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Via email: P2D.Consultation@ontario.ca

Re: IESO Pathways to Decarbonization Study

OPG welcomes this opportunity to respond to the IESO's Pathways to Decarbonization Study ("**P2D**"), and we look forward to supporting the province as it undertakes the most consequential energy transformation in a century.

As Ontario's largest clean energy generator, with one of the world's most diverse electricity portfolios, OPG is also an energy industry leader. We are advancing the development and innovation of new technologies like advanced nuclear, hydrogen, and storage. Through our skilled and dedicated workforce, we have a 100-year history of safe operations and project development; including successful equity partnerships with Indigenous communities. By closing our coal stations, we achieved one of the largest climate change-specific actions globally. Today, Ontario's grid is extremely low emitting, primarily powered by hydroelectric and nuclear sources.

OPG acknowledges that publishing P2D significantly advanced dialogue around the opportunities and challenges that Ontario faces in addressing future electricity system needs. OPG is generally aligned with P2D scenarios, identified risk mitigation actions and overall conclusions, including with the following themes:

- **Urgency**: Meeting the challenges of decarbonizing Ontario's electricity system, while protecting reliability, and at a minimum doubling system capacity by 2050, requires urgent action, while in parallel, developing an integrated supply and transmission system plan. This means proceeding immediately with near-ready clean energy projects and taking action to preserve real-estate sites for long-term supply options while commencing consultation, environmental and technical assessments for long-lead projects such as new nuclear generation. Advancing work now is important to enable long-lead projects such as nuclear and hydroelectric generation that will continue to form the backbone for Ontario's clean electricity system.

- **Clarity**: Timely, clear, and transparent policy outcomes are needed for the electricity sector, reflected in an integrated electricity system plan. This will drive alignment across adjacent ministries and help to ensure Ontario's secure energy future with "Made-in-Ontario, for Ontario" solutions. Policy certainty is needed to enable expedient development of long-lead assets, including accelerating procurements, aligning education, and training programs, attracting workers, building vendor capacity, securing capital, and streamlining overall regulatory review and approval processes.

- **Integration:** The entire electrical system must undergo fundamental growth to preserve grid reliability to support net-zero goals and economy-wide decarbonization in Ontario. Planning for this growth must be integrated to consider coordination between fuel types, optimal use of large-scale generation sites, transmission corridor upgrades and distribution level system needs.

- **Targeted Emission Reduction:** Ontario enjoys one of the lowest-emitting electricity sectors of any jurisdiction in the world, representing two to three per cent of the province's total emissions on an annual basis. This clean system should be leveraged to enable the decarbonization of other economic sectors. Targeting a net zero-emitting electricity sector will be difficult and expensive until new technologies that can replace natural gas become available. Conversely, permitting a relatively small amount of electricity sector

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emissions will enable a significant net economy-wide emission reduction e.g., transportation sector, industrial sector, buildings etc.

- **Affordability:** Costs must be carefully managed when further decarbonizing Ontario's growing electrical system to ensure that the total energy costs remain affordable for all customer classes, with particular focus on low-income customers. These total energy costs should remain competitive with neighbouring jurisdictions for Ontario to maintain its economic growth potential. In addition to the cost of electricity, affordability measures should consider other energy costs impacted by this transition, including home heating and transportation, to determine net impact.

- **Engagement and Partnerships:** Community and Indigenous engagement and partnerships will help enable transformation. Transparent and inclusive conversations on siting and land use need to start now and take place on an ongoing basis over the coming decades. A focus on Indigenous participation in new developments is imperative and would also aid to enhance energy equality in Northern Ontario, and enable the build-out of Northern Ontario, including Ontario's Critical Mineral Strategy e.g., Ring of Fire.

OPG appreciates the opportunity to provide input on the Environmental Registry (ERO #019-6647) posting of key questions regarding P2D's "no-regret" recommendations, and respectfully submits the following responses to the Ministry of Energy for its consideration:

1. **What are your thoughts on the appropriate regulatory requirements to achieve accelerated infrastructure build-out? Do you have specific ideas on how to streamline these processes?**

   There are three key issues to be addressed with respect to regulatory requirements:

   1. Streamlining environmental and regulatory approval, permitting and oversight processes is needed. Recognizing the long-lead times required for the magnitude and scale of development facing the sector, streamlining can help expedite the process involved with electricity system expansion.

