Lyndonville Substation Project

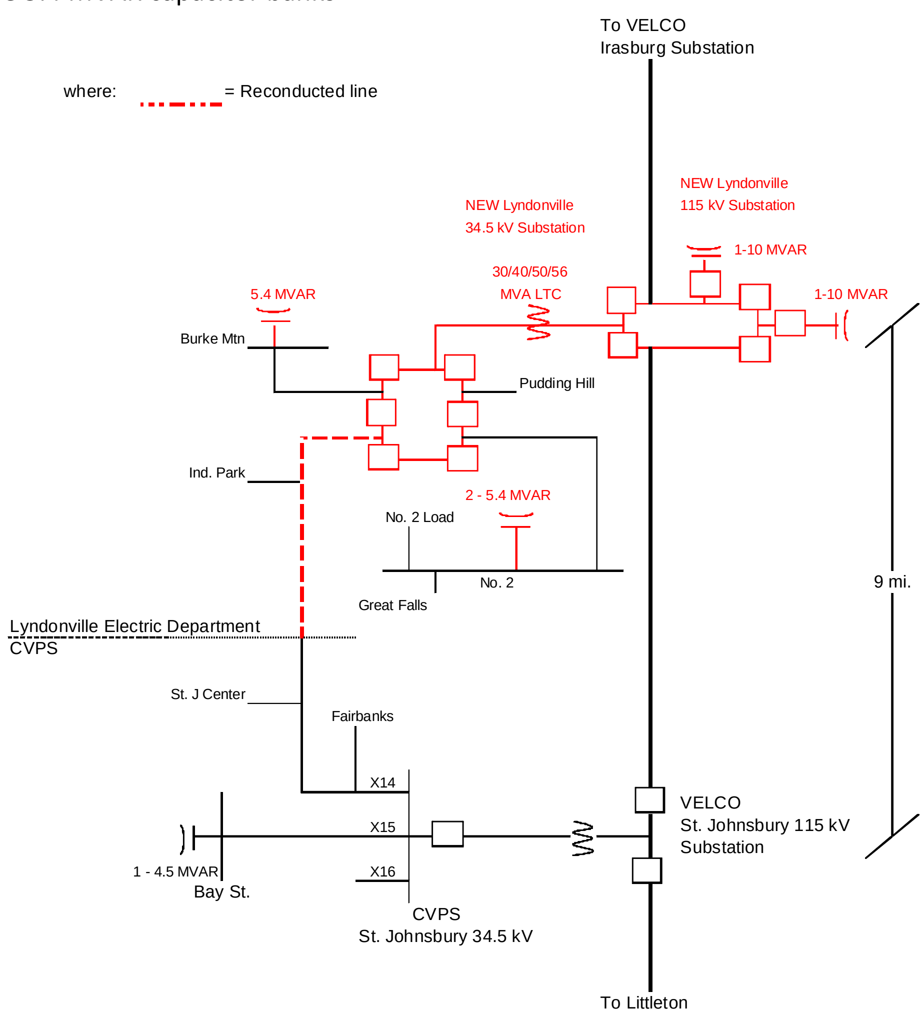
NTA Screening Tool Evaluation

October 27, 2008

Question 1: *Is the proposed project's cost expected to exceed $2,000,000?*

Answer 1: Yes – the proposed project has a planning grade estimate of $24.3M based on an assumed end of 2010 in-service date. The project consists of the following (see figure below for one-line):

- Looping the VELCO K28 line in and out of a new 4-breaker 115 kV ring substation in proximity to the LED No. 2 substation (approximately 9 miles north of the VELCO St. Johnsbury substation).
- A new 115/34.5 kV 30/40/50/56 MVA LTC transformer
- Two 10 MVAR 115 kV capacitor banks
- A new 6-breaker 34.5 kV ring substation, providing a separate breaker position for the LED No.2, Burke Mountain, Pudding Hill, and Industrial Park substation loads. (The number of breakers in the ring may be reduced, resulting in lower costs. The highest cost alternative was chosen for the screening, because if the higher cost project screens out, then a lower cost project will also.)
- Three 5.4 MVAR capacitor banks



