



Understanding Vermont's Energy Policies

Reaching the goal of “90% renewable by 2050”

by

Vermonters for a Clean Environment, Inc.
Annette Smith, Executive Director
789 Baker Brook Road
Danby, Vermont 05739
(802) 446-2094
vce@vce.org, www.vce.org

March, 2018



Vermonters for a Clean Environment

Vermonters for a Clean Environment (VCE) provides facts and information so people can make informed decisions. In our discussions with Vermonters it became evident that most residents do not understand the statutory mechanisms to achieve the state's renewable energy goals. To that end, this paper provides an overview of enacted policies, a discussion about northern Vermont's grid constraints, and information about Vermont as part of the regional electric grid.

Vermont has a complicated set of energy policies. They include

- A Renewable Energy Standard (RES)
- A standard-offer program
- A net-metering program
- Act 174's energy planning process
- Arbitrage with Renewable Energy Credits (RECs)



In addition, Vermont has both utility and merchant developers with different regulatory oversight and competing profit motives. And there are unexpected costs due to electric grid limitations in northern Vermont.

The complexity and unintended consequences of these policies raise questions for more than one type of stakeholder. Ratepayers, taxpayers, advocates, property owners, developers, investors and utilities have affected interests.

Decision-makers are still learning about the technical issues associated with the grid accepting high levels of intermittent renewable generation. Utilities and regulators need to perform more analysis and planning to better inform residents of costs to solve the problems. Perhaps most importantly, residents need to understand these policies. Only then can they assist policy makers to identify and fix energy policy problems.

- Do Vermont's policies result in environmental benefits (emissions reductions)?
- How does Vermont account for meeting the state's "90% renewable by 2050" goal?
- How can Vermont update energy policies to address emerging issues?

Table of Contents

	Page
Understanding Vermont's Energy Policies	ii
Table of Contents and Acknowledgements	iii
The Renewable Energy Standard	1
Tier 1	1
Tier 2	8
Tier 3	9
The Standard-Offer Program	10
Net-Metering	13
Utility and Merchant Developers	17
The SHEI	18
Act 174 Energy Planning	20
Vermont and the ISO-NE Regional Grid	22
Recommendations to Improve Energy Policy Outcomes	30
Conclusion	31
Acronyms	32
Endnotes	33

Acknowledgements

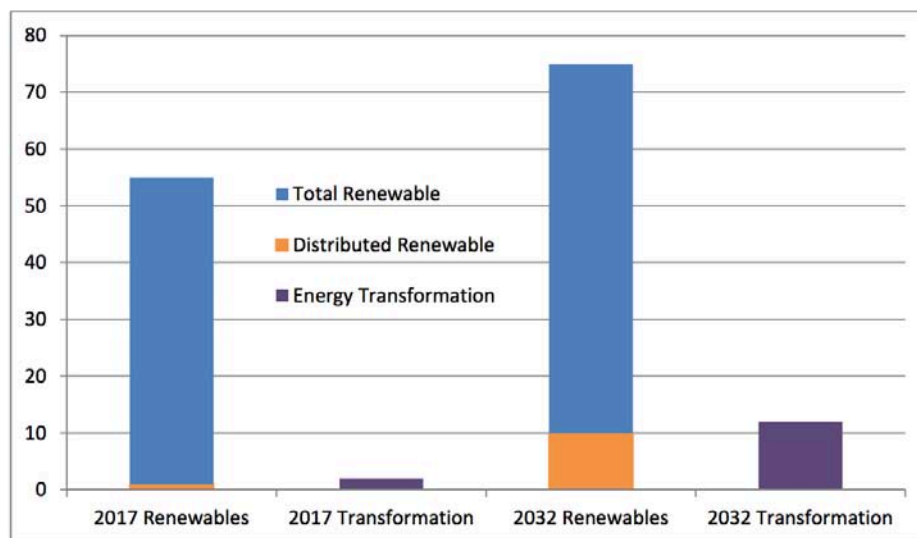
VCE wishes to thank the many members of Vermonters for a Clean Environment who assisted in the development of this white paper with content, editing, photographs and technical support.

The Renewable Energy Standard, Alternative Compliance Payments and the problem with Renewable Energy Credits

Meeting Vermont's Energy Goals with Monetary and Paper Transactions

In 2015, Vermont adopted a Renewable Energy Standard (RES) known as Act 56. This utility standard has three Tiers that, taken together, are intended to achieve Vermont's goal of "90% renewable by 2050."

Tier 1 is called "Total Renewable Energy" and is 75% of the goal. Tier 2 is "Distributed Renewable Energy" and is 10% of the goal. Tier 3 is "Energy Transformation" and is 12% of the goal.¹ Tier 2 is included as part of Tier 1, while Tier 3 is not.² The graph below shows how the goals are to be met "on and after January 1, 2032."³



Tier 1 is defined in state statute as "Total renewable energy:"

§ 8005. RES categories⁴

(1) Total renewable energy.

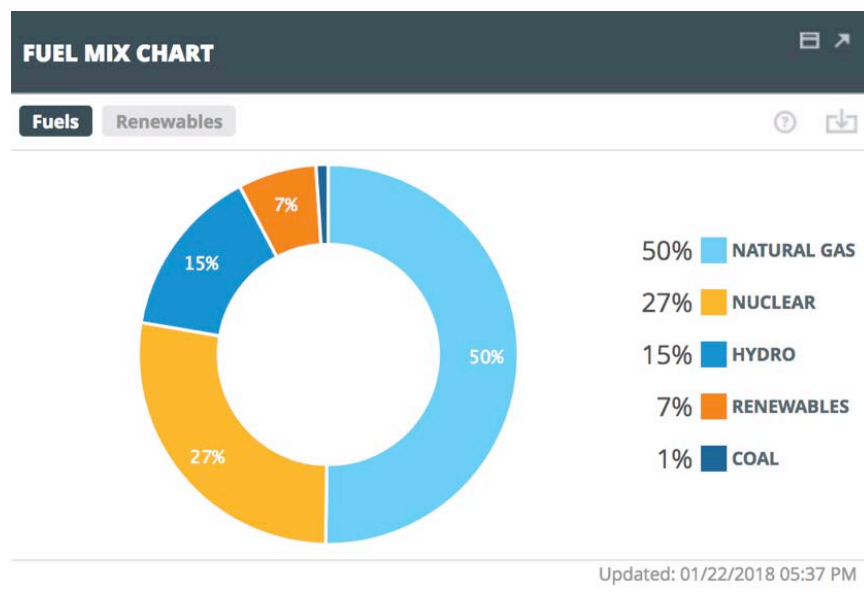
To satisfy this requirement, a provider may use renewable energy with environmental attributes attached or any class of tradeable renewable energy credits generated by any renewable energy plant whose energy is capable of delivery in New England.

The amounts of total renewable energy required by this subsection shall be 55 percent of each retail electricity provider's annual retail electric sales during the year beginning on January 1, 2017, increasing by an additional four percent each third January 1 thereafter, until reaching 75 percent on and after January 1, 2032.

Tier 1 (75%) is the largest and therefore most important portion of the RES, and is not understood by most Vermonters. Tier 1 utilizes a form of derivative -- something that is based on another source -- known as Renewable Energy Credits (RECs) to increase flexibility in renewable energy market choices.

Every solar, wind, biomass and hydro generator in Vermont creates two products and issues contracts for them separately; one for the energy generated and one for the renewable energy attributes -- the RECs associated with that energy. When the energy is from a renewable energy resource but the RECs are sold, the remaining energy is referred to as "null power." Null power is defined as "the underlying power remaining when the RECs have been stripped off and sold elsewhere. Null power is not renewable but is the unspecified and undifferentiated power that has the attributes of the overall system mix or the residual mix where specified power purchases have been removed."⁵

For customers in the ISO-NE region, when the utility sells RECs from a renewable resource, the customer is getting null power from the regional fuel mix, which varies seasonally and hour by hour. This was the regional fuel mix on Jan. 22, 2018 at 5:37 p.m.



In addition to the RECs which have a robust market in New England, Vermont’s RES grants an equivalent market status to RECs from Hydro-Quebec, which are not recognized elsewhere in the REC market.

As explained in a paper by Vermont Law School professor Kevin Jones, et. al.,⁶

“Vermont’s RES defined qualified renewable energy much more broadly than other New England states, allowing utilities to practice REC arbitrage. Act 56 allowed much older vintage renewable resources to qualify for the Vermont RES than was permitted in other New England States.

“Moreover, Vermont also became the first New England State to allow its utilities to count RECs from large scale hydro, such as that from Hydro Quebec, toward their compliance obligations.”

Because Vermont is the only New England state to declare H-Q power to be renewable, there is very little market for H-Q’s RECs. Jones, et.al. explain it this way:

“As a result, while RECs eligible for other states’ RPS (Renewable Portfolio Standard) programs were trading in the range of \$20/MWh to \$60/MWh (\$0.02 to \$0.06/kWh) in recent years, Act 56 only set a penalty for noncompliance of \$0.01/kWh (\$10/MWh) for its total renewable energy requirement. Premium renewables in Vermont, including wind, solar projects of at least 5 MW, and biomass would continue to be sold into the Massachusetts and Connecticut RPS programs. Existing RECs for old or large hydro and other resources that did not count toward the other New England States programs would be purchased at a substantial discount to meet Vermont’s RES Tier 1 goal.”

■ ***“Vermont’s RES defined qualified renewable energy much more broadly than other New England states, allowing utilities to practice REC arbitrage.”***

The New England REC market has fallen from \$0.05 or \$0.06/kWh (\$50-60/MWh) around the time the Lowell Wind project came online at the end of 2012 to between \$0.01 and \$0.02 cents/kWh, (\$10-20/MWh) which is the primary reason that Washington Electric Coop (WEC) recently sought a 6% rate increase.⁷

Green Mountain Power (GMP) testified to the Vermont House Energy & Technology committee in Feb. 2018 that the company will seek a rate increase, due in part to the decline in the value of RECs.

For an example of how declining REC prices affect rates, GMP entered into a 25-year contract to purchase power from Avangrid/Iberdrola’s Deerfield Wind project at \$88/MWh (\$0.088/kWh). However it was reported in the press, “the developer has an agreement with Green Mountain Power to purchase 30 megawatts of power for 4.8 cents per kilowatt from the project once it is constructed.”⁸ The difference of \$0.04 is the REC value assumed by GMP for the life of the contract. GMP, and the PUC in awarding the Certificate of Public Good (CPG), made no effort to protect ratepayers⁹ in the event that energy and REC prices declined, which they have.



On Feb. 15, 2018 Vermont RECs for wind and solar (known as Tier 1) were trading between \$.01 and \$0.025/kWh. (\$/MWh shown below).¹⁰

Vermont		
Product	BID	ASK
Tier 1 2017	\$1.00	\$2.50

Nevertheless, there is still profit in selling higher value wind, solar and biomass RECs out of state for renewable generation projects built in Vermont.

