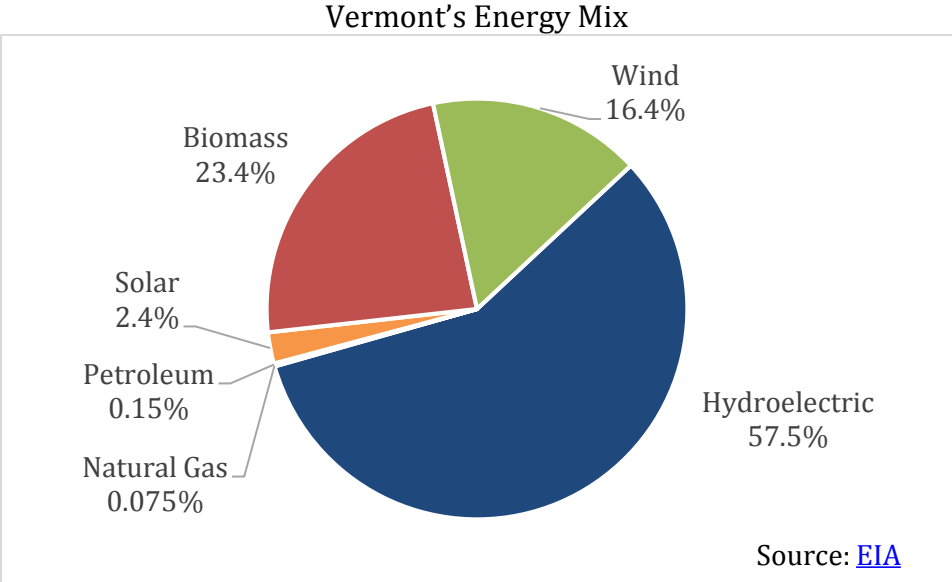
State Brief: Vermont

Background

Vermont relies heavily on renewable energy, including hydroelectric, wind, and solar. It is [one of two states in the nation without a coal-fired power plant](#) (the other is Rhode Island). The electricity produced in-state is sufficient for only [35% of its demand](#); the remainder is supplied from New England and Canada.

Vermont's forests provide renewable wood products for electricity and heating. Approximately 15% of Vermont's households use wood products as their [primary heating source](#).



The Yankee Nuclear Power Plant used to be the source of more than [70% of Vermont's net generation](#), but was [decommissioned](#) and permanently shut down in 2014, dramatically decreasing Vermont's total energy production. In 2014, Vermont produced 7,031,394 megawatt hours and in 2015, after the decommissioning, it produced only 1,982,047 megawatt hours, a 72% decline. During this same time, solar power generation doubled, while wind power generation climbed 5%. In 2012, Vermont was the first state to [ban hydraulic fracturing](#).

In terms of the [2016 Comprehensive Energy Plan](#), the state aims to reduce total energy consumption per capita by more than 33% and to meet 90% of the remaining energy need from renewable sources by 2050. It also aims to meet 10% renewable transportation, 30% renewable buildings, and 67% renewable electric power by 2025. Compliance with the state's integrated [Renewable Energy Standard (RES)](#) requires that utilities are responsible for supplying renewable electricity as well as supporting reduction in fossil fuel use by customers.

Vermont's utilities are regulated by the three member [Public Service Board (PSB)](#). Commissioners are appointed for a term of six years. In 2017, the state is under divided party government with Democrats in control of both [legislative chambers](#) and [Republican Phillip Scott](#) in the Governor's office.

Policy Strengths and Opportunities[1]

An important framework for policymakers to consider, the notion of "policy stacking"[2] was developed at the National Renewable Energy Laboratory (NREL). The basic idea behind policy stacking is that there is an interdependency and a sequencing of state policy that, when done effectively, can yield greater market certainty, private sector investment, and likelihood of achieving stated public policy objectives.

