

Integrated Energy Resource Plan Response (019-9285)

For: Ontario Ministry of Energy and Electrification

Date: 2024/12/13

Overarching Question

- 1. What policy options and actions should the government consider in the integrated energy resource plan to achieve Ontario's vision for meeting growing energy needs, keeping energy affordable and reliable, ensuring customer choice and positioning us to be an energy superpower?**

To achieve Ontario's vision for meeting growing energy needs, keeping energy affordable and reliable, ensuring customer choice, and positioning the province as an energy superpower, the government must adopt a clear and forward-thinking policy approach.

Establish a Comprehensive Energy Transition Roadmap:

The government must develop and communicate a long-term roadmap for Ontario's energy transition. This roadmap must include clear objectives, measurable targets, and integrated cross-sectoral strategies. A well-defined policy direction will provide the necessary certainty for energy planning, investment, and regulatory decision-making, creating a supportive environment for both public and private stakeholders.

Send Clear Policy Signals and Government Commitments:

Outlining specific and future-oriented objectives, such as procurement schedules, will give investors the confidence needed to make significant capital investments in transforming Ontario's energy system.

Prioritization of Key Technologies:

With the expected growth of demand, the investment in nuclear power and intermittent renewable energy sources, and the stated goal of Ontario becoming an energy superpower/exporter, the government should prioritize the deployment of Long Duration Energy Storage (LDES) solutions including Hydrostor's Advanced Compressed Air Energy Storage (A-CAES). LDES is essential for Ontario to effectively integrate renewable energy, providing a reliable solution to store excess power and stabilize the grid during periods of low generation. By enabling the province to reduce reliance on fossil fuels, LDES supports Ontario's transition to a cleaner energy future while ensuring energy security and affordability.

A-CAES is a long-duration energy storage technology utilizing just rock, air, and water which provides a minimum 8+ hours of duration. This storage duration has been identified as critical in both the Long Term 2 (LT2) and Long Lead Time (LLT) procurements identified by the Independent Electricity System Operator (IESO). Over the long life (50+ years) of A-CAES it is cheaper than short-term electrochemical battery solutions and has a smaller and more favourable environmental footprint than Pumped Hydro.

A-CAES is commercially ready with deployments in Hydrostor including Goderich, Ontario and has been a key factor in other jurisdictions' IRPs. Hydrostor's Silver City and Willow Rock Projects, totalling 700 MW of capacity in Australia and California, are expected to achieve financial close in 2025 with significant progress on permitting and development. Both projects have also secured some of the world's largest LDES offtake agreements (e.g., \$1+ billion of value) with world-class utilities.

Utilizing A-CAES, Hydrostor is advancing the development of the Quinte Energy Storage Centre ("Quinte ESC" or "the Project") in Lennox and Addington County in Ontario with a current capacity of 500MW / 4,000+ MWh and with sites identified close to the Lennox Transformer Station for an additional 1,500MW+ in capacity in the future. The project will be a key factor in addressing

Ontario's upcoming electricity constraints including asset retirement, renewable intermittency, and transmission support. Further, thousands of MWs of additional economic deployment potential for A-CAES exist across other regions of the province. Development is driven by commercial pathways in Ontario, rather than any techno-economic limitations, allowing for extensive scalability based on provincial demand.

Ultimately, by prioritizing A-CAES and including it in its future planning reports, Ontario can unlock surplus clean energy capacity for domestic use and export, supporting economic growth and energy trade.

Leverage Ontario's Innovation Ecosystem:

Ontario will become a global leader in energy innovation by supporting and promoting its domestic technology solutions, such as Hydrostor's A-CAES technology. Policies should be introduced that reduce barriers to deploying Ontario-developed solutions, ensuring these innovations thrive in domestic markets, positioning them for growth in international markets. Focus and collaboration with domestic private-sector businesses will foster a path of innovation, deployment, and domestic economic benefits.

Planning for Growth

1. Building on the recommendations of the EETP's final report, what actions should be prioritized to enhance planning across natural gas, electricity, and other fuels?

