

# Financing Clean Energy: A Powerful Tool for Driving Investment in Vermont's Economy

By encouraging private-sector investment in renewable energy and energy efficiency, strategies to finance clean energy are playing an important role in transforming clean energy markets in the United States and other countries. Institutions that run state clean energy financing programs can provide underwriting support, facilitate conversations with key stakeholders, and educate the public and lenders on technological options.

Based on the experiences of existing clean energy financing initiatives, the Union of Concerned Scientists (UCS) has analyzed the potential impact of expanded clean energy financing capacity in Vermont. According to this analysis, the state could leverage an initial capitalization of \$7 million into a \$148 million investment in renewable energy and energy efficiency projects over the next 15 years.

By 2031, expanded clean energy investment could:

- Support the deployment of nearly 50 megawatts (MW) of new solar- and wind-power capacity and generate or save the equivalent of 3.2 percent of Vermont's 2015 electricity sales;
- Save homes and businesses \$14.6 million on their annual electricity bills by investing in efficiency; and
- Reduce carbon dioxide emissions by more than 111,500 tons, equivalent to taking 21,300 cars off the road.

Forging new public-private partnerships to increase private sector financing for local clean energy projects would be a cost-effective approach to drive investment and create new clean energy jobs in communities across Vermont. At the same time, it would help Vermont achieve state targets for energy efficiency, renewable energy, and reducing global warming emissions.

## A Promising Pathway for Clean Energy Finance

The basic approach of clean energy financing programs is to leverage a pool of public-sector funds to garner a larger pool of private-sector investments in renewable energy and energy efficiency. They do this by bringing together a suite of financial

products that support the development of clean energy projects. Just as important, these programs raise awareness of clean energy technologies and their benefits. Already New York's and Connecticut's green banks and Rhode Island's Infrastructure Bank are aiding the transition from government incentives for clean energy to financial products funded primarily with private-sector capital. And many more states, including Vermont, have developed related loan programs for efficiency and renewable energy.<sup>1</sup>

Typically, the performance of a clean energy financing initiative is measured as a leverage ratio of private-sector to public-sector funds invested. For example, Connecticut and New York have achieved an average leverage ratio across their programs of more than \$5 of private funds to every \$1 of public funds over recent years (Shrago and Healey 2016; NY Green Bank 2016; Connecticut Green Bank 2016).

By increasing the leverage ratios, policy makers aim to reduce the need for government incentives and make clean energy markets more sustainable. This makes clean energy financing programs a viable strategy for helping states foster economic growth and competitiveness while reducing emissions and meeting goals for renewable energy and efficiency. For example, a study by Vermont's Department of Public Service found that the number of jobs in the state's clean energy sector rose by about 9.8 percent annually between 2013 and 2015, reaching more than 16,000 jobs (BW Research Partnership 2015). Respondents to the study's survey projected that another 1,000 jobs would be added in the first quarter of 2016. While the energy efficiency industry accounted almost half of the clean energy workforce (49 percent), the solar industry has driven the high growth rates. The solar industry

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alone increased by 22 percent between 2013 and 2015, to 1,899 employees. In the case of efficiency upgrades and renewable energy projects, job creation tends to be local, keeping money in the state by reducing spending on fossil fuel imports.

Vermont is a national leader in investing in solar and energy efficiency, with 100 MW of solar installed at the end of 2015. Vermont ranked eighth in solar capacity per capita and third in solar jobs per capita (Solar Foundation 2015). The state also ranked third for savings of retail electricity sales through energy efficiency in 2015 (2 percent), and first for spending of statewide electricity revenues on efficiency (6.9 percent or \$54.4 million) (ACEEE 2016a). A comprehensive clean energy financing initiative could help Vermont build on this impressive track record.