   2. Effective planning can significantly reduce overall project timelines and costs, but mechanisms for recovery of these early investments are necessary to get projects moving. The risk of moving too slowly due to a lack of certainty outweighs the relatively small cost to ratepayers required to support the advancement of early planning.

   3. Expanding the mandate of agencies to include principles of climate change mitigation, adaptation, and economic development would enable the agencies to incorporate these considerations more formally in decision making. Additionally, this change for agencies involved with environmental assessments could help to address the urgency theme noted above, including the need to accelerate review and approval timelines to enable a start-now approach.

   To prepare for the anticipated increase in volume of reviews and approvals associated with infrastructure build-out, agencies should expand resources as early as possible to expedite the review and approval of supply and transmission projects. Updating guidelines or "codes of practice" would also provide clarity for project proponents, reduce cycle time, and streamline the permitting process. Simplifying and streamlining the terms of reference and permitting processes will also contribute to the efficient and cost-effective building out of transmission corridors.

   There is an opportunity to seek greater harmonization between federal and provincial assessment requirements, for example moving towards a more coordinated approach on consultation listings, as detailed in question #2 below, Indigenous engagement is important to advance and accelerate infrastructure build-out. Lack of clarity in expectations, along with inconsistencies across legislation and implementing agencies leads to confusion and causes delays in project approvals, which ultimately affects applicants.

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Enabling planning agencies to consider broader economic benefits would allow for a more holistic view of the merits of different projects and would result in better outcomes for the province. This could include the extent to which labour and materials could be sourced in Ontario, as well as the knock-on economic benefits of projects, particularly in Northern Ontario.

2. What are your expectations for early engagement and public or Indigenous consultations regarding the planning and siting of new generation and storage facilities?

OPG believes that community and Indigenous acceptance is important to advance new electricity system developments. Stakeholders and Indigenous communities need to be involved in decisions on how and where new infrastructure is located. This requires providing appropriate and transparent information about the energy sector, characteristics of various technologies and tradeoffs between them.

It is important that this dialogue start now (with appropriate cost recovery mechanisms in place) and take place on an ongoing basis over the coming years. OPG would welcome the opportunity to start early communications through joint public engagement process with the Ministry of Energy, and/or its agencies.

To facilitate open and inclusive dialogue, a greater effort should be made to meet communities in their own areas or territories, particularly in early planning stages. Additionally, an industry coordinated effort to help elevate public awareness of evolving transmission and distribution level changes, challenges, and opportunities (including new clean technologies), could aid in enhancing overall public support for new infrastructure developments. While the primary benefit would be engaging consumers as active participants, a potential secondary benefit could be increased employment interest in the sector, including a focus on the skilled trades required to implement these developments.

OPG sees many opportunities for Indigenous partnerships in the development of new projects, aligned with the commitments outlined in its Reconciliation Action Plan, and is including this as a key consideration for all new development prospects.

3. Do you believe additional investment in clean energy resources should be made in the short term to reduce the energy production of natural gas plants, even if this will increase costs to the electricity system and ratepayers?

Additional investment in clean energy resources should not be made in the short term to reduce the role of natural gas in Ontario's clean electricity system. Electricity provided by natural gas generating stations performs a critical reliability function for the province's electrical grid, providing back-up for unforeseen events. In addition, natural gas supports investments in renewables and other clean energy resources, as it serves an essential load balancing role. If wind or solar production is high in any given hour, gas does not need to run, and if wind or solar production decreases, gas can step in to fill any shortfalls to meet demand. Therefore, the province should focus on investments in clean energy that support overall, long term decarbonization objectives, rather than on short term investments to replace gas.

The IESO should continue to pursue the acquisition of diverse energy resources in accordance with its communicated acquisition targets. Additionally, direction should be given to advance the near-term "no regret" actions set out by the IESO including siting and planning for transmission and large-scale clean energy resources (such as new nuclear, hydroelectric generation, and long duration storage) needed to meet electrification and decarbonization objectives of the 2030s and beyond, with a focus on affordability and cost management as a core objective.