Question 2: *Could elimination or deferral of all or part of the upgrade be accomplished through the use of non-transmission alternatives?*

Answer 2: Yes, but it would not be cost-effective as demonstrated in the NTA analysis attached. The need for the project and its equipment is driven by current loads with the exception of one of the proposed 5.4 MVAR 34.5 kV capacitor bank additions. This project is primarily needed to provide a redundant supply to both the Lyndonville and CVPS St. Johnsbury loads for loss of the sole VELCO source at the existing St. Johnsbury substation. Loss of the VELCO 115/34.5 kV transformer disconnects the entire Lyndonville and CVPS 34.5 kV system. If the load growth expected for the system could possibly be deferred or eliminated, the need for one of the 5.4 MVAR 34.5 kV capacitor banks may be delayed or removed ($858,000). In addition to the capacitor banks included in the project, the analysis reflected the need for 2 MVAR and 0.66 MVAR of power factor correcting capacitor banks to be added to the Lyndonville and CVPS system at existing load levels.

The implementation of non-transmission alternatives to provide a redundant supply to both the Lyndonville and CVPS loads, should the existing VELCO St. Johnsbury source trip, would require 32 MW to meet the current peak loading, and up to 52 MW of future capability, depending on the timing associated with the Burke Mountain ski area expansion. Any generation facility would need to be designed with the ability to stay on-line when its only synchronizing source to the transmission system has been lost and can operate in an islanded situation. If this were possible, and the unit were on-line feeding the entire load at the time the existing St. Johnsbury transformer were lost, then this alternative could possibly remove the need for the new substation. However, this type of operating capability is not typical, and depending on the installation may not be sufficiently robust to allow all customers to remain connected for loss of the tie to the transmission network at St. Johnsbury. In addition, the unit will need to be dispatched and on-line generating to match local load for all hours as if the existing St Johnsbury transformer did not exist. This may be challenging for a fossil-fueled power plant due to emission issues. The generation installation should be designed to make up for loss of one unit at the plant site to achieve a roughly equivalent level of redundancy and robustness provided by the transmission option. This would require the installation of more capacity than needed (likely somewhere between 20 to 50% extra capacity).

Question 3: *Is the likely reduction in costs (in Question 2 above) from the potential elimination or deferral of all or part of the upgrade greater than $1,000,000?*

Answer 3: Yes – the entire substation upgrade could be eliminated with 32 MW of distributed resources at existing loads.

Notes:

1- These planning grade cost estimates are based on the assumptions made in the "*Lyndonville Electric Department Feasibility Analysis*" dated March 26, 2008.

2- This screening is not indicative of the technical feasibility of alternatives. It only evaluates the costs of NTAs versus the transmission alternative cost.

"Back Of the Envelope" NTA:

Cost of Proposed Transmission Project= $24.3 M

Amount of Load Reduction Necessary with DR = 32 MW

Cost of scalable, fossil-fueled generation (lowest cost DG) = $1100/KW (Based on costs used in Southern Loop Analysis in 2007)

Cost of 32 MW DG = 32 MW * 1000 * $1100/KW = $35.2 M

These costs exclude operating and maintenance costs, which would be significant due to the number of operating hours needed for such an alternative. This analysis also does not include redundant capacity in the event of a generator being unavailable.

Should assumption be that DSM could reduce load by 25%, this would still require 24 MW of generation to meet existing load levels.

Cost of 24 MW DG with 8MW DSM = $26.4 M

Even with assumption that DSM has no societal costs this would still result in $26.4 M of capital investment, with *additional* generation needed to meet future load growth.

Based on these costs the installation of generation as an alternative would not be the least cost alternative given that the recommended transmission upgrade is $24.3 M and accommodates future growth.