

Responses to Small Business Advocate Requests – received via letter May 9, 2014

Comment/Request 1:

Amount of variable generation: The graphs on pages 4 and 11 denote the operational wind integration costs versus installed wind capacity. NSPI indicates throughout the document that 600 MW of variable generation are available and committed. Furthermore, the template on page 5 describes how NPSI will conduct the capital investment cost analysis for projects above 600 MW of variable generation. Please confirm that NSPI will evaluate in the 2014 IRP only additional to 600 MW of variable generation.

Response:

The final level of presently committed wind generation on the system is contingent on how many community feed in tariff (COMFIT) projects eventually materialize. We estimate that the level of wind penetration on NS Power's system, with completion of all presently committed projects, including COMFIT, will be between 550 and 600 MW. In the 2014 IRP we intend to evaluate wind generation additions incremental to the presently committed penetration level.

Comment/Request 2:

NB additional tie: If 600 MW of variable generation exist and are committed for the 2014 IRP, NSPI should evaluate a case where an additional tie to NB is constructed. This additional transmission line will provide mitigated measures for the wind integration and displace the potential need for capital investments of new fast start generators in Nova Scotia. The document describes the need for the additional tie but only at a level above 600 MW of variable generation. SBA believes that the benefits from an additional tie to NB may appear before the 600 MW level.

Response:

The additional New Brunswick 345 kV line is proposed in order to maintain system reliability and stability at wind generation penetration above 600 MW. Collateral benefit of the additional capacity on the New Brunswick tie will extend to the ability to export higher amounts of energy and thus limit potential wind curtailment. Availability of import power from New Brunswick is not expected to increase significantly since the available imports are limited by New Brunswick transmission system issues that are not addressed by the second 345kV line alone. NSPI agrees that the benefits from the additional 345 kV tie to New Brunswick would appear at wind penetration levels of less than 600 MW; however, present analysis suggests that the reliability driver only exists above that penetration level. Cost-benefit analysis for the additional 345 kV tie with New Brunswick has not been completed since the additional line is proposed as a system security measure and not on economic basis.

Comment/Request 3:

Wind-Hydro Synergies: The document does not provide information on potential synergies between hydro and wind in Nova Scotia. The large amount of hydro resources in Nova Scotia and its potential ability to quickly adjust its output to meet system demand can assist in reducing the wear and tear on the thermal units by utilizing hydro before thermal to follow system conditions. Therefore, SBA requests NSPI to consider in its modeling the enhanced ability of hydro resources to follow load in comparison with thermal units.

Response:

NS Power models the full extent of hydro resources to integrate and follow wind generation. It is important to note that our hydro resources are limited and as such are used to help meet peak system demand. For example, Wreck Cove hydro station has capacity of over 210 MW, and it constitutes more than half of NS Power's hydro resources; however, due to water availability, Wreck Cove generating station has average capacity factor of only 17%. Other Hydro systems have significant seasonal operating restrictions related to operating license requirements which will limit or preclude their contribution to wind following. System balancing has always been and will continue to be one of the operational roles for Hydro generation on the NS Power system. At 600 MW of installed wind generation this variable resource will be approximately double the installed capacity of the existing, dispatchable Hydro assets.

Comment/Request 4:

Smart grid integration: There are many new developments that can assist in the integration of variable generation. This may include the deployment of smart meters to facilitate more demand response programs, incentives to promote the installation of stationary and mobile storage facilities, and generation on the distribution system. This document does not provide any information on whether NSPI will consider the initiation of these programs in correlation with the integration costs of the variable generation.

Response:

NS Power presently participates in several smart grid initiatives. While some technologies such as time of use metering and electrical thermal storage are in the commercial stage and have been chosen by customers on NS Power system, other technologies are still in the research and development phase. NS Power has been collaborating with New Brunswick on the Power Shift Atlantic project which calls for direct demand control at various levels of customer participation. Within the Power Shift Atlantic initiative we have signed up approximately 5 MW of customer load as a pilot project, and we are studying the effects of larger customer participation through results gathered from the pilot project and

system simulation. Cost effectiveness of these and other projects will be evaluated once the technologies are ready for commercial deployment. NS Power has included assumptions for demand response in DSM assumptions for the IRP.

Comment/Request 5:

Better wind technology can reduce the wind forecast error: The rapid growth of variable generation technology results in wind and solar actively participating in system reliability along with conventional generation. For example pitch controlled wind turbines can minimize the forecast error by adjusting to the system needs without the additional cost of non-contingency reserves. SBA requests NSPI to model different estimates of reserve requirements that will result in different integration costs. In addition the internal transmission reinforcements, which are described in page 16, will further reduce the impact of variable generation.

Response:

Reserve requirements associated with incremental wind generation additions will correspond to the type of wind turbines being studied. The more basic, and thus less expensive wind turbines, have fewer integration facilitating features and generally require more integration resources from the power system, resulting in higher integration cost. The ability of wind generation to serve the power system with regulation or frequency response comes with trade-offs related to capacity factor.

Comment/Request 6:

Potential changes in unit dispatch in Nova Scotia: The considerable increase of variable generation will increase the system uncertainty that NPSI must factor in its operating decisions. This will initiate enhancements to existing operating criteria, practices and procedures to account for the significant penetration of the new resources, and potentially result in changes in how dispatch is commenced. In practical terms, NSPI may decide to commit additional capacity for ramping capability and ancillary services to ensure the system can withstand significant contingencies (Similar to Must Run). Also the company may initiate restrictions on the range of oscillations on thermal units, which are not designed to operate in such mode, to minimize their potential wear and tear.

Response:

NS Power is aware of the operational challenges associated with integration of large quantities of variable generation. These challenges will be addressed in the IRP and reflected in the cost of integration of variable generation resources.

Comment/Request 7:

32 MW of additional non-spinning 10-minute reserve mentioned on page 12: The document does not provide adequate information on how this number was derived. The 10 minute criterion is related to the procurement of enough 10 minute reserves for a balancing authority to meet its first contingency loss. NSPI must explain how the added variable generation will affect this procurement.

Response:

Please refer to GE Energy Renewable Energy Integration Study, Page 67.

Comment/Request 8:

Graphs on page 4 and 11 cost calculation: There is no information or documentation on how the graphs on pages 4 and 11 were developed. In addition, it is not clear how NSPI will model these costs in the candidate resource plan process.

Response:

The referenced graphs serve as an indicator that integration of incremental variable generation on the existing system becomes significantly higher at the levels of variable generation penetration higher than the presently committed 550-600 MW. Candidate Resource Plans calling for additional amounts of variable generation will also specify additional resources which are required to integrate further quantities of variable generation. Once quantity of additional variable generation, location, timing and integrating resources are known. System simulations will be conducted using the Plexos model to assess the impact of integration resources on operating portion of integration costs and the overall system performance.