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May 16, 2018

Craig Kinney
Vermont Electric Cooperative, Inc.
42 Wescom Road
Johnson, VT 05656-9717

Dear Craig:

I have reviewed your request for information dated May 7, 2018, and below you will find VELCO's response.

1a. *Is my understanding that the location of load does matter correct?*

Correct. The locations of both load and generation matter.

1b. *If so, in a situation when curtailments are already occurring, what would be the incremental reduction in the amount of generation that could be exported from the SHEI in MW of a 1 MW reduction in load at School Road, Holland, VT?*

We are assuming that this address is served from the Newport 115/46 kV substation.

Canadian Supply Situation

There are many times when this substation is supplied from a Canadian source and is isolated from the US grid. When it is supplied from Canada, the Newport substation is not considered part of the SHEI area, and load reductions have no effect on the amount of generation that could be exported.

US Supply Situation

However, the situation changes when the Newport 115/46kV substation is served from the US.

At a time when there is no curtailment in the SHEI area, a 1 MW reduction in load will result in a 1 MW load reduction as seen from the 115 kV system, which will translate into a 1 MW increase in generation export from the SHEI because the load reduction is localized to the Newport substation as opposed to being distributed across a wide area.

At a time when there is a curtailment in the SHEI area, a 1 MW load reduction will require ISO-NE to reduce the export level so that it does not exceed the SHEI limit. ISO-NE will accomplish this by further curtailing generation by 1 MW or some other amount depending on the effectiveness and other characteristics of the marginal generator. For example, without regard to price and other factors, if curtailing the marginal generator is twice as positive as the load reduction is negative, the curtailment will only be 0.5 MW.

1c. *Similarly, what would be the incremental reduction in the amount of generation that could be exported from the SHEI in MW of a 1 MW reduction in load at 2021 Route 5, Derby, VT in a situation when curtailments are already occurring?*

Please see the answer to question 1b above.

2. *What is the math ISO-NE uses to determine the amount of incremental curtailments on specific generation technologies due to load reductions in the SHEI?*

ISO-NE uses its market rules to determine which generators to curtail and by what amount. ISO-NE does not publish its exact methodology. However, it would appear that ISO-NE considers such factors as: generation price, the amount of grid support that a generator provides, how severely a generator affects system performance, how easily the generator's output can be changed, the location of the generator with respect to the limiting equipment, and perhaps other factors.

2. *In addition, is the amount of incremental curtailment a function of what is causing the load to be reduced, for example a load reduction due to behind-the-meter solar project vs that due to a behind-the-meter wind generator vs that due to behind-the-meter demand reduction.*

If the size and location of the load reduction are the same, it does not matter whether the load reduction is achieved by energy efficiency, load management, or behind-the-meter generation. However, the pattern (variability, repeatability, frequency and duration) of those load reductions will depend on the source of the load reduction.

For instance, suppose a manufacturing facility with a 1 MW constant demand goes bankrupt, this 1 MW load reduction will occur during all 8760 hours of the year. Similarly, a load reduction from energy efficiency is similar in that it is constant when it occurs, except the reduction will only occur when the more efficient appliance is energized.

By contrast, if the load reduction is caused by behind-the-meter solar PV generation, the amount of load reduction will follow the production curve of the solar PV source, which is generally a bell-shaped curve with the maximum output occurring around noon and the minimum output between sun up and sun down. We should expect solar PV generation to be nonexistent when it is snow covered, and near minimum during cloudy days. Similarly, if the load reduction is caused by behind-the-meter wind generation, the amount of load reduction will vary depending on wind availability, wind speed and direction. Because load reduction patterns vary, what really matters is whether the load reduction is expected to be coincident with the curtailment events. Estimating the extent to which a load reduction will aggravate curtailments can be more or less challenging depending on whether and to what extent the load reduction aligns with the expected curtailment events.

Sincerely,



Hantz Pr sum 
Vermont Electric Power Company