

Walking the Walk: Considering Non-Transmission Alternatives in Utility Planning, Part Deux

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ABSTRACT

The proposal to defer transmission with energy efficiency is alive and well in Southern Vermont. Efficiency Vermont, the statewide energy efficiency utility in Vermont is targeting the delivery of energy efficiency in Southern Vermont to defer potential upgrades to the distribution utility's 46 kV sub-transmission system as described here last year (**Plunkett et al 2006**). A filing was made for the development of two synchronous condensers to solve immediate reliability issues on that same 46 kV system and the Vermont Public Service Board issued a certificate of Public Good in Docket 7246 on March 28, 2008. A separate filing is underway in Vermont (Docket 7373) to propose a bulk system 345 kV transmission line upgrade to meet regional reliability needs and to support another feed into the 46 kV system to solve local reliability issues. A separate public review process and separate NTA analysis was conducted as support for the decision-making process. Striking differences emerged from this new review and analysis. First, while the Southern Loop reliability and capacity needs are driven by winter peaks, the new line upgrade (the Coolidge Connector or CC) was driven by summer load in Central and Northwest Vermont. Second, the NERC reliability criterion is a stringent, deterministic N-1-1 scenario where the line is tested by two major contingencies. Third, regional load growth in New Hampshire and New York affects the need for the bulk system line. Fourth, the need for the line is imminent so the time to develop and implement NTAs is very short – some peak load reductions are needed immediately before the line can even be constructed, and the line or NTAs are needed by 2011. Fifth, the deployment of NTAs in Vermont can result in local rate impacts, while the benefits are distributed more broadly across the bulk system including to non-Vermont participants. Sixth, since this is a bulk power line and the driving load is much larger the NTAs are larger and can utilize utility size generation in addition to distributed generation. Sixth, since the affected area covers 80% (but ironically not the Southern Loop area) of Vermont the decision affects multiple utilities. At this point in time the decision is uncertain but the sponsoring utilities deemed the use of NTAs infeasible to avoid or defer the proposed bulk-system upgrade given the expected case assumptions.

Deferral of the Southern Loop 46 kV Sub-Transmission Line Upgrade to 115 kV

We were here in 2006 to describe the research and analysis of distributed resources to defer an upgrade of the existing 46 kV line to 115 kV (**Plunkett et al 2006**). We also described the public outreach process to review alternative solutions that resulted in an expressed preference for energy efficiency and community generation to support local reliability with transmission upgrades as a last resort.

So what are we doing now to defer the line upgrade?

First, CVPS plans to build two synchronous condensers, i.e. devices to create and absorb reactive power near the apex of the transmission arc to provide the voltage support necessary to increase reliability under existing load conditions (**Vermont PSB Order 7246, 2008**).

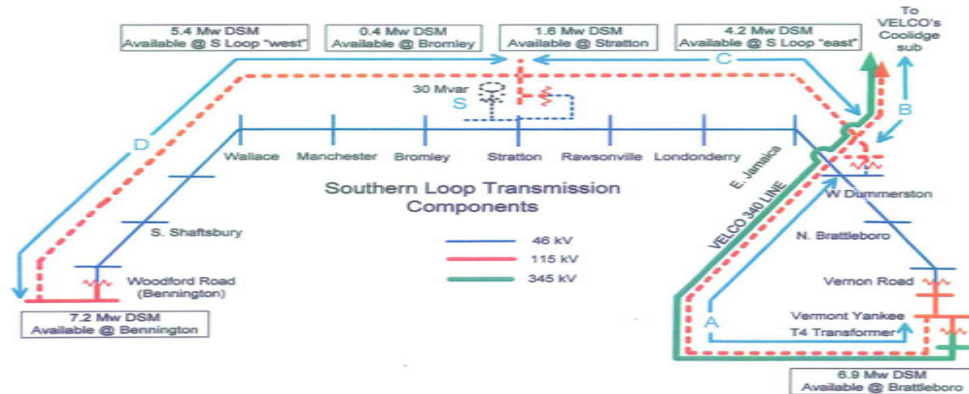
Second, the statewide energy efficiency utility (Efficiency Vermont or EVt) has targeted the Southern Loop area for the addition of demand and energy reduction measures with a goal to acquire 7.2 MW in the area by the end of 2008 (**Efficiency Vermont 2007**).

