Feedback Form

Pathways to Decarbonization – February 24, 2022

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Following the February 24 engagement webinar, the Independent Electricity System Operator (IESO) is seeking feedback from stakeholders on the items discussed during the webinar. The webinar presentation and recording can be accessed from the engagement web page.

Please submit feedback to engagement@ieso.ca by **March 16**. Please attach research studies or other materials for consideration by the IESO to support your submission.

If you wish to provide confidential feedback, please submit as a separate document, marked "Confidential". Otherwise, to promote transparency, feedback that is not marked "Confidential" will be posted on the engagement webpage.

Policy

Topic	Feedback
Are the assumptions indicated reasonable and comprehensive in terms of scale and timing?	1. The forecasted carbon price is reasonable and in line with announced prices out to 2030 in the 2020 Update to Federal Climate Action Plan. However, the carbon price beyond 2030 is currently not available. Enbridge agrees with the assumption that the carbon price will continue past 2030. Nevertheless, continuing the escalation at $15/tCO2e/yr may be a high assumption. 2. It is unclear how the Border Carbon Adjustments will be applied. 3. The Emission Performance Standards (EPS) benchmark for electricity generation currently is fixed at 370 tCO2e/GWh, and we are unaware of any planned reduction in the benchmark. It may, however, be appropriate to assume a declining benchmark is implemented in the future, although it is difficult to know if the rate of decline and dates that the IESO has assumed are appropriate.

Topic	Feedback
Are there other considerations for the IESO?	1. The information provided by the IESO does not indicate the specific policy that supports building heat and other end-use fuel switching assumptions that form the basis of electricity demand. We have provided further discussion below under "General comments". 2. The IESO should include the impact of the federal Clean Fuel Regulation (CFR), which allows credit generation and, therefore, a revenue stream that may lower the cost for the use of renewable natural gas (RNG) and hydrogen as building heat. 3. The IESO should consider aligning hydrogen-related assumptions with the Canadian Federal Hydrogen Strategy. This Hydrogen Strategy calls for 30% of the energy delivered today across the country to be provided by renewable and low carbon hydrogen by 2050, with this number reaching 6% by 2030. This is a major shift in the Canadian energy landscape that requires Federal and Provincial alignment. Therefore, aligning the IESO assumptions with this Strategy will enable its use in harmony with the Federal government. It is important to note that most, if not all, turbine manufacturers (GE/Mitsubishi/Siemens/Hitachi and others) have had systems running on hydrogen for many decades and they are currently developing new, as well as retrofitting, systems for 100% hydrogen use.

Demand

Topic	Feedback
Are the assumptions indicated reasonable and comprehensive in terms of scale and timing?	1. The industrial fossil fuel demand should include both natural gas demand and non-gas fossil fuels demand. 2. It is unclear what reference is being used for the assumptions governing building envelop efficiency improvements. 3. It is unclear how the APS is being updated and what new measures or circumstances are being considered in the update, i.e., a shift to a winter electrical peak. 4. It is unclear if the decarbonization of heavy trucks is considered, including how Mega Chargers (not yet developed) might be accommodated on the grid. The IESO should consider how this greater power should be modeled, developed, and deployed in remote areas along the major highways.

Topic	Feedback
Are there other considerations for the IESO?	The APS is being updated for this work. It is not clear what public consultation, if any, is planned for the update. In addition, a few questions to consider include: Will the study consider the resource/supply impact on winter peak electricity demand due to complete electrification of space and hot water heating? And will the study consider hybrid heating (space and hot water) as a cost-effective pathway to reduce GHG emissions?

Resources

Topic	Feedback
Are the assumptions indicated reasonable and comprehensive in terms of scale and timing?	1. Overall, the resource assumptions appear reasonable, though we note that a 20-year life for a solar project is far too short. More reasonable project lifetime assumptions would be 30 years for solar and 35 years for offshore wind. 2. The ongoing future reductions in the cost of wind, solar, offshore wind, and power storage (paired with improved capacity factors) should be factored into any analysis. 3. Enbridge suggests the earliest in-service date for Carbon Capture and Storage is 2030.