### Building on Existing Clean Energy Programs in Vermont

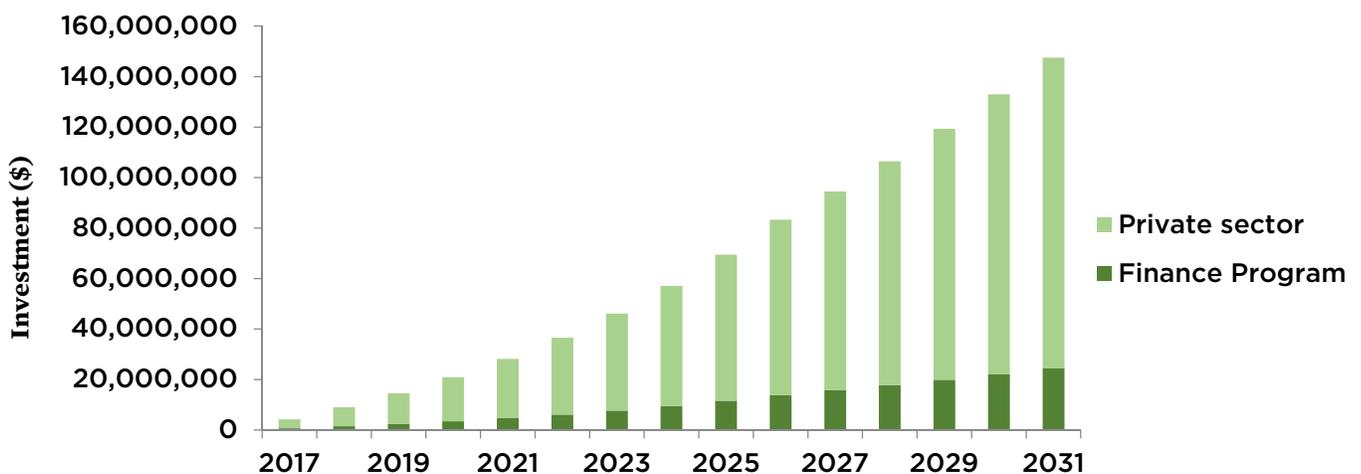
Vermont already deploys a number of financing programs and incentives to invest in energy efficiency and renewable energy. A more comprehensive approach to financing clean energy could expand, enhance, and supplement these laudable programs. Current programs and policies, administered by numerous state entities and utilities, include the following:

- In 1999, the Vermont Legislature and Public Service Board established **Efficiency Vermont**, the nation’s first energy efficiency utility. Rather than having multiple utilities in the state deliver their own energy

efficiency programs, Efficiency Vermont provides a one-stop shop for these services to all Vermonters. Administered by the **Vermont Energy Investment Corporation (VEIC)**, it offers financing and rebates for measures that reduce residential, commercial, and agricultural electricity use. VEIC is funded through an Energy Efficiency Charge on Vermonters’ electricity bills.<sup>2</sup>

- Efficiency Vermont also provides services to reduce heating and fuel usage in homes and businesses, funded by revenue from the **Regional Greenhouse Gas Initiative** (\$3.3 million in 2015) (RGGI n.d.) (a mandatory, market-based program established in 2009 to reduce power-sector emissions of carbon dioxide) and the sale of energy efficiency’s peak reduction value in the regional electricity grid’s Forward Capacity Market (PSD 2016).<sup>3</sup>
- VEIC launched a loan program with support from the U.S. Department of Agriculture’s Rural Utility Service, which obligated \$46 million in **Energy Efficiency and Conservation Loan Program** funds for Vermont in 2015 (USDA 2015). The funds will be available to business, municipal, and residential sectors for a variety of energy efficiency improvements and renewable energy projects, including weatherization, heat pumps, lighting, fuel switching, and solar photovoltaics (PV).

FIGURE 1. Cumulative investment leveraged by the Vermont Clean Energy Financing Program



Within 15 years, a Vermont clean energy financing program could leverage more than \$123 million of private capital for renewable energy and energy efficiency projects.