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What are your expectations for the total cost of energy to customers (i.e., electricity and other fuels) as a result of electrification and fuel switching?

To maintain customer confidence and ensure Ontario remains competitive throughout this transition, total energy cost to consumers needs to remain stable, or increase only modestly. This can be attained by focusing on pragmatic solutions, such as allowing some emissions to remain in the electricity sector while electrifying higher emitting economic sectors (transportation, industry and buildings).

Focusing on early and prudent planning and execution (as OPG has demonstrated through its ongoing execution of the Darlington Refurbishment project) will also mitigate costs and maintain public support. As described earlier in OPG's response, this will require mechanisms for early cost recovery. Additional levers include investing in coordination between projects, technology standardization, and application of alternative cost-recovery mechanisms while spreading costs over long-term assets.

4. **Are you concerned with potential cost impacts associated with the investments needed? Do you have any specific ideas on how to reduce costs of new clean electricity infrastructure?**

We are confident that costs to consumers can be managed effectively through the measures described in OPG's response to the previous question. In addition, re-contracting of existing facilities, retaining, and using existing real estate sites designated for electricity generation, developing an integrated plan (including transmission, supply, and distribution - see response to question 8), selection of standardized technology, and the application of alternative cost-recovery mechanisms can all help to mitigate costs to consumers.

Additionally, there is an opportunity to apply several federal programs including loans, grants and the recently announced federal investment tax credits (Clean Electricity Investment Tax Credit and Clean Technology Investment Tax Credit). Projects starting in the near-term will be able to take advantage of these targeted programs, available for limited durations, which have been established to accelerate change across the electricity sector.

5. **Do you have any comments or concerns regarding the development and adoption of hydrogen or other low-carbon fuels for use in electricity generation? What are your thoughts on balancing the need for investments in these emerging technologies and potential cost increases for electricity consumers?**

Atura Power, a wholly owned subsidiary of OPG, is playing a leadership role in establishing the supply of low-carbon hydrogen in Ontario, including building Ontario's flagship green hydrogen production centre in Niagara, which is anticipated to begin production in the second half of 2024. In the near term this critical project will support decarbonizing generation from Halton Hills generating station, while in the longer-term decarbonizing adjacent heavy emitting industries and regional transportation/mobility sectors. Aligned with Ontario's Low-Carbon Hydrogen Strategy, this low-carbon technology has the potential to reduce or offset emissions in a variety of applications, including providing flexibility to meet future seasonal power and reliability needs. Prominent equipment manufacturers, including several Ontario based manufacturers, are motivated to prove out and further develop reliable hydrogen power production at scale. Ontario should seek to expand its production of hydrogen to meet provincial needs, rather than relying on neighbouring jurisdictions for production and import.

Developing Ontario's hydrogen economy presents a tremendous opportunity for growing a new clean technology industry for the province with many benefits, not currently contemplated by P2D. While the P2D

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study considers importing hydrogen produced from other regions across North America, it does not consider Ontario's unique value proposition for domestic hydrogen production. This value is derived from hydrogen technology intellectual property, and human intellectual capital located within Ontario, coupled with the province's high concentration of clean electricity production. These factors provide a particular opportunity for enabling electrolytic hydrogen production to support a burgeoning hydrogen economy. As investment and interest in hydrogen technologies continues to grow across Ontario, technology commercialization will accelerate while simultaneously driving the capital cost curve lower over time. When produced in Ontario, this low-carbon fuel can be introduced on a reliable and dispatchable basis with transportation efficiencies recognized from producing this fuel closer to the end-users. This emerging technology will play a vital role in Ontario's broad decarbonization plans. Developing the fuel production infrastructure and leveraging Ontario inputs to produce the fuel itself will provide a total economic benefit to the province including GPD growth, job creation and raising Ontario's productive capacity.

6. Following the end of the current 2021-2024 energy efficiency framework how could energy efficiency programs be enhanced to help meet electricity system needs and how should this programming be targeted to better address changing system needs as Ontario's demand forecast and electrification levels grow?