Adding new generation in Vermont that enables Mass. and Conn. to meet their RPS goals is not advancing Vermont’s renewable energy goals or reducing carbon emissions.

During legislative testimony in 2015, Conservation Law Foundation and Renewable Energy Vermont advocated a phase-out of REC sales. A previous legislative session considered an RPS bill that included phasing out REC sales over time. However, no REC phase-out was included in Act 56. As a result, no in-state big wind projects and few big solar arrays are counted towards Vermont’s renewable energy goals and likely will not be as long as there is monetary value in higher value RECs created by wind, solar and biomass projects.¹¹

“Additionality” may be the least understood marketplace driver in our transition to generation that does not burn fossil fuels. However, it is an important concept to ensure progress in meeting Vermont’s climate goals. Additionality is defined as “a quality criterion for GHG emission reduction (carbon offset) projects stipulating that the project would not have been implemented in a baseline or ‘business as usual scenario.’” “Additionality is a

standard that we should strive for to ensure that our efforts are resulting in the development of new renewable energy not just financial arbitrage.”¹²

As Jones, et. al. note referencing a Vermont Department of Environmental Conservation report,

“Out-of-state REC sales are one of the biggest contributors toward the growth in electric sector greenhouse gas emissions and are in direct conflict with the state renewable and greenhouse gas reduction goals. Vermont’s electric sector greenhouse gas emissions approximately doubled over the last decade.”

“According to the 2016 Comprehensive Energy Plan, Vermont receives 0% of its energy from solar and 0% from wind after adjusting for REC sales.”

“Out-of-state REC sales are one of the biggest contributors toward the growth in electric sector greenhouse gas emissions and are in direct conflict with the state renewable and greenhouse gas reduction goals. Vermont’s electric sector greenhouse gas emissions approximately doubled over the last decade.”

Arbitrage is simultaneously selling a product while buying the same product at a lower price. The maple syrup market is a useful analogy to explain the REC arbitrage allowed in Vermont. Suppose Vermont required statewide annual maple syrup production and consumption targets, since new research showed that tapping more maple trees absorbed more carbon dioxide. Vermont producers could sell all of the maple syrup target amounts at the Grade A Fancy (now called Golden)¹³ price of \$60. To replace any shortfall in meeting production targets, producers could either buy lower price Grade B Dark (now called Very Dark) maple syrup, or pay a penalty price of \$10. This obviously ridiculous situation would not exist in any normal market.



Renewable energy attributes are not like maple syrup, where consumers can taste and pay more for the higher quality. This analogy illustrates the concept of additionality. Vermont could set extremely high goals for future maple syrup production that could be met by paying the penalty (see ACP section, p. 7) without actually tapping additional trees.

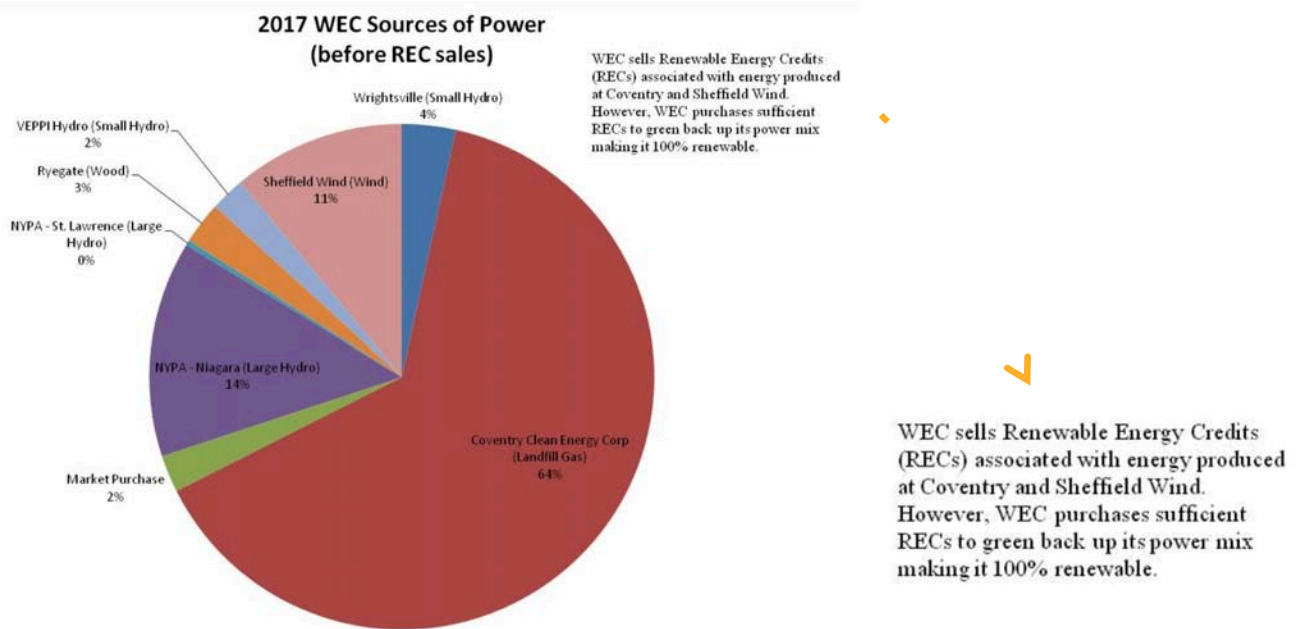
“According to the 2016 Comprehensive Energy Plan, Vermont receives 0% of its energy from solar and 0% from wind after adjusting for REC sales.”

Burlington Electric Department's (BED) frequently-publicized "100% renewable" status is an example of how renewable energy goals are being met by using REC arbitrage instead of in-state renewable generation.

BED achieves this goal by selling out of state the high value RECs generated by McNeil biomass, Georgia Mountain Wind, solar and hydro energy out of state, and repurchasing lower value RECs mostly from old hydro dams in Maine that still bear the renewable energy label but are worth less because they have lower environmental value via the certification process for hydro facilities.¹⁴

BED cannot legitimately claim biomass, wind or solar are providing renewable energy to its customers, unless the RECs for those specific generators are retired rather than sold, although they regularly do.¹⁵

WEC presented this information (see pie chart, below) to a Vermont legislative committee¹⁶ with a disclaimer acknowledging the sale of high value wind and landfill gas RECs. WEC cannot claim it is providing renewable energy to its customers from wind and landfill gas energy, unless the RECs for those specific generators are retired.



Utilities can also meet the Tier 1 requirement by making what are known as “alternative compliance payments” (ACPs) equivalent to the value of Hydro-Quebec’s (H-Q) environmental attributes. ACPs are defined in statute as:

§ 8004. Sales of electric energy; Renewable Energy Standard (RES)¹⁷

(d) Alternative compliance payment. In lieu of purchasing renewable energy or tradeable renewable energy credits or supporting energy transformation projects to satisfy the requirements of this section and section 8005 of this title, a retail electricity provider in this State may pay to the Vermont Clean Energy Development Fund established under section 8015 of this title an alternative compliance payment at the applicable rate set forth in section 8005.

As long as REC values are worth more than the ACPs, utilities can and will continue to sell those RECs to Massachusetts and Connecticut to count towards those state’s Renewable Portfolio Standard (RPS) programs in order to reduce rates for Vermonters.¹⁸

That the value of the ACP is based on H-Q environmental attributes is of interest. Vermont’s annual amount of renewable energy from H-Q has declined from in the 2012-2016 period, from a contract capacity (power) rating of 310 MW to 225 MW. The H-Q environmental attribute would be a REC if other states recognized H-Q’s large hydro generation as renewable. With numerous proposed transmission lines between H-Q and New England, which if built, would be used to deliver large amounts of renewable energy from H-Q to other New England states, if other states declare H-Q energy to be renewable, that would impact the REC market.

According to the statute, utilities can pay ACPs to the Clean Energy Development Fund (CEDF).¹⁹ “The purpose of the Fund is to increase the development and deployment in Vermont of cost-effective and environmentally sustainable electric power resources, primarily with respect to renewable energy resources, and the use in Vermont of combined heat and power technologies.” Curiously, the CEDF’s *Fiscal Year 2018 Annual Program Plan and Budget*²⁰ contains no reference to ACPs.

The Public Utility Commission (PUC) is required to update the rate for ACPs annually.²¹ In Oct. 2017, the PUC issued an order²² stating “the ACP rates for the 2018 RES compliance year shall be as follows:”

■ ***Utilities can meet the Tier 1 requirement by making what are known as “alternative compliance payments” (ACPs) equivalent to the value of Hydro-Quebec’s (H-Q) environmental attributes.***

Category or Tier	\$/kWh	\$/MWh ⁴
Total renewable energy (Tier I)	0.01013	10.13
Distributed renewable generation (Tier II)	0.06078	60.78
Energy transformation (Tier III)	0.06078	60.78

Vermont’s RES forever allows wind, solar and biomass projects built in Vermont to count towards other states’ RPS, while 75% of Vermont’s goals can be met by monetary and paper transactions that do not require renewables to be built in Vermont to meet the state’s goals.

- Is the state’s policy of allowing the goal to be met with low value RECs consistent with Vermonters’ goal of meeting our energy needs with renewable energy?
- Do Vermonters understand that the state’s energy policy enables 75% of the “90% by 2050” renewable goal is to be met by alternative compliance payments or low value RECs, not additional generation that measurably replaces fossil fuels?

■ *Vermont’s RES forever allows wind, solar and biomass projects built in Vermont to count towards other states’ RPS, while 75% of Vermont’s goals can be met by monetary and paper transactions that do not require renewables to be built in Vermont to meet the state’s goals.*

Tier 2 is defined in state statute as “Distributed renewable generation.”²³

(A) Purpose; establishment. This subdivision establishes a distributed renewable generation category for the RES. This category encourages the use of distributed generation to support the reliability of the State’s electric system; reduce line losses; contribute to avoiding or deferring improvements to that system necessitated by transmission or distribution constraints; and diversify the size and type of resources connected to that system. This category requires the use of renewable energy for these purposes to reduce environmental and health impacts from air emissions that would result from using other forms of generation.

Tier 2 (10%) requires utilities to contract for in-state renewable power and retire the RECs. Tier 2 caps individual project sizes at 5 MW.

In 2017, the PUC changed the net-metering rule (referred to by stakeholders as “net-

metering 2.0”). The new rule provides an economic incentive for net-metered customers to turn their RECs over to the utilities and penalizes these customers for retaining their RECs. As a result, utilities can now meet their Tier 2 requirement using net-metering RECs and avoid constructing or entering into contracts for new in-state renewables. In this scenario, can the net-metering customer claim the energy they generate is renewable? ^{24 25}

Tier 3 is referred to in state statute as “Energy transformation.”²⁶

(A) Purpose; establishment. This subdivision establishes an energy transformation category for the RES. This category encourages Vermont retail electricity providers to support additional distributed renewable generation or to support other projects to reduce fossil fuel consumed by their customers and the emission of greenhouse gases attributable to that consumption. A retail electricity provider may satisfy the energy transformation requirement through distributed renewable generation in addition to the generation used to satisfy subdivision (2) of this subsection (a) or energy transformation projects or a combination of such generation and projects.