*Clean energy financing programs could be used to fund solar projects like this mobile home replacement zero energy modular (ZEM) unit from Vermont, which is designed to be all-electric and produce as much energy as it uses on an annual basis. (Peter Schneider / Vermont Energy Investment Corporation)*

- VEIC also serves as the state’s third-party administrator of the **Property-Assessed Clean Energy (PACE)** program. Authorized by state law in 2009, PACE programs enable residential and commercial property owners to fund the upfront costs of energy efficiency and renewable energy projects and repay the costs over time (usually 10–20 years) through assessments added to their property tax bills.<sup>4</sup> Forty-two towns have adopted PACE financing for loans up to \$30,000 (Efficiency Vermont n.d.a; Efficiency Vermont n.d.b). PACE financing has been significantly underutilized in Vermont because the enabling legislation does not allow PACE loans to precede mortgages and other loans; this is in contrast to successful programs in Connecticut and other states (Connecticut Green Bank 2016).
- The **Clean Energy Development Fund (CEDF)** is dedicated to increasing the deployment of cost-effective and sustainable electric power resources in Vermont, particularly local small-scale renewable energy and combined heat and power projects.<sup>5</sup> Funding comes from revolving loans backed by an initial capitalization through Entergy (the owner of the now-retired Vermont Yankee Nuclear Power Plant) and the American Recovery and Reinvestment Act (ARRA). The Entergy funds support building a sustainable wood-heating market and supply chain and solar rebates in Windham County, the former site of the Yankee power plant. The ARRA funds support

small-scale commercial and residential renewable energy rebates and credit enhancements for commercial solar facilities under the Small Scale Renewable Energy Incentive program (Vermont Clean Energy Development Fund 2015). In mid-2015, the program stopped offering incentives for solar PV and micro-hydro projects, but it continues to fund solar hot water and advanced wood-pellet heating systems (DSIRE 2016a). VEIC’s Renewable Energy Resource Center administers the program.

- In 2015, the **Vermont Economic Development Authority (VEDA)** established a \$10.8 million energy loan program for agricultural, small business, and commercial energy generation and distribution projects. VEDA guarantees a maximum of 75 percent of loans of up to \$250,000 for commercial, local government, and nonprofit borrowers (Vermont EDA n.d.a). Small businesses and commercial-sector loan applicants are supported for loans up to \$500,000 and \$2 million, respectively, capped at 60 percent of the project’s total financing (EDA n.d.b; EDA n.d.c). Agricultural loans are provided for up to \$1.3 million (DSIRE 2016b). VEDA also operates a loan program for electric-vehicle EV charging stations. The funds for the EV program are provided by the State Infrastructure Bank, which is jointly operated by VEDA, the Vermont Agency of Transportation, and the Federal Highway Administration (EDA n.d.d).
- All utilities in Vermont must offer **net metering** for customer-owned solar and other distributed generation systems up to 500 kW in size for most facilities and 2.2 MW for military facilities. There is an overall statewide cap of 15 percent of the utility’s peak demand. Any excess generation from these systems in a month is credited to the customer’s next monthly bill at the retail rate. Any excess credits at the end of an annual billing period are granted to the utility without compensation to the customer. Vermont also has “virtual” net metering, which allows multiple customers to be credited to a single facility of up to 500 kW (NESEMC 2016).

**A clean energy financing program leverages a pool of public-sector funds to garner a larger pool of private-sector investments in renewable energy and energy efficiency.**