In theory, but not always in practice, clean energy policies can be categorized into one of three tiers of the policy stack. Tier 1, Market Preparation Policies, remove technical, legal, regulatory, and infrastructure-related barriers to clean energy technology adoption. Tier 2, Market Creation Policies, create a market and/or signal state support for clean energy technologies. Tier 3, Market Expansion Policies, create incentives and other programs in order to

[1] For more information on policy opportunities, please visit the [SPOT for Clean Energy](#). For more information on specific policy actions related to these opportunities, please review the *[Clean Energy Policy Guide for State Legislatures](#)*.

[2] V.A. Krasko and E. Doris, *National Renewable Energy Laboratory*, 2012. Strategic Sequencing for State Distributed PV Policies: A Quantitative Analysis of Policy Impacts and Interactions. [http://www.nrel.gov/docs/fy13osti/56428.pdf](#).

expand an existing clean energy market by encouraging or facilitating technology uptake by additional market participants.

A simple example, before financial incentives for combined heat and power (CHP) will be successful, two key considerations for deployment are having clear interconnection standards and favorable stand-by rates for customers who opt to add CHP. In this example, policies to address interconnection and stand-by rates should be adopted before financial incentive programs are implemented.

Grid Modernization

In the last two decades, digital technologies have been developed that enable utilities to better manage the grid and provide opportunities for consumers to customize their services to fit their priorities. These technologies allow a two-way flow of information between the electric grid and grid operators and between utilities and their customers. Emerging technologies improve system reliability and resiliency by enabling better tracking and management of resources.

These technologies allow grid operators to incorporate central and distributed energy resources, energy storage technologies, electric vehicles, and assist in addressing the challenges associated with planning, congestion, asset utilization, and energy and system efficiency. This can make the operational side of the utility more efficient. On the customer's side of the meter, advanced metering infrastructure, dynamic pricing, and other emerging technologies allow an exchange of information and electricity between a consumer and their electric provider. Grid modernization will be associated with greater consumer choice, allowing customers to meet their energy priorities by producing their own energy or to selecting to receive innovative energy efficient or clean energy services from different providers.

Grid modernization efforts compliment other policies such as demand response policies, customer data management, smart metering infrastructure, electric vehicles and others. Policy approaches around grid modernization should be seen as an umbrella to put in place a structure that supports and ties together these other individual policy initiatives.

In terms of state efforts to modernize the grid, Vermont is ranked thirteenth overall for state support, customer engagement, and grid operations in the latest Grid Modernization Index. The state moved up two spots from 2014. While Vermont demonstrates leadership in this area, and in line with the notion of policy stacking, discussed above, there are supportive policies that could advance in-state modernization efforts:

1. Require that utilities' integrated resource plans include plans to integrate distributed energy resources (including electric vehicles and energy storage), and measure and report on the results of grid modernization efforts.

2. Enable customer data access to allow third parties to provide energy management services based on signals from the utility. Customer data access is easily provided through the Green Button Connect program. Approximately seventeen utility providers committed to provide customer data access through the Green Button Connect program, yet only one has implemented it. Efficiency Vermont has been collecting energy usage and savings data for every town in Vermont since 2006, and with that information, developed a state map of electricity usage and savings. Vermont's Community Energy Dashboard provides free and open access to official energy data to enable communities to make clean energy choices.

3. Improve the state's energy storage policies (see below). The adoption of incentives for or a mandate to integrate a certain amount of energy storage on the grid would enhance modernization efforts. Enhancing clean energy financing and electric vehicle policies (see below) would also improve the chances of successful grid modernization.

Clean Energy Financing

Distributed generation (DG) provides localized generation that serves a specific part of the grid. It may include generation serving a specific residence or business, a neighborhood, or a region served by a substation. DG has the benefit of reducing stress on large transmission infrastructure by providing distribution level power (as opposed

to central generation). Because small-scale renewable energy systems require large upfront investments, overcoming the upfront cost barrier is arguably the biggest challenge to clean energy deployment at the consumer level. Financing is key; and many states provide financing and financial incentives to spur adoption of these technologies.

