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January 2, 2019

Members of the Vermont General Assembly  
115 State Street  
Montpelier, VT 05633-5301

Dear Senators and Representatives,

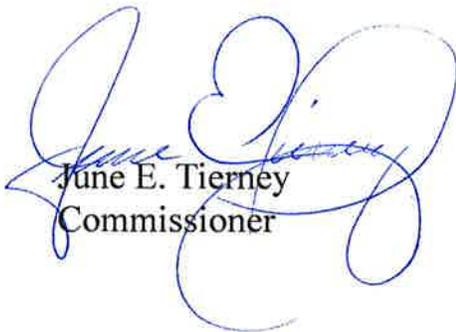
I am pleased to submit the Fiscal Year 2018 Annual Report of the Clean Energy Development Fund (CEDF), which includes information on the Fund's activities and finances from July 1, 2017 through June 30, 2018.

Members of the Clean Energy Development Board, as well as CEDF and other Public Service Department staff, have all worked diligently throughout the year to fulfill the promise and purpose of the CEDF as created by the legislature.

If you have any questions or concerns upon reading the report please do not hesitate to contact me or the Fund Manager, Andrew Perchlik.

I look forward to working with you this year in continuing the work of the Clean Energy Development Fund.

Sincerely,



June E. Tierney  
Commissioner





# ANNUAL REPORT TO THE LEGISLATURE FISCAL YEAR 2018

*[July 1, 2017 – June 30, 2018]*

Published: January 2019

Submitted to the following Committees of the Vermont  
General Assembly: **Senate Committee on Natural  
Resources and Energy, Senate Committee on Finance,  
House Committee on Energy and Technology, and House  
Committee on Commerce and Economic Development.**

## Summary of Fiscal Year 2018

During fiscal year 2018 (FY18) the Clean Energy Development Fund (CEDF) focused on growing Vermont's advanced wood heating market. As in previous years, the low price for fossil fuels continues to pose a challenge to providers of wood chips and pellets. The relatively high price for market entry for advanced wood heating systems is also an obstacle, but the CEDF has succeeded in tempering this obstacle by providing incentives for new installations and support for the supply side of the local wood fuel market.

In this report "advanced wood heating" denotes wood heating that: 1) utilizes highly efficient combustion technology; 2) produces low levels of emissions; 3) supports healthy forest ecosystems; and 4) consumes local wood. What is considered "highly efficient," a "low level of emissions," a "healthy forest ecosystem," or "local wood" will evolve with technology improvements. Accordingly, the CEDF's program requirements will be adaptive to ensure its programs are always leading the wood energy market to improve its performance.

For purposes of programs implemented in Fiscal Year 2019, the CEDF required that wood heating systems meet efficiency standards and have best available emission-control technologies that limit fine particulates. The emission and efficiency levels were developed for each wood heating technology (pellet boilers, chip boilers, or cord wood stoves).

The CEDF maintained its involvement across State government and the private sector in efforts to expand advanced wood heating. Work sponsored by the CEDF reinforced the awareness that the State can promote wood heating while supporting low-income Vermonters, increasing renewable energy generation, boosting economic development, improving air quality, and maintaining sustainable forest health.

Overall, about 11,250 workers are employed full time in Vermont's clean energy market.<sup>1</sup> This past year saw the first decline in the number of clean energy jobs since the CEDF began collecting this data in 2014. The annual *Vermont Clean Energy Industry Report* sponsored by the CEDF recorded a 1.7 percent decline in the number of workers involved with clean energy from 19,081 in 2017 to 18,759 in 2018. The decline is due largely to a contraction in the solar segment and mirrors larger national trends. At the same time, there was a higher proportion of renewable energy workers who spend most or all of their time on clean energy activities.

During FY18 the CEDF incentive and grant payments totaled over \$1.75 million with just over \$675,000 of that paid out through the Fund's Small Scale Renewable Energy Incentive Program (SSREIP). Here are highlights from Fund's programs and awards during the year:

1. Started Two Local Wood Stove Change-out Programs for Low-income Vermonters  
The CEDF continued its work with the Agency of Natural Resources' Air Quality and Climate Division on two stove change-out programs for low-income Vermonters in targeted areas of the state (Rutland and Windham Counties).
2. Continued Building the Automated Wood Heating Market

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<sup>1</sup> [Vermont Clean Energy Industry Report 2018](#)

The Small-scale Renewable Energy Incentive Program supported the installation of 43 new automated wood pellet heating systems, twenty of which were residential.

3. Published the Fifth *Vermont Clean Energy Industry Report*

The CEDF commissioned the state's fifth Clean Energy Industry Report, which once again characterized the state's clean energy workforce. The report's statistics continue to be quoted and cited in clean energy policy discussions. A decline in employment in the state for clean energy workers this year provided evidence regarding the connections between growth of clean energy activity in the state in relation to policy developments and the broader national economy.

4. Published the First *Vermont Clean Energy Finance Report*

Building on the work of the Public Service Department's Clean Energy Finance Collaborative, the CEDF provided resources to fund the first of three annual reports designed to provide a baseline understanding of activities and products for clean energy finance in the Green Mountain State. The findings helped members of the collaborative identify two potentially high impact follow-up activities: creation of an energy savings guarantee and support for the expansion of the State Energy Management Program to serve the unmet needs of the state's institutional buildings.