Tier 3 (12%) enables utilities to market heat pumps and electric vehicles and weatherization of buildings. This component of the RES is challenging to account for, as it is the most dependent on making predictions decades into the future using today’s technologies.

Scenario Analysis: Energy Transformation Project Requirements (Tier III)		
	2017 - 2% of retail sales	2032 - 12% of retail sales
Weatherization	500	45,000
Heat Pumps	1,100	90,000
Electric Vehicles	700	60,000 <small>(extrapolated)</small>

For an extensive discussion of Tier 3 of the RES, see the paper titled “*Beneficial Disruption: Vermont's Renewable Energy Standard and the Need for Innovative Utility Regulation in the 21st Century*” by Darren Springer, Chief Operating Officer and Manager for Strategy and Innovation at BED.²⁷

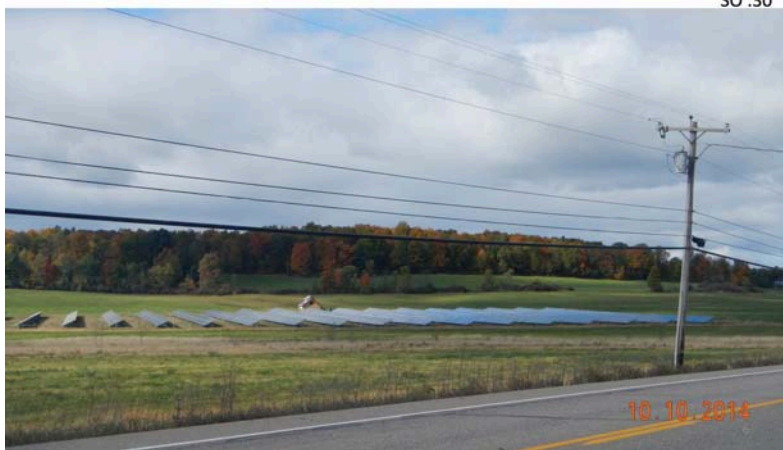


The Standard-Offer Program

Is it still needed?

Created in 2009, the standard-offer program²⁸ was created to encourage merchant power development of renewable energy in Vermont. The program has a project size cap of 2.2 MW. The earliest projects received contracts on a first come, first served basis for high priced power, \$0.30, \$0.27 and \$0.24/kWh. [2009 average wholesale electricity price - \$0.042/kWh²⁹] Those projects have long-term contracts that guarantee high rates for the duration of the contract.

FERRISBURGH SOLAR, Route 7 Cross Pollination



Barton Solar Essex Capital Partners MA, 1.89 MW



After identifying problems with the program’s implementation and effectiveness, in 2013 the PUC changed the way the projects are chosen, to let the market determine the price.³⁰ The most recent bids into the standard-offer program have been \$0.08 to \$0.10/kWh. [2017 average wholesale electricity price - \$0.033/kWh³¹]

VEPP, Inc., the standard-offer program administrator, wrote to the PUC in October 2017, “Since the first Vermont RFP was issued in 2013, twenty-seven projects have been awarded Standard Offer Contracts. Of the twenty-seven projects awarded contracts, three are commissioned and ten have withdrawn. More than half of the remaining projects have requested commissioning milestone extensions (eleven out of remaining seventeen).”³²

RFP SUMMARY			
RFP YEAR	CAPACITY (MW) SOLICITED	CAPACITY (MW) CONTRACTED	CAPACITY (MW) ON-LINE
2013	5.0	8.0	4.0
2014	5.0	2.2	2.2
2015	5.0	4.7	2.2
2016	7.5	4.7	0.0
2017 (October)	7.5	9.9	0.0
TOTAL	30.0	29.5	8.4

In Dec. 2017, the PUC opened an investigation to review the effectiveness of the standard-offer program. At the close of the comment period, Feb. 2, 2018, some Vermont utilities, one developer, and VCE submitted responses to the PUC.³³

The PUC asked commenters to address whether utilities should continue to receive an exemption from the standard-offer program. The way the program was initially conceived, chosen bids guarantee the project developer a contract for the power, and the power is distributed throughout Vermont’s utilities. In practice, though, WEC, BED and other utilities have sought and received exemptions from the program as they claim 100% renewable generation.

Vermont Electric Coop (VEC) addressed the exemption in its Feb. 2 submission: “The exemption allows a utility to purchase energy from a large out-of-state wind project (with or without retaining the renewable attributes of the energy) and thereby avoid purchases from in-state standard-offer projects. This exemption seems to be a clear disconnect from current state policy and should be eliminated.”

■ *“The exemption allows a utility to purchase energy from a large out-of-state wind project (with or without retaining the renewable attributes of the energy) and thereby avoid purchases from in-state standard-offer projects. This exemption seems to be a clear disconnect from current state policy and should be eliminated.”*

The PUC also received comments from the Department of Public Service (DPS) and others that the standard-offer program should be scaled back or eliminated, because with the enactment of the RES, it is no longer needed.

Standard-Offer Project RECs are turned over to the Utilities to meet Tier 2 of the RES

RECs from standard-offer projects are turned over to the utilities that are required to take the energy from each project. With no reporting requirements in place, the public has no way of knowing how many RECs are retired and for which standard-offer projects.

In July, 2017, GMP's Dorothy Schnure provided the following information to individual ratepayers³⁴ who inquired how GMP handles RECs from standard-offer projects:

“The utilities each make their own call on what they do with the RECs in a standard offer project. Utilities are required to retire RECs from net metered projects, so they evaluate how many RECs they get from net metered projects before determining what to do with RECs from other sources.”

~ July 3, 2017

“We retired in Vermont more than 25% of the RECs we received from Standard Offer projects in the time period below. The remainder we sold to reduce costs for all our customers.”

~ July 5, 2017

Based on the above information, it appears that some RECs from standard-offer projects are being used to meet the utilities' Tier 2 goal that requires distributed renewable energy to be built in state with RECs retired.

- Should the standard-offer program continue as is, be scaled back, or eliminated?



Net-metering

Lawmakers never envisioned that net-metering would be used by merchant developers to maximize profits and fill up the grid

Vermont has been a leader with policies that encourage residential and commercial customers to erect solar panels on rooftops and adjacent to structures, with a generous rate paid for the energy produced, well above market prices.³⁵ The Vermont Energy Act of 2011, Act 46, required all utilities to offer a solar adder setting total value at \$.20 cents/kWh. [2011 wholesale price of electricity - \$.046/kWh³⁶]. In 2017, the PUC updated the net-metering rule.³⁷

The 2011 rule is referred to as “net-metering 1.0.” The new rule is called “net-metering 2.0.”

Comparative Cost for 500-kW Projects Developed Under Different Programs

		NM 1.0 (no RECs)	NM 2.0 (w/RECs)	PPA	Standard Offer
¢	Price/kWh	\$0.1900	\$0.1692	\$0.1163*	\$0.1167**

38

Proposed changes to the net-metering rule caused an outcry from net-metering customers who invested in systems based on the high rate, when the PUC recommended the rate be reduced to bring it more in line with current market prices. The draft net-metering 2.0 rule also initially contained a requirement that the customer on whose site the project is located must use at least 50% of the power generated. That provision was dropped from the final rule. The rule update went through numerous iterations before adoption.

The generous rate set for net-metering customers is partially responsible for GMP’s recent rate increase of 5.02 percent.³⁹

An unintended consequence of the 2011 legislation is that some developers’ business models are based on profiting from net-metering’s differential between the retail price of the power generated and the price paid for net-metered power.

Net-metering was initially envisioned as a program that would encourage local generation to serve the needs of the structure next to or on which the renewable technology is placed. Merchant developers have maximized their profits by building 150 - 500 kW solar projects in remote areas far from the location of the customer (off-taker).

In this business model, the actual product is the package of incentives, including federal and state tax credits, REC sales, accelerated depreciated schedules and other financial incentives sold to investors. The energy generated is merely a by-product, to be off-loaded at a discount

to recruited customers. Net-metering credits become just one more added bonus to investors.

Vermont's net-metering 1.0 policy resulted in some developers submitting applications with their own meter as the off-taker, and no real customer lined up. The result of this unintended application of net-metering is raising rates for Vermonters and saturating the

grid in some areas of Vermont with projects that receive a high price for the energy generated, while homeowners and local businesses are shut out of net-metering



because there is no more room on the grid.⁴⁰ Ben Luce, Ph.D., of Lyndon State College warned in 2010 this could happen, and he was right.⁴¹

In February 2018 after industry representatives complained that the change in the net-metering rule was slowing solar development, Vermont's Senate Finance Committee took testimony on net-metering from WEC, VEC, VPPSA, the PUC and GMP and others.⁴²

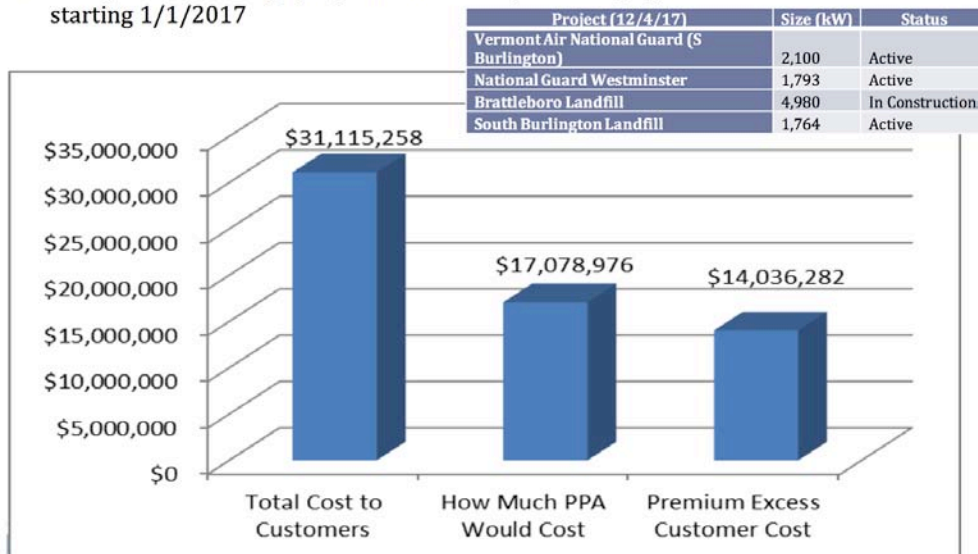
Melissa Bailey of VPPSA testified⁴³ that under net-metering 2.0 “some customers are reaping more benefit while all customers are paying for the program, and the value being delivered to the utilities are significantly lower than the rates being paid to net-metering customers.” She told legislators, “The differential in the value that ratepayers get and what is paid out is \$.05 to .06/kWh,” and “We are seeing that the installed costs can be recovered just at the retail rate, roughly \$.15/kWh so anything above that is essentially profit or return on investment.”

