportunity to provide input on the federal government's proposed Clean Electricity Standard (CES) with the objective of having a net-zero emissions electricity grid in Canada by 2035. Our submission will focus on the key benefits nuclear energy, and Bruce Power, can provide in Canada's efforts to produce that net-zero grid.

Over the past two years, changes in demand and usage patterns as a result of the COVID-19 pandemic brought renewed spotlight on our electricity system and the importance of reliable, clean power. Throughout the pandemic, Bruce Power nuclear provided safe, reliable electricity to the people and businesses of Ontario to help keep the lights on when needed the most. By reliably generating that power while producing zero carbon emissions, Bruce Power is proud of the role it plays in keeping the air clean and helping Canada meet its global emission reduction targets.

Our message regarding the proposed CES is simple and clear: there is no path to Net-Zero by 2050 or a clean electricity grid in Canada by 2035 without nuclear energy. Bruce Power is ready to play its part to help increase electrification as demand increases in the move toward a cleaner, greener economy. The CES must recognize the vital role nuclear is playing and will play in decarbonization efforts in Canada.

Nuclear energy phased out coal-fired electricity generation in Ontario

As you're aware, it was nuclear power that was responsible for Ontario being able to phase out coal-fired electricity generation in Ontario, with Bruce Power providing fully 70% of the power needed to achieve that. It remains the single largest greenhouse gas emissions (GHG) reduction in North American history, and one Canada can and should be proud of. Between 2003 and 2008, coal was gradually replaced by clean nuclear generation. To achieve this transformation, 35 TWh of low GHG-emission generation were added to Ontario's supply mix, with nuclear generation accounting for 32 TWh or 89 per cent of that supply. All told, Ontario's GHG emissions decreased by 35 Mt and air quality greatly improved, with the number of smog days declining from 53 in 2005 to zero in 2015.

Bruce Power contributes to one of the cleanest electricity grids in the world

As you have previously pointed out, Canada's electricity sector is already 82% emissions-free, and here in Ontario where Bruce Power is located, we have a 94% emission-free electricity grid.

The importance of nuclear energy in Canada cannot be understated. It provides 20% of our national power supply, including 60% in Ontario alone. Moving forward, nuclear energy will remain essential to meeting Canada's net-zero carbon targets and reducing global greenhouse gases.

Nuclear power sits alongside renewables as electricity sources with lifetime carbon emissions of under or about 20 grams per kilowatt-hour (g/kWh). These sources generate very little carbon dioxide – about 600 grams or less, per home, per day. Nuclear is safe and reliable and should be formally recognized as a clean energy source that contributes to climate commitments, while helping to improve the health of people around the world.

The scientific consensus is clear — Net Zero needs nuclear

Achieving the governments net zero objectives through the development of a clean energy standard is necessary to make a significant impact in the global fight against climate change, and nuclear power will have an important role to play.

The goal is daunting, but not unattainable. Successfully reaching Net Zero 2050 will require a clean energy supply mix and will rely on a strong baseload of stable nuclear power. As a reliable source of clean energy, nuclear helps avoid 80 million tonnes of carbon emissions per year in Canada (equal to removing 15 million cars from the road) while generating electricity at a low cost second only to hydro and below the average cost of production in Ontario.

CANDU nuclear technology has a proven history of performance excellence; providing a long-term, dependable supply of carbon-free electricity while also positioning Canada as a world leader in the production of life-saving medical isotopes.

The technological advancements and innovations that have propelled the refurbishments of OPG's and Bruce Power's existing fleets and a CANDU design that continues to evolve make the next generation of nuclear a crucial piece of the Net Zero solution.

We thank the federal government for inclusion of and recognition of Bruce Power's current role and the potential for us to participate in Canada's clean energy future in both the SMR Action Plan and the Hydrogen Strategy for Canada, both released by the federal government in 2020. However, we are disappointed the government failed to recognize this role in its initial Green Bond issue last month, but are committed to working with you to ensure there is a path forward for the inclusion of nuclear technology in future a bond issue.

The scientific consensus is clear - there is no path to Net-Zero emissions by 2050 without nuclear power, and Bruce Power looks to continue its leadership position in the global clean energy transition.

To demonstrate our commitment, Bruce Power released a Net-Zero strategy, 'NZ-2050,' to contribute to a net zero Canada, while growing the economy and supporting innovation. The strategy consists of five pillars:

1. Optimize and leverage existing investments in Canada's largest private-sector infrastructure project to drive further decarbonization;
2. Foster innovation in new energy technologies including new nuclear and fusion energy;
3. Utilize nuclear power generation to produce clean fuels and electrify industrial processes and transportation with an historic opportunity to contribute to a national hydrogen and clean fuels strategy;
4. Create an ecosystem of "green collar" jobs including the nuclear, manufacturing, and energy development sectors with a focus on diversity and more representation from women, visible minorities and Indigenous peoples; and
5. Inspire innovation by supporting strong social responsibility and sustainability, and providing contributions to global health such as life-saving medical isotopes as the world battles COVID-19.