The EETP emphasizes the need for comprehensive, long-term energy plans that considers the balance between various energy sources. It is invaluable that the Ministry collaborates with stakeholders, through consultations, to fully understand how various energy sources can contribute toward the energy mix, to meet the energy transition goals of the province. In particular, the EETP outlines that there should be a clear directive of what the future role of natural gas in Ontario's energy mix is. Clarity on this policy direction will allow for appropriate cadence of asset deployment and help give innovative solutions, such as A-CAES, ample time to strategize how best to be integrated either alongside traditional peaker plants or as replacements to support intermittent technologies such as nuclear, wind and solar.

Additionally, the report emphasizes strengthening frameworks for local energy planning. This should be done in parallel with further empowering the IESO, within the broad direction established by government, to independently procure electricity resources and lead bulk-system planning (including potential use of interties) and regional electricity system planning.

Further, the panel highlights the importance of Indigenous involvement in energy planning and governance. Energy transition and electrification in Ontario requires full participation of Indigenous communities. Most of the proposed solutions for achieving a clean energy economy rely on using Indigenous lands and resources to build clean and renewable energy infrastructure and extraction projects. The energy transition in Ontario provides an unparalleled opportunity for meaningful inclusion and collaboration with Indigenous communities from the beginning of what is likely to be an incredible transformation with generational effects. Managed well, the transition offers significant opportunities for Indigenous economic participation to advance reconciliation.

2. Building on the recommendations of the EETP's final report, what actions should be prioritized to enhance planning across natural gas, electricity, and other fuels?

If the goal is a transition to clean energy and to meet the expected demand growth, the province should continue to design and implement procurement initiatives for assets that meet the future

needs of the system, including all non-emitting 8+ hour duration assets. An example of this is the Long Lead Time (LLT) procurement identified in the Minister's Directive on December 11th, 2024. The province should design and launch the first LLT procurement by the end of 2025 to ensure that adequate LDES projects can be contracted. Furthermore, the province should ensure that the target capacity (1GW+) for the procurement is large enough such that the procurement attracts large-scale LLT projects which provide the lowest cost to ratepayers. There will be a vital need for long duration assets, such as A-CAES, to manage the expected abundance of clean energy resources such as intermittent renewable assets and nuclear. A regular cadence of procurements, tied to regional and provincial planning processes, will create a predictable environment for private investors. Additionally, incentivizing hybrid projects that combine renewables with storage can optimize capacity and reduce integration challenges.

3. What actions should government consider to promote greater access to electricity and accelerate grid-connections that will support economic growth, connecting new homes, and electrifying transportation and heating?

Ontario should look to improve transmission and distribution infrastructure, including the use of non-wire alternatives (NWA). NWAs and upgrades will alleviate grid congestion, reduce transmission losses, and signal to energy project developers that the province is building modern, accessible infrastructure that can be readily connected to future projects. It has long been discussed that utilities should be appropriately supported and incentivized through the regulatory process to deploy innovative, smart-grid NWA solutions where cost effective. Growing electric vehicle penetration, combined with the charging infrastructure will only make the case for these solutions more strongly. The government should direct the Ontario Energy Board to require Local Distribution Companies (LDC's) to consider NWA solutions prior to advancing traditional (poles and wires) solutions first, and services on the transmission system should be considered. The awarding of an NWA contract for a long duration energy storage asset in New South Wales¹, is an example of innovative thinking system operators are using to meet the needs of clean energy system while maintaining reliability.

4. As the need for new transmission infrastructure continues to grow, what steps can government take to ensure that transmitters have the certainty they require to move forward with development work as soon as possible, while also ensuring that competitive pressures keep costs as low as possible?

As part of the process, the government should look to non-wire alternative solutions to meet transmitter needs.