Third, CVPS in cooperation with other organizations in Vermont is launching a program to find candidates for cogeneration/combined heat and power (CHP) projects that are the right size to fit on the Southern Loop and hopefully are fueled by renewable resources such as biofuel or biomass (**Bentley 2008**). (Contact Bruce Bentley at Central Vermont Public Service for more information 802-747-5520 or bbentley@cvps.com)

Fourth, the DPS conducted an extensive Public Engagement Process focused on long-term power needs in anticipation of the end of the current large power contracts with Hydro Quebec and the Vermont Yankee Nuclear Plant. Public preferences for efficiency and renewable resources were clearly indicated in the responses at Open House forums and a statistically selected sample of people who participated in a weekend event with deliberative polling. (<http://www.vermontenergyfuture.info/>) Those preferences may result in more energy efficiency efforts and more efforts to install small renewable resources and CHP.

Figure 1 below shows a one-line schematic of the Southern Loop. The existing 46 kV line could be augmented with a 115 kV line in the same corridor. The synchronous condenser (S) near Stratton and the new injection point from the 345 kV line near Newfane will solve existing reliability problems at existing loads. New energy efficiency on the loop (not at Brattleboro or Bennington) along with distributed generation, preferably renewably fueled combined heat and power will defer line segments C and D for some time.

