2020 NOVA SCOTIA POWER INTEGRATED RESOURCE PLAN

COMMENTS ON THE ASSUMPTIONS AND THE DRAFT ANALYSIS PLAN

Submitted jointly by the Canadian Wind Energy Association (CanWEA) and the Canadian Solar Industries Association (CanSIA), February 14, 2020

About CanWEA and CanSIA

The Canadian Wind Energy Association (CanWEA), is the voice of Canada's wind energy industry, actively promoting the responsible and sustainable growth of wind energy. A national non-profit association, CanWEA is Canada's leading source of information on wind energy's social, economic, health and environmental benefits for Canadian communities and provincial economies. Established in 1984, CanWEA represents the wind energy community — organizations and individuals who are directly involved in the development and application of wind energy technology, products and services

The Canadian Solar Industries Association (CanSIA) is a national trade association that represents the solar energy industry throughout Canada. Since 1992, CanSIA has worked to develop a strong, efficient, ethical and professional Canadian solar energy industry with capacity to provide innovative solar energy solutions and to play a major role in the global transition to a sustainable, clean-energy future.

On November 28th, 2019, the members of both CanSIA and CanWEA voted overwhelmingly to amalgamate the two organizations into a new multi-technology association focused on wind energy, solar energy and energy storage. The new organization will officially launch on July 1, 2020. In the meantime, CanSIA and CanWEA will work hand-in-hand to represent wind, solar and energy storage in Nova Scotia.

Comments

The Canadian Wind Energy Association (CanWEA) and Canadian Solar Industries Association (CanSIA) appreciates the opportunity to present these comments on Nova Scotia Power's (NS Power's) 2020 Integrated Resource Plan (IRP). The comments offered below pertain to the 2020 IRP Draft Analysis Plan and the 2020 IRP Draft Assumptions Set, both of which were discussed in a webinar and meeting held on January 28, 2020. Specifically, we offer comments on four issues: (1) the proposed IRP evaluation criteria; (2) ensuring appropriate assumptions regarding wind and solar integration alternatives; (3) contrasting LCOEs for different resource alternatives with market data and available price benchmarks; and (4) outlining the rationale for the natural gas pricing scenarios.

The 2020 IRP Draft Analysis Plan contained seven proposed evaluation criteria on page 4: (1) minimization of the cumulative present value of annual revenue requirements; (2) magnitude and timing of electricity rates; (3) reliability requirements to ensure supply adequacy; (4) provision of essential grid services for system stability and reliability; (5) plan robustness or ability of plan to withstand plausible changes to assumptions; (6) reduction of greenhouse gas and other emissions; and (7) flexibility. CanWEA and CanSIA are generally supportive of these evaluation criteria. However, we are concerned that risk might not be receiving sufficient attention. We understand that plan robustness will assess risk by evaluating how changes to assumptions affect the performance of other criteria. Nonetheless, economic and price

considerations are reinforced by the consideration of two metrics (i.e., revenue requirements and rates) as are reliability considerations (reliability requirements and essential grid services). We understand that ultimately the critical issue will be the weight given to plan robustness as well as how the sensitivity analyses that will be used to assess plan robustness are applied. It will be important to ensure that these sensitivities reflect the underlying potential variability of these different key assumptions and recognize how the modular nature and extensive experience with respect to some technologies dramatically reduce their underlying risks and potential variability of their costs.

A number of parties participating in the January 28th webinar commented on the importance of utilizing realistic assumptions regarding wind integration strategies and their corresponding costs. There's a considerable body of evidence regarding wind and solar integration best practices. It is essential that NS Power's IRP reflects these best practices given that E3 analysis indicates that onshore wind is the least-cost resource today (E3, NSPI Resource Options Study, p. 15). This includes the application of the full possible range of wind and solar integration strategies including:

(1) ensuring system operations reflect best practices including employing an expanded balancing footprint and joint system operations. CanWEA and CanSIA understand that NS Power and NB Power employ joint system operations. Broader geographic areas facilitate wind and solar integration. While CanWEA recognizes that there is limited geographic diversity offered by the wind regimes in New Brunswick and Nova Scotia, a broader electricity market should assist with wind and solar integration and needs to be recognized in wind and solar integration studies, particularly given the joint dispatch arrangement between NS Power and NB Power.