■ ***“We are seeing that the installed costs can be recovered just at the retail rate, roughly \$.15/kWh so anything above that is essentially profit or return on investment.”***

GMP's Robert Dostis, who had been a legislator involved in the development of the net-metering policy, presented the following information showing how much net-metering is costing ratepayers compared to how much it would cost the utility to enter into a Power Purchase Agreement instead:

2014: Act 99 Net Meter Changes

- ▶ Increased cap from 4% to 15%
- ▶ Allowed 5 MW solar on a closed landfills (Cost – see chart - total built 11 MW)
- ▶ Charged PUC to design program to balance pace of deployment with cost shift starting 1/1/2017



Net Metering Today

- ▶ 1,300% increase since 2013
- ▶ Growth under NM 2.0 remains robust with 32.2 additional MW (= 4.6% of cap = Growth leader in U.S.)
- ▶ More than half of the capacity are 500 kw systems that are essentially stand-alone merchant generating plants
- ▶ Merchant generators receive the net meter rate, but
- ▶ Unlike traditional net metering (roof top/back yard):
 - ▶ They send power directly to the grid rather than to a home or business
 - ▶ They sell power to customers through PPA or contract
 - ▶ They serve primarily commercial customers

GMP's Dostis testified that more solar has diminishing value now, as the peak has moved to the evening. He said the customer cost impact of net-metering for 2018 is estimated to be around \$24 million.

Many of the large net-metered 1.0 projects have been selling the RECs out of state, so they are not producing renewable energy that counts towards Vermont's goals. It is not at all clear that Vermonters who have purchased that power understand they are not actually buying renewable energy. The PUC attempted to address this problem with recent changes to the rule that reduces the price paid for net-metering from \$.19 to \$.169/kWh and allows 500 kW projects only on preferred sites, while providing an economic incentive to turn the RECs over to the utilities and penalizes homeowners for retaining their RECs.

Net-metering RECs are turned over to the Utilities to meet Tier 2 of the RES

With net-metering 2.0, the RECs are being retired by the utilities to meet the Tier 2 goals of the RES. This transfers the renewable attributes to the utilities. By using net-metering RECs to meet the Tier 2 requirements, utilities do not have to build new in-state generation to meet Tier 2.

- Should the rate of compensation be changed to eliminate the profit motive?
- Should renewable energy be required to be built next to load to reduce distribution and transmission infrastructure upgrades and costs?
- Should utilities do a better job identifying load and grid capacity to help developers and planners identify areas where additional development is needed?



Utility and Merchant Developers

It is less expensive for utility customers and more profitable for utility investors to build and own generation than to enter into contracts with merchant developers

Unlike other New England states, Vermont has not deregulated its electricity market. In deregulated states, utilities were required to dispose of their generation assets and became solely distribution companies.

At a March 2018 ISO-NE consumer liaison group meeting, New Hampshire Public Utilities Commissioner Michael Giaimo said that New England's market restructuring has benefited consumers.

“No longer can a utility build a generation facility solely on the backs of ratepayers,” Giaimo said. “The system of captive ratepayers being susceptible to stranded costs has been replaced by developers and their shareholders bearing the risks and the rewards associated with building, operating and maintaining a generation facility.”⁴⁴

In Vermont, investor-owned utilities can own generation and make a 9% guaranteed return for shareholders on any infrastructure investment. Tensions exist between developers who complain about the utility monopoly and utilities that are finding that it is less expensive for its customers and more profitable for its investors to build and own generation than to enter into contracts with merchant developers who are focused on making a profit.

VEC testified recently in the Senate Finance Committee that the 5 MW group net-metered project they developed is more cost-effective for its ratepayers than the projects developed by merchant developers.⁴⁵

Utilities are regulated by the PUC. Merchant developers are operating in Vermont without adequate regulation. Vermont landowners enter into non-transparent leases with developers of wind and solar projects. In some instances, developers seek out landowners for project development that exploit vulnerable Vermonters who are experiencing financial hardship. Municipalities⁴⁶ and schools are solicited by developers and enter into power purchase agreements without adequate disclosure or transparency regarding the mechanisms by which those projects are financed.

An additional level of regulation of merchant developers would protect the interests of Vermonters, and provide transparency on financial contracts and landowner leases. Vermont could also develop a code of ethics for merchant developers and create standards by which merchant developers are expected to comply to address exploitation.

The SHEI

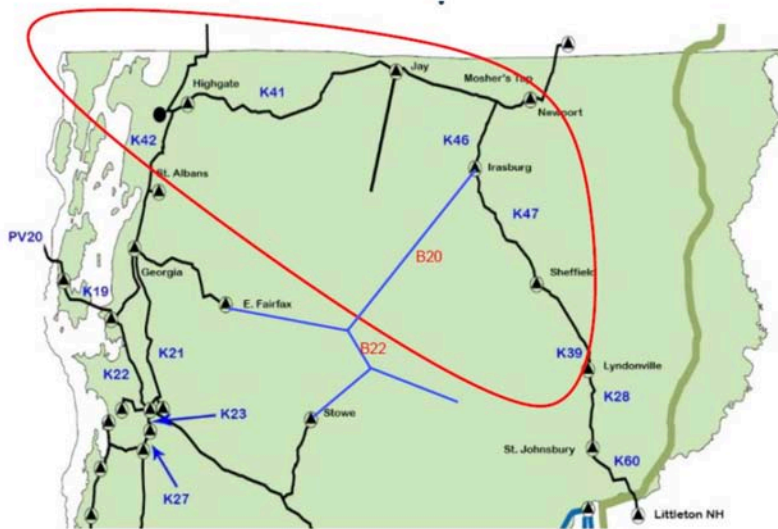
New rules from regional grid manager, ISO-NE, charges ratepayers for poor planning by regulators and developers

In January 2018, the PUC held a workshop for interested parties to discuss the Sheffield Highgate Export Interface, or SHEI as it is called. More than one presenter noted that the problem is complicated, so readers are encouraged to watch the video⁴⁷ and/or read the transcript⁴⁸ to understand the details and get an excellent education in operation of the grid and power market issues.⁴⁹

Generation constructed in the northern part of Vermont exceeds existing transmission capacity. Those generators include Brookfield Renewable Energy's Sheffield Wind and GMP's Lowell Wind projects, numerous solar arrays, hydro and landfill gas generation. The SHEI transmission system also carries H-Q power into and through Vermont.

Vermont Electric Power Company (VELCO), responsible for managing the statewide grid, states in its presentation about the SHEI issues,⁵⁰ "Robust, long-term solutions that support '90% renewable by 2050' energy vision will be complex and could lead to costly reinforcements and other strategies."

- ***Total generation in SHEI is 430 MW at maximum potential output, while total load is between 20 and 60 MW, on average 35 MW. The electricity in the SHEI area is trying to get to Chittenden County where it is needed, but cannot.***



The Sheffield Highgate Energy Interface Area

Total generation in SHEI is 430 MW at maximum potential output, while total load is between 20 and 60 MW, on average 35 MW. As a result, electricity in the SHEI area cannot reach the load center in Chittenden County where it is needed.

In May 2016, ISO-NE, the regional grid manager required to assure system reliability,⁵¹ instituted new rules⁵² to address grid congestion. These new rules have increased the costs for utilities and therefore ratepayers. Under the new rules and under the terms of existing contracts, ratepayers, not the project developer, are paying the cost; e.g. \$550,000 for VEC ratepayers from Oct. 2015 through April 2016.⁵³

VELCO is working on the issue and commissioned a study.⁵⁴ Even with the clear identification of the SHEI problem and high cost to ratepayers, developers are still proposing new generation in the grid-constrained area to the dismay of the utilities and grid operators.

The SHEI problem provides a good education about why it makes sense to site new renewable generation near load, and shows why, for instance, it was a ‘mistake’ to build 63 MW of generation (the Lowell wind project) so far from where the power can be used, a scenario not adequately vetted during the CPG project permitting.

Stakeholders seem to be in agreement that the first step to fix the SHEI problem is to reduce curtailment at existing projects. This fix also reduces the costs to utilities and ratepayers. So far, nobody is guaranteeing that the fix will enable more new generation to be constructed in this grid-constrained area without expensive transmission upgrades and a decision about who pays for it. Two questions loom on the horizon:

- Should the need for additional transmission during peak generation times from intermittent resources without sufficient load to absorb the energy be part of the cost to develop/own/manage a project?
- Should ratepayers continue to pay those costs?

■ ***“Robust, long-term solutions that support ‘90% renewable by 2050’ energy vision will be complex and could lead to costly reinforcements and other strategies.”***



Act 174 Energy Planning

Touted upon passage in 2016 as “giving towns more say,” compliance has left towns, including volunteers working on energy issues, vulnerable to lawsuits

Act 174 directs regional planning commissions (RPCs) to develop a plan to meet criteria written by the DPS.⁵⁵ Three pilot RPCs have had their regional plans certified by DPS, enabling them to certify municipal plans that meet the DPS standards. The rest of the RPCs are finalizing their draft regional plans to meet the deadline for certification by DPS. Addison County’s RPC is the last to submit a draft regional energy plan, and the Town of New Haven submitted a municipal plan directly to DPS that was rejected for not meeting the criteria.



The municipal planning process is voluntary, while the regional planning process is not. To receive certification, towns are expected to develop maps of “preferred sites” for renewable generation. Certified plans receive the higher standard of review by the PUC of “substantial deference” instead of the lower standard currently in place of “due consideration.”

On Jan. 24, 2018, the intent of Act 174 experienced a major setback. A developer sued the Town of Bennington’s Select Board, Planning Commission, individual members of its ad hoc energy subcommittee, and the Bennington County Regional Commission over its Act 174 planning process and preferred sites map.⁵⁶

The project developer objected to the way the town plan was developed, and in particular objected to the “preferred sites” map that did not include all of the solar projects the developer is pursuing in Bennington.⁵⁷ This action by a developer raises questions for towns and volunteers working on behalf of their town.

Vermonters want to be involved in where and what type of energy is sited in their communities. The Act 174 planning process places a large burden on volunteer planners and takes a long time. While regions and municipalities struggle with

- ***On Jan. 24, 2018, the intent of Act 174 experienced a major setback. A developer sued the Town of Bennington’s Select Board, Planning Commission, individual members of its ad hoc energy subcommittee, and the Bennington County Regional Commission over its Act 174 planning process and preferred sites map.***

the long list of requirements,⁵⁸ renewable energy projects continue to be proposed by developers who are not working with communities to find sites that work for everyone.

