

Vermont's Renewable Future

(Without Destroying Our Mountains)

Vermont's Need Is Manageable

- Currently 43% of our electricity comes from sources classified as renewable.
- Our current and projected future demand for electricity is annually around 6.1 million megawatt hours.
- To achieve the 90% renewable goal, we must replace approximately 3.1 million megawatt-hours from new renewable sources (in addition to those we already have).

A Solar Future – With minimal impact

- To achieve the state's renewable goals with solar covering 3.1 million megawatt-hours we would need to install 2400 MW of PV solarⁱ.
- We have over 240,000 homes in Vermont, and roughly 50% of them could house solar installations (5 kilowatts per home would achieve this 50% portion).
- The entire 2400 MW would require 6000 acres of Total Solar Collector Area, which is 0.1 % of our total land areaⁱⁱ (VT has a area of ~6,000,000 acres) or about 1% of open farmland.
- With roughly half of this sited on buildings or back yards, the other half could be generated from carefully sited "solar orchards" utilizing only 1-2% of existing open lands (with spacing requirements included).

Solar Won't Break the Bank

- Solar is on a historic cost decline, with prices expected to continue to decline over the coming years. The annualized price of solar-generated electricity at today's rates, including current subsidies, is ~12 cents a kWh, on par with our current residential rates.

Wind Ruins Critical Mountain Habitats and Resources

- Generating even just 25% of Vermont's relatively small electrical consumption (about one quarter of 1 large conventional power plant's worth) would require:
 - Close to 200 turbines, each over 400 feet tall, and each with a substantial section of new road and large cleared area several hundred feet in diameter.
 - 70 miles of new ridgeline roads, based on existing project development.
- Since VT's electricity accounts for only ~4% of VT's emissions, this would reduce GHG emissions by only 1%, and at a cost of close to \$1 billion.
- Ridgeline wind development destroys and fragments existing habitat, and creates hazards for birds and bats.
- Wind development degrades existing water quality via the destruction of micro-wetland features and the disruption of normal mountain hydrological flow patterns.
- Vermont's best resource to help fight climate change is the refuge provided by our forests on undeveloped mountain ridges – a far better resource than our mediocre wind potential.

Distributed Solar Reduces Greenhouse Gas Emissions with Low Impact

- Utilizing distributed solar to reach our goals could do so with little or no impact to the environment, and even more importantly, would help advance an energy source that has real potential (unlike wind) for supplying the large load centers of the Northeast and Eastern US. This is because it turns out the onshore wind resources in the East are tiny relative to those of the Midwest, and could contribute little to reducing US greenhouse gas emissionsⁱⁱⁱ.

i A kilowatt of PV on one of the tracking systems commonly used in VT today will produce approximately 3.5 kWh per day in Vermont on average. 2400 MW of PV would therefore produce an amount equal to:

$2400 \text{ MW} \times 1000 \text{ kW/MW} \times 3.5 \text{ kWh/kw/day} \times 365 \text{ day/yr} \times 1 \text{ MWh}/1000 \text{ kWh} = 3.1 \text{ million MWh.}$

ii A kilowatt of PV capacity (DC) requires a solar collection area of about 7 square meters (assuming 15% efficient modules). There are 4047 square meters to an acre. 2400 MW is 2,400,000 kilowatts. Therefore the acreage needed for 2400 MW is:

$\text{Acreage} = 2,400,000 \text{ kw} \times (7 \text{ m}^2/\text{kw}) / (4047 \text{ m}^2/\text{acre}) = 4151 \text{ acres.}$

Applying a de-rating factor for DC to AC conversion, and also assuming for slightly lower production from rooftop systems as opposed to trackers, we arrive at approximately 6000 acres.

iii The state-by-state estimates of commercially viable wind resource published by the Department of Energy at www.windpoweringamerica.gov show that via onshore wind generation in the East has a gross maximum potential of about 52 gigawatts of peak potential. When a “capacity factor” of .3 is applied to this, it is found immediately that this could offset little more than 3% of the roughly 470 gigawatts of power the US currently consumes on average. This 52 gigawatt figure is also likely a gross over-estimate of potential when myriad local siting factors are also included, so the real potential of onshore wind generation in the East is likely less than 1% of US electricity generation.

Renewable Energy Siting Process Unprepared For Future

State Response to Climate Change Requires Careful Planning

- Some of the currently proposed technologies create massive impacts on our communities and natural resources, others do not.
- Badly crafted subsidies and laws can end up encouraging projects to be built in inappropriate places that disenfranchise our communities and harm the environment, instead of promoting sustainable and appropriate development.

Projects Should be Subject to an Open, Comprehensive Process

- Currently the price of new generation sources is held confidential throughout the PSB process, except for utility projects. Vermonters need to know what their sacrifice is costing.
- There needs to be a comprehensive plan in Vermont and the region that takes full account of the true potential of various options to meet our regional needs, and cost trends as well as the current costs of various options, along with the actual impacts. Renewable energy development in the Northeast is presently essentially ad hoc, driven more by the needs of corporations than the true needs of society.

Different Venue for Vermonters Needed – to Act 250

- The Section 248 process for the permitting of wind projects in Vermont lacks the rigorous environmental requirements of Act 250, and encourages conflicts between Vermonters and renewable generation projects.
- To participate in the permitting process, neighbors and towns need to raise vast amounts of money to hire their own lawyers and experts, and are often not allowed to testify on many important factors related to the need for and the impacts of wind projects.
- Once they do choose to participate, experience has shown that their concerns will be ignored by regulators

Electricity Generation Should Respect Natural Resources

- Current methods of construction for utility-scale wind are sacrificing natural resources to accommodate the projects, rather than adapting to protect the resources
- The burden should be on the developer to *prove* that the projects are good for the climate, host communities and natural resources, not the other way around

Thoughtful Action Is Needed – Time for Time Out

- Every day our state's quest for new generation sources is putting Vermonters and our natural resources at risk. Good decisions now will enhance our future while also preserving the resources and qualities that make our state so special. Now is the right time to take the time to establish a better and more effective path.