Overall, the slow uptake of CEDF's targeted technology (advanced wood heating systems) resulted in the CEDF ending the year with sufficient funding to continue its current programs through fiscal year 2019. However, with no new appropriations or resources secured for the future, CEDF's incentive programs will likely run out of funding at the end fiscal year 2019, followed by only little available funding for fiscal year 2020.

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## ■ Purpose and Scope of This Report

The purpose of this annual report is to provide information to the Vermont Legislature, clean energy stakeholders, and the citizens of Vermont that details the CEDF activities, revenues, and expenditures made for Fiscal Year 2018, as well as the progress the CEDF made toward its goals and fulfilling its purpose as directed by the Legislature.

## ■ Strategic Planning for the Clean Energy Economy

*The mission of the Clean Energy Development Fund is to serve the citizens of Vermont by increasing the local supply and utilization of distributed, small-scale, community-supported electrical and thermal renewable energy, while targeting related economic development advantages.<sup>2</sup>*

During FY18 the CEDF and the Clean Energy Development Board (CEDB) drafted a new Strategic Plan for the CEDF. Given its financial situation, the CEDF created a different type of strategic plan, one that was more of a strategic framework, to be used as needed. Past CEDF strategic plans looked forward five years. Because CEDF resources are declining, with no new revenue sources committed, the CEDF and CEDB more appropriately created a multi-year plan designed to inform decision-making regarding the remaining funding available to the CEDF, which is not likely to last five years.

The multi-year plan created the framework on which CEDF endeavors to use its structural strengths, position, experience, and knowledge to design and implement programs based upon three foundational pillars:

1. To meet the State's clean energy goals, Vermont needs an entity to focus on and coordinate renewable energy market development.
2. Vermont's energy future must include significant contributions by local and distributed thermal and electrical renewable energy generation.
3. Renewable energy development should be pursued with an eye toward obtaining the economic development benefits that contribute to improving the prosperity of Vermont citizens.

In support of the mission of increasing distributed, small-scale, community-supported thermal and electrical renewable energy generation, the CEDF is guided by four goals:

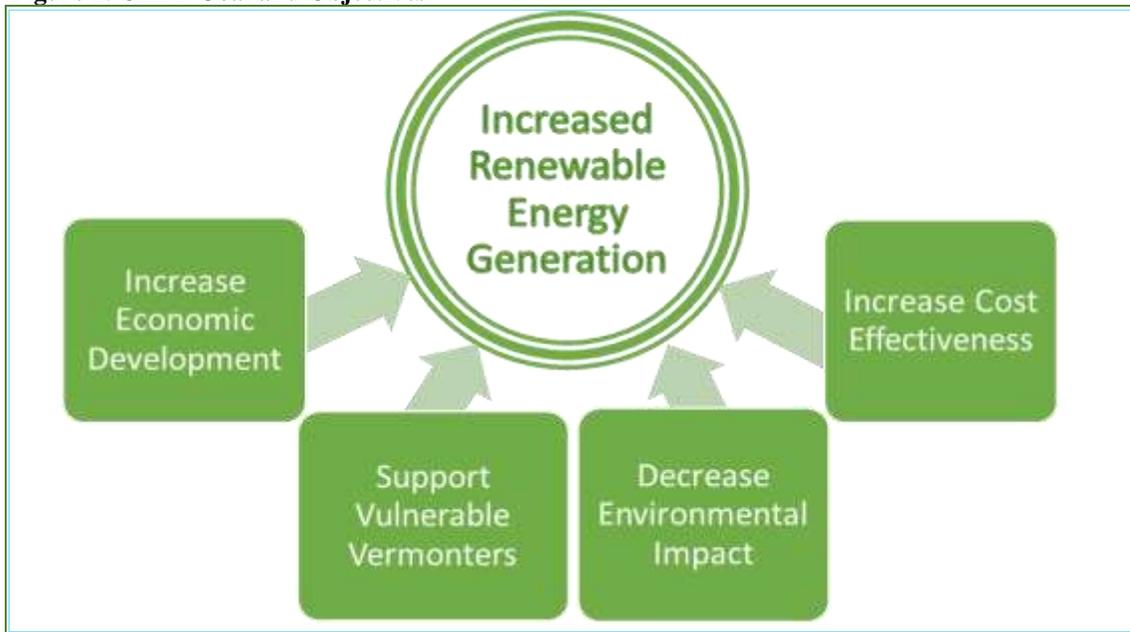
1. Create economic development via the clean energy economy;
2. Increase the cost effectiveness of clean energy;
3. Support vulnerable Vermonters; and
4. Reduce negative impacts of Vermont's energy use and generation on the environment.

Figure 1 shows graphically the interaction between CEDF's Vision and its four supporting goals.

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<sup>2</sup> [CEDF 2018 Multi-year Strategic Plan](#)

**Figure 1. CEDF Goal and Objectives**



### Strategies

In pursuit of the primary goal and four objectives the CEDF has implemented the following strategies:

- 1) Concentrate on un-regulated energy markets;
- 2) Focus on a select market/technology;
- 3) Transform emerging markets;
- 4) Coordinate and collaborate across State government and beyond;
- 5) Leverage other projects and programs;
- 6) Focus on projects that have community support;
- 7) Allow low-income Vermonters to access, and benefit directly from, renewable energy;
- 8) Learn from past activities; and
- 9) Maintain low administrative costs.