- Vermont has offered a **feed-in tariff** since 2009, providing long-term contracts for eligible renewable energy sources. The “Standard Offer” program is administered by the Vermont Electric Power Producers Inc. under a contract with the Vermont Public Service Board. Eligible energy facilities include solar, wind, biomass, landfill gas, farm methane, and hydroelectricity up to 2.2 MW and commissioned on or after September 29, 2009. Renewable energy credits are transferred to the purchasing utility except for facilities using methane from agricultural operations (DSIRE 2016c; VEPP 2016).
- In 2015, Vermont established a **Renewable Portfolio Standard** that requires utilities to provide 55 percent of their electricity sales from renewable energy in 2017 and 75 percent by 2032. The standard includes specific targets for distributed generation, such as rooftop solar PV, of 10 percent by 2032 and for “energy transformation projects” of 12 percent in 2032. Examples of energy transformation projects include home weatherization, heat pumps, high-efficiency heating systems, support for electric vehicles, and electricity storage systems (DSIRE 2016d).
- In 2000, Vermont adopted an **Energy Efficiency Resource Standard** that requires Efficiency Vermont and Burlington Electric to achieve average incremental energy savings of about 2.1 percent per year from 2015 to 2017 (ACEEE 2016b). Budgets must be set at a level that would achieve all cost-effective energy efficiency savings.

A comprehensive and integrated public-private financing initiative could help Vermont meet its clean energy and emission reduction targets. Such an effort could focus on filling gaps in existing programs and structures, including better reaching underserved markets, such as low- and moderate-income communities. Potential partners include the Vermont Energy Investment Corporation, the Vermont Economic Development Authority, and the Vermont Department of Public Service. These agencies already provide energy efficiency and renewable energy loans similar to what a more comprehensive initiative might provide. In any case, new or expanded clean energy financing programs would need to be coordinated with these institutions and others to make use of existing staff knowledge and expertise. Given the variety and current fragmentation of resources already provided to stimulate clean energy investments, better coordination might greatly benefit efficiency and public awareness of these funds.

Expanded clean energy finance capacity is central to financing Vermont’s Comprehensive Energy Plan. In 2011, that plan established a long-term goal of meeting 90 percent of the

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state’s total 2050 energy needs from renewable sources and increased efficiency. A 2016 analysis by the Energy Action Network estimates that a clean energy investment of \$33 billion would be needed in Vermont to achieve this goal (Energy Action Network 2016). This would include investing \$6 billion in solar, \$312 million in wind, \$158 million in biopower, \$1.9 billion in energy efficiency to reduce electricity use, \$1.2 billion in electric vehicles and biofuels for transportation, \$7 billion in electric grid upgrades, and \$16.6 billion in thermal energy efficiency and fuel switching.

**The Leverage Potential of a Vermont Clean Energy Finance Authority**

A comprehensive financing initiative in Vermont could supply a range of financial products that would help transform or advance clean energy markets (Rhodes, Bloustein, and Pitkin 2013):

- **Credit enhancements** reassure private lenders. New financing programs could offer to occupy a first-loss position or create a loan-loss reserve fund in the case of default. Both of these actions can lower a lender’s perceived risks, allow loans to be issued to a wider variety of credit ratings, or assist with funding new or emerging technologies. States previously provided enhanced credit for efficiency using American Recovery and Reinvestment Act funds, but legislative changes could prevent this type of public-private finance strategy in the future.
- **Warehousing and securitization services** aggregate loans and sell the collections as securities. The institution can then use the proceeds to further its programs. Several states have used the warehousing model (NASEO n.d.): Connecticut (through its C-PACE program), Pennsylvania and New York (through the Warehousing for Energy Efficiency Loans—WHEEL—program), and Oregon (through the Clean Energy Works program) (Beldon, Clemmer, and Wright 2015).<sup>6</sup>
- **Direct lending** involves traditional consumer or business loans for renewable energy or energy efficiency projects. Both VEDA and the Efficiency

Vermont already provide these services. An expanded clean energy finance program could further leverage these efforts.

- **Structured products and other financing tools.** Examples of this category include PACE financing, state-backed leasing programs for renewables, and performance-based incentives, grants, or other support mechanisms. The Clean Energy Development Fund’s interest buy-down program is an example of a performance-based support.
- **Technical expertise** on such topics as underwriting support can help traditional lenders improve their knowledge of new technology investments and lower the risks.