These pillars will support historic and long-term investments in Canada's single largest site for clean electricity, which will support thousands of jobs annually in Canada. Last year, Bruce Power also announced it would achieve net-zero emissions from its operations by 2027.

Less nuclear means higher emissions

In 2019 Ontario produced 26% of Canada's overall electricity generated; however, total GHG emissions from energy generation in Ontario was 3.9 Mt CO_2e, or only 6% of Canada's total emissions from electricity generation and currently has the 6th lowest carbon intensive electricity systems in Canada[1] (as seen in figure 2) This is largely the result of Ontario nuclear resources, providing 60% of Ontario's energy needs daily.

The IESO forecasts there will need to be an increase electricity generation/output from the existing natural gas generation facilities to balance the rising electricity demand with reduced nuclear supply because of the ongoing refurbishment projects. While natural gas is an important part of a diverse supply and critical to providing system reliability during peak hours it does have a greater GHG intensity then other non-emitting resources.

As a result of this increased proportion of natural gas generation, **annual emissions from electricity generation are forecasted to increase this decade from a recent average of 5.4 megatonnes (Mt) CO_2e to 11.9 Mt CO_2e in 2030, an increase of 120%**.[2] Figure 1 shows how GHG emissions from electricity generation are expected to rise from now through to 2042.

1 GHD Limited (2022) The Energy Sector's Role in Net Zero p. 6

2 GHD Limited (2022) The Energy Sector's Role in Net Zero p. 11

Figure 1

Ontario Electricity Sector GHG Emissions (historic and projected)

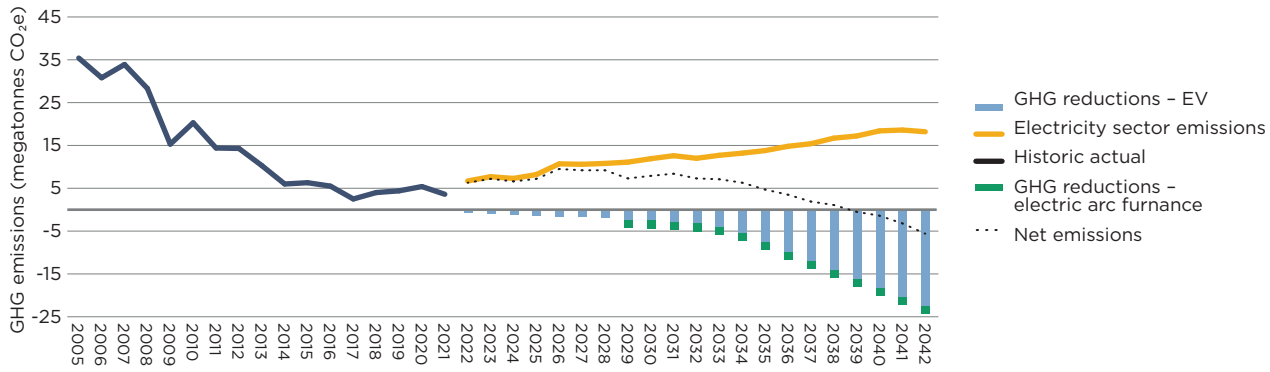


Table 1

Electricity generation GHG intensity by energy source

Electricity Generation Energy Source	Ontario 2019	Ontario Average	Canada	Ontario 2020	IPCC	UNECE
			gCO_2e/kWh			
Coal	0	0	955	0	860	753 to 1,095
Natural Gas	406	411	475	472	490	403 to 513
Other Fossil Fuels	80	130	565	0		
Nuclear	0	0	0	0	12	5 to 6
Hydro	0	0	0	0	24	6 to 147
Other Renewables	0	0	0	0	11-48	8 to 21 (wind) 7 to 83 (solar)
Other Generation	0	0	0	0	-	
Average	30	29	120	-	-	

Considering these rising emissions from Ontario's electricity sector the value of incremental and refurbished nuclear becomes even more clear. Using 2019 electricity generation intensity data available from the NIR (as shown in Table 1) every additional kWh electricity generated in Ontario from low carbon sources such as nuclear instead of carbon emitting resources avoids on average 406g CO_2e.[3]

With "incremental power output" expected from Bruce Power's investment in a series of power recovery projects under Project 2030 totaling approximately 700 MW of incremental output per year by 2030, **the avoided emissions are estimated to be almost 450,000 metric tonnes of CO_2e annually, the equivalent of taking approximately 100,000 cars off the road**.