- Is everyone who now serves on a town or regional select board or planning commission at risk of being sued by a landowner who objects to having his/her land shown on a “preferred sites” map, or by a developer whose land is not shown on the “preferred sites” map?
- Is choosing sites an appropriate role for planners?
- Will the legislature fix this threat to volunteer community board and commission members?
- Is the goal of getting plans reviewed under the “substantial deference” standard rather than “due consideration” a sufficient incentive for planning commissioners to risk being sued by developing the “preferred sites” map?



Vermont and the ISO-NE Regional Grid

Vermont is not an island

Electricity flows through Vermont and interconnects with Canada, New York, Massachusetts and New Hampshire. Policies that affect commercial activities between states must consider and comply with the Commerce Clause. “State laws that block imports or exports of goods across state lines, or impose added taxes or charges on out-of-state goods are considered impermissible barriers under the Commerce Clause.”⁵⁹

The Commerce Clause and RPS issues are complicated and the law is not settled on this topic. Attempts to limit renewable energy development to in-state may be subject to litigation.

“Requirements that a project be located in a state or region to qualify for the RPS discriminate on their face because they treat in-state and out-of-state projects differently solely for geographic reasons. As such, location-based RPS requirements can avoid invalidation under the Commerce Clause only if the state can show that there are no other non-discriminatory alternatives available to achieve legitimate state goals.”⁶⁰

Vermont’s grid is self-contained and is managed by the non-profit called VELCO which is jointly owned by Vermont’s utilities, unique among New England states.

VELCO Transmission Lines



**Peak load
Less than
1,000
MW**

As stated on its website,⁶¹ “VELCO’s works with Vermont’s 17 local utilities and the New England regional grid operator to meet high national and regional standards of reliability designed to ensure that electricity, the lifeblood of our homes, economy and society, is always available, even in times of peak demand, severe weather and unforeseen events.”

ISO-NE Region



- 6.5 million households and businesses; population 14 million
- Approximately 350 generators
- Approximately 500 participants in the marketplace (those who generate, buy, sell, transport, and use wholesale electricity and implement demand resources)
- Over 8,600 miles of transmission lines
- 13 interconnections to electricity systems in New York and Canada
- 136,355 gigawatt-hours (GWh), all-time annual energy served, set during 2005
- All-time peak demand of 28,130 megawatts (MW), set on August 2, 2006
- Approximately 31,000 MW of total generation for 2014
- Approximately 2,300 MW of demand resources for 2014
- Market value in 2014:
 - \$10.47 billion total
 - \$9.08 billion energy market
 - \$1.06 billion capacity market
 - \$0.33 billion ancillary services market
- Approximately \$7.2 billion in transmission investment since 2002; approximately \$4.8 billion planned

All-time peak demand of 28,130 MW on August 2, 2006

Vermont's load is roughly 4% of regional load.

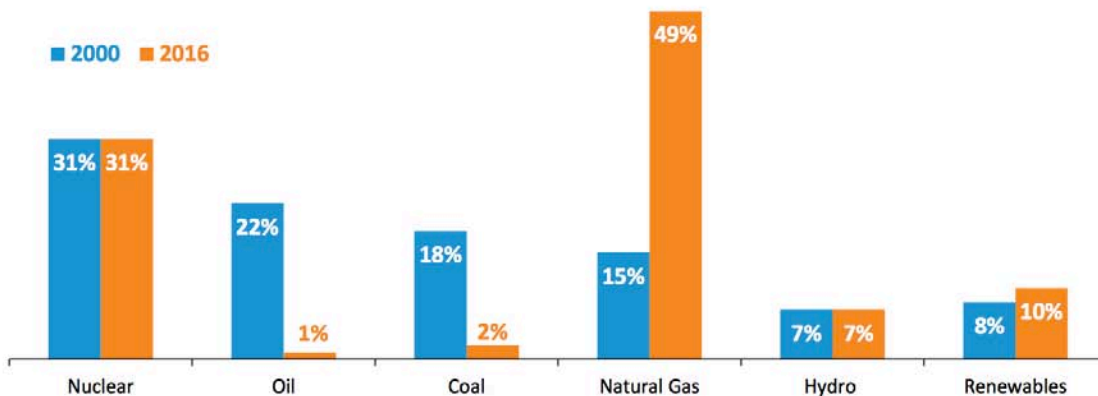
In December 2017, Gordon van Welie, President and CEO of ISO-NE,⁶² gave a presentation to a broad cross-section of regional stakeholders titled “Key Grid Challenges Facing the New England Electric System.”⁶³

The following two slides from van Welie’s presentation should serve as a reality check for Vermonters who believe that the state’s “90% by 2050” goal can be met simply by building solar and wind in Vermont and the region, and by switching heating and transportation to electric vehicles and heat pumps.

In the last 16 years, the region has reduced oil and coal consumption in the fuel mix. Those fossil fuels have been replaced by another fossil fuel, natural gas. New natural gas generating capacity is forecast to increase. During the same time period, despite supportive policies in many but not all New England states, energy from renewables has only increased from 8 to 10%.

New England Has Seen Dramatic Changes in the Energy Mix: *From Coal and Oil to Natural Gas*

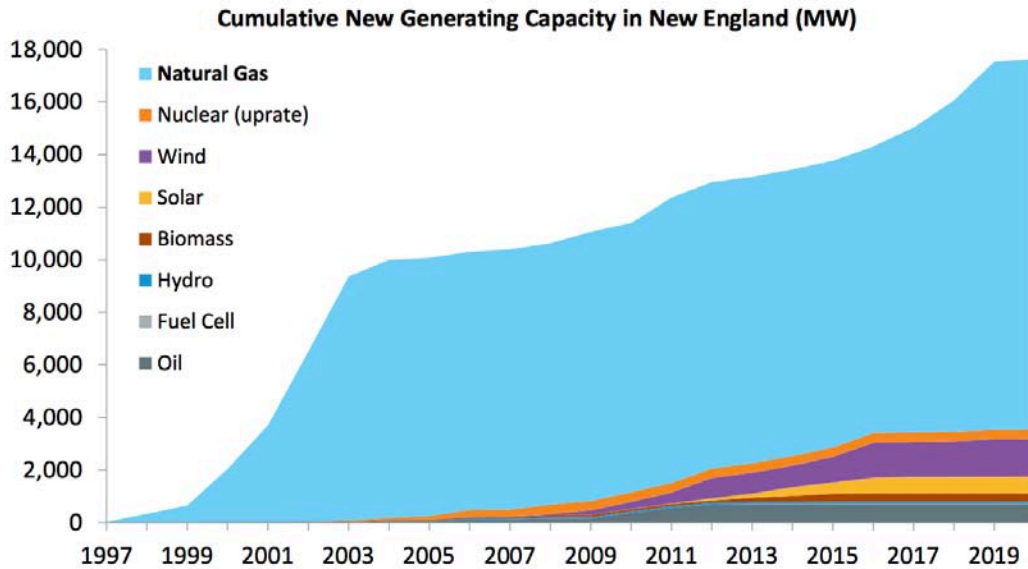
Percent of Total **Electric Energy** Production by Fuel Type
(2000 vs. 2016)



Source: ISO New England [Net Energy and Peak Load by Source](#)
Renewables include landfill gas, biomass, other biomass gas, wind, solar, municipal solid waste, and miscellaneous fuels



Natural Gas Is the Dominant Fuel Source for New Generating Capacity in New England



Note: New generating capacity for years 2017 – 2020 includes resources clearing in recent Forward Capacity Auctions.



Slightly more current data⁶⁴ shows an increase in renewables in the region from 8 to 11%.

Sources of Electricity Production

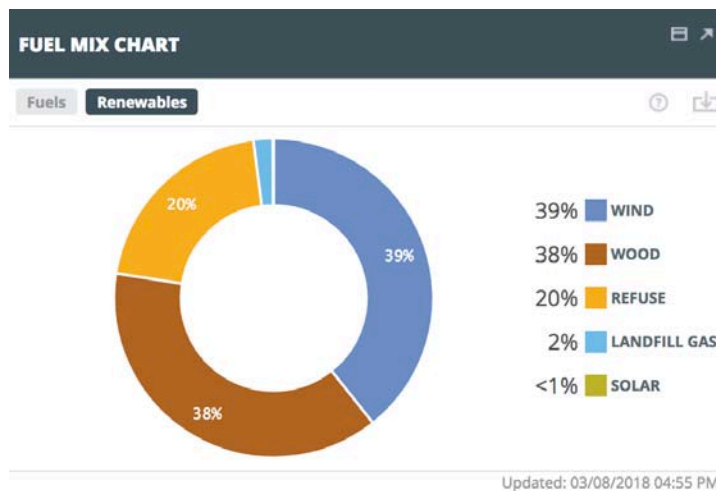
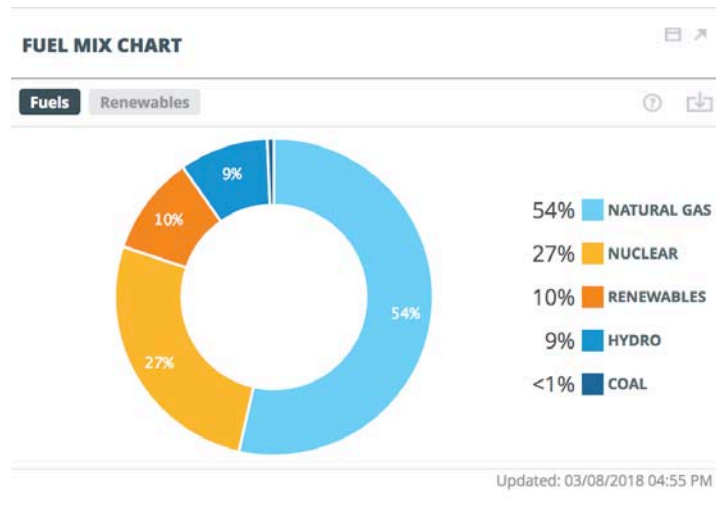
Major shift from oil and coal to natural gas over the past 17 years



The topic dominating the ISO-NE grid operators is “Operational Fuel-Security”⁶⁵ – “the possibility that power plants won’t have or be able to get the fuel they need to run, particularly in winter – is the **foremost challenge to a reliable power grid in New England.**”

Vermonters who “go solar” and install electric air source heat pumps or invest in electric vehicles may not be aware that on cloudy days and after dark, they are not fueling their heating or transportation with renewable energy, but are relying primarily on fossil fuels.

The following two charts from ISO-NE’s Real Time Maps and Charts⁶⁶ show the Fuel Mix at around 5 p.m. on a cloudy day, March 8, 2018, and the Renewable portion of the Fuel, the majority of which is Wood and Refuse.