Guided by its strategic plan the CEDF focused on fostering growth of Vermont's nascent advanced wood heating sector. A mature advanced wood heating market in Vermont requires consumer demand for wood heating tightly coupled with a supply chain capable of delivering affordable, dependable wood fuel and installing cost-effective heating systems. The CEDF's FY18 efforts continued to help strengthen both supply and demand in the advanced wood market and local value chain. An evaluation of activities in this energy segment to be undertaken by the CEDF in FY 2019 will reveal the scope of impacts from CEDF investments and focus on the advanced wood heating market in Vermont.

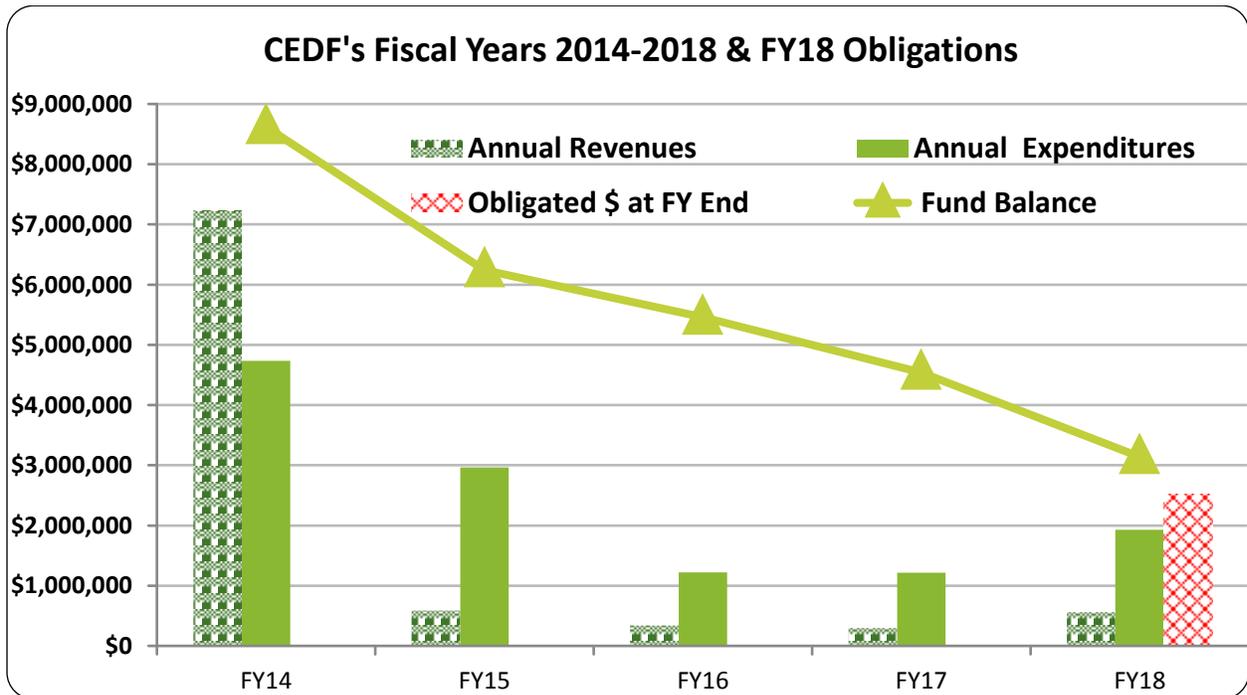
## ■ Authority, Funding & Resources

The Vermont General Assembly established the CEDF in 2005 through Act 74 (30 V.S.A. § 8015). The CEDF is administered by the Public Service Department (PSD), which employs a CEDF Manager and dedicates additional PSD staff to CEDF tasks as needed. (See Appendix I)

While in recent fiscal years (FY15–FY17) the CEDF did not receive funding from the Legislature or from Entergy Vermont Yankee, the Fund received an appropriation of \$453,292 from the Legislature in 2018. Of this, \$200,000 is dedicated to reimbursing the State’s General Fund to fund a sales tax exemption for advanced wood heating, enacted by the legislature for FY 2019-2020. In addition, the Legislature appropriated \$200,000 from the CEDF to the Department of Environmental Conservation for a wood stove change-out program, to be implement in FY19 in partnership with CEDF.

Without a new infusion of funding in FY19, the CEDF will be winding down its active operations. Fund balances are declining steadily and the bulk of remaining CEDF resources are already committed. Figure 2 below shows the revenue, expenses, and end-of-year balance of the Fund for last five fiscal years, and the amount of award and contract obligations at the end of the FY18.

**Figure 2. CEDF Annual Revenue, Expenses, Year-end Fund Balance, and FY18 Obligations**



At the end of FY18 the Fund had over \$2.5 million in fiscal obligations (i.e. signed grant agreements, contracts and program awards). The CEDF will continue to receive loan repayments from the approximately \$1.0 million in outstanding loans from CEDF borrowers. Loan repayments to the CEDF for FY18 equaled \$214,319. These repayments should continue

annually for several more years, decreasing each year, unless there are one or more unexpected defaults. See Appendix II for a financial report of FY18 revenue and expenses.

Boosting CEDF revenue in FY18 was a \$270,000 grant from Green Mountain Power Corporation's Nuclear Electricity Insurance Liability (NEIL) Fund. CEDF will expend these funds during FY19 for a low-income stove change-out program started in FY18 and a pilot low-income solar project in FY19.