Figure 1. Southern Loop Schematic



CVPS Southern Loop Technical Study for Community Working Group

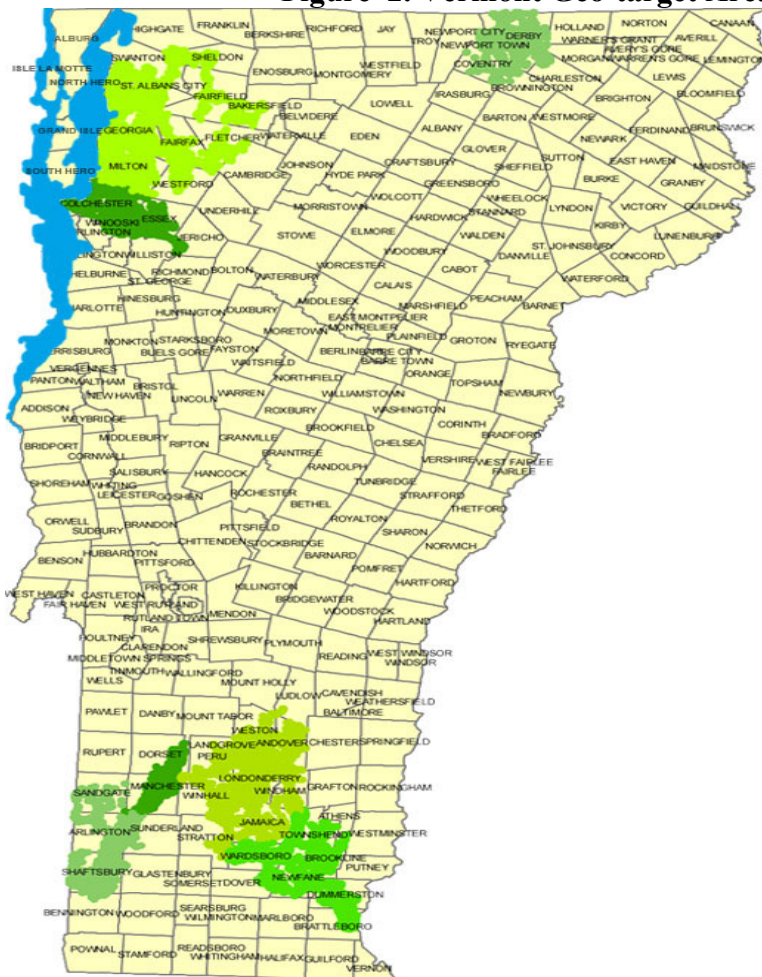
Geo-Targeted Energy Efficiency

Efficiency Vermont is funded by an electric bill surcharge called the “energy efficiency charge.” In 2006 the budget for electric energy efficiency programs in Vermont was ramped up so that the funding nearly doubled by 2008. In light of the public support for energy efficiency as an alternative to transmission and distribution (T&D) upgrades, the legislature authorized the Public Service Board to increase the bill surcharge and to consider targeted energy efficiency programs, beyond the existing statewide programs that were designed to have geographic equity over the three year contract term. The Public Service Board (PSB) worked with distribution utilities and other interested parties to set the new budget and consider geographically targeted programs.

After considering the potentially deferrable T&D projects, the utilities recommended and the PSB accepted a collection of four targeted geographic areas in Vermont including the Southern Loop.

The map below shows those areas and is available on the Efficiency Vermont web site. (<http://www.encyvermont.com/pages/Common/GeoTargeting/>):

Figure 2. Vermont Geo-target Areas



Efficiency Vermont web site for Geo-Targeting

The Southern Loop area, unlike the other three areas is a winter peaking load zone. So the EVt goals for winter peak demand are heavily skewed to capture savings on the Southern Loop. EVt's goals of 7.2 MW acquired in 2007 and 2008 is about 10 times the intensity previously designed for the statewide programs and represents more than 10 % of the roughly 70 MW total peak load of the targeted areas.

EVt describes the geo-target (GT) efficiency measures in their FAQ as follows:

In GT areas, energy efficiency opportunities will be evaluated on a case-by-case basis to determine if the benefits to the electric grid are greater than the associated installation costs. If an energy efficiency measure is cost-effective, it may be eligible for an incentive.

Efficiency Vermont is developing specific energy efficiency efforts for customers within GT areas, including enhanced services or increased incentives to encourage efficiency measure acceptance. Increased incentives make it easier for customers to overcome the first cost expense of adopting energy efficiency. Due to the unprecedented savings goals associated with GT efforts, Efficiency Vermont will be targeting ratepayer resources to customers in GT areas who use a substantial amount of electricity and therefore have significant savings opportunities. Efficiency Vermont will be developing special services and incentive offers for these geo-targeted customers.

As an example, homes in GT areas that use electricity for heat or hot water may be eligible for one of these special offers. Customers may be contacted by Efficiency Vermont to evaluate the benefits of replacing an electric system with a non-electric system. These customers could be eligible for significant incentives for replacing these electric systems with non-electric systems.

Community support for the geo-targeting DSM effort is cultivated by EVt and is being stimulated by a statewide effort towards sustainability and creative economic development from the Vermont Council on Rural Development with grass roots efforts. For example, the Town of Londonderry in the heart of the Southern Loop created an Energy Efficiency Committee as part of their Creative Economy effort. That Committee set up an initial workshop with EVt and CVPS to help understand the Southern Loop problems and the EVt Geo-Target Program. The intent of the local committee is to support and publicize the Geo-Target efforts in the local community.

A new budget will be developed this year for the EVt efforts after 2009. Previous budgets have been associated with three year contracts with the companies that operate EVt. There may be changes in the level and location of the geo-targeting programs to reflect long-range transmission and distribution upgrades needs. There may also be changes in the structure of the statewide EEU to reflect the long-range responsibilities and funding needs for an EEU

Cogeneration or Combined Heat and Power (CHP)

In response to the public preference for community generation, CVPS pledged to issue an RFP for CHP in the Southern Loop area (**Southern Loop Public Input 2006**). Small distributed generation without waste heat use was not economic, so community generation sources that passed the economic screen were small CHP projects.