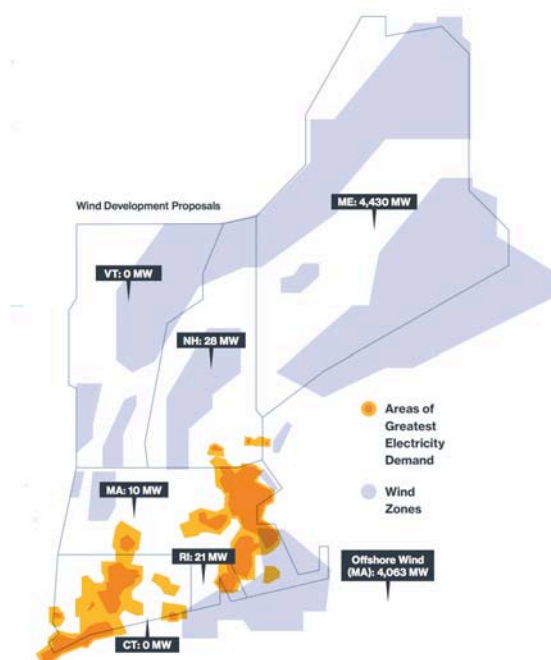
The Challenge of Meeting Vermont's "90% x 2050" goal with 2018 Technology

Grid operators must assure reliability. When the wind does not blow and the sun does not shine, the regional grid must still be ready and able to supply up to 28,000 MW of energy. Battery storage is advancing and is expected to be a major factor in the transition from fossil fuels to renewables.

In cloudy New England with winter weather, renewables backed up by batteries are not sufficient, at least not with current technologies. The generator is still needed, especially in the winter months. For now, when wind and solar are not producing energy, the regional grid is fueled by natural gas, nuclear, and some hydro, landfill gas, refuse and wood.

Massachusetts and Connecticut are attempting to increase the amount of H-Q power in the region. Gordon van Welie said⁶⁷ in Dec. 2017 that H-Q is trying to sell power to Ontario, New York, and New England, and H-Q does not have that much power to sell to everyone.

A possibility for supplying the region's needs is off-shore wind, which is a much stronger and more consistent resource than the on-shore wind located in northern New England. In either scenario, the cost of transmission is expected to be expensive to transport the wind energy to the load centers in Massachusetts and Connecticut.



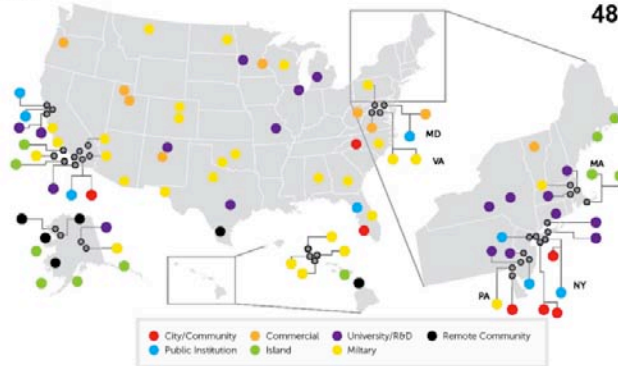
68

On-shore Wind Resources (purple) and Areas of Greatest Electricity Demand (orange)

One possibility for Vermont is to create Microgrids.

Map of U.S. Operational Microgrid Deployments

124 microgrids* are currently in operation, with a total generation capacity of 1,169 MW



Regional hotspots include California (23), Alaska (12), New York (10), and Hawaii (8).

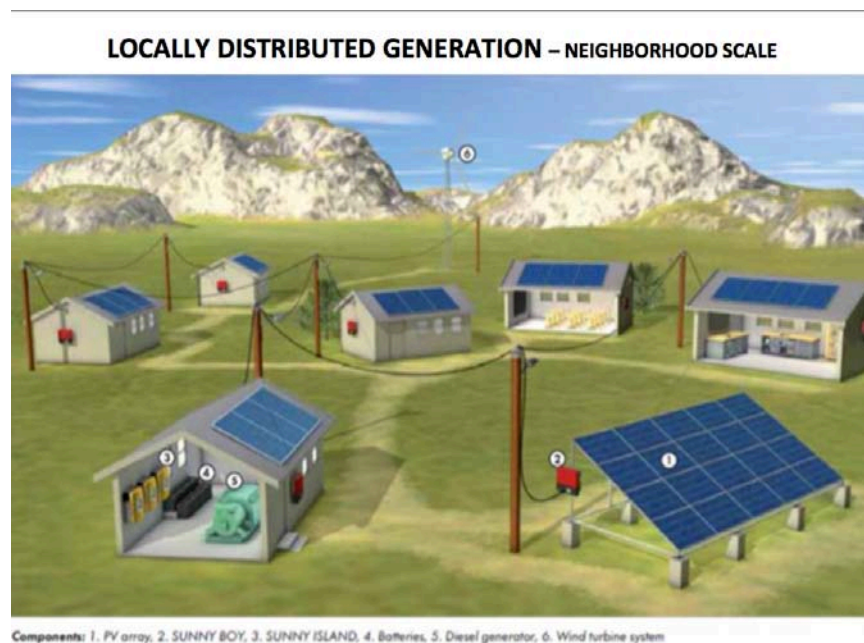
Source: GTM Research North American Microgrids 2015

Microgrids can be created on a community, regional, or statewide scale.

LOCALLY DISTRIBUTED GENERATION COMMUNITY, REGIONAL, STATEWIDE SCALE MICROGRID



Microgrids in cloudy Vermont winters would require a local generator, or the use of the regional grid to supply power when the renewable resource and battery storage are not adequate. At this time, the local generator's fuel would likely be trucked-in natural gas.



Another possible solution for Vermont is to require the utilities to purchase more H-Q power for Vermont. Since current state policy is to meet 75% of the goal by 2032 with ACPs based on the low value of H-Q's renewable attributes, a more honest energy policy could be to purchase the actual resource. If Vermont purchases more H-Q energy, unlike intermittent generation from wind and solar, the H-Q energy could be scheduled and delivered as needed to supply load.

No matter what path Vermont chooses in the future, it is important to think in terms of the system. To date, too much emphasis has been placed on technology, building wind and solar, converting consumers to heat pumps and electric vehicles. How that system is fueled, whether it is scaled to meet a community's need or the state's need, or as part of the regional system, Vermonters need to begin to incorporate the overall system into energy planning.

One aspect of the transition to "green" energy that has also been missing from consideration to date is the externalized environmental costs of components of renewable energy technologies. The mining of rare earth minerals,⁶⁹ lithium,⁷⁰ and cobalt⁷¹ used in wind turbines, solar panels, smart phones, battery storage, and electric vehicles is a still largely unacknowledged disconnect that justice conscious Vermonters can be a leader in addressing.

Recommendations to Improve Energy Policy Outcomes

- Phase out REC sales for in-state renewables
- Disallow H-Q environmental attributes for compliance with Tier 1
- Eliminate ACPs for compliance with Tier 1
- Set net-metering rate at retail rate, eliminating profit motive
- Clarify renewable status of net-metered RECs turned over to utilities
- Tie Tier 3 to mechanisms to facilitate energy innovation technologies powered by renewables rather than fossil fuels
- Create publicly available database of all in-state renewables, under each program, with REC status and contract length
- Eliminate standard-offer program
- Regulate merchant developers with code of ethics and disclosure of lease and contract terms
- Require financing mechanisms be publicly available if they include state, local, and/or federal subsidies for net-metered and standard-offer program renewable energy development
- Eliminate Act 174 certification process and give municipal and regional plans “substantial deference” in the CPG process
- Require utilities to perform more analysis, planning and collaboration with planners and the public to assure that renewables minimize transmission upgrades and are constructed where needed, close to load
- At all levels of new renewable development create a transparent system that makes all data and costs public and discloses who is financially benefitting and how much
- Establish green technology certification standards
- Develop programs and work regionally and in-state to reduce costs and consumption, increase land-based resilience to the effects of extreme weather events, and change behavior

Conclusion

Vermonters deserve transparent, consistent, easily understood policies on social, environmental and economic issues like energy consumption and the transition to renewable energy sources. Much of the energy policy put in place by past legislatures and governors is under scrutiny, now that implementation has resulted in predicted and unforeseen problems.

Vermonters have made it clear they want to transform the state's energy system away from fossil fuels to renewable energy. The current system lacks transparency in terms of costs, profits, and benefits. State agencies have been required to administer standard-offer, net-metering, Act 174 Planning and CEDF programs, each with their associated websites and no one place in the bureaucracy that brings it all together.

There is no single place that Vermonters can go for information about how much renewable energy has been deployed and where, and what the status of RECs is for each project. Nor do ratepayers have any ability to know if utilities are paying the ACP penalty rather than purchasing RECs, or the details of how utilities claiming to be 100% renewable are accounting for that claim.

State policies support meeting goals with paper and monetary transactions that are so complicated few people understand the system politicians have put in place, including many of the politicians themselves. The policies are driven by profit seeking, not by the implied goal of reduced carbon emissions.

Opinions of climate change notwithstanding, our planet is in trouble: more extreme and uncertain weather is undeniable. An energy transformation dependent on the same resource extraction model and levels of consumption as fossil fuels is not a long-term solution.

Under the circumstances, fraught with uncertainty and international haggling, the best possible local outcomes are achieved when all stakeholders – utilities, developers, regulators, property owners, investors and communities – are well-informed partners in transparent, equitable solutions.

- *“State policies support meeting goals with paper and monetary transactions that are so complicated that few people understand the system that politicians have put in place, including many of the politicians themselves.”*

Acronyms

ACP – Alternative Compliance Payment

BED – Burlington Electric Department

DPS – Department of Public Service

CEDF – Clean Energy Development Fund

CPG – Certificate of Public Good

GHG – GreenHouse Gas

H-Q – Hydro-Quebec

ISO-NE – Independent System Operator of New England

NM – Net Metering

PUC – Public Utility Commission (formerly Public Service Board)

REC – Renewable Energy Credit (also known as Renewable Energy Certificate)

RES – Renewable Energy Standard (similar to RPS)

RPC – Regional Planning Commission

RPS – Renewable Portfolio Standard (similar to RES)

SHEI – Sheffield Highgate Export Interface

VCE – Vermonters for a Clean Environment

VEC – Vermont Electric Cooperative

VELCO – Vermont Electric Power Company

VEPP, Inc. – Vermont Electric Power Producers administers the standard-offer program

VPPSA – Vermont Public Power Supply Authority

WEC – Washington Electric Coop

Endnotes

Copy and paste links into browser if clicking on them does not work

¹ Title 30: Public Service, Chapter 89: Renewable Energy Programs
<https://legislature.vermont.gov/statutes/fullchapter/30/089>, ePUC Case No. 8550

¹ Title 30: Public Service, Chapter 89: Renewable Energy Programs
<https://legislature.vermont.gov/statutes/fullchapter/30/089>, ePUC Case No. 8550

² Title 30: Public Service, Chapter 089: Renewable Energy Programs,
Subchapter 001: General Provisions, § 8005. RES categories
<https://legislature.vermont.gov/statutes/section/30/089/08005>, see section (a)(1)C

³ The numbers do not add up to 100%. VCE cannot explain why.