To promote wide-spread deployment of DG, there are a handful of policy opportunities in Vermont:

1. Commercial Property Assessed Clean Energy (PACE) – PACE is a financing mechanism used by local governments that allows property owners to finance energy efficiency and renewable energy improvements through their property tax payment. The repayment of qualified energy improvements is done via a voluntary property tax assessment collected by local governments, just as other public infrastructure investments are financed. The financing for PACE projects may be provided by municipal bonds or third-party capital secured by the property assessment payments. Repayment responsibility transfers to the next owner if the property is sold. While PACE programs can be designed for both the residential and the commercial markets, residential PACE takes a much more committed and engaged approach on the part of the state. Commercial PACE programs have been expanding rapidly in recent years with a robust market evolving around these programs. State legislative authority must be in place to allow local governments to establish energy financing districts. Vermont authorizes local governments to create PACE districts to provide financing to owners of a "dwelling" for renewable energy and energy efficiency projects. The Vermont definition of dwelling is applicable to residential properties, not commercial properties. There is thus an opportunity to expand the state's PACE legislation and programming to include commercial buildings. Commercial PACE programs have been expanding rapidly in recent years with a robust market evolving around these programs.

2. Combined Heat and Power Incentives (CHP) – CHP is a suite of policies that enable large industrial customers to install systems that boil water to produce steam (heat) and use that steam to drive a turbine generator (power), where excess steam can be used for district heating or cooling. Sometimes referred to as cogeneration, the primary benefit of CHP is very high system efficiency. A key consideration in CHP deployment is identifying the right application – a constant electric and heating/cooling load. Breweries, universities, hospital complexes, are all suitable applications. Vermont currently has more than 30 CHP sites, including in healthcare centers and hospitals. Providing additional incentives for CHP can increase the number of sites substantially.

Electrification of the Transportation Sector

One of the most important barriers to increased adoption of electric vehicles (EVs) is their higher up-front cost as compared to a similar conventionally-fueled vehicle. In addition, there has been a complicated relationship between increased adoption of EVs and the availability of EV charging stations. Put simply, consumers want to be sure their car will get them where they need to go. The good news is that both supportive policies for developing charging infrastructure and technological advancements have eased "range anxiety." For instance, the most recent GM Bolt has an estimated range of 240 miles.

While Vermont signed a memorandum of understanding to support the deployment of zero-emissions vehicles (ZEVs) through involvement in a ZEV Program Implementation Task Force, the state requires some of its departments to consider alternative-fueled vehicles when purchasing vehicles, and it has a low emission vehicle standard, there are policy opportunities to further encourage and prepare for increased market penetration of EVs:

1. Charging Infrastructure Plan – Create a charging infrastructure plan for the state and that can serve as a model plan for local governments. Locating charging infrastructure is different than locating conventional fueling stations. For the most part, EVs are cars used for commuting and local trips. Furthermore, while one fuels a conventional vehicle when they are going somewhere, stopping at a gas station for the specific purpose of filling up, a driver of an EV is generally looking to refuel when they are stopping somewhere: when going shopping, going into a restaurant, or going to work. Charging infrastructure plans should target these types of locations and attempt to pair the appropriate level of charging infrastructure with a reasonable amount of time a person may be stopped at that location. Legislation could direct a state agency to develop such a plan through a stakeholder process.

2. Parking Infrastructure Requirements – In tandem with the development of a state-wide plan, legislation could set requirements for EV parking infrastructure. Some states have adopted permitting standards for parking lots, requiring, for instance, that for every 100 parking spaces, one EV charging spot must be provided.

3. Commercial and Public Charging – Vermont could offer tax incentives for companies to install charging at their workplace and provide grants to local governments to put charging infrastructure in accordance with a state plan.

4. Residential Charging Incentives – The state could offer tax credits or other incentives for residents to install charging infrastructure in their homes.

5. Electric Vehicle Supply Equipment (EVSE) Financing and Financial Incentives – The provision of financial incentives and innovative financing options can increase installations of charging stations. Currently, The Vermont State Infrastructure Bank, administered by the Vermont Economic Development Authority, is offering EV charging station loans to qualified buyers. States have adopted several financial incentives including income and property tax credits, sales tax credits, low-interest loans, grants, and rebates. A handful of states qualify EVSE under their property assessed clean energy (PACE) programs.

