Feedback Form

Pathways to Decarbonization – February 24, 2022

Feedback Provided by:

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Email: Click or tap here to enter text.

Date: **March 16, 2022**

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?	Click or tap here to enter text.

Topic	Feedback
Are there other considerations for the IESO?	Click or tap here to enter text.

Demand

Topic	Feedback
Are the assumptions indicated reasonable and comprehensive in terms of scale and timing?	Click or tap here to enter text.

Topic	Feedback
Are there other considerations for the IESO?	Click or tap here to enter text.

Resources

Topic	Feedback

Are the assumptions indicated reasonable and comprehensive in terms of scale and timing?	**ONSHORE WIND** The capacity factor high-end range at 52% seems on the high side for Ontario. Can the IESO provide the source of data indicating that 52% is reasonable in the context of Ontario? **RETROFIT – HYDROGEN SCGT** The assumptions document assumes that all performance characteristics will be the same as the underlying unit being retrofitted. However, • Maintenance intervals may increase for CCGTs with H2 co-firing as hot section gas path parts may degrade quicker and require more frequent inspection/repair/replacement (Please see page 9/10 of the ETN gas turbine article); • Increased hydrogen cofiring can increase NOx emissions such that a unit derate is required, which may impact MLP (please see page 5/6 of the MHI Co-Firing document and page 9 of the ETN gas turbine article) Atura Power agrees with the technology readiness level (TRL) of 8, however, that would apply up to a certain point (i.e. 30%). Anything beyond that, the TRL would be much lower as it is still in the R&D phase. (Please see page 7 of the ETN gas turbine article). Atura notes that the assumptions table is missing CAPEX, OM&A and Fuel Costs. Can the IESO confirm what costs the IESO will be assigning for each (CAPEX, OM&A, and fuel) in its model? **RETROFIT – NG WITH CCS** The assumptions document assumes that all performance characteristics will be the same as the underlying unit being retrofitted. However, it is our understanding that by retrofitting a natural gas-fired generation facility to CCS, the newly retrofitted facility's capacity will be reduced. Page 4 of the Global CCS Institute's CO2 Capture Technologies Report: Post Combustion Capture dated January 2012, suggests that the retrofit results in a parasitic load of approximately 20-30%. However, given technological advancements since that time, it may be more appropriate to now use 20-25%. The CAPEX range looks to be appropriate, however, the variable and fixed OM&A would likely be closer to the lower end of the range shown in the assumptions document. Please find attached the IEA's special report on carbon capture utilization and storage in clean energy transitions. Pages 102 through 104, in particular contain graphs showing indicative costs.

	FIRM IMPORTS A reliance of up to 3,300 MW of firm imports from Quebec will require transmission upgrades. Can the IESO confirm what the cost of the expansion of the transmission system will be to accommodate the maximum volume of firm MW from Quebec? The current assumptions document does not have an annual capacity cost associated with firm imports. Can the IESO confirm what capacity cost it will be assigning to firm imports?

Topic	**Feedback**
Are there additional data sources that we should consider	
Are there other considerations for the IESO?	Click or tap here to enter text.

General Comments/Feedback

Atura Power would like to thank the IESO for the opportunity to comment on the modelling assumptions and generally on this important topic.

It is important to underscore the critical role that gas fired generation (GFG) currently plays in maintaining reliability of the electricity system. Currently, GFG can provide continuous energy when needed as it is generally available year-round under all weather conditions, once online it is flexible and can be ramped up or down quickly to follow load or meet unexpected changes of the availability of other generators and lastly, GFG facilities also provide other reliability services, such as those that help maintain and stabilize voltage and frequency on the grid[1]. As acknowledged in the IESO's October 7, 2021, Decarbonization and Ontario's Electricity System report, currently there is no like-for-like replacement supply that can offer similar operating characteristics of gas generation. As such, these assets should be relied upon until the end of their useful life or until such time that there is a suitable, proven and cost-effective technology that provides the same flexible characteristics to the system that gas-fired generation provides today.

Furthermore, leveraging Ontario's reliable, low-cost, low-emitting electricity is essential to decarbonization, and GFG will play a key role. GFGs are able to respond relatively quickly to meet demand, providing much needed flexibility to the system and this will be important going forward as more intermittent, cleaner generation is added to Ontario's supply mix. In this respect Ontario is fortunate compared to many other jurisdictions and rather than narrowly focus our efforts, Ontario should leverage the tools it has in order to more globally drive down emissions. Therefore, the IESO should model the effects of leveraging Ontario's low-cost and low emitting electricity to decarbonize Ontario's economy more broadly as such a scenario may prove that maintaining and

[1] IESO Report: Decarbonization and Ontario's Electricity System: Assessing the impacts of phasing out natura gas generation by 2030. October 7, 2021, Page 9

leveraging GFG assets would have a net benefit to driving down overall emissions in Ontario while maintaining a reliable and cost-effective electricity grid.

Lastly, given the tight timelines and consequently the limited opportunities for feedback, it would be beneficial if the IESO could develop a workplan to share with stakeholders, which includes a table of contents of the report. This information would provide stakeholders an additional opportunity to work collaboratively with the IESO in shaping the report.