⁴ Title 30: Public Service, Chapter 089: Renewable Energy Programs,
Subchapter 001: General Provisions, § 8005. RES categories
<https://legislature.vermont.gov/statutes/section/30/089/08005>

⁵ Green-e Glossary: <https://www.green-e.org/glossary>
Power and energy are sometimes used interchangeably. The “Null Power” definition uses the term power loosely, rather than the correct term “energy”. RECs are based on units of energy, not power. Energy equals Power multiplied by time. E.g. a 1.0 MW renewable generator operating at maximum output continuously over a month produces 720 MWh of energy and 720 MWh of RECs.

⁶ *Do You Know Who Owns Your Solar Energy? The Growing Practice of Separating Renewable Attributes from Renewable Energy Development and its Impact on Meeting Our Climate Goals*, Kevin Jones, Mark James, Heather Huebner, *Fordham Environmental Law Review*, Volume 28, Number 2 2017 Article 2, Spring 2017
<https://ir.lawnet.fordham.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1787&context=elr> or <https://tinyurl.com/y8bwbj1h>

⁷ *Washington Electric Will File For Rate Increase*, By Steve Zind • Nov. 4, 2016
<http://digital.vpr.net/post/washington-electric-will-file-rate-increase#stream/0> or
<https://tinyurl.com/ycahwrf6>

⁸ *First Wind Project on U.S. Forest Service Land Set to Break Ground*, Terri Hallenbeck, Sept. 16, 2016, <https://www.sevendaysvt.com/OffMessage/archives/2016/09/16/first-wind-project-on-us-forest-service-land-set-to-break-ground> or <https://tinyurl.com/y7bb8d5w>

⁹ *Comments of Industrial Wind Action Group, Inc., Deerfield Wind, LLC, Post-CPG Compliance Filings, Set 3, July 22, 2015*, <https://vermontersforacleanenvironment.files.wordpress.com/2015/12/wa-postcp3-comments-20150722-final.pdf> or <https://tinyurl.com/ycdmt8r8>

¹⁰ BGC Environmental Brokerage Services, <http://www.bgcebs.com/Energy/?page=Renew>

¹¹ *An Analysis of Renewable Energy Credits in Vermont*, Gregg Freeman, Heather Huebner, Aaron Kelly, Vermont Law School Energy Clinic, [http://www-assets.vermontlaw.edu/Assets/iee/VLS Energy Clinic Report on RECs Final for SNRE.pdf](http://www-assets.vermontlaw.edu/Assets/iee/VLS%20Energy%20Clinic%20Report%20on%20RECs%20Final%20for%20SNRE.pdf) or <https://tinyurl.com/ya4knvww>

¹² *Do You Know Who Owns Your Solar Energy? The Growing Practice of Separating Renewable Attributes from Renewable Energy Development and its Impact on Meeting Our Climate Goals*, Kevin Jones, Mark James, Heather Huebner, *Fordham Environmental Law Review*, Volume 28, Number 2 2017 Article 2, Spring 2017 <https://ir.lawnet.fordham.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1787&context=elr> or <https://tinyurl.com/y8bwbjhl>

¹³ Grade A Fancy and Grade C Dark are Old Terminology and are more useful for the purposes of this paper. New maple syrup grades are descriptive <https://vermontmaple.org/maple-syrup-grades>

¹⁴ Low Impact Hydropower Institute <https://lowimpacthydro.org/>

¹⁵ *Over 100 Global Cities Get Majority of Electricity from Renewables*, February 27th, 2018, by Andrea Bertoli, <https://cleantechnica.com/2018/02/27/100-global-cities-get-majority-electricity-renewables/> or <https://tinyurl.com/ybdw62bc>

¹⁶ Washington Electric Cooperative, House Energy & Technology Committee, January 19, 2017, Barry Bernstein & Patty Richards, [https://legislature.vermont.gov/assets/Documents/2018/WorkGroups/House Energy and Technology/Overview/W~Patty Richards~Washington Electric Cooperative~1-19-2017.pdf](https://legislature.vermont.gov/assets/Documents/2018/WorkGroups/House%20Energy%20and%20Technology/Overview/W~Patty%20Richards~Washington%20Electric%20Cooperative~1-19-2017.pdf) or <https://tinyurl.com/ybqhlb6r>

¹⁷ Title 30: Public Service, Chapter 089: Renewable Energy Programs, Subchapter 001: General Provisions, § 8004. Sales of electric energy; Renewable Energy Standard (RES), <https://legislature.vermont.gov/statutes/section/30/089/08004>

¹⁸ *Types of Renewable Energy Credits in New England: A Summary*, Public Service Department, Jan. 23, 2015, [https://legislature.vermont.gov/assets/Documents/2016/WorkGroups/House Ways%](https://legislature.vermont.gov/assets/Documents/2016/WorkGroups/House%20Ways%20and%20Means/Types%20of%20Renewable%20Energy%20Credits%20in%20New%20England%20-%20A%20Summary.pdf)

[20and Means/Bills/H.40/H.40~Asa Hopkins~Types of Renewable Energy Credits in New England~2-20-2015.pdf](#) or <https://tinyurl.com/y94fp9yo>

¹⁹ Clean Energy Development Fund,
http://publicservice.vermont.gov/renewable_energy/cedf

²⁰ *Clean Energy Development Fund Fiscal Year 2018 Annual Program Plan and Budget*
http://publicservice.vermont.gov/sites/dps/files/documents/Renewable_Energy/CEDF/Reports/CEDF_Fiscal_Year_2018_Annual_Program_Plan_and_Budget.pdf or
<https://tinyurl.com/yckrlfuz>

²¹ Public Utility Commission, Renewable Energy Standard,
<http://puc.vermont.gov/electric/renewable-energy-standard>

²² Continuing issues related to the implementation of the Renewable Energy Standard,
October 18, 2017, ePUC Case No. 4632-INV

²³ Title 30 : Public Service, Chapter 089: Renewable Energy Programs,
Subchapter 001: General Provisions, § 8005. RES categories,
<https://legislature.vermont.gov/statutes/section/30/089/08005>

²⁴ *Guidance for Third-Party Solar Projects*, State of Vermont, Office of the Attorney General,
[http://www-assets.vermontlaw.edu/Assets/ice/Guidance_on_Solar_Marketing_\(ID_85283\).pdf](http://www-assets.vermontlaw.edu/Assets/ice/Guidance_on_Solar_Marketing_(ID_85283).pdf) or <https://tinyurl.com/y7fhopgf>

²⁵ Federal Register, Vol. 77 Thursday, No. 197 October 11, 2012, Part VII, Federal Trade
Commission, 16 CFR Part 260, *Guides for the Use of Environmental Marketing Claims; Final
Rule*, [https://www.ftc.gov/sites/default/files/documents/federal_register_notices/guides-
use-environmental-marketing-claims-green-guides/greenguidesfrn.pdf](https://www.ftc.gov/sites/default/files/documents/federal_register_notices/guides-use-environmental-marketing-claims-green-guides/greenguidesfrn.pdf) or
<https://tinyurl.com/phatujn>

²⁶ Title 30 : Public Service, Chapter 089: Renewable Energy Programs,
Subchapter 001: General Provisions, § 8005. RES categories,
<https://legislature.vermont.gov/statutes/section/30/089/08005>

²⁷ *Beneficial Disruption: Vermont's Renewable Energy Standard and the Need for Innovative Utility
Regulation in the 21st Century*, Darren Springer, William & Mary Environmental Law and
Policy Review, Volume 1, Article 3
<http://scholarship.law.wm.edu/cgi/viewcontent.cgi?article=1691&context=wmelpr> or
<https://tinyurl.com/y7r3geqq>

²⁸ Chapter 089: Renewable Energy Programs, Subchapter 001: General Provisions, § 8005a.
Standard Offer Program, <https://legislature.vermont.gov/statutes/section/30/089/08005a>

²⁹ *Wholesale power prices in New England jumped 55% in 2013*, Rod Kuckro, E&E reporter, March 19, 2014, <https://www.eenews.net/stories/1059996351>

³⁰ Public Utility Commission, Standard Offer, <http://puc.vermont.gov/electric/standard-offer>

³¹ ISO-NE, *New England's Wholesale Electricity Prices in 2017 Were the Second-Lowest since 2003*, https://www.iso-ne.com/static-assets/documents/2018/03/20180306_pr_2017prices.pdf or <https://tinyurl.com/ydgn4e2f>

³² The chart seems to show four projects in service, not three as stated in the letter

³³ Investigation into programmatic adjustments to the standard-offer program, Sept. 16, 2016, ePUC Case No. 8817

³⁴ e-mail correspondence shared with VCE

³⁵ Testimony to Senate Finance- February 15, 2018, Status of Net Metering, Andrea Cohen, Manager, Government Affairs and Member Relations, VEC
<https://legislature.vermont.gov/assets/Documents/2018/WorkGroups/Senate%20Finance/Net%20Metering/W~Andrea%20Cohen~Testimony%20to%20Senate%20Finance-%20February%2015,%202018~2-15-2018.pdf> or <https://tinyurl.com/y9c95pde>

³⁶ ISO-NE, *New England's Wholesale Electricity Prices in 2017 Were the Second-Lowest since 2003*, https://www.iso-ne.com/static-assets/documents/2018/03/20180306_pr_2017prices.pdf or <https://tinyurl.com/ydgn4e2f>

³⁷ Public Utility Commission, Net-Metering, <http://puc.vermont.gov/electric/net-metering>

³⁸ Testimony to Senate Finance- February 15, 2018, *Status of Net Metering*, Andrea Cohen, Manager, Government Affairs and Member Relations, VEC
<https://legislature.vermont.gov/assets/Documents/2018/WorkGroups/Senate%20Finance/Net%20Metering/W~Andrea%20Cohen~Testimony%20to%20Senate%20Finance-%20February%2015,%202018~2-15-2018.pdf> or <https://tinyurl.com/y9c95pde>

³⁹ *GMP, PSD agree on 5.02 percent rate increase*, Nov. 27, 2017, by Timothy McQuiston Vermont Business Magazine
<http://www.vermontbiz.com/news/2017/november/27/gmp-psd-agree-502-percent-rate-increase> or <https://tinyurl.com/ycuseh99>

⁴⁰ Front Porch Forum Post, Sept. 8, 2017:
Solar in New Haven
JOHN ROLEAU, INFO@PACKARDOFVT.COM, SELECTBOARD MEMBER,
NEW HAVEN

As a selectboard member, a resident and a small business owner here in New Haven I just want to share my most recent experience with solar. First, I must preface this post by saying I am pro solar. I feel renewable energy is a great idea and is definitely needed now and in the future. However I'm not a fan of giant solar farms lining our country roads or the infringement on residents viewsheds they have caused for the benefit of huge corporate tax breaks for out of state entities. The local landowners rewards are a fraction of the total payback, including the taxes the town raises. This brings me to my personal issue....