6. EV Financing and Financial Incentives – The provision of financial incentives and innovative financing options can help spur greater market penetration of EVs. Sales and income tax credits are one of the simplest methods for addressing higher up-front costs. While sales tax credits are typically applied at the time of purchase, income tax credits may do less to address the upfront cost barrier as receipt of the credit is typically removed in time from the purchase. However, a study by the Congressional Budget Office suggests that tax credits are important tools for ensuring increased adoption of alternative-fueled vehicles. To increase the value of the incentive, some states offer transferrable tax credits, allowing the savings to be applied by the dealership at the time of sale. States have adopted many other financial incentives including low-interest loans, grants, vouchers, and rebates.

Energy Storage

Energy storage offers a unique opportunity to dynamically manage supply and demand to maximize the value of grid resources. By deploying storage in strategic locations, utilities can more effectively manage their energy portfolios. First, storage can dispatch power to better integrate intermittent resources like renewable energy. Second, it provides management of intermittent demand – helping to flatten peak demand requirements for the utility. Third, the responsiveness of energy storage can allow the utility to implement voltage regulation and other ancillary services, useful for improving system efficiency. Finally, energy storage can help the commercial sector avoid costly "demand charges." As utilities around the country consider extending demand charges to the residential sector, this will become an even more important issue.

Storage provides multiple benefits to both the customer and the utility. State planning and regulatory policies can help maximize these benefits through a combination of 1) establishing a framework for easy integration of energy storage into the grid and 2) establishing a marketplace that monetizes the benefits of energy storage for cost effective investment.

House Bill 501, introduced this year, aims to spur the development of energy storage in Vermont. The bill would require Vermont's Department of Public Service "to develop policy recommendations and targets for the installation and increase of electricity storage capacity connection to the Vermont transmission and distribution system." This bill, if enacted, would be the first step towards developing an energy storage mandate.[3] Green Mountain Power's Stafford Hills solar farm in Rutland, launched an experimental storage project last year. In another pilot program, the utility partnered with Tesla to offer residential storage systems to 500 customers. Vermont's RES includes language that supports an undertaking that provides "infrastructure for the storage of renewable energy on the electric grid."

There are several opportunities for developing additional supportive state policies:

[3] For additional Information on storage-related activities in Vermont, see Energy Storage News.

1. Require the inclusion of energy storage as a critical piece of the energy system as both a demand and supply management resource. Some states have required utilities to evaluate the cost effectiveness of "non-wires" alternatives (NWAs) to large generation investments that are more traditional utility avenues for meeting demand. Or, states may want to require utilities to develop a distribution investment plan that identifies the locations on the distribution system where energy storage or other distributed resources would offer the system the greatest value.

2. Provide incentives for customers to purchase storage to both manage their electric load and store locally produced renewable energy. Allow utilities that provide incentives to customers to install smart meters that enable dynamic energy management from multiple distributed battery systems.

3. Adopt clear data access policies that allow third parties to provide energy management services based on signals from the utility to greatly increase the value of efforts to monetize the value stream offered by energy storage. As noted above, Vermont's utility providers have committed to, but not all have implemented the Green Button Connect program.

4. Provide an option for utility customers (targeted at commercial users) to pay an additional charge to be included in a "high reliability zone" created through a combination of distributed generation and energy storage – forming a utility integrated "microgrid".

5. Provide financing for commercial businesses to install energy storage to reduce their demand charges.

6. Incentivize energy storage. Policymakers may want to start first with a policy to incentivize those who have solar systems, along with a utility incentive that will allow the utility to maximize the benefit of solar by aligning solar resources with peak load.