Energy efficiency programs are a fundamental aspect of managing Ontario's growing demand for clean electricity. OPG supports targets and incentives for energy efficiency as an important lever to achieve provincial decarbonization objectives. Both the Moratorium and Pathways scenarios in P2D assume the maximum level of demand reduction based on the cost-effective conservation and demand management potential[1] of the 2019 Achievable Potential Study, which is 18 – 24 TWh in 2038, not an insignificant amount. If these conservation targets are not realized, it could push Ontario's long term energy shortfall even deeper, further enhancing the importance of the themes discussed above.

7. A recently released assessment estimates that there may be potential to develop 3,000 to 4,000 MW of new hydroelectric generation capacity in northern Ontario and 1,000 MW in southern Ontario. What are your thoughts on the potential for development of new hydroelectric generation in Ontario by private-, Indigenous- and government-owned developers?

While the capital costs for hydroelectric generation may be higher than nuclear, wind, solar, and natural gas, do you support investing in large scale hydroelectric assets that may operate for over a hundred years?

There is substantial hydroelectric generation potential in northern Ontario, which can be deployed more quickly than contemplated in P2D. This potential is outlined in the report "Made-in-Ontario northern hydroelectric opportunities" prepared by OPG, with input from the Ontario Waterpower Association and Indigenous communities. While historically it has taken 10+ years to plan and build new hydro assets, future developments can be executed more efficiently. For example, when Indigenous communities are given time, space, and capacity to play a leadership role in defining what they would like to see proceed on their traditional territory, projects that are supported from the outset can be collaboratively accelerated. OPG supports early collaboration between Indigenous communities and industry partners.

As mentioned previously, Ontario is facing a period of considerable growth in electricity demand. While pursuing innovation and new clean energy technologies is important for long-term sustainability, it is equally

[1] P2D, page 11

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important to balance this consideration with the understanding that some of these technologies have yet to be proven. Hydroelectric generation is a ready-now technology capable of meeting future needs with a high probability of success, which must continue to form a part of Ontario's diverse energy mix.

Hydroelectric power generating assets have expected lives of 100+ years that contribute to Ontario's circular economy on an ongoing basis. Initially, development and execution bring employment and contracting opportunities, then throughout the life of the assets they continue to contribute to economic growth by leveraging local labour and materials for ongoing operations and maintenance.

Development of northern hydroelectric generation projects, in combination with new transmission, will support the electrification across that portion of the province, supporting development of industry in northern Ontario, including the resource extraction industry. Hydroelectric development in this region will also significantly support Indigenous communities to reach their growth objectives through energy independence and economic benefit on a long-term basis.

8. Transmission will also be required to balance intermittent supply with dispatchable supply (such as natural gas and energy storage) and meet demand in regions with retiring assets.

What steps should be taken to ensure that transmission corridors can be preserved and lines can be built as quickly and cost effectively as possible?

OPG agrees that transmission capacity and adequacy is required to meet the energy transition, both to serve new electricity demand and to connect new electricity generation.

As identified in the opening themes, OPG believes that an integrated plan (including supply, transmission, and distribution requirements) is needed to provide clarity. OPG anticipates that the integrated plan would identify necessary transmission corridors, rights of way and land for generation development required to support Ontario's growing electricity needs, while ensuring the necessary transmission infrastructure is in place and coordinated with the development of large-scale generating assets prior to in-service. In advance of an integrated plan, a positive signal supporting transmission expansion will enable project developers and Indigenous communities to come together, ahead of expansion needs to meaningfully discuss engagement, consultation, and economic participation opportunities. This is particularly valuable when considering transmission reinforcements near to existing generation sites with expansion capability, particularly those serving large load centers. In addition, similar steps should be taken to ensure that real estate sites that are already designated for electricity generation are preserved for that designated use, which will aid in generation development.

Power generation opportunities that are more remote can be enabled by extending the existing grid to the generation project location. As noted in the response to question 7, there is substantial untapped hydro power potential in Ontario's north that could be developed in conjunction with transmission system expansion to bring new sources of clean power to Ontarians. Building out the transmission system into northern Ontario also provides energy security and economic development to northern communities.