My automotive shop in the village generates an electric bill of roughly \$500-800/month. My general store generates an electric bill of \$1200-\$1800/mo. My house is around \$200-250/mo. Total electricity in my little corner of New Haven is up close to \$3000 per month. Go solar they say? So I called two solar companies to get a quote on a roof mounted system. I was told that between my shop buildings and the store I had enough roof space to fit a system big enough to cover my electricity usage. They also had state and federal tax incentives and financing to help pay for the system with a reasonable payback. Sounds great right? Well the next thing the solar company said had me floored. He said the power lines in Addison county are saturated and because of the high amount of huge solar farms there isn't enough capacity to build the size array I would need to be self sufficient. All energy created must go back on a the grid, regardless how much I the generator uses. I could be approved for roughly 10% the size I need and that would generate around \$300/mo in power. So I ask you this, how do we let small business owners in our town who employ dozens of people, offer local services and contribute to our local economy and infrastructure get shut out? Meanwhile huge companies with millions come in a plop acres of these panels wherever they want, buying the neighbors with hush money and lobbying the state to change the rules? I'm trying to put this in a proper prospective for anyone that may question why our town has fought big solar. There are dozens of other reasons (and I'm sure many of you have your own) but this onslaught has needed the brakes put on it for a while, and this is why I will continue to scrutinize such projects in the future. Again, I'm not against solar but I'm against the real motives behind it...

⁴¹ Dr. Ben Luce presenting to the Friends of the Northfield Ridge at the Skinner Barn, September 22, 2010, <https://vimeo.com/15594006>

⁴² Senate Finance Committee Testimony on net-metering, Feb. 15, 21, 23, 2018

Audio of Testimony to Senate Finance Committee,
<http://vce.org/Senate%20Finance%2002-15-2018-01.mp3>
<http://vce.org/Senate%20Finance%2002-21-2018-01.mp3>
<http://vce.org/Senate%20Finance%2002-23-2018-01.mp3>

Video of Testimony to Senate Finance Committee, Feb. 21, 2018

Margaret Cheney of the PUC and Patricia Richards of WEC <https://youtu.be/cjSlcqrPI3I>
Documents of Testimony Submitted to Senate Finance Committee, Feb. 15, 21, 2018

VEC, Andrea Cohen

<https://legislature.vermont.gov/assets/Documents/2018/WorkGroups/Senate%20Finance/Net%20Metering/W~Andrea%20Cohen~Testimony%20to%20Senate%20Finance-%20February%2015,%202018~2-15-2018.pdf> or <https://tinyurl.com/y9c95pde>

GMP, Robert Dostis

<https://legislature.vermont.gov/assets/Documents/2018/WorkGroups/Senate%20Finance/Net%20Metering/W~Robert%20Dostis~Presentation~2-15-2018.pdf> or <https://tinyurl.com/ycrqsgnj>

PUC, Margaret Cheney

<https://legislature.vermont.gov/assets/Documents/2018/WorkGroups/Senate%20Finance/Net%20Metering/W~Margaret%20Cheney~Summary%20of%20Net-Metering%20Facilities%20Approved%20by%20the%20Public%20Utility%20Commission%202015-2017~2-21-2018.pdf> or <https://tinyurl.com/y8l683lk>

WEC, Patricia Richards

<https://legislature.vermont.gov/assets/Documents/2018/WorkGroups/Senate%20Finance/Net%20Metering/W~Patricia%20Richards~Washington%20Electric%20Cooperative-testimony~2-21-2018.pdf> or <https://tinyurl.com/ycqk7vmy>

⁴³ Video, Melissa Bailey of VPPSA, Feb. 21, 2018: <https://youtu.be/2xlQAV9w8No>

⁴⁴ *Overheard at ISO-NE's Consumer Liaison Group Meeting*, By Michael Kuser, RTO Insider, March 4, 2018, <https://www.rtoinsider.com/iso-ne-consumer-liaison-group-cold-snap-87692/> or <https://tinyurl.com/y8sat336>

⁴⁵ Testimony to Senate Finance- February 15, 2018, *Status of Net Metering*, Andrea Cohen, Manager, Government Affairs and Member Relations, VEC
<https://legislature.vermont.gov/assets/Documents/2018/WorkGroups/Senate%20Finance/Net%20Metering/W~Andrea%20Cohen~Testimony%20to%20Senate%20Finance-%20February%2015,%202018~2-15-2018.pdf> or <https://tinyurl.com/y9c95pde>

⁴⁶ Solicitation to the Town of Danby, March 2018, <http://vce.org/doc03259820180307132857.pdf>

⁴⁷ Sheffield Highgate Export Interface, VT PUC Workshop, Jan. 11, 2018
<https://youtu.be/s4lGWC0GeiE>

⁴⁸ PUC Transcript of SHEI Workshop, Jan. 11, 2018
http://vce.org/5343589565538145onbase-unity_581141766377066204478588.PDF or
<https://tinyurl.com/yaf9ub93>

⁴⁹ Public Utility Commission, Public Forum on the Sheffield-Highgate Export Interface, ePUC Case No. 17-5219-INV

⁵⁰ Hantz Presume, VELCO, Presentation to Senate Finance Committee on *Sheffield-Highgate Export Interface*, Feb. 23, 2018
<https://legislature.vermont.gov/assets/Documents/2018/WorkGroups/SenateFinance/ElectricUtilityIssues/W~HantzPresume~Sheffield-HighgateExportInterfacebooklet~2-23-2018.pdf> or <https://tinyurl.com/y7ec4ymr>

⁵¹ ISO-NE *Locational Marginal Pricing, Introduction to Wholesale Electricity Markets (WEM 101)*, Sept. 25-29, 2017
<https://www.iso-ne.com/static-assets/documents/2017/10/20170925-07-wem101-lmp.pdf>
or <https://tinyurl.com/ycj9vvsl>

⁵² ISO-NE Do Not Exceed Dispatch (DNE) Project
<https://www.iso-ne.com/participate/support/customer-readiness-outlook/do-not-exceed-dispatch> or <https://tinyurl.com/ybsxths6>

⁵³ Craig Kieney, Vermont Electric Coop Testimony to Senate Finance Committee, Feb. 23, 2018
<https://legislature.vermont.gov/assets/Documents/2018/WorkGroups/SenateFinance/ElectricUtilityIssues/W~CraigKieney~VermontElectricCoop.-Testimony~2-23-2018.pdf> or <https://tinyurl.com/y7aylnn2>

⁵⁴ Vermont System Planning Committee, *Information about Sheffield-Highgate Export Interface*,
<https://www.vermontspc.com/grid-planning/shei-info>

⁵⁵ Department of Public Service, Act 174 Recommendations and Determination Standards,
<http://publicservice.vermont.gov/content/act-174-recommendations-and-determination-standards> or <https://tinyurl.com/ydbmo9cs>

⁵⁶ *Complaint for Declaratory and Injunctive Relief and Damages for Violations of the Vermont Constitution, the United States Constitution, the Public Trust Doctrine, the Sherman Act, the Clayton Act, the Vermont Consumer Protection Act, and Other Vermont Statutory Provisions, and for Review of Governmental Action*, Chittenden Superior Court, Jan 24, 2018
<http://vce.org/Complaint%20PLH%20et%20a1%20v%20Bennington%20et%20a1%20final.pdf>
or <https://tinyurl.com/yc8yre3m>

⁵⁷ On Wed., Feb. 28, 2018, the Complaint was dropped after the Town removed the case to Federal Court. The developer has re-filed two complaints in Environmental Court.

⁵⁸ Vermont Department of Public Service, *Act 174 Recommendations and Determination Standards*, <http://publicservice.vermont.gov/content/act-174-recommendations-and-determination-standards> or <https://tinyurl.com/ydbmo9cs>

⁵⁹ *The Commerce Clause and Implications for State Renewable Portfolio Standard Programs*, Clean Energy States Alliance, March 2011, <https://cesa.org/assets/Uploads/CEG-Commerce-Clause-paper-031111-Final.pdf> or <https://tinyurl.com/yc2zztpf>

⁶⁰ Ibid. p. 11

⁶¹ Vermont Electric Power Company website, <https://www.velco.com/>

⁶² *New England Power Grid Operator Budgets Soaring*, Hartford Courant, March 5, 2018, <http://www.courant.com/politics/hc-pol-iso-ne-rising-costs-20180223-story.html> or <https://tinyurl.com/ybl9ohar>

⁶³ *Key Grid Challenges Facing the New England Electric System*, Restructuring Roundtable, Dec. 15, 2017 <http://www.raabassociates.org/Articles/van%20Welie%20Presentation%202012.15.17.final.pdf> or <https://tinyurl.com/ybtvb2fk>

⁶⁴ ISO-NE *New England Power Grid 2017–2018 Profile*, https://www.iso-ne.com/static-assets/documents/2018/02/ne_power_grid_2017_2018_regional_profile.pdf or <https://tinyurl.com/ybfbpxxp>

⁶⁵ ISO-NE *Operational Fuel Security Analysis*, Jan. 18, 2018, https://www.iso-ne.com/static-assets/documents/2018/01/20180117_operational_fuel-security_analysis.pdf or <https://tinyurl.com/yd9xkgdg>

⁶⁶ ISO-NE Real Time Maps & Charts <https://www.iso-ne.com/isoexpress/web/charts>

⁶⁷ New England Electricity Restructuring Roundtable (156), Video (on Demand) of Keynote Address ISO-NE President/CEO van Welie; and Improving Energy Facility Siting & Permitting in New England, Dec. 15, 2017 <https://signup.clickstreamtv.net/event/raab/events/neer/156/>

⁶⁸ ISO-NE 2018 Regional Electricity Outlook, p. 10, https://www.iso-ne.com/static-assets/documents/2018/02/2018_reo.pdf or <https://tinyurl.com/y9c876hs>

⁶⁹ *Rare Earth Metals Electrified by China's Illegal Mining Clean-Up*, Bloomberg News, September 7, 2017, <https://www.bloomberg.com/news/articles/2017-09-07/rare-earth-metals-electrified-by-china-s-illegal-mining-clean-up> or <https://tinyurl.com/yc8ggjtj>

⁷⁰ *Electric Vehicles, Batteries, Cobalt, and Rare Earth Metals*, Josh Goldman, Senior Policy and Legal Analyst, Clean Vehicles, Oct. 25, 2017, <https://blog.ucsusa.org/josh-goldman/electric-vehicles-batteries-cobalt-and-rare-earth-metals> or <https://tinyurl.com/yahvslnl>

⁷¹ *What's life like for kids mining cobalt for our gadgets?* CBS News, March 6, 2018, <https://www.cbsnews.com/news/children-cobalt-mining-congo-cbsnews-investigation-ziki-swaze/> or <https://tinyurl.com/yb6bkyu8>