3 GHD Limited (2022) The Energy Sector's Role in Net Zero p. 8

With emissions from the electricity sector in Ontario projected to increase, a broad spectrum of measures including enhancing the existing and adding additional zero carbon capacity are necessary if Canada and Ontario are to realistically achieve its decarbonization goals.

Nuclear is competitive with other forms of generation

While often cited as the standard there are concerns around the accuracy of the Levelized Cost of Energy (LCOE) from Lazar often cited in price assumptions for all types of electricity generation sources. In fact, it is better to measure the total cost implications of integrated systems. With this type of approach, it becomes very clear that nuclear based integrated solutions are cost effective for both baseload and intermediate supply.

However, even when using LCOE what is evident is that is that the cost competitiveness of nuclear and SMR's has been dropping due to lower financing costs. Alternatively, to the LCOE is the NREL 2020 Annual Technology Baseline, 2035 installed costs, sourced from the EIA. Using these assumptions, the cost competitiveness of nuclear becomes even more apparent.

Table 2

NREL Unit cost references by year of installaion (2018 $USD)

LCOE ($/MWh)	2020	2035	$CDN	IESO***
Community Solar	79	45	65	52
Onshore Wind*	33	24	31	54
Gas CCGT excluding CC****	34	40	47	
Gas CCGT w/CC****	62	65	77	
Nuclear	75	71	77	120

** Costs used in Strapolec analysis scaled to Ontario using parameters from prior work
- Expected capacity factors
- IEA adjustments for region
- Exchange rate of 1.15
- Domestic content assumptions

*** From IESO, 2021 [3]

Table 3

NREL Conventional nuclear costs assumptions 2015 vs. 2020 (in 2018 $USD)

Assumptions	2015	2020
LCOE ($/MWh)	126	75
CAPEX ($/kW)	6,959	7,112
Overnight Capital Cost	5,995	6,062
WACC (real) (%)	6.2%	3.2%
Interest rate (nominal) (%)	8.0%	5.0%
Construction interest rate (%)	8.0%	3.5%
Net Capacity Factor (%)	90.1%	92.5%
RoE Rate (nominal)(%)	13.0%	10.0%
Tax Rate (%)	40.0%	25.7%
Debt Fraction (%)	50.0%	67.0%

NREL use of EIA nuclear data reflect perspectives on the AP1000

Adding to some of the cost irregularities and confusion across energy sources, specifically as it relates to wind and solar cited in the LCOE is that the entire cost of generation is not disclosed. For example In December 2017, a competitive electricity-supply auction in Alberta yielded the lowest-ever rate paid for wind energy in the country, a weighted average of $37 per megawatt hour."[4]

However, this contracted price only tells part of the story. Almost all wind generators are dependent on one or more of the following:

- PPAs with private customers, the pricing terms of most of which remain undisclosed.
- PPAs with provincial governments.
- Carbon offset credits through the TIER program: https://www.alberta.ca/technology-innovation-and-emissions-reduction-engagement.aspx#jumplinks-0.
- Electricity and Renewable Energy Credits, purchased by the federal government under recently announced RFPs

4 Canadian Wind Energy Association https://canwea.ca/wind-facts/a_ordable-power/.

The true issue with these costs is some is hidden in the PPAs, while what is totally unaccounted for is the backup generation primarily peaking gas that is necessary for when intermittent renewables are not able to provide the needed power. This is due to the primary challenge with intermittent sources that when wind/solar are in high supply demand is low and the exact opposite is true when demand is high wind /solar are in low supply.

Therefore the true cost of intermittent supply must include:

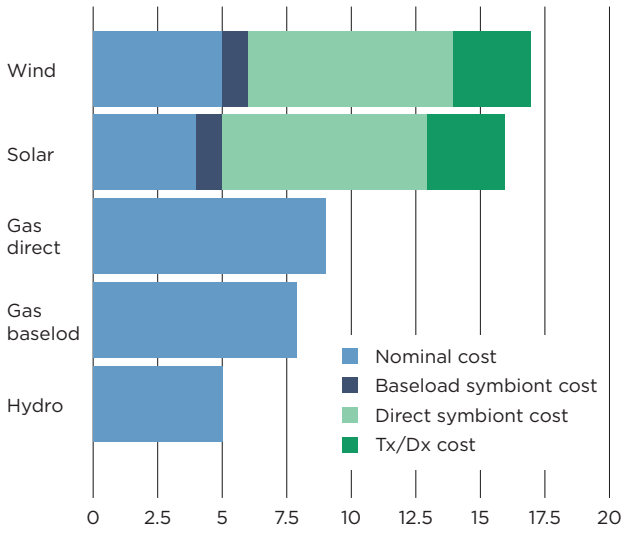
- The nominal cost of wind/ solar (often cited as the full cost incorrectly)
- The cost of the bottom-baseload-layer of supply in the system,
- The cost of the synchronous "following" supply (coal in Alberta, ramping/peaking hydro in Ontario, combined cycle gas in Texas and California, "dual fuel"-gas or oil-in New York); and
- The cost of connection to the grid: each wind farm requires dedicated transmission