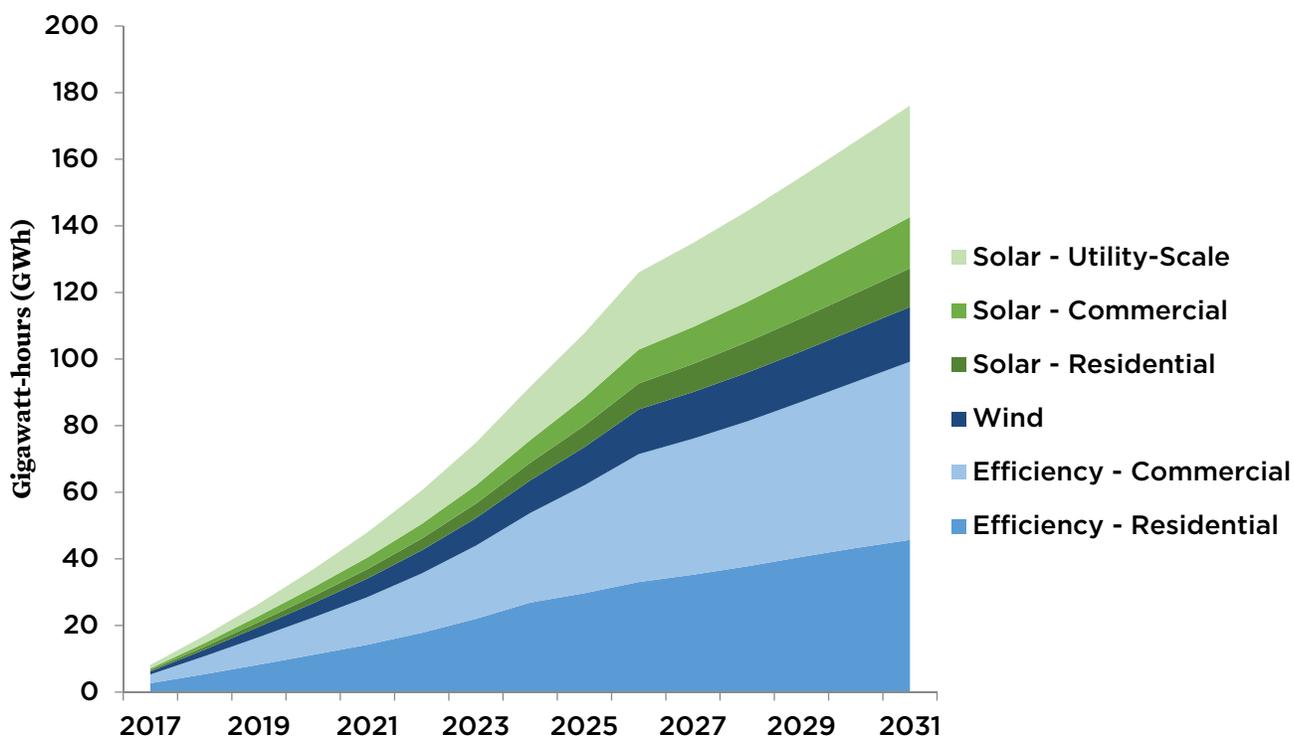
Each of these products carries its own risks and benefits, of course, and an effective green bank may support different clean-energy market segments through different means of financing.

### Driving Investments and Emissions Reductions under a Vermont Clean Energy Finance Authority

For our analysis of the impact of creating a clean energy finance authority in Vermont, UCS developed an illustrative example of what a program focused on saving or generating electricity could accomplish by investing in energy efficiency and renewable energy. It shows significant economic and emission reduction benefits.