The Southern Loop area is primarily a rural area with virtually no industrial customers. Bennington and Brattleboro are the largest communities, but are so well connected to the transmission grid that they do not provide the best opportunities for load reduction relief on the Southern Loop line. This is somewhat ironic since Brattleboro has some existing CHP facilities and the potential for more. Since the opportunities for CHP rest largely on the availability of large thermal loads, CVPS is working with other organizations to identify thermal hosts and to hold a workshop with potential host customers, developers and other interested parties. The need for CHP was discussed at the Renewable Energy Vermont Distributed Energy Conference – Building Resilient Communities at the Stratton Ski Resort in the heart of the Southern Loop on Thursday May15, 2008.

Vermont has a legislated mandate to meet all new load growth from 2004 through 2012 with renewable resources. To the extent that the CHP projects can be fueled with sustainable wood or sustainable fuels such as biodiesel, then the Southern Loop goals and renewable power supply goals are both satisfied. Even CHP with non-sustainable fuels will satisfy the goals since the loads on the utility system will be reduced (**SPEED 2007**).

The size of CHP to help the Southern Loop is like the porridge for the three bears. If a unit is greater than 25 MW on the transmission system, then we need a transmission upgrade just for the unit. If the unit is greater than a few hundred kW on the distribution system, then we may need a distribution system upgrade particularly if the distribution system is single-phase secondary voltage. If a CHP unit is smaller than a few hundred kW then the costs usually exceed the benefits. So ‘just right’ is a few MW connected at one or more places on the 46 kV transmission line.

The Coolidge Connector 345 kV Line and Non-Transmission Alternatives

The immediate reliability problems on the Southern Loop required the installation of synchronous condensers near the middle of the line close to the Stratton Ski area and an additional input from a higher voltage source to provide an alternate path to Brattleboro and an additional feed to the Southern Loop 46 kV line. Originally CVPS planned to build a 115 kV line from south of Brattleboro to a point on the Southern Loop north of Brattleboro. During the public outreach process VELCO determined a need for a parallel 345 kV line to an existing line running from just south of Brattleboro to a substation north of the Southern Loop near Cavendish. That line provides regional reliability benefits and also provides a higher voltage input to the Southern Loop and Brattleboro with construction of a new substation and short line to inject power into the Southern Loop. The public outreach effort was expanded and extended to invite input and review from people adjacent to the proposed line.

Non-transmission alternatives were ultimately rejected on feasibility grounds as a means to defer the line due to the imminent need for the line to meet North American Electric Reliability Counsel (NERC) criteria. That conclusion and the construction of a new line largely in an existing corridor met the concerns of people involved in the public outreach effort.

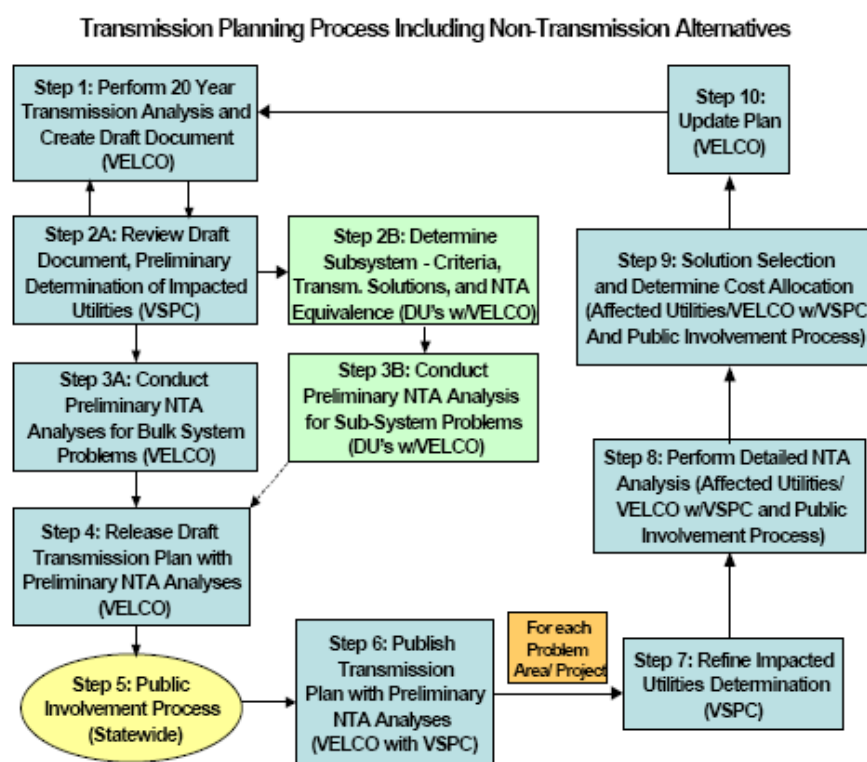
Since the line is necessary under current load conditions, but cannot be built until 2011 at the earliest, additional support or load reductions may be necessary in the near-term. The preferred transmission solution is a hybrid, i.e. it consists of 15 to 40 MW of demand response in the years prior to commissioning and operation of the line.

