

From: Doug Smith
Sent: Friday, May 26, 2017 5:59 PM
To: Hantz Presume
Cc: Josh Castonguay; Cole, Chris; Kerrick Johnson; Ancel, Charlotte
Subject: GMP follow-up questions on Potential SHEI Interface Solutions

Hello Hantz,

GMP appreciates the helpful letter that you sent to Josh Castonguay on May 18th, regarding potential T&D solutions to SHEI export constraints. This type of specific context is needed to support the benefit/cost evaluation of potential solutions, and will help us make progress on that evaluation.

In the meantime, my GMP teammates and I have developed a few follow-up questions related to evaluating potential solutions. The questions below focus mostly on understanding some key points in your letter, and exploring a couple of potential implications that are not directly spelled out in the letter, but could have significant effects on the benefits of the potential solutions. We've grouped them by major themes.

I trust that these questions are helpful, and hope that they are reasonably clear in spite of the fact that I am not a transmission planner! After you have a chance to review them, please let us know if you have any questions. We would also be glad to discuss them with you next week, if that would be helpful.

Thanks again, and wishing you a good weekend,

Douglas C. Smith
Director, Power Supply
Green Mountain Power
802-655-8462

GMP Follow-up Questions Related to Potential Solutions to SHEI Export Constraint

Impacts of Potential Solutions Implemented Together

The May 18th letter contains a table showing ranges of estimated wind generation increases that would be associated with the implementation of each of three potential solutions, and the narrative below notes that the export limit improvements from two or more of the potential solutions would not necessarily be cumulative/additive to each other. It appears to GMP that more than one solution could potentially be warranted in order to cost-effectively address the congestion in this area. In order to support GMP's anticipated benefit/cost screening of combinations of solutions, could VELCO please provide an estimate of the total wind generation increases that would be associated with two combinations of solutions:

- Voltage regulation at Sheffield, combined with reconductoring of the B-20 line;
- Trip of Sheffield, combined with reconductoring of the B-20 line.

Baseline Conditions

Relative to what baseline configuration of the transmission system are the estimates of wind generation increase being compared?

- For example, GMP is aware that significant work was recently performed on the Essex Statcom facility. To what extent will the improvements at the Essex Statcom affect the SHEI interface limit, relative to the prior (pre-outage) configuration?
- If the Essex Statcom improvements will have the effect of increasing or decreasing the SHEI limit and the allowed wind generation in the area, then should GMP consider that change to be additive to the estimated effects of the solutions presented in your letter?

How Wind Generation Affects Reported Flow Over The SHEI Interface

Based on GMP's review of 2016 interface flow data as reported by ISO-NE, it appears that in the determination of actual hourly "flow" over the interface, generation from the KCW and Sheffield wind plants has been counted roughly twice (or, equivalently, that generation from these sources was added to the observed physical flows over the interface).

- Is that a valid observation? If not, we'd like to discuss that with you to help us understand what we're seeing in the data.
- Assuming yes, could you please refresh us: what is the concept behind that? For example, is it that additional generation at the KCW and Sheffield locations tends to be approximately twice as "aggravating" to the grid's post-contingency voltage performance, relative to generation at some of the other locations (e.g., Highgate)?

Looking forward, should we expect that this factor/multiplier for the wind generation will change, if any of the three potential solutions (B-20 reconductor, Sheffield trip, Sheffield voltage regulation) discussed in the VELCO letter were implemented? If yes, what would the direction and approximate magnitude of those changes be?

- For context, this factor as it is presently applied to wind generation appears to be a very important driver of the observed duration and depth of congestion of the SHEI interface. It would therefore be helpful to hear the high-level reasoning on why it would be expected to change (or not).
- If the wind factor can be expected to change, then do the range estimates for wind generation increases presented in your May 18th letter already incorporate such a change, or would it be additive to the estimated effects of the solutions presented in your letter?

B-20 Flows

If the B-20 line is reconducted, and if observed flows out of the SHEI area via the B-20 line increase as a result, how (if at all) will the amount of allowed wind generation within the SHEI area be affected? For example, can reconducting the B-20 line be expected to increase the interface limit? Reduce the observed flows over the interface? Or both? If both effects are expected, then we are wondering if the estimated wind generation increases that you've shared capture both effects.

Impact of Potential Solutions During Alternative Conditions

Your letter notes that the estimates of additional wind generation that could be enabled by the three potential solutions were estimated under all-lines-in conditions, and that the benefits of the tested solutions could be reduced or eliminated under certain outage conditions and other operating conditions. This appears to be an important observation, because substantial portions of the lost generation and lost financial value that GMP has experienced during the past year as a result of the SHEI export limits have occurred during times when the SHEI interface limit was lower than normal (we

expect this was often due to outages of certain transmission system elements). We expect that there are numerous potential outage conditions and operating conditions that may occur, and that it would likely be impractical to test them all. Still, it would be very helpful if VELCO could provide an indication (even directional, rough magnitudes) of whether the potential solutions are likely to increase the potential volumes of wind generation during the types of outage conditions that are most likely to be experienced, because this could be a significant factor in the benefit/cost evaluation of potential solutions.