Section 3.2.2 of the IESO's APO alludes to Ontario's plan to retire the Lennox Generating Station ("GS"), a critical peaking plant in eastern Ontario that currently supplies power during periods of high demand and serves as a backup to Ontario's nuclear fleet. The retirement will lead to a significant capacity shortfall and potential grid reliability challenges in Eastern Ontario, particularly around the Lennox Transformer Station ("TS"), a key bulk transmission hub for the region (Section 5.4.1.2). With growing demand in the region driven by economic and population growth and the expansion of electric vehicle industries, the area will require transmission reinforcements to ensure

¹ <https://www.transgrid.com.au/media-publications/news-articles/preferred-option-for-broken-hill-back-up-electricity-supply-identified/>

adequate supply and support ongoing development. An LDES solution, such as the proposed Quinte ESC can offer Non-Wires Alternatives (NWA) services at Lennox TS by absorbing energy during low-demand periods and dispatching it at peak. This flexibility may reduce or delay the need for costly transmission upgrades while helping to maintain grid stability and providing capacity as demand increases in the region.

In the process, the government should offer clear guidelines, while valuing the ancillary services and benefits when leveraging Non-Wires Alternatives, ensuring timely development while minimizing ratepayer costs. Through the IESO, competitive bidding processes that encourage innovation and cost-efficiency must be prioritized.

5. What policy guidance should the government provide to the Ontario Energy Board (OEB) with respect to the long-term role of natural gas in Ontario's economy and opportunities for low-carbon alternatives in the gas system?

To ensure that Ontario meets its long-term energy transition goals while maintaining its position as an energy superpower, the government should provide guidance to the OEB that it should look to strategies that integrate natural gas with renewable and nuclear assets that can ultimately maintain a responsive, flexible energy system. Long duration energy storage solutions can play a critical role in managing peak demand in the long-term. While natural gas may be vital in the transitory phase, while providing reliable power during periods of renewable intermittency, non-emitting resources that can provide similar value to the grid, including A-CAES, need to be valued and procured ensuring grid stability as other renewable capacities scale up.

6. How can the government best support Indigenous leadership and participation in energy planning and projects?

The EETP provides an excellent summary of how best the government can support Indigenous leadership and participation in the energy planning and projects. This includes seed funding to enable early, meaningful and coordinated engagement, which is a critical lever to break barriers that prevent full Indigenous participation in the energy system. In addition, the government and the sector must create space for Indigenous perspectives throughout energy and technical planning discussions. The government and the sector should support larger scale community capacity-building efforts to enable full Indigenous participation in planning, including technical regional and provincial planning discussions, and enable opportunities to address the cumulative impacts of energy development projects.

Critical capacity-building efforts may include:

- Building community knowledge and awareness of Ontario's energy system, such as the roles and responsibilities of the province, agencies, transmitters, LDCs, etc.
- Tailored training and learning tools for Indigenous leadership to support informed community energy conversations.
- Education and skills development to enable participation in regional and provincial energy planning, including technical planning discussions.
- Learning/funding for designated community members/staff to regularly assess and evaluate community energy needs and interests.

Further, to increase Indigenous participation in future procurement processes, it is recommended that the Province thinks beyond blanket equity ownership targets as the sole indicator of a

successful Indigenous partnership. While equity participation can be a valuable tool, not all communities may be financially positioned to pursue such opportunities, especially when considering projects with longer development timelines (such as new transmission and LDES projects). Further, local Indigenous communities may have unique needs that can be better addressed through a comprehensive Indigenous Participation Plan, including alternative forms of participation such as above-mentioned capacity-building efforts. Blanket targets for Indigenous equity ownership across all projects risks creating a rigid framework that could limit flexibility in meeting both community priorities and long-term project objectives. A more holistic approach to evaluating Indigenous participation will ensure that projects are aligned with the needs of the local communities they impact while also delivering sustained value to Ontario's energy system.

7. How can provincial planning processes be enhanced to support high growth regions, ensure greater coordination between energy resources, and better integrate municipal, distributor and regional planning processes?

Ontario's long-term energy planning must be integrated and collaborative, involving both the government and stakeholders looking to maximize electrification. This approach will provide certainty and predictability, aligning efforts across the energy sector. At the same time, it will prioritize affordability, reliability, and support for the province's prosperity. Once planning has occurred, predictable cadenced procurements need to follow.