The CEDF also receives federal funds from loans funded with Vermont's American Recovery and Reinvestment Act (ARRA) funds. No new loans have been issued since the ARRA grant was closed-out. The existing loans are serviced by the Vermont Economic Development Authority (VEDA). During the 2018 fiscal year \$117,409 in ARRA repayments were received by the CEDF. These funds are regulated under the US Department of Energy's State Energy Program grant to Vermont and are administered by the CEDF and PSD. At the end of FY18 the CEDF held approximately \$1.4 million in returned ARRA loan funds. The repaid loan funds retain their ARRA restrictions and cannot be co-mingled with CEDF or other State funds. Repayments from the ARRA-CEDF loans are deposited into an ARRA-CEDF account. See Appendix II for the FY18 financial report for the ARRA funds held by the CEDF.

### **Clean Energy Development Board**

While the Fund is administered by the PSD, a seven person Clean Energy Development Board (Board) oversees CEDF programs and spending. The Board members are appointed by State legislators and the Commissioner of the PSD.

At the beginning of FY18, the Board consisted of the following members: **Jared Duval, David Farnsworth, Janice St. Onge, Ken Jones, Johanna Miller, Sam Swanson, and Gaye Symington**. Jared Duval and Sam Swanson were co-chairs of the Board. The Board reviews and approves the CEDF Annual Plan, Annual Budget, and programs developed by the PSD to carry out the CEDF mission.<sup>3</sup>

The Board met five times during FY18. The Board provided guidance and input on a variety of topics, including: the 2018 Multi-year Strategic Plan, the FY19 Annual Program Plan and Budget, program design, and administration. For more details on the Board, see Appendix I.

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<sup>3</sup> 30 V.S.A. §8015(e)

## ■ New FY18 Awards & Activities

With substantially diminished resources available for deployment, the CEDF issued only three new grants during the fiscal year. The CEDF did not release any new grant solicitations in FY18. The grants and programs started in past fiscal years carried forward into FY18 and accounted for the bulk of CEDF activities and obligations. The CEDF remains focused on advanced wood heating market development, which continues to progress through the early development stage.

Awards (grants, incentives, MOUs, and contracts) issued by the CEDF in FY18 totaled approximately \$2.12 million (including CEDF-ARRA funds) and are detailed below and in Appendix III. Of the total, the CEDF signed new grants, MOUs, and contracts valued at \$1.45 million. In addition, the Small Scale Renewable Energy Incentive Program (SSREIP) paid out \$667,259 in incentives for projects with total project costs of \$3.35 million. Overall project costs for all awards were estimated to be \$6.48 million. Thus, CEDF awards leveraged over \$4.36 million in private investment in Vermont's clean energy infrastructure. These investments demonstrate that the CEDF was able to generate about \$2.06 of private investment for each CEDF dollar awarded.

The renewable energy projects supported by the CEDF will not only produce energy (the equivalent of 7,328 MWh per year ) but will also have the following environmental benefits:

- Annually eliminate the use of 191,635 gallons of fossil fuel (heating oil and propane)
- Annually reduce greenhouse gas emissions by 2281 metric tons<sup>4</sup>

During FY18 the Fund spent \$187,320 on staff and internal administration expenses. This represents a greater percentage of the total monies expended (approximately \$2 million) than CEDF's target of 5 percent. The CEDF anticipated a higher amount of grant reimbursements in FY18 than came through, resulting in a higher than normal administrative expenses as a percentage of expenses. The CEDF expects that limiting administration expenses to 5 percent of expenditures will grow increasingly difficult as CEDF expenditures decline in future years.

### **Contracts & MOU's**

The CEDF continued to gather knowledge and insight into the rapidly growing clean energy markets in Vermont. Whether this be through conducting market-based industry census projects to track jobs, coordinating with co-funders working towards similar objectives, or evaluating grant programs and installed projects, the CEDF is using this knowledge to fill strategic roles that are necessary for maturing industries to thrive. Below is a description of the contracts and MOUs executed in FY18.

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<sup>4</sup> See Appendix IV for more information on the GHG accounting

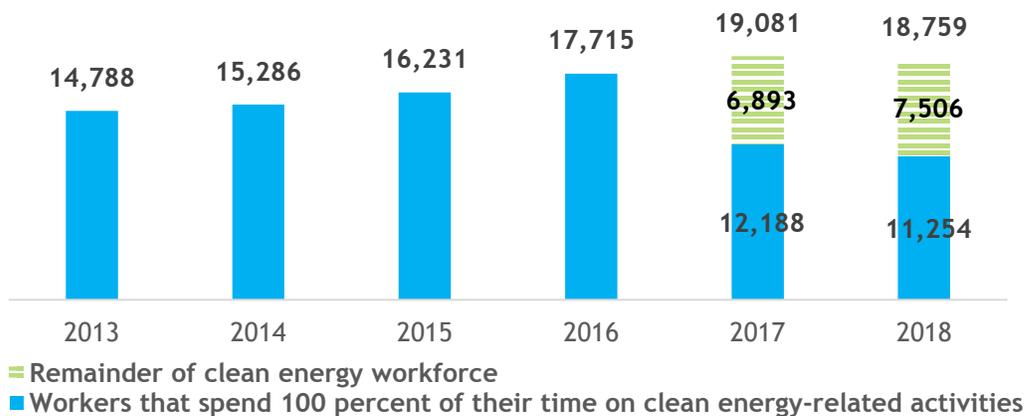
➤ **CLEAN ENERGY INDUSTRY REPORT: BW RESEARCH PARTNERSHIP, INC. (FIRST YEAR OF A TWO-YEAR CONTRACT: \$39,940)**

The CEDF released the most recent characterization of the state’s clean energy economy in the [Vermont Clean Energy Industry Report](#) during the spring of 2018. This is the first of two currently contracted reports that help track the evolution of employment in the clean energy industry in the state. For the fifth consecutive year, BW Research Partnership (BWR) prepared the report for the CEDF. This year’s report drew from 2017 data developed at the national level in conjunction with a coalition of funders seeking to continue the effort supported previously by the U.S. Department of Energy. The Vermont report has been regularly cited in a variety of reports.