2017 Energy-Related Legislation Introduced by Attendee

Bill Number	Bill Summary	Bill Status	Sponsor
SB 17-51	This bill proposes to establish a statutory goal that, by 2050, 90 % of Vermont's total energy consumption be from renewable energy. It also proposes to establish additional supporting goals and to require State plans that affect energy to recommend measures to achieve these goals.	Introduced	Bray
SB 17-118	This bill proposes to increase the visibility of building energy performance by requiring the disclosure of informational materials related to energy use when a contract is executed for the sale of a single-family dwelling and by allowing the owner of a multi-unit building to obtain anonymized aggregated data on the building's energy use for the purpose of energy benchmarking or labeling.	Introduced	Bray
SR 17-10	Senate resolution strongly opposing the U.S. withdrawal from the Paris Agreement of the United Nations Framework Convention on Climate Change and recognizing Governor Philip Scott's enrolling Vermont in the U.S. Climate Alliance.	Adopted by Senate	Bray

Other 2017 Legislative Activity

Only bills that have passed both chambers are set out below. For all 2017 energy-related legislation, visit aeltracker.org.

Bill Number	Bill Summary	Bill Status
HB 17-411	The act adopts federal appliance and lighting efficiency standards in effect on January 19, 2017 so that the same standards will be in place in Vermont should the federal standards be repealed or voided. The act also adopts federal standards for general service lighting that have been adopted by the U.S. Department of Energy and are scheduled to come into effect on January 20, 2020, again so that the same standards will be in place in Vermont. Second, the act authorizes the Public Service Board, commencing 10 years from the date on which an existing net metering system was installed, to apply to the system	Enacted

	the same rules governing bill credits and the use of those credits on the customer's bill that it applies to net metering systems for which applications were filed on or after January 1, 2017, other than any adjustments related to siting and tradeable renewable energy credits.	
SB 17-135	This act adopts multiple economic development provisions concerning the Vermont Employment Growth Incentive Program; Rural Economic Development Districts; the Green Mountain Secure Retirement Plan; VOSHA and workers' compensation; workforce education and training; financial technology; the minimum wage and benefits cliff; housing; and tax increment financing districts.	Enacted
S 17-52	This act makes numerous changes to procedures in cases before the Public Service Board (PSB). The cases primarily relate to energy and telecommunications facility siting. The act also requires the Commissioner of Public Service to submit a report relating to fostering energy storage on the Vermont electric system, authorizes the Clean Energy Development Fund to fund energy storage projects that support renewable resources, and requires a report on an exemption from the Standard Offer Program.	Enacted
S 17-34	This act enacts multiple provisions related to rural economic development. Among other provisions, the act requires the Department of Public Service to report to the General Assembly regarding self-administration of the energy efficiency charge by industrial and commercial customers. The report shall recommend a pilot program under which commercial and industrial customers may receive the amount of the efficiency charge in the form of services.	Enacted

Media

- September 1st, 2017: Efficiency Vermont and Vergennes Partnership Celebrate Success on Vergennes Day.
- August 29th, 2017: Co-Op Opposing Projects Larger Than Rooftop, Backyard Solar.
- August 25th, 2017: Solar Firm Gets OK for Guilford Community Project.
- August 24th, 2017: Scott Agrees to Carbon Dioxide Emission Reductions.
- August 23rd, 2017: Vermont, RGGI States Propose Additional 30% Emissions Cap Cut by 2030.
- August 21st, 2017: Vermont Yankee Settlement Money to Be Used for Wood Boiler Projects.
- July 29th, 2017: Utility Helps Wean Vermonters From the Electric Grid.
- July 19th, 2017: Vermont Regulators to Examine Grid Modernization.

Other Resources

- 2016 Vermont Comprehensive Energy Plan full text: https://outside.vermont.gov/sov/webservices/Shared%20Documents/2016CEP_Final.pdf
- Renewable Energy Standard Program Details: http://programs.dsireusa.org/system/program/detail/5786
- The American Council for an Energy-Efficient Economy State and Local Policy Database, Vermont: http://database.aceee.org/state/vermont
- The Database of State Incentives for Renewables and Efficiency, Vermont: http://programs.dsireusa.org/system/program?fromSir=0&state=VT
- U.S. Energy Information Administration, Vermont: https://www.eia.gov/state/?sid=VT
- SPOT for Clean Energy, Vermont: https://spotforcleanenergy.org/state/vermont/