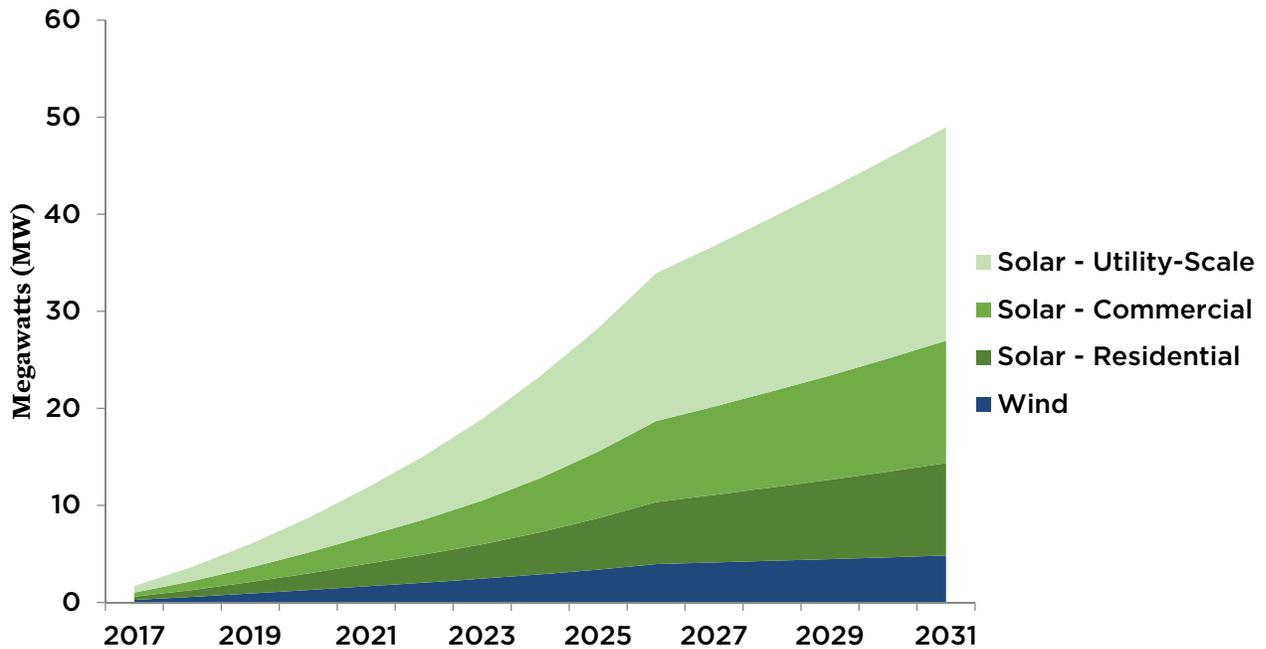
We did not analyze additional technologies and sectors that could be good candidates for clean energy loan programs, such as biomass heating, energy storage, transportation, combined heat and power, and financial products for low-income and minority communities. Also, more analysis and input from stakeholders are needed to identify preferences and priorities among the possible technologies, sectors, and communities. Nevertheless, given the great variety of financing and rebates already provided to stimulate clean energy investments, improved coordination of these funds could leverage further private and even institutional investments.

FIGURE 2. Cumulative Energy Efficiency Savings and Renewable Generation Added under a New Vermont Clean Energy Finance Program



Over 15 years, investments from a clean energy financing program would generate or save 176 GWh of electricity through renewable energy and energy efficiency projects. This is equivalent to 3.2 percent of Vermont’s 2015 electricity sales.

FIGURE 3. Cumulative Solar and Wind Capacity under a New Vermont Clean Energy Finance Program



By deploying a suite of financial products, a Vermont clean energy finance program could support nearly 50 MW of solar and wind power by 2031.