The most recent report showed that the number of clean energy workers in the state declined for the first time since statistics in Vermont were developed (Figure 3). In 2018, the number of clean energy workers dropped 1.7 percent from a total of 19,081 in 2017 down to 18,759 in 2018. The number of workers who spent all of their time on clean energy related activities decreased from 12,188 to 11,254 over the same period. This change was driven largely by a contraction of the solar industry in Vermont, which is consistent with larger national trends. However, the overall number of jobs full- and part-time remains up by a healthy 27 percent since data collection began in 2013.

**Figure 3. Clean Energy Employment Growth, 2013-2018**



About 60 percent of all the workers identified spend all of their time on clean energy-related business activities. The state is home to 3,612 establishments conducting clean energy work, about a 4 percent decrease over the previous year’s data but still 43 percent above the early numbers recorded.

The data from the 2018 report shows that more workers are spending the majority of their time on clean energy work, while at the same time, there are fewer overall full-time clean energy workers. In turn, the number of small establishments reporting 1 to 5 permanent employees

dropped but the number of medium sized employers (11 to 99 permanent employees) increased by notable margins. Almost 8 in 10 of surveyed clean energy employers reported having trouble finding qualified workers to fill open positions last year. See the report for a complete description of the findings.

➤ **DEPARTMENT OF FORESTS PARKS AND RECREATION (MOU: \$10,000 OF A THREE YEAR AGREEMENT)**

The CEDF, along with the Public Service Department, Agency of Commerce and Community Development, and the Department of Forests Parks and Recreation (FPR), each continued to supply a portion of the funding needed for a Wood Energy Coordinator at FPR, a role that is providing technical assistance, market research and inter-agency coordination to promote and develop wood energy activities in the state. Previously, FPR secured funding through USDA Forest Service of \$241,500 to be matched with \$130,038 of cash and in-kind services from the three State parties to fund this position. The CEDF contribution is \$10,000 for each of the three years of the agreement. FY18 was the second period of the three-year term.

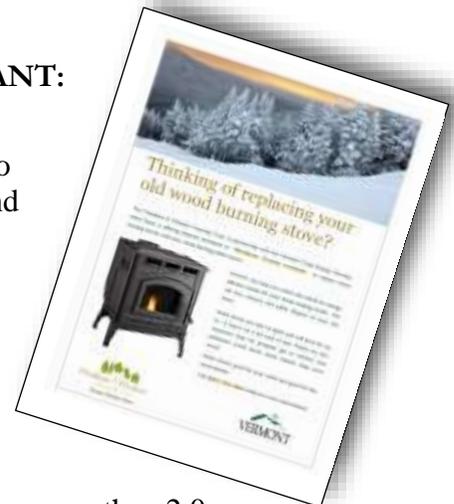
In FY18, activities for the State Wood Energy Coordinator included the design and delivery of a wood heating information and education program in Vermont to reduce market barriers to adoption of wood energy applications.<sup>5</sup> The Coordinator also provided staff assistance to FPR’s Wood Utilization Program Leader, Division Director, and Commissioner on issues related to wood heating. The Coordinator was responsible for the management of the State Wood Energy Team. This work helped to expand markets for the products of sustainable forestry.

## **Grants**

*Advanced Wood Energy Grants* – In FY18, the CEDF continued to provide funding to organizations interested in substituting old, inefficient, and polluting heating equipment with modern wood heat systems. This funding is part of the CEDF’s strategic focus on building the advanced wood heating market in the state. The CEDF grants below are components of that overall strategy.

➤ **WINDHAM AND WINDSOR HOUSING TRUST (GRANT: \$270,500)**

The Windham and Windsor Housing Trust located in Brattleboro received a grant of \$270,500 from the CEDF to support a low and moderate income residential pellet heating program. This funding allowed them to work with low income residents in Windham County to change out their old, non-EPA certified systems for new pellet-fueled systems or install boiler/furnaces in 2-4 unit owner-occupied multi-family properties.



As with other CEDF programs, the new stoves had to be EPA-compliant and have an emission rating for particulate matter of no more than 2.0

<sup>5</sup> See: [https://fpr.vermont.gov/forest/wood\\_biomass\\_energy/residential\\_wood\\_heating](https://fpr.vermont.gov/forest/wood_biomass_energy/residential_wood_heating)

grams per hour with an efficiency rating of at least 70 percent. Fuel for the stoves was preferably wood pellets made in or within 50 miles of the state to build the local biomass supply chain. The Housing Trust was also encouraged to strive for a combination of maximizing home heating cost savings, fossil fuel displacement, indoor air quality, and home safety improvements for the participating homes. Overall, the program was designed as part of the CEDF's effort to stimulate the wood heating market in the southern part of the state.