This means: **cost of wind = nominal cost of wind + cost of synchronous supply (gas) + baseload symbiont cost + tx/dx cost for unique connection.**

An example for Ontario is shown below in Figure 2 which demonstrates that the true cost of wind and solar is more like $20 cents a Kwh on the low end not factoring in carbon tax charges on coal or gas.

Figure 2

Illustrative Example from Ontario — System cost of electricity by generation type: Fossil provinces (cents/kWh)



The economic and health benefits and highly skilled jobs created by nuclear are unparalleled

The nuclear energy sector supports 76,000 of Canada's highest-skilled and best-paying trades jobs, and nearly 500 companies nationwide which form a robust nuclear supply chain. Bruce Power alone supports 22,000+ direct and indirect jobs and generates between $9-11 billion in economic impact.

We announced a plan last summer to contribute to a 'Made in Canada' economic recovery, investing $3 billion over the next 18 months through the company's Life-Extension Program, isotope development, and asset optimization strategy.

Supporting the clean energy technology at Bruce Power also has the added benefit of furthering our world-leading capability to produce life-saving medical isotopes. The federal government can ensure this opportunity is effectively captured by making the right investments in the burgeoning domestic medical isotope ecosystem that exists across the country today.

The benefits of leading in this global market are wide-ranging. Canada – and importantly the First Nations partners that are key to this ecosystem — will contribute to global health by being a leading supplier to the world of both novel medical isotopes and life-saving cancer therapeutics we produce here at home.

Demand for isotopes and the treatments derived from them far outstrip supply. It's estimated the global medical isotope market is valued at US$6B with potential to grow to between US$14-30B by 2030.

Leading in this market will grow our innovation economy as we capture the benefits of made-in-Canada IP, establish start-ups, scale-ups and spin-offs, and attract foreign investment.

Canada already has the necessary high-value infrastructure and expertise to support and grow our medical isotope ecosystem. We have power reactors that produce medical isotopes at scale, research reactors and cyclotrons that produce novel isotopes, and the commercialization value chain that can take ideas to market. Additionally, the ecosystem includes leading research universities and hospitals who deliver the basic research and clinical trials necessary to further advance Canada's medical isotope ecosystem.

The ecosystem in Canada exists from coast-to-coast and includes the Saugeen Ojibway Nation, who are working in close partnership with Bruce Power on the production and marketing of medical isotopes; TRIUMF, Canada's particle accelerator; McMaster University, home to Canada's largest research reactor; and the Centre for Probe Development and Commercialization, who are ensuring the most advanced imaging agents and radiotherapeutics are brought to market.

What's needed today is continued support and investment in Canada's medical isotope ecosystem from the federal government to ensure that this infrastructure, and the partnerships that exist presently, can be leveraged to maximum benefit, and unlock growth potential.

Four of Bruce Power's reactors already produce Cobalt-60, an isotope which helps to sterilize 40 per cent of the world's medical devices and treat complex forms of cancer — including brain tumours. Bruce Power harvested enough Cobalt-60 in 2020 to sterilize 24 billion medical gloves and swabs as the global health community fights COVID-19.

In 2020, the Chiefs of the Saugeen Ojibway Nation (SON) wrote a letter to Prime Minister Trudeau and several ministers regarding the Bruce Power-SON isotope proposal which involves production and marketing of Lutetium-177. The agreement reached in 2019 leverages Bruce Power's isotope project to produce Lutetium-177 starting later this year.

Government contributions will be critical to providing the enhanced economic opportunity that will enable SON to meet key community needs in health and wellness, education, and infrastructure towards building healthier, stronger, more self-sufficient communities.

The active collaboration of a First Nations community in a project of this nature will be historic. It would be a tool of reconciliation in a way that engages a First Nation in securing critical infrastructure key to Canada's economic and strategic strength in this area.

This project directly aligns with a number of public policy priorities for the federal government including reconciliation, Indigenous economic and community development, innovation and building new high-skills jobs in Canada. It also helps to fulfill many of the directives found within the mandate letters of the Minister of Health, the Minister of Innovation, Science and Industry, and the Minister of Indigenous Services.