We based the analysis on several assumptions about inputs, all of which reflect the experience of existing clean-energy lending programs in Connecticut, New York, Rhode Island, and elsewhere.<sup>7</sup>

- Initial additional capitalization for Vermont’s needed clean energy finance capacity would be \$7 million, a figure derived by applying a per-capita investment level similar to that of New York’s comprehensive green bank.
- New programs would provide direct-lending products for solar, wind, and consumer energy efficiency programs. Because Vermont already makes significant investments in efficiency, we assumed half of the fund would be allocated to utility-scale and rooftop solar PV projects, 10 percent to community wind projects, and the remaining 40 percent to efficiency, using Energy Action Network’s 2016 analysis as a rough guide.
- Loan terms would be at least seven years for energy efficiency and 10 years for renewable energy; the interest rate would be 5 percent.
- If effectively organized, each \$1 of public funding would leverage \$5 of private-sector funding for energy efficiency and renewable energy projects.

Creation of a revolving loan fund, with loan repayments regularly returned to the program to fund additional projects, would allow the impact to increase each year. Over 15 years, an initial \$7 million investment in public funds could lend more than \$24.5 million to projects, while leveraging nearly \$123 million in private-sector funding, for a total impact of about \$148 million (Figure 1). In other words, homes and businesses would cover almost all of the upfront investment costs by repaying loans to financial institutions that are involved with the program.

The resources built with the support of clean energy financing would be substantial. After 15 years of operation, investments would rise to the point where new energy efficiency and renewable energy resources would generate or save 176 Gigawatt hours (GWh) each year, equivalent to 3.2 percent of Vermont’s 2015 electricity sales (Figure 2). The investments would lead to 99 GWh of efficiency savings, lowering electricity bills an estimated \$14.6 million annually by 2031, based on 2015 average retail electricity prices (US EIA 2016).

Through these energy efficiency and renewable energy resources, Vermont would avoid more than 111,500 tons of carbon dioxide emissions over 15 years. This would be

equivalent to taking roughly 21,300 cars off the road, making an important contribution to Vermont's 2030 carbon goal. This program could also support the development of nearly 50 MW of new solar and wind capacity over the next 15 years (Figure 3).

## Conclusion

A comprehensive clean energy financing strategy in Vermont could be an effective tool for expanding and enhancing existing programs and policies, while leveraging additional private-sector investment, increasing the sustainability of clean energy markets, and improving access to clean energy in low-income and minority communities. Potential institutions that could be expanded to host or coordinate a clean energy financing initiative include the Vermont Energy Investment Corporation and the Vermont Economic Development Authority.

If Vermont decides to pursue a comprehensive approach to financing clean energy, key stakeholders such as existing program managers, utilities, lenders, and communities across the state should engage in a dialogue to set its goals and priorities. Adding a greater focus on financing to Vermont's clean energy programs could be an effective strategy for helping the state reach its long-term goals for clean energy, carbon reduction, and economic development.

**An expanded clean energy financing initiative in Vermont could save homes and businesses \$14.6 million on their annual electricity bills by investing in energy efficiency.**

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The Union of Concerned Scientists bears sole responsibility for the report's content.

## ENDNOTES

- 1 For further details, see: *Financing Clean Energy: Cost-effective Tools for State Compliance with the Clean Power Plan* (Belden, Clemmer, and Wright 2015).
- 2 For more information on *Efficiency Vermont*, see: [www.encyvermont.com/about/what-we-do](http://www.encyvermont.com/about/what-we-do).
- 3 For more information on the *Forward Capacity Market*, see: [www.iso-ne.com/markets-operations/markets/forward-capacity-market](http://www.iso-ne.com/markets-operations/markets/forward-capacity-market)
- 4 In most states, the debt is tied to the property and not the property owner, so the obligation to repay the debt typically transfers to the new owner after a property is sold.
- 5 For more information on the *Clean Energy Development Fund*, see: <http://publicservice.vermont.gov/renewable-energy/cedf>
- 6 For more information on *Clean Energy Works*, see: <http://energy.gov/eere/better-buildings-neighborhood-program/portland-shows-how-clean-energy-works>.
- 7 For a more detailed discussion of methodology, please see the companion document *Quantitative Methodology Description*: [www.ucsusa.org/greenbanksmethodology](http://www.ucsusa.org/greenbanksmethodology)

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