➤ **RUTLAND WEST NEIGHBORHOOD HOUSING SERVICES INC. DBA NEIGHBORWORKS OF SOUTHWESTERN VERMONT (GRANT: \$715,000)**

Building on their strong regional connections and history of working with lower and moderate income families, NeighborWorks of Western Vermont received a combination award of \$715,000 with \$500,000 from the CEDF's ARRA allocation, \$115,000 from Green Mountain Power Corporation via the CEDF, and \$100,000 from the Vt. Department of Environmental Conservation's Air Quality Division to support a residential wood stove change out and interest rate buy down program for pellet stove/boiler purchases. The program aims to help low and moderate income residents of Rutland County and neighboring towns with financial and logistical support to install wood/pellet stoves or pellet boilers/furnaces coordinated with thermal energy efficiency retrofits to reduce energy consumption. A sample change-out is seen in Figure 4.

**Figure 4. Old wood stove with new wood pellet replacement stove completed by NeighborWorks of Western Vermont**



During the initial period of activity in FY18, NeighborWorks replaced 54 units using \$229,445 of rebate funds which when combined with customer match yielded \$278,800 invested in cleaner-burning stoves in the Rutland area in just three months. This new wood-fired equipment is on average 50 percent more efficient than the old units and emits on average 96 percent less particulate matter.

All incentivized measures were in homes owned by low or moderate income residents or owned by non-profit organizations that serve low and moderate income citizens. As with the Windham and Windsor Trust grant above, new heating systems must be EPA certified with particulate

emissions of not more than 2.0 grams per hour and 70 percent efficiency ratings. The grant also supported interest rate buy downs to help lower the financing costs for eligible measures—a combination designed to facilitate substantial energy savings and emissions reductions among vulnerable populations in Rutland County.

*Farm Energy Grants* – CEDF continued to assist farmers with development of renewable energy projects that yield economic and environmental benefits.

➤ **TAMARLANE FARMS LLC – D/B/A KINGDOM VIEW COMPOST (GRANT: UP TO \$53,000)**

The proprietors of Tamarlane Farm in Lyndonville saw an opportunity to combine farm manure, local forest product residuals, and local food scraps from their family owned restaurant at their own compost site. This CEDF award provided resources for *Kingdom View Compost*, to design, purchase and install a compost heat recovery system sold by Agrilab Technologies of Vermont at the grantee’s facility in Lyndonville.

The system would make use of the company’s compost, established aerated static pile and compost heat recovery technology to convert the raw animal manure, local food waste, and forest product residuals into stable, value-added soil amendments/compost for use in agricultural, commercial and residential applications. The compost heat will be used to warm a garage/shed via a radiant floor and for heating a greenhouse. The compost system is expected to generate 1,449 MMBtu estimated annual gross energy production with the compost heat recovery system capacity rated at 256,800 Btu/hour. About a quarter of this heat capacity will be devoted to the shed and greenhouse (362 MMBtu/year). When completed, the system will have the potential to displace about 2,600 gallons of propane per year.

**Continuing Awards & Activities from Prior Fiscal Years**

**Windham County Dedicated Funds**

In FY2014 the General Assembly appropriated over \$7.5 million to the CEDF. Included in that appropriation was a final one-time payment of \$5.2 million from Entergy Vermont Yankee (EVY). The Legislature allocated half of that EVY payment (\$2.6 million) for projects in, and for the benefit of, Windham County.

Starting in FY15 the CEDF allocated over \$2.4 million for renewable energy programs in Windham County. These funds have been dedicated to help the County address the local economic effects of the closure of the Vermont Yankee power plant as well as to leverage the County’s strategies to build on its emerging clean energy economy.

The CEDF had two active awards deploying the Windham County funds in FY18: the Windham Wood Heating Initiative, and the Windham Renewable Energy Grant Program.

➤ **WINDHAM WOOD HEAT INITIATIVE (ORIGINAL GRANT \$1,193,143)**

The Windham Wood Heat Initiative (WWHI), signed with the Windham Regional (WRC) commission in FY17, is now in its third year. The \$1.2 million grant agreement was designed to support the development of advanced wood heating systems for schools, municipalities, and public-serving non-profits located in Windham County. The WRC continued to implement program activities and provide technical assistance to potential audiences in the Windham region. The program assisted town, school, and now non-profit building owners to convert fossil fuel and non-functioning wood heating systems to advanced, automated, high-efficiency wood boilers while also addressing those buildings’ energy efficiency needs. (Figure 5)

Through the program, qualifying property owners were recruited for advanced wood heat assessments, thermal energy and building envelope analyses, and technical and financial assistance in converting fossil fuel systems to wood. Services included one-on-one coaching, assistance with bid review, budget, system commissioning, and public approval process. Financial incentives of 75 percent of the cost of an audit report and feasibility study, plus 25 percent of the installation cost were made available. Additional grant funds were available for projects that installed wood heating systems and also completed energy efficiency measures recommended by the audit. A total of three new institutions were awarded grants to install wood

**Figure 5. Windham Wood Heat Initiative Grantees for FY18**

Grantee Name	Town	Type of Organization	Cost (Est'd)	Grant - based on cost	Type of wood or Activity	Oil Displace (gal/yr Est'd)	Estimated Completion Date
Bellows Falls Middle School	Rockingham	School	\$155,000	\$49,500	Chips	10,815	November 2019
Brattleboro Transportation Center	Brattleboro	Municipality	\$176,145	\$59,491	Pellets	4,944	November 2019
Putney Central School	Putney	School	\$89,100	\$30,010	Pellets	7,565	December 2018
Wardsboro School	Wardsboro	School	\$5,500	\$4,125	Audit	NA	September 2017
NEYT	Brattleboro	Non-Profit	\$5,500	\$4,125	Audit	NA	March 2018
Winston Prouty Center	Brattleboro	School	\$18,500	\$13,875	Audit	NA	April 2018
Retreat Farm	Brattleboro	Non-Profit	\$4,000	\$4,000	Audit	NA	March 2018
Kurn Hattin Homes for Children	Westminster	School	\$5,000	\$3,750	Audit	NA	April 2018
School for International Training	Brattleboro	School	\$9,500	\$7,125	Audit	NA	August 2018
<b>Fiscal Year 2018 Award Totals</b>			<b>\$468,245</b>	<b>\$176,001</b>			

heating systems and energy efficiency measures during the year, and another six received assistance to perform audits.