There are 8,500 people employed in the medical isotope sector across the country, and the Canadian Nuclear Isotope Council (CNIC) last year launched a directory of companies involved in isotope research, development, production and export numbering some 75 members. Bruce Power believes this is a strategic national health and economic priority where we can punch above our weight on the world stage in producing, marketing and exporting life-saving isotopes for domestic and global use.

We look forward to discussing how additional investments can leverage Canada's clean energy infrastructure advantage and strong network of researchers, clinicians, and entrepreneurs, to position our country as a global leader in medical isotope innovation.

Increased electrification necessitates nuclear power

Across Canada provinces will differ greatly on the need for non-emitting supply capacity influenced by both electrification demand but specifically their existing electricity system supply mix.

Several Net Zero carbon emissions studies conclude that Canada's annual electricity demand will significantly increase, from 500 TWh to between 1,250 and 2,000 TWh by 2050, with most scenarios estimating a total electricity demand of around 1,500 TWh.

If we were to meet this challenge using only one power generation type, additional capacities required to add **1,000 TWh*** would translate into:

- 114 1,000 MW-sized large nuclear reactors (i.e. 19 sites the size of Bruce Power)
- 115 1,100 MW-sized large hydro reservoirs similar in capacity to BC Hydro's Site C project
- 380 300 MW small modular reactors
- 20,000 10 MW-sized wind turbines
- 400 GW+ of aggregate solar capacities
    - ****Based on SNC-Lavalin's Engineering Net Zero report

While net-zero does not necessarily mean zero emissions, a fact the federal government has correctly recognized, it is however reasonable to assume in the long run that most emitting assets will need to be retired. In provinces like Alberta, Saskatchewan, Nova Scotia and New Brunswick coal generation must be replaced while in Ontario some of our natural gas fleet will need to be replaced or augmented with carbon capture technologies. The challenge in Ontario is heightened by the fact that we will also have to replace 25% of its existing non-emitting supply due to the retiring of Pickering Nuclear Generation Station and the expiration of some wind and solar contracts.

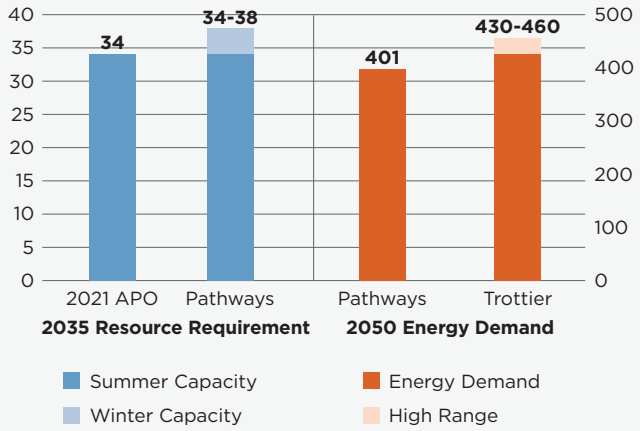
Overall, Canada may see a 76% increase in needed capacity.

Alberta & Saskatchewan collectively have the second greatest need at 31 GW potentially 21 GW of new baseload.

Ontario will see the greatest absolute demand growth in need for non-emitting supplies at 43 GW, potentially 23 GW of new baseload.

Figure 3

Comparative electrification forecasts (2035 GW vs. 2050 TWh)



Enabling the innovation needed to reach Net Zero requires a fair playing field

Recognition of nuclear as green infrastructure is important as we seek to innovate and deploy the next generation of clean energy technology.

Bruce Power is appreciative of measures announced in Budget 2022 to support development of small modular reactors (SMR) and hydrogen technology, the inclusion of nuclear in the new $250 million envelope for clean electricity pre-development and of uranium exploration in a new critical minerals tax credit. We are also excited to explore opportunities that may stem from the new Canada Growth Fund. However, there are even more ways the government can support the nuclear industry and its key role in achieving clean electricity targets, which will be critical given the need to increase clean generation in Canada by 2 to 6 times current levels to reach Net Zero by 2050.

The Tax Rate Reduction for Zero-Emission Technology Manufacturers included in the 2021 Budget proposes a temporary measure "to reduce—by 50 per cent—the general corporate and small business income tax rates for businesses that manufacture zero emission technologies."

Given the national and global greenhouse gas emissions reductions attributed annually to the use of nuclear energy, and the fact that nuclear is a carbon-free electricity source, the exclusion of nuclear technology from the Zero-Emission Technology Manufacturing tax reduction program is an omission from Canada's plan to reach Net-Zero emissions by 2050 and risks our competitiveness in a sector in which we're currently a global leader.