At the same time CVPS and VELCO were analyzing options and conducting the public outreach program, the Distribution Utilities (DUs), VELCO, the DPS and several other interested

parties were collaboratively developing a mechanism to use integrated planning for transmission facilities. The process was in response to a Legislative mandate articulated in Act 61 and a Public Service Board Order in Docket 6860. The resulting Memorandum of Understanding (MOU) was adopted by the PSB Order in Docket 7081. A Vermont State Planning Committee (VSPC) composed of all DUs, VELCO and three public members was established to direct long-term (20 year) planning efforts for transmission facilities with the express purpose of expanding public input, creating planning transparency and considering of non-transmission alternatives. EVt and the state’s renewable resource development program (SPEED) facilitator were also made non-voting participants to the VSPC.

While the MOU is extensive, the process can be illustrated with an information flow chart that was developed as a negotiating tool and a way to help explain the results to the PSB.

Figure 3. VSPC NTA Process Flow Chart



Vermont PSB Docket 7081 Order - MOU

The filing for the Coolidge Connector included a process to examine the need for interim reliability solutions through the VSPC as a bridge to the new line.

The Petitioners have engaged in good faith efforts during this transition period under Act 61 and the recently adopted Docket No. 7081 MOD. The Vermont System Planning Committee ("VSPC") has already commenced meetings under the new Docket 7081 planning regime. The Petitioners anticipate that continued efforts to evaluate and implement NTA resources as may be necessary to maintain system reliability would be undertaken through the VSPC. VELCO and CVPS

will provide access to information resulting from the Southern Loop and Coolidge Connector NTAs studies to assist the VSPC's evaluation.

That process is underway as of March 2008. There are existing demand response programs in New England to increase reliability during times of system stress and to reduce loads during times of high prices to reduce costs. A VSPC sponsored Coolidge Connector Project Group is examining alternative demand response program designs to determine whether expansion of the existing programs or design of new programs are necessary to support the Vermont system prior to completion of the Coolidge Connector. Central Vermont Public Service is working with a vendor to add as much as 25 MW to the ISO-NE 30-Minute Real Time Demand Response program in the company's service territory included in the Coolidge Connector affected area.

Summary

Geo-targeted energy efficiency and CHP projects continue to hold the promise to defer Southern Loop 46 kV transmission upgrades as reported in 2006 based on the analytical work performed to date. Neither general load growth nor large specific developments appear on the near-term horizon. Vermont's public preference for energy efficiency and small distributed resources, particularly renewable and sustainable generation units, may result in more non-transmission alternatives to further defer the Southern Loop upgrade.

While the Coolidge Connector appears to be moving ahead as primarily a transmission solution, it does consider the use of demand response programs as part of a hybrid response to the interim reliability deficiency.

References

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