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Ontario Ministry of Energy

SNC-Lavalin has prepared a response, attached, to ERO number 019-6647, requesting feedback on the findings of the Pathways to Decarbonization study, released in December of 2022.

We are pleased to offer our thoughts and advice to the Province of Ontario, and commend the Province for its leadership in developing ways to limit the impacts of climate change, while accommodating the large projected growth of Ontario's industrial, commercial, and residential sectors.

We welcome any further discussion with the Ministry that you may desire, at your convenience.

Sincerely,

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Consultation Questions:

The Ministry of Energy is seeking feedback on the report and, in particular, the IESO's "no-regret" recommendations. We are particularly interested in comments and responses on the following questions:

1. **The IESO's Pathways Study recommends streamlining regulatory, approval and permitting processes, citing that it can take five to 10 years to site new clean generation and transmission infrastructure.**

   What are your thoughts on the appropriate regulatory requirements to achieve accelerated infrastructure buildout? Do you have specific ideas on how to streamline these processes?

   SNC-Lavalin strongly believes that faster approval of large new energy projects is needed, without compromising safety or community support. Ensuring that we achieve a net-zero economy in line with Canada's commitments will require aggressive project selection, investment, and execution schedules.

   There may be opportunities to speed up approvals at existing sites: to expand production, or where one technology is replaced with another technology. Using existing data from existing assessments and consultations can help to expedite approvals. For similar, repeated technology deployments, a generic approach to approvals and engagement should be considered. In addition, when considering environmental impacts, assessments should also compare the impacts of doing nothing (in the sense of overall climate impacts) to the impact of the project in question.

   Timelines should be well defined with specific commitments from the various stakeholders. Describing the timeline as "between 5 to 10 years" is too broad to allow for any certainty in project site selection, planning, and financing. Jurisdictions around the world are experiencing similar challenges, so benchmarking and calibrating current processes with best in class globally will have a beneficial impact on Ontario's regulatory, approval and permitting processes.

2. **The IESO's Pathways Study recommends beginning work on planning and siting for new resources like new long-lived energy storage (e.g., pump storage), nuclear generation and waterpower facilities.**

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

   SNC-Lavalin expects early engagement and frequent consultations as they are important to a more effective siting and planning program. The duty to consult neighboring communities that are Indigenous rights holders or interest holders of potential projects is paramount to a project's success, and provides genuine opportunity to accommodate Indigenous Peoples and forgo any adverse impacts on Aboriginal treaty rights.

   Early engagement, reviewing options, and co-creating solutions with Indigenous communities is very important so that feedback is provided early enough to impact the decision/outcome. If engagement is too late in the siting/planning process, the process of duty to consult is not interpreted as genuine and has serious potential for negative consequences to project timelines and reputation. We also propose that during engagement activities/consultations, we compare proposed solutions against scenarios where nothing is done. This comparison would show that we can provide options/different ways to achieve net-zero with different solutions socialized with communities.

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3. The IESO's Pathways Study shows that natural gas-fired generation will need to continue to play an important role in the system for reliability in the short to medium term. The IESO's assessment shows that most of the projected Ontario demand in 2035 can be met with the build out of non-emitting sources, but some natural gas will still be required to address local needs and provide the services necessary to operate the system reliably.

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? 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?

We strongly believe that meeting the target of a net-zero economy is going to require investment in many different technologies – large nuclear, solar, wind, energy storage, carbon capture, etc. Short term investment to mitigate increasing GHG emissions should be considered to avoid future larger investments (avoiding bringing on new power only to have to later replace and decommission). If there is no choice for short term projects based on technological maturity or siting constraints, ensure that the long term planning includes decommissioning or repurposing as part of the initial evaluation and decision making process.

Investments in new technologies and building projects are in the provincial and national interest; as such it may not be necessary to burden only the ratepayers in an electricity system with these costs. There are already precedents where governments subsidize projects (new or existing) in order to cap the actual cost to industrial and residential customers.

Large CANDU reactors are highly cost competitive on a lifecycle electricity cost comparison and should not burden the rate payers of Ontario. SNC-Lavalin supports increasing the amount of nuclear power generation (beyond the projected amount), as noted in the Pathways report.

We considered as well that increased economic production as a result of direct, indirect, and induced domestic product can be used to offset the cost of the investment in new generation and transmission capacity, as well as preventing increased costs due to long term climate change.