Echoing the EETP, it is imperative that the government establishes a roadmap for Ontario's clean energy economy by 2050. It will ensure alignment across the government and stakeholders.

8. What cooperation opportunities exist across other jurisdictions to support energy trade, construction of transmission infrastructure (ex. pipelines and interties), and transportation electrification?

Continued cross-government collaboration will be a key factor for Ontario to meet its electricity goals. Cross-governmental alignment provides greater clarity for consumers and businesses on their energy use decisions and for investors to raise capital and facilitate economic growth and the development of new jobs.

Hydro-Quebec features an extensive network that extends to Maritime provinces, as well as several Northeastern US states that are expected to face growing green electricity demand in the near term. In addition, the two provinces have worked in the past to establish a 600-megawatt (MW) trade agreement between the IESO and Hydro-Quebec that will optimize the use of existing electricity generation capacity in both provinces. With respect to transportation electrification, Hydro-Quebec has spearheaded the Electric Circuit program, a network of charging stations that has exponentially grown from a handful in Quebec, to a full network that serves all of Quebec and Eastern Ontario, with the potential for even more growth across Ontario.

Regarding the US, three of Ontario's largest U.S. trading partners, Michigan, Illinois and New York, have set strong targets for emissions reductions. It is in Ontario's best interest to align with these partner jurisdictions on strategic policy directions related to the clean energy economy. Alignment on strategic objectives creates further opportunities for trade and investment through, for example, the province's Strategic Investment and Procurement Agreements (SIPAs) with U.S. states. Ontario recently strengthened its long-standing economic relationship with Michigan by signing an Economic Cooperation Memorandum of Understanding (MOU). This agreement focuses on priority areas such as EVs and charging stations, underscoring a mutual commitment to advancing the clean energy economy. Building out significant clean energy resources, strengthening the strategic interties and facilitating firm export market agreements will take time to plan and execute. The

Government should be commended for taking a long-term strategic view toward establishing Ontario as an energy superpower. The actions necessary to cement Ontario's export prospects will take years, but future Ontarians will look back at this time with pride that the energy sector and government embarked on a long-term strategic goal that had the potential for major economic gains.

9. What types of technical information and forecasts would best support sector participants and energy consumers as the system is built out for growth and the economy increasingly electrifies?

Crucial that detailed, long-term forecasts for electricity demand are built out. This would include grid congestion and factor in the expected impact of EV/ charging station build out, and continued industry electrification throughout the province (including anticipated rates for fuel switching).

Identification of key upgrades both required and expected in the future to T&D infrastructure, as well as the supply chain requirements including labour and training needed to update. In relation, it is important that the cost analysis outlining the impacts to ratepayers is presented in a transparent manner.

The IESO's ARO outlines growing physical climate risks as a threat to the electricity system. To ensure the ability to maintain infrastructure capability it is imperative that data on grid reliability and resiliency to extreme climate events are monitored and projected.

Becoming an Energy Superpower

1. What opportunities exist to further capitalize on Ontario's leadership and expertise in nuclear technology and nuclear innovation?

Leveraging its expertise in nuclear innovation, the province can develop integrated solutions that combines nuclear technology with long duration energy storage solutions that drive decarbonization goals. Pairing nuclear generation with LDES to store excess energy that can be exported to the US. These efforts can position Ontario as a global leader in clean energy exports.

2. What opportunities should Ontario consider to leverage its position as a clean energy leader?

Ontario can strengthen its position as a global clean energy leader by expanding renewable energy integration and leveraging its strong domestic technology development and developer eco-system. Building a strong provincial market for energy storage, including A-CAES, will attract global investors, drive local innovation, and create high-value jobs in the clean tech sector. By fostering collaboration between government, industry, and research institutions, Ontario can accelerate the development of innovative energy solutions. Supporting local pilot projects and scaling successful models will highlight the province's leadership in the global energy transition. Ultimately, prioritizing Ontario-made technologies and expertise in storage and renewables will ensure a sustainable and competitive energy future.

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