The Government of Canada's climate change policy framework clearly includes nuclear energy in its clean and low-carbon technology definitions, as demonstrated in its recently released Fiscal Economic Updates, Climate Plan, Hydrogen Plan and Small Modular Reactor Action Plan. It's also recognized by the government as a Clean Energy Technology on page 54 of NRCan's 2021-2022 Energy Fact Book.

Extending the Tax Rate Reduction for Zero-Emission Technology Manufacturers to include nuclear applications would therefore be consistent with the federal government's position that nuclear energy is a clean, carbon-free source of electricity.

Inclusion of nuclear technologies in federal tax initiatives is imperative to Canada's ability to meet its climate change commitments and level the competitive playing field for our sector in the global clean energy market. This comes at a time countries around the world are increasingly counting on nuclear power to play a significant role in their decarbonization goals. President Biden has included nuclear in the US pursuit of a 100% clean electricity system by 2035 and in his $2 trillion infrastructure plan. China plans to increase nuclear energy generation by 40% between 2020 and 2025, with an eye to quadrupling its nuclear power capacity over the next four

decades. And the European Union recently recognized nuclear power in its green taxonomy. That leaves Canada as the outlier, risking our standing as a global leader in nuclear energy.

Canada must align its policy course today to enable its world-class nuclear energy sector to achieve the formidable climate targets being set by the world's largest carbon emitters.

We also request the government amend Class 43 and recognize nuclear power as a clean energy generating source, thus making it eligible for ACCA. Under class 43.1 and 43.2, ACCA is currently in place for certain clean energy technologies. However, and most notably, nuclear is not included.

As well, the federal government explicitly excluded nuclear from its initial Green Bond offering, which is in direct opposition to the growing trend to include nuclear in bond offerings and project catalogues in Europe and China. We will look to work with the government on inclusion of nuclear in its future Green Bond offerings and on how we can be leaders in starting international discussions on this subject at the G7 and in other forums. Recognition of nuclear as green infrastructure is important and represents an important opportunity as we seek to innovate and deploy the next generation of clean energy technology.

Bruce Power also recommends the SIF Net Zero Accelerator set aside specific funding to invest in nuclear technology and innovation. The 2021 Budget enhanced funding for this initiative, providing $8 billion over seven years.

In a recent department presentation, Development of Clean Technologies was one of three key areas identified for investment. Specifically, goals stated include "leverage Canada's resources and tech advantage" and "enable decarbonization of large emitters and industrial transformation. Information we've presented here clearly shows the global competitive advantage Canada has in nuclear, and the success nuclear has had in decarbonization with the phase out of coal in Ontario. This would enable the nuclear industry and its supply chain partners to pursue research and develop new innovations such as small modular reactors and support Canada's clean energy transition.

Providing broad support for clean and innovative investments can offer a financial edge to Canadian businesses, while also swaying the relative attractiveness of investment towards low-carbon solutions, including baseload nuclear, SMRs and hydrogen development. It is for this reason Bruce Power Net Zero (BNPZ) Inc. was formed in late 2021. BPNZ is focused on unlocking the potential of other complementary technologies to nuclear including storage, renewables, hydrogen, and electrified transportation to achieve a Net Zero future. Bruce Power Net Zero also operates Huron Wind, a 9MW wind farm located in Tiverton. Huron Wind was the first commercial wind farm in Ontario. Bruce Power Net Zero is owned jointly by TC Energy and OMERS.

BPNZ is currently accepting Expressions of Interest (EOI) for new carbon-reduction projects. Sharing the clean energy benefits of nuclear power with local communities and other economic sectors is the impetus behind BPNZ and the EOI provides a way for the nuclear industry to collaborate with governments, project developers, renewable generation owners, and community members on innovative ways to reduce the emissions of carbon dioxide and other greenhouse gases that are driving climate change. To this end, Bruce Power and BPNZ have recently announced partnerships with General Fusion and Energy Storage Canada, and are working to support TC Energy's proposed pumped hydro storage project near Meaford, Ontario.

As well, Bruce Power has launched a feasibility study in conjunction with Ontario's Low-Carbon Hydrogen Strategy to explore potential production opportunities from our site, with completion expected early in 2023.

All of this demonstrates why continued exclusion of nuclear technology from certain federal measures that support clean energy technology is incongruent with the scientific consensus that there is no credible path to Net-Zero emissions by 2050 without nuclear energy. Doing so leaves an uneven playing field when other forms of generation-related equipment including hydro, wind, solar, geothermal, biomass and tidal are eligible for these same measures. We acknowledge and thank the federal government for recognizing its role in supporting all clean technologies in the fight against climate change and look forward to its continued leadership in this rapidly evolving space.