As noted above with respect to timelines for site and project approvals, we believe that this area would also benefit from reviewing other jurisdiction approaches to financing and accelerating new energy projects.

The IESO should also actively collaborate with neighbouring provinces on generation planning exercises to include cross-province exchange of clean power alongside Ontario generated power to ensure an optimal generation mix in all load configurations. Any gas-fired generation planned in the long term should also be quantified in terms of use and in terms of emissions so the proper mitigations can also be planned in advance.

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4. **The IESO's Pathways Study highlights emerging investment needs in new electricity infrastructure due to increasing electricity demand over the outlook of the study. The IESO pathway assessment illustrates a system designed to meet projected demand peaks almost three times the size of today by 2050, at an estimated capital cost of $375 billion to $425 billion, in addition to the current system and committed procurements. Please see supporting materials for illustrative charts on capacity factor and cost by resource type.**

   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?

   The estimated costs are generally covered by future power sales of generation/transmission. Big industrial players require large, reliable sources of baseload power including large datacentres, heavy manufacturers (battery manufacturers, auto manufacturers, steel producers etc.). Many of these companies are concerned about the availability of baseline power where they intend to site their facilities. This presents potential to sign future power purchase agreements at long-term rates that are commensurate with the payback requirements for the capex expenditures. In turn, this can be backed by large financial institutions including pension funds etc. who are interested in ways to invest large sums of money for very long-term paybacks.

   In addition, if projections are accurate, the only way to mitigate the anticipated growth and required investment is to either fail to grow (i.e. investment in industry, population growth, etc. will occur in Ontario) or to face the consequences and significant cost of climate change.

   Without a strong commitment to build, Ontario will be left behind economically as we will not be able to power our industrial, commercial, and population growth. The energy density, zero emission, and excellent safety performance of large CANDU nuclear plants makes them well suited to building near high-density urban and industrial centers, which will also reduce transmission line costs. Building a higher portion of large nuclear, coupled with innovative technologies under development to pair CANDU reactors with hydrogen production (providing for domestic sources to feed the hydrogen peaking plants considered in the model), can further reduce cost of deployment. Building a Canadian Ontario-focused technology will also drive additional GDP and government tax revenues, additionally offsetting the impacts of large spends.

   In addition, we recommend that the IESO further develop its strategy for distributed generation and grid digitalization. Such initiatives are now established and have been implemented around the globe. A comprehensive distributed generation policy will allow reduction of the load on both the transmission and distribution systems. Grid digitalization initiatives will further allow optimization of the load flow both at distribution and at generation level. Connection of car batteries to residential or commercial facilities should be fully integrated within both policies to ensure bi-directional power flow with smart centralized controls. These types of initiatives will also contribute to grid resiliency in the case of extreme weather events as recently observed in Quebec. In a net zero world where society largely relies on electricity for all their needs, grid resiliency should be a central concern.

   The IESO Pathways report already considers hydrogen-powered generating stations for peaking power but does not identify the source of the hydrogen. Reducing the effective overbuild required by renewable energy sources and using excess (when PV and wind assets are active) to produce and store hydrogen as nuclear stations allows a unique opportunity to boot-strap a hydrogen economy – solving the first step of "how to produce". This will make investment in use cases (transportation, power, industry) much easier as the "chicken and the egg" problem will be resolved.

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5. The IESO's Pathways Study recommends that for a zero-emissions grid by 2050, investment and innovation in hydrogen (or other low-carbon fuels) capacity could be required to replace the flexibility that natural gas currently provides the electricity system.

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?

We have noted that the Pathways report does not include energy production to create the hydrogen supply needed to fuel this flexible power generation need. We would recommend considering overbuilding on baseload capacity and, without throttling the electrical output from large nuclear, use the excess power to generate hydrogen, feed battery systems, or pumped hydro, etc. As noted in the previous response, using nuclear to produce hydrogen can increase the viability of private sector investment as there can be a ready supply of hydrogen, useable for development of supply lines & industrial applications.

In addition, government can play a key role inducing investment by providing both funding, and illuminating a path to an emergent technology realized as a commercial project. Investment vehicles such as an Ontario equivalent to the Canadian Infrastructure Bank will jump-start new technologies, once risks are managed and project goals are well defined, the private sector can take over, finalize programs and a build-out.