However, further expansion is possible recognizing the size of the ISO-NE market and the diversity offered by better integration with that market. In addition, sub-hourly scheduling and dispatch such as the Ontario IESO employs would reduce wind and solar integration costs. Finally, ensuring that real-time forecasts of wind and solar energy output reflect best practices and minimize the resulting forecast error and corresponding requirements for regulation reserve also will minimize wind and solar integration costs.

(2) utilizing demand response strategies to facilitate the integration of wind and solar energy. This includes using space and water heating as a form of energy storage with space and water heating devices switching on during high wind output periods or switching off when wind generation drops significantly. NS Power participated in the PowerShift Atlantic project, which used load and wind forecasting and aggregation capabilities to perform near real-time load shifting of commercial and residential loads and provide new ancillary services to the grid.

Electrification of Nova Scotia's space and water heating end-uses as well as its transportation sectors are likely to be fundamental elements of the Province's strategy to achieve net zero GHG emissions by 2050. Configuring these end uses with load control devices can allow them to be part of a demand response framework that can facilitate the integration of renewable energy resources. This can significantly reduce wind and solar integration costs.

(3) curtailing wind and solar generation when they are surplus can also be a part of a least cost wind and solar integration strategy. Furthermore, at higher levels of wind and solar electrolysis of wind and solar

generation that can't be integrated into the NS Power system or for which there isn't sufficient export capacity to produce hydrogen can be another element of a wind and solar integration strategy.

(4) hydro imports offer a relatively high degree of flexibility, particularly those flowing over the Maritime Link which can used to assist with wind and solar integration and has the ability to vary output. As an HVDC interconnection, the Maritime Link is not a synchronous connection to Newfoundland such as would be provided by AC facilities where power flows are instantaneous. However, HVDC stations have very fast acting controls that can respond almost instantly to a contingency, similar to a fast responding generating unit (e.g., a hydro generator). Under the Energy and Capacity Agreement for the Muskrat Falls project, it is expected that 20 MW of regulation capacity will be under automatic generator control at the Nova Scotia end of the Maritime Link. These regulation signals will help off-set any generation/load imbalance in the NS Power system. Such imbalances could be from rapid changes in wind and solar generation or any generation surplus or shortage.

The IRP presents a series of assumptions for technology costs including capital costs and operating costs (both fixed and variable) of a wide range of possible technologies. These assumptions along with financing costs, project useful life and capacity factors will yield LCOEs or "revenue requirement profiles for input into Plexos". Capital or operating cost assumptions on their own can be reasonable, but when combined along with these other assumptions can yield revenue requirement profiles that don't align with reasonable expectations as supported by market data (e.g., RFP results). LCOEs were provided in E3's NSPI Resource Options Study. However, these were presented in figures, making the values more illustrative. CanWEA notes that there are a number of price benchmarks that are available that can be used to assess the reasonableness of these various IRP assumptions on an aggregate basis based on a direct comparison of these LCOEs with the various resource price benchmarks. A more explicit identification of these LCOE values would facilitate such direct comparisons and enhance the transparency of the IRP and ideally confirmation of the reasonableness of these assumptions.

A wide range of natural gas-fired generation technologies are identified as a resource in the IRP. It is important to understand the rationale for natural gas pricing and availability scenarios. The vast majority of Nova Scotia's natural gas supplies are delivered through New England where there are major natural gas pipeline constraints and the inability to build additional natural gas pipelines. These constraints can limit the ability to supply natural gas volumes to new natural gas resources. The Canaport LNG facility is typically available to address peak period requirements. However, its role may change with the proliferation of LNG supply projects in the US. Insights into these questions and what underlies the various natural gas price and supply scenarios could be contribute greater confidence in the reasonableness of IRP results.