Ontario's population will continue to grow, and electrification of the various emitting sectors is expected to continue at a rapid pace. Transmission infrastructure that can support expected load growth in the Greater Toronto Area (GTA) will help to also alleviate needs and bottlenecks in other regions of the province. There is an opportunity to design an upgraded transmission system from the north to the GTA, and across the north of Toronto that will provide clean power from new hydro and other renewable electricity development in the north, as well as from various new non-emitting sources of supply to the west and to the east of the

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GTA. This upgraded transmission back-bone in the center of Ontario should be planned, designed and built-in anticipation of the electricity system of the future.

9. Do you have any additional feedback on the IESO's "no-regret" recommendations?

P2D identifies that resources and labour may be a challenge as jurisdictions around the world are simultaneously decarbonizing over the next 25 years[2]. Canada's workforce will be strained to plan, permit, and construct new projects as each province and territory implements changes to decarbonize and electrify concurrently. Attracting new workers to the energy sector will be imperative to meeting this challenge. Possible mitigating actions to alleviate labour constraints include: enhancing the province's programs on trades skills to remove unnecessary barriers including optimizing supervisors to worker ratios, advancing opportunities to accelerate accreditation and learning, removing any unnecessary remaining hurdles to facilitate movement of trades (regionally, nationally and internationally), and examining industry opportunities to time shift other construction where possible to smooth the workforce demand such that the electricity industry doesn't face unnecessary inefficiencies or delays in construction. OPG supports the province's trades strategy and looks forward to the opportunity to participate in the Ministry of Labour's fall 2023 planned consultation around ways to make it easier for young people to enter a career in trades.

A coordinated and collaborative approach must be pursued when considering the materials and resources required for the energy transition more broadly. Domestic and global supply chains will be strained to meet the coming wave of demand, and early indications of needs will help to mitigate the risk of future bottlenecks. Ontario's integrated plan, assessed in combination with those of other provinces, is one way to provide such a signal. Lead times to establish new supply chains and expand existing ones are long and must be factored into the overall magnitude of change required.

Finally, preserving existing generation sites is vital to meet decarbonization goals. These sites offer advantages like ample space and access to transportation and transmission infrastructure. Building new electricity generation facilities on these designated sites is faster and more cost-effective than attempting to amass new sites of the required scale and proximity. Without these sites, meeting expansion targets becomes extremely challenging. By preserving and facilitating early planning and consultation with site owners, meeting the challenges of decarbonizing Ontario's electricity system, while protecting reliability, and at a minimum doubling system capacity by 2050 are attainable.

Thank you for the opportunity to provide input into the Ministry of Energy's consultation on the Report's "no-regret" recommendations. With OPG's role in decarbonizing Ontario's electricity grid in mind, we respectfully submit this response. **OPG believes that the most effective path to net zero is one where permitting and approval processes are streamlined, the system is affordable, and expansion takes place with reliability and electricity grid resilience in mind.** We look forward to working with the Ministry of Energy in its ongoing assessment and would welcome future discussions to address this in more detail.

[2] P2D page 36

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Best regards,

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OPG at a glance:

- One of North America's largest, most diverse electricity generators
- 18,225 MW generating capacity
- 66 hydroelectric stations
- 2 nuclear stations
- 2 leased nuclear stations (Bruce Power)
- 1 biomass station
- 1 dual-fueled oil and gas station
- 4 combined-cycle gas stations (operated by subsidiary Atura Power)
- 1 solar facility (First Nations partnership)
- 85 US hydroelectric stations (operated by subsidiary Eagle Creek Renewable Energy)
- Undertaking one of Canada's largest clean energy infrastructure projects, the Darlington Nuclear Refurbishment
- Developing Canada's first Small Modular Reactor (SMR)
- Laying groundwork for hydrogen production hubs in Ontario (through subsidiary Atura Power)
- Providing turnkey fleet and transit electrification solutions (through subsidiary PowerOn)
- Growing Ontario's largest EV charging network (Ivy Charging Network, a partnership between OPG and Hydro One)