

NVDA Wind Study Committee – Meeting #3 – 6:30 p.m., Wednesday, April 3, 2013 @ the Barton Town Office

Attendees: M. Whitworth, D. Snedeker, J. Greenwood, J. Morley, R. Croteau, P. Rodin, R. Creaser (Chronicle), R. Smith (Orleans Record)

Introductions

Dave Hallquist to focus on electricity (generation, transmission, distribution)

Dave Hallquist 4.3.13 (M. Whitworth notes)

1. Grid integration issues
 - a. Grid was designed for “spinning generation”
 - b. Most generation technologies provide “ride-through” (akin to inertia)
 - c. Solar and wind provide no ride-through
 - d. In our section of the grid, we’re at about 20% renewables and we’re experiencing problems
 - e. Growing realization that we don’t know everything we need to know about grid-integration of renewables
2. Capacity factor
 - a. actual production / nameplate capacity
 - b. Lowell promised 33%; last reporting period 17%
 - c. Sheffield promised 32%; 2012 production was 23%
3. Synchronous condenser
 - a. Like a flywheel—provides short term ride-through
 - i. Less than a second
 - ii. Can recharge in a second or less
 - b. Was recommended by ISO-NE
 - c. GMP / VEC didn’t want to include it
 - d. PSB didn’t require it
 - e. Expected to resolve 2/3 of the curtailment problem
4. ISO-NE spinning reserve rules
 - a. Intermittent renewables require 8% spinning reserve
 - b. Kin NE, reserve is provided by gas
 - c. When available reserve drops, renewables are curtailed
 - d. ISO-NE is looking at increasing reserve requirement to 10 or 12%
 - e. Part of the increase is due to intermittent renewables “behind the meter”
 - f. Net-metered installations that feed power to the grid through distribution lines pose the same problem as big installations feeding the transmission lines
 - g. Wind is the first generator to be kicked off the grid when there’s a danger of grid instability
5. Severe capacity problems this winter
 - a. Resulted in severe wind curtailment
 - b. Caused by gas pipeline capacity limit
 - c. Home heating has priority for gas

- d. Use for home heating starved spinning reserve gas plants
- e. Price of gas was \$30/million BTU in NE and \$6 in NY (I need to check the unit of measure)
- f. Idled oil plants were fired up in order to supply region's electricity needs
- g. ISO was forced to violate its own spinning reserve requirements
 - i. Demand-side management procedures were invoked
 - ii. Next step would have been voltage reduction
 - iii. After that it would have been rolling blackouts
6. Gas plants have replaced 500 MW of coal-fired capacity
7. Vermont is importing as much HQ as it can
 - a. All HQ power goes through Highgate converter
 - b. The converter was de-rated
 - c. An additional converter could be installed, but it'd be expensive and the transmission system near Highgate can take only 25% more
8. VEC will oppose SMW
 - a. SMW will destabilize grid
 - b. Additional wind will jeopardize VEC's investment in Lowell
 - c. (VEC has already met its 2017 SPEED goal)
9. Vermont's clean electricity goals
 - a. Impossible to meet without storage
 - b. Storage cost must be < \$250 kWh installed
 - c. The least expensive Dave has seen: \$1,000 kWh
10. Biomass
 - a. Takes 10,000 acres per MW
 - b. Average size of forest parcel in VT: 47 acres
 - c. Growth to harvest ratio 1.7 in No Vt; 3.1 in So Vt
 - d. Biomass is not considered renewable in Mass.

Dave Hallquist (VT Electric Cooperative) – 4.3.13 (D. Snedeker notes)

- VEC has recommended moratorium on implementing renewable mandates until the problems in the transmission system have been figured out.
- The transmission grid is designed for 'spinning generation'
- Over 20% renewable generation will create grid instability – VEC is currently experiencing problems with this in northern VT
 - Synchronous condensers will only take care of 2/3 of the problems with their KCW wind project. 1/3 is attributable to ISO-New England rules
 - Capacity factor is key measure of generation facilities and helps to determine return on investment. KCW estimated capacity factor of 33% (actual 12-17%); FirstWind est. capacity factor 32% (actual 23%) – both problems have contributed to local stability problems – least stable generators are taken off line first to deal with these issues. Adding SMW would exacerbate problems.
 - Merchant generators can scale-back production with the selling price is not right, but they would not typically do this.

- Intermittent resources require ‘spinning reserves’ to operate (This is typically 8%). If spinning reserve requirements can’t be met, the intermittent generator can be shut down.
- New generation and transmission – simply adding transmission facilities to the system will not necessarily improve the system.
- VELCO is looking at the integration of intermittent renewables in the system to determine their effects on the entire system(?)
- VT current renewable requirements: 90% by 2050
- VT is 87%+ carbon free
- VT goals cannot be met with current technologies or storage

Costs:

- Current market rates for purchasing power are \$0.05 kwh (or less)
- Industrial wind is \$0.10 kwh (*capacity factor 30% - or less*)
- Solar is \$0.27 kwh (*capacity factor of 15%*)
- Biomass is \$0.14 kwh
- VEC investment in KCW would likely not have occurred without renewable requirements – project would not have been cost effective.
- VEC understands the desire for moratorium for 3 years – VT should establish a group of experts to oversee generation and transmission and integration and transmission
- More power from HQ is not possible because of transmission constraints
- Power demand in northern VT will likely increase over the next 5-10 years

Where is the cheap power?

Utility Bill:

- 50% of cost is for power supply. Cost trend has been going down
- 15% of cost is for transmission. Cost trend has been increasing (New England wide)
- 35% of cost is for local operations, including distribution. Cost trend varies.

Next meeting April