Conclusion

Bruce Power supports the goal of a clean electricity grid in Canada by 2035, but any Clean Energy Standard (CES) must recognize the important role of nuclear energy in reaching it, and support and enable the incredible innovation our sector is capable of in helping decarbonize our country. It must use accurate and proper data when comparing clean energy technologies to optimize emissions reduction benefits. And it must follow the science, which is clear — Net Zero needs nuclear.

Appendix A – Responses to Discussion Paper Key Questions

General

Should interim standards be included in the period before 2035?

Canada's 2030 reduction target and commitment to achieve net zero GHG emissions by 2050 necessitates a radical transformation in the way in which the country produces, transports, and consumes energy.

Government must accompany its climate ambitions with an unwavering commitment to economic growth. Growth, economic prosperity, and corporate success are all essential to produce the financial and technical resources the country will need to invest in climate solutions.

The federal and provincial governments must work more closely together to provide business with long-term policy stability and clarity. Public policy should incent widespread investment in existing and emerging technologies and attract the capital necessary to support large-scale deployment and commercialization of promising technologies.

We have only 13 years to meet the ambitious 2035 targets. Most significant emissions reductions projects will take several years to plan, construct, and put into action, in addition to the prospect of a multi-year regulatory approval process. Therefore the pathway to 2035 necessitates incremental standards .

How should the CES regulation be designed to minimize stranded capital assets and associated rate impacts?

The Canadian Government has committed to significant GHG reduction targets. At the recent Climate Leader's Summit, Prime Minister Justin Trudeau committed Canada to a 40% - 45% reduction of 2005 levels by 2030. The path forward to achieving those targets must include a significant increase in clean energy including nuclear generated electricity and hydrogen.

Energy planning is undoubtedly a complex process. Climate change, air pollution, economic development, technological change, and political mandates are all just a few of the considerations necessary with energy system being at the heart of many of these issues. Weighing these variables with affordability must be addressed in modern energy planning. Affordability is, and always should be, the paramount consideration in energy planning.

The key is a holistic approach to energy planning, one that ensures the pillars of reliability, affordability and stability are maintained while accounting for modern challenges and objectives. Energy, economic development and climate policy can no longer be viewed as separate planning processes aimed at picking winning and losing companies or technologies. This approach has only contributed to increased costs for customers, increased debt load and fragmented system reliability. System planning now needs to be a more inclusive process than ever before.

What would be an acceptable end-point emissions intensity standard to achieve the objective of the CES?

Net- zero does not necessarily mean zero emissions, and will require a careful balancing of that requires a holistic approach. For more information please refer to the answer in Question 2.

Compliance Flexibilities

Under what conditions should offset credits available through federal, provincial/territorial, or other programs be permitted?

With emissions from the electricity sector in Ontario projected to increase, a broad spectrum of measures — including supporting the existing or adding additional zero-carbon capacity and carbon offset credits — are necessary if Canada and Ontario are to realistically achieve its decarbonization goals.

To meet the demand from increased electrification, nuclear power will play a critical role, both in providing critical supply to decarbonize other sectors of the economy and in helping to avoid emissions from other GHG-emitting resources.

Given that these investments will generate additional clean energy and are forecast to result in avoided emissions from natural gas generation, it is Bruce Power's opinion that the case is strong for incremental/additional nuclear output, as well as other clean energy that will displace emissions, to be considered eligible to register for GHG offsets or clean energy credits within the appropriate offset or credit program.

The credit eligibility of incremental/additional nuclear output and other clean energy resources requires a due diligence process that will validate the avoided emissions and determine credit additionality and the eligibility of resources, enabling the development a pathway for future clean energy resources to be adapted into the process.

Alignment with carbon pricing

How might the treatment of electricity under the OBPS have to change to align with the CES?

Bruce Power also supports the development of a federal offset system; however, the system must be designed in a way that values credible and verifiable GHG emissions reductions wherever they are realized. Specifically, nuclear power should be included as an eligible offset or clean energy credit generating activity to accelerate the transition to non-emitting energy sources.

Canada will need to harness all its electricity assets to have a realistic hope of meeting its ambitious targets. The full value of non-emitting power should be recognized within this policy framework including new, or incremental output through optimization being eligible to create offset credits. While this recognition is not in place today, due to the design of the OBPS, providing nuclear energy with the ability to generate offset or clean energy credits where emissions are lowered beyond the business-as-usual scenario would go a long way in helping to achieve the decarbonization of our economy.

The OBPS should be designed in such a way values both the supply side and demand side of electrification.

Supply side

- System does not currently provide credits to clean energy generators.
- Government must develop alternative ways by which to value non-emitting electricity.