### **WINDHAM RENEWABLE ENERGY GRANT PROGRAM**

*(\$300,000 in FY18 plus \$400,000 in prior fiscal years)*

The CEDF issued a grant to the Windham Regional Commission for this program at the end of FY16. In early FY17, the WRC investigated options and conducted a public comment and engagement process regarding program design. They issued grants in the second half of FY17 and continued with grant making in FY18. In FY18, CEDF re-allocated an additional \$300,000 from the previous fiscal year for renewable energy projects in Windham County. The WRC developed a program that required at least 50 percent match from the grantees. The grant program priorities included:

- ***Municipal Projects*** – Projects sited on municipally owned or controlled properties which benefit the municipality as a whole
- ***Neighborhood or Community-Scale Projects*** – Projects that support renewable energy development by groups of homes and/or businesses
- ***Projects that Promote Economic Development in Windham County*** – Economic development in this context is defined as projects that create new long-term employment (i.e., permanent jobs beyond those involved in the development and construction of the project). Projects that emphasize this priority should tie into the Windham Region Comprehensive Economic Development Strategy and its goals and objectives.
- ***Projects that Have High Creativity and/or Educational Value*** – Projects that support the transfer of knowledge and understanding to others about renewable energy generation and are designed with access and education in mind
- ***Projects Utilizing Heavily-impacted Sites*** – Projects utilizing heavily-impacted, difficult to develop sites such as quarries, landfills, mines, industrial sites, commercial and industrial rooftops, and brownfields
- ***Projects for Underserved Communities or Groups*** – Projects which serve to invest in renewable energy generation and reduce energy insecurity for underserved or at-risk communities or groups (e.g., low-income, elderly, etc.)
- ***Projects which create or enhance energy system resilience***

In FY18, WRC awarded four grants totaling \$264,000. (Figure 6)

**Figure 6. Windham Regional Commission Renewable Energy Grant Program Awardees (FY18)**

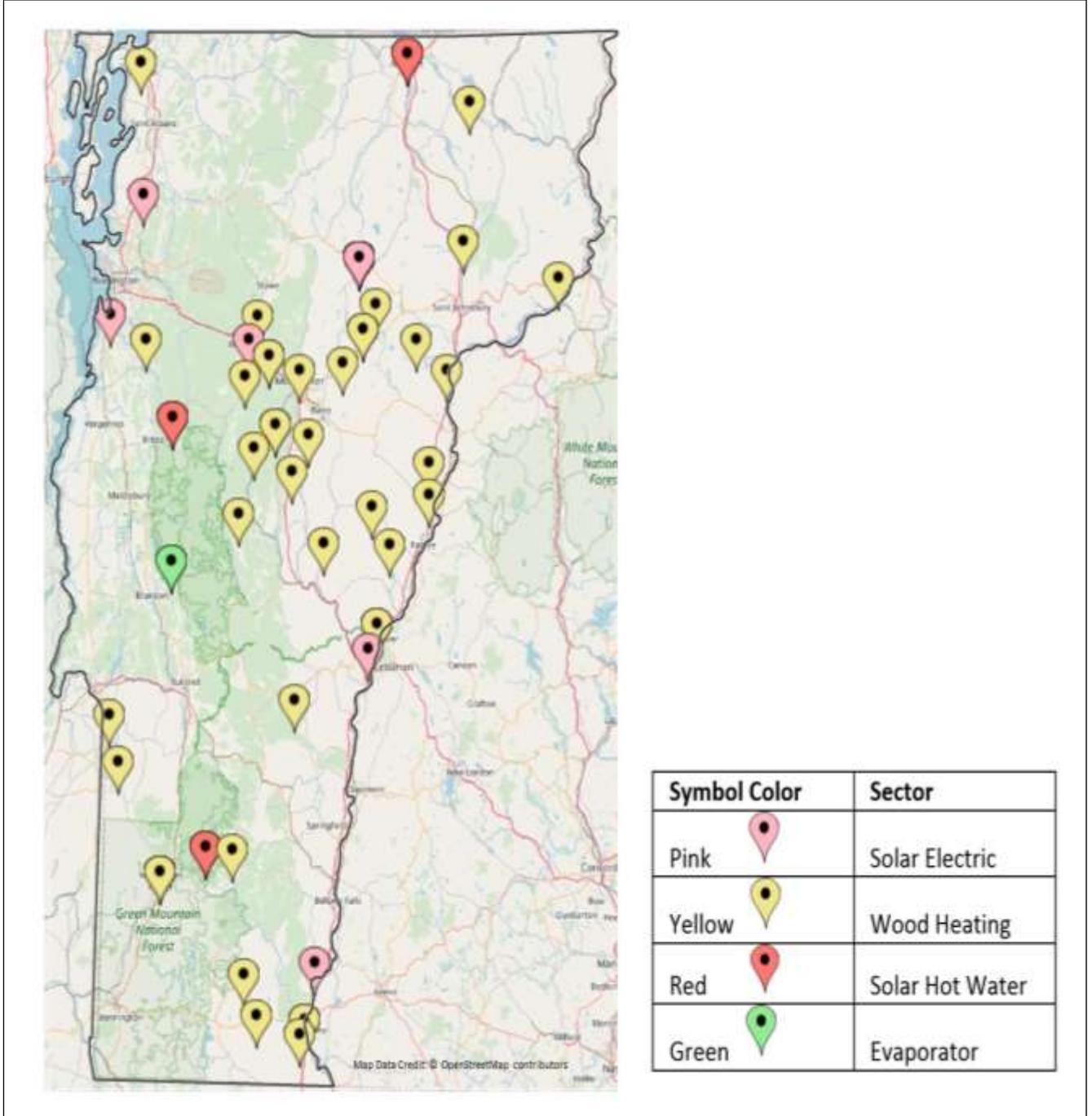
Grantee Name	Project Type	Town	Type of Org	Estimated Project Cost	WRC Grant \$ Amount
Grafton Community Solar & Incentive Prgm.	Solar PV Array Installation	Grafton	Business	\$1,155,000	\$26,000
Southeast Vt. Community Action (SEVCA)	PV Array Credits to Low Income Community	Westminster	Non-Profit	\$375,000	\$111,000
Windham Co. Integrated Resource Recycling Ctr.	Aerobic Digester	Brattleboro	Public-Private Partnership	\$1,500,000	\$101,000
Windham & Windsor Housing Trust – Flat Street	Solar PV Array Installation	Brattleboro	Non-Profit	\$70,000	\$26,000
<b>Fiscal Year 2018 Totals</b>				<b>\$3,100,000</b>	<b>\$264,000</b>

