Feedback Form

Pathways to Decarbonization – February 24, 2022

Feedback Provided by:

Name: Martin Green, PhD

Title:

Organization:

Email: [redacted]

Date: 2022-03-04

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?	The 2021 APO assumes annual savings of 290 GWh due to the Canada Homes Grant Program. This seems excessive since substantial grant funds will be used for electrification. The electrical demand may actually increase instead of decreasing.Although Codes and Standards for new and renovated buildings will improve overall energy efficiency, they will also result in migration from natural gas to electricity for space and water heating, stoves and clothes dryers, again leading to increased (not decreased) electrical demand.Instead of assumptions, modeling should be based on empirical data or a sample of scenarios whose statistical properties are explicitly given, well-justified and publicly disclosed.

Topic	Feedback
Are there other considerations for the IESO?	The IESO should consider a scenario in which district energy (DE) is implemented at large scale, with 5 percent of new and existing buildings (all sizes) being converted to DE each year, starting in 2028. DE will provide space heating and cooling and domestic hot water. It will include thermal energy storage (TES) for seasonal and shorter terms, recovery of waste heat from many sources, and solar thermal collectors to make up any annual deficit.Although DE will use electricity to power pumps and heat pumps, use of TES will allow use of electricity when it is lowest cost (and with lowest GHG emissions intensity), thereby utilizing otherwise curtailed DER and flattening demand peaks.With DE, the need for and costs of energy retrofits of buildings and conversion to air source heat pumps will be greatly reduced, with savings far exceeding the cost of DE infrastructure.Failure to consider the above DE scenario would deny the public and interested stakeholders the right to know the cost, benefit and risk implications.

Demand

Topic	Feedback
Are the assumptions indicated reasonable and comprehensive in terms of scale and timing?	Instead of clothes dryers with electric resistance heaters, the IESO should assume widespread installation of condensing dryers. See:https://www.applia-europe.eu/images/Library/Review_study_on_tumble_dryers_06-2019.pdf.The 2021 APO Figure 2 - Seasonal Peak Demand does not appear to account for high winter peak demand due to the coefficient of performance of air source heat pumps (ASHPs) dropping to near 1 on very cold days (<~-20 C) and simultaneous use of electric resistance supplementary heat. Large scale deployment of ASHPs as proposed in Toronto's Net Zero Strategy (https://www.toronto.ca/services-payments/water-environment/environmentally-friendly-city-initiatives/transformto/transformto-climate-action-strategy/) would result, by 2040, in at least 5 GW additional peak load for Toronto buildings alone (my estimate) on those very cold days. Whether the Toronto Net Zero Strategy will actually succeed is a separate, but relevant, issue. (See https://www.toronto.ca/legdocs/mmis/2021/ie/comm/communicationfile-141781.pdf.)If ASHPs are installed as assumed but deep energy retrofits do not achieve the assumed average 75 percent energy efficiency improvement then the additional 2040 peak electricity demand for Toronto buildings may exceed 10 GW. Conversion of existing buildings with electric resistance heat to ASHPs will reduce the annual energy consumption, but will not significantly reduce the winter peak demand. Conversely, such conversions are likely to increase the summer peak power and energy demand since many of those buildings would not have previously had air conditioning.With the DE scenario, proposed above, the winter peak demand due to ASHPs would be greatly reduced, but would still be significant when considered province-wide, including rural areas where DE is not feasible.

Topic	Feedback
Are there other considerations for the IESO?	

Resources

Topic	Feedback
Are the assumptions indicated reasonable and comprehensive in terms of scale and timing?	

Topic	Feedback
Are there additional data sources that we should consider	
Are there other considerations for the IESO?	The IESO should determine what portion of peak power and energy demand are to serve heating and cooling needs at temperatures that could instead be directly served by thermal sources at less than 85 C. This should include analysis of the potential for reuse of thermal energy otherwise rejected to the environment and for large scale collection of thermal energy from the earth, air, bodies of water and the sun.Such thermal energy sources should be recognized as valuable demand reduction and demand management resources for the electric power system and their development and use should be economically optimized.

General Comments/Feedback

Risks associated with unforeseen major incidents impacting the ongoing operation of nuclear reactors, both existing and new, should be explicitly acknowledged and credible risk management and contingency plans developed. Examples of such "black swan" events include the pressure tube rupture at Pickering unit 2 in 1983 and the Fukushima disaster due to an earthquake and tidal wave. The former caused major unit outages for years, with financial and corporate implications that persist today. The latter resulted in the political decision by Germany to close all its nuclear power stations. Russian attacks on Ukrainian nuclear power stations indicate that these risks are not small.