Demand side

- Establishing meaningfully stringent output based standards for sectors under the OBPS will incent companies to find lower-emitting options. These options exist. EVs, heat pumps, electrified industrial processes – the Canadian economy can be powered by plentiful non-emitting electricity generation.

Sending a carbon pricing signal

- Canada must send the message to power producers that natural gas is a bridge fuel to get off coal. But the length of the bridge must be defined. Market participants want certainty.

Treatment of natural gas generation

What is the role of natural gas in a net-zero electricity sector before 2035? Post-2035?

In 2021 the IESO in Ontario undertook a study to examine the possibility of phasing-out natural gas generation by 2030. This study looks at what would be required, the associated costs and what impact it would have on the future of Ontario's electricity system.

While this study demonstrates the complexity of change that would be required to completely phase-out natural gas, it also reveals possibilities. Emerging technologies like battery storage, distributed energy sources and demand response programs are rapidly developing to meet Ontario's long-term energy needs.

The report revealed that natural gas will need to continue to play a role in Ontario's electricity system because completely phasing out natural gas generation by 2030 would lead to blackouts and the system changes that would be required would increase residential electricity bills by 60 per cent. However, While the removal of gas from the grid is not possible by 2030, it can be accomplished in a way that will ensure reliability, given an adequate amount of time for the sector to plan and prepare. Properly assessing this kind of work will be critical — and can't be done in isolation.

Full Link: Decarbonization and Ontario's Electricity System

If natural gas has an electricity system-support role post-2035, what are the expected impacts on the rollout of emerging system support technologies such as energy storage?

If natural gas has a role in generation post-2035, what are the expected impacts on the penetration of nascent generation technologies like SMRs, geothermal electricity, etc.?

Pairing the clean electricity produced by nuclear power with energy storage capacity like the proposed Ontario Pumped Storage project, or through increased EV proliferation and overnight charging being discussed as part of this consultation, will help lower greenhouse gas emissions while ensuring a dependable source of electricity.

Energy storage technologies are in themselves non-emitting—they simply store electricity generated elsewhere and optimally from non-emitting sources and provide it when needed. But when coupled to an already largely clean

electricity system such as Ontario's, they have the potential to reduce the overall carbon footprint by storing clean, emission-free electricity when available and displacing the need to use natural gas fired generation during peak demand periods.

Incentivized charging at "off peak times" 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.

Other Questions

What additional investments are anticipated to be necessary to achieve NZ2035 to help ensure affordability for consumers?

Recognition of nuclear as green infrastructure is important as we seek to innovate and deploy the next generation of clean energy technology.

The Tax Rate Reduction for Zero-Emission Technology Manufacturers included in the 2021 Budget proposes a temporary measure "to reduce—by 50 per cent—the general corporate and small business income tax rates for businesses that manufacture zero emission technologies." Extending the Tax Rate Reduction for Zero-Emission Technology Manufacturers to include nuclear applications would therefore be consistent with the federal government's position that nuclear energy is a clean, carbon-free source of electricity.

We would also recommend government amend Class 43 and recognize nuclear power as a clean energy generating source, thus making it eligible for ACCA.

Under class 43.1 and 43.2, ACCA is currently in place for certain clean energy technologies. However, and most notably, nuclear is not included. As the federal government looks to implement its own Green Bonds, recognition of nuclear as green infrastructure or at least clean non-emitting is important and represents an important opportunity as we seek to innovate and deploy the next generation of clean energy technology.

Bruce Power also recommends the SIF Net Zero Accelerator set aside specific funding to invest in nuclear technology and innovation. The 2021 Budget enhanced funding for this initiative, providing $8 billion over seven years.

What role could existing and expanded energy efficiency programming play in helping to meet new demand as they transition towards net-zero 2035? What are the constraints for additional efficiency measures? Technological? Policy? Other?

Long-term planning requires assumptions about future demand, supply and resource costs. Projecting what electricity demand will be is no easy task. Nor is understanding the pace and direction of innovation or knowing what external challenges or opportunities may be presented by domestic or international policy changes. However, what we can plan for is ensuring that our frameworks and models are flexible by also placing consideration for other societal needs like medical isotopes or alternative fuels as part of the decision making process. This will enable a more diverse/inclusive look at sector and societal needs. This guarantees that Ontario can respond to changing market conditions, allowing the province to balance electricity demand and supply effectively.

Fundamentally, the government needs to create long-term policy that is flexible, but also provides the clarity and consistency needed to create private sector confidence to invest the considerable sums of capital that are necessary to realize innovation. Policy stability can be entrenched in energy planning to provide the long-term time horizon needed to create the environment that enables technological innovation.