6. The IESO's Pathways Study recommends greater investment in new non-emitting supply, including energy efficiency programs.

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?

The load increase in Ontario is largely driven by commercial and residential heating, and transportation electrification. Any future energy efficiency program should be driven by targeting in priority specific classes of buildings and facilities and setting clear efficiency standards and expectations to be reached by 2050 or earlier.

We note that the context of these energy efficiency measures is very different from what was implemented in the past. In the context of a wide electrification program (new generation, transmission and distribution) towards Net Zero, we recommend that a clear link be established between any efficiency program and the associated savings in infrastructure buildout over time. For example, given that a power grid is planned and designed to meet the peak load, an initiative that targets load reduction during peak hours will translate into more significant savings on the infrastructure side. Similarly on the generation side, efficiency measures can be studied together with power import/export times to neighbouring provinces/states.

Generally speaking we would recommend the IESO proceed with an energy efficiency study for the province to estimate and detail the nature and timing of the load forecast reductions in proportion to the incentive proposed for each load. This should include the impact on future infrastructure investments and initiatives triggering the highest value per incentive dollar invested should be prioritized.

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7. The IESO's Pathways Study includes a scenario for over 650 MW of new large hydroelectric capacity to meet system needs in 2050.

A recently released assessment estimates that there may be potential to develop 3,000 to 4,000 megawatts of new hydroelectric generation capacity in northern Ontario and 1,000 megawatts 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?

Canada is blessed with abundant water resources and, as with nuclear power, world class hydro technology expertise is available right here within Canada. The future generation mix for Ontario should consist of a healthy combination of hydro and nuclear for base load mixed with intermittent sources (both grid connected and distributed), gas/hydrogen for peaking and backup power. The generation mix should also take into account any economically viable opportunities to export power to support decarbonization elsewhere in Canada and in the USA. The development of Ontario's hydro resources should be central to this long term plan.

8. The IESO's Pathways Study suggest that significant transmission capacity will be needed to help balance intermittent sources of electricity (e.g., wind and solar) and to ensure cost-effective supply can be delivered to meet growing demands from electrification and economic growth.

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?

A complex and detailed 2050 master planning exercise would be required to optimize the siting of new generation facilities in combination with the transmission requirements they would trigger. Several well proven technologies exist to optimize current corridors including reconductoring, the use HVDC technology (or the conversion of AC lines into DC), and others. It should however be noted that while the preservation of current corridors should be prioritized, there is an expectation that such extensive power grid developments will certainly require new corridors.

In terms of building transmission capacity as quickly and cost effectively as possible, the "Early Contractor Involvement" is a key step. This approach has proven beneficial from a schedule and project risk perspective by prequalifying a limited number of contractors and engaging them to produce preliminary engineering in order to develop the final cost and schedule for the interconnection in a collaborative way with the utility. This includes both design and sourcing of raw materials, availability of equipment for construction, etc. One (or more) contractors can then be retained for the implementation phase with better schedule and cost certainty than the traditional EPC lumpsum approach.

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

We believe the no-regrets recommendations are an excellent path to drive an urgent need, and commend the IESO for proposing such clear actions.

We recommend the following additional topics to be considered in order to supplement the no-regrets decisions:

1. Public education (Ontario education curriculum, social media, major news outlets and other ad campaigns) on how electricity systems work and the tie-in to climate action. Very few people understand this connection, the amount of electricity required, or system reliability with mix of baseload + renewables.

2. Survey other jurisdiction's decisions (Europe as an example) to learn and apply best practices for how Ontario can make decisions on energy distribution, and generating capacity.

3. Establishment of a multi-disciplinary team in charge of developing a detailed Net Zero Master Plan for the province.

References:

1. Notice for consultation (due May 14): https://ero.ontario.ca/notice/019-6647

2. Pathways to Decarbonization Report (issued Dec 15 2022): https://www.ieso.ca/-/media/Files/IESO/Document-Library/gas-phase-out/Pathways-to-Decarbonization.ashx

3. Engineering Net Zero – SNC-Lavalin's reports
    a. https://www.snclavalin.com/~/media/Files/S/SNC-Lavalin/download-centre/en/report/net-zero-canada-2030-report.pdf
    b. https://www.snclavalin.com/~/media/Files/S/SNC-Lavalin/download-centre/en/report/canada_enz-technical-report_en.pdf
    c. https://www.engineeringnetzero.com/reports/