**Small Scale Renewable Energy Incentive Program (SSREIP)**

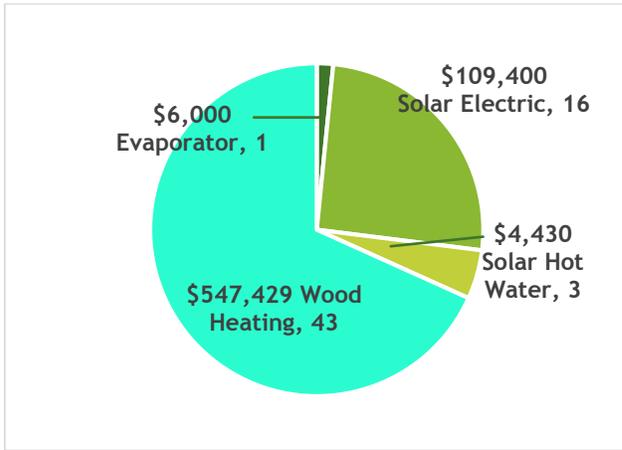
The SSREIP is a market-based, first-come, first-served open incentive program. The SSREIP has been CEDF’s longest running (since 2007) and most effective program. In FY18 it provided \$667,259 in incentives for advanced wood heating systems for homes, business, and institutions; low-income solar PV; and solar thermal systems. As shown in the map, participation in the SSREI Program was well distributed across the state. (Figure 7)

The FY18 incentive payments supported the installation of the following 63 renewable energy systems: 16 Solar PV systems for low-income energy efficient homes, 3 solar hot water systems, 43 wood pellet heating systems and one maple syrup evaporator. (Figure 8) The CEDF awarded these incentives to school, low-income, residential, non-residential, and municipal customers in the state. (Figure 9) See Figure 10 for an example of a pellet boiler system installed at the Twinfield Union School in Marshfield/Plainfield.

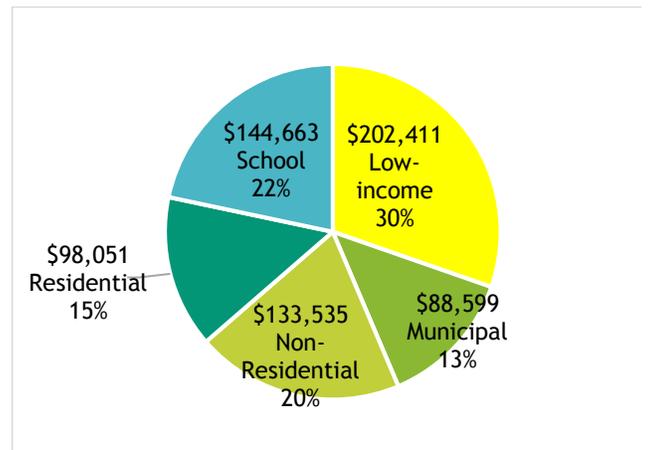
Figure 7. Small Scale Incentive Program FY18 Awards



**Figure 8. FY18 SSREIP Incentives Paid by Amount (\$), Technology and Number (#)**



**Figure 9. SSREIP FY18 Incentives by Amount (\$), Customer Segment and Percentage (%)**



The evaporator incentive was started in FY17 and the only pellet fired evaporator incentive was paid in FY18.

As in prior years, the CEDF continued to contract the administration of the program to the Renewable Energy Resource Center (RERC – a unit within the Vermont Energy Investment Corporation, or VEIC). The RERC was last awarded the