Topic	Feedback
Are there additional data sources that we should consider	1. Canada's Energy Future 2021 provides forecasted fuel costs for RNG $15/GJ ($54/MWh), and hydrogen ranging from $10/kg to $1.5/kg ($70 to $10/GJ or $254 to $38/MWh). 2. The 2020 Hydrogen Strategy for Canada also provides a vision for hydrogen production costs that target $1.5 to $3.5/kg by 2050. 3. Additional resources for hydrogen include: Council Decarbonization Pathways series of studies and vision documents; IHS Markit Studies; NREL studies; Transition Accelerator; IEA series of study including "Canada2022", "Net Zero by 2050" and many others on hydrogen; Germany and Australia's hydrogen plus close to another 30 countries strategies; World Hydrogen Leaders, U.S Department of Energy (DOE), Bloomberg, and Ernst & Young (EY) report on the hydrogen economy; and BC, Quebec, and Alberta's hydrogen strategies.
Are there other considerations for the IESO?	1. The gas grid's output is ~3x the electrical grid at peak, with both peaking at opposite seasons winter and summers respectively. It is not clear how the IESO intends to replace the peak demand (about 83 TWh) on the gas grid in the cold months. 2. Additional clarity is being sought related to how a potential Clean Energy Credits (CEC) registry may be incorporated in the analysis, and to what extent it may affect the forecasted cost of renewable power. 3. The IESO should consider the use of carbon-negative sources, such as certain types of hydrogen (hydrogen from biomass as an example) and RNG (agricultural waste). 4. The scenarios chosen in the decarbonization study should consider minimizing cost shocks to the ratepayers.

General Comments/Feedback

Enbridge recognizes that the IESO has been tasked to develop a high-demand scenario, with various scenarios that can achieve a decarbonized electrical grid. The webinar on February 24, 2022, indicated that electricity demand forecast will be developed based on known flagged policies. In the "Assumptions for Feedback" document, it appears that widespread fuel switching from fossil-fuelled equipment to electric-supplied equipment will be assumed for the residential and commercial sector, with no natural gas-fueled equipment in new construction after 2030 and 100% of new space and water heating equipment sales being electric powered after 2035. It is unclear which specific policies have been assumed to derive the IESO's assumptions around the end-use fuel switching for each sector and end-use/sub-sector.

Currently, many of the policies that may drive end-use fuel switching in building and water heating have not yet been promulgated. Therefore, Enbridge believes that these assumptions may be overly aggressive. The 2020 Federal Healthy Environment and A Healthy Economy Strengthened Climate Plan signal the introduction of net-zero energy ready model building codes by 2030. However, there is currently no basis to assume that electricity will be the sole energy type allowed under future building codes. While future changes to building codes will require equipment to be more efficient, this could be met by electric and gas heat pumps or hybrid heating systems which pair an electric heat pump with a gas furnace with smart controls. It is also possible that any future requirements regarding new or existing homes having carbon-free space and water heating could also be met by gas heat pumps or hybrid heating systems that use RNG or hydrogen.

Hybrid heating integrates the electricity and gas systems at the end-use level and can mitigate the effects of the cold temperature on electric heat pump performance leading to a reduction in peak demand versus complete electrification of all space heating. Reducing winter peak demand and having dual fuel systems also provide resiliency to extreme weather events. Additionally, reducing winter peak will lead to lower required installed capacity, which can reduce costs.

As a comparable exercise, Canada's Energy Future 2021 seeks to model energy demand up to 2050 from "evolving policies" and assumes an increased adoption of heat pumps (type not specified) and incorporation of renewable natural gas and hydrogen in the residential and commercial sectors (pg. 36). Enbridge recommends that the IESO considers a more varied end-use equipment mix that includes gas heat pumps and hybrid heating, as well as the use of RNG and hydrogen, which we would be happy to discuss further.

Ontario needs a comprehensive energy plan, with all energy sources and all relevant policy objectives in mind to decarbonize the system at the lowest cost. Gas-fired generation made the transition off coal possible and now plays an integral role in maintaining power system reliability as Ontario refurbishes its nuclear fleet. Natural gas remains the best value for energy dollar at about half the cost of electricity, oil, or propane, with the potential for RNG and hydrogen blending and hybrid heating solutions playing a crucial role in decarbonizing the gas grid and making Ontario's 94% emissions-free electricity systems even cleaner.

Enbridge appreciates the opportunity to provide comments under this consultation and we look forward to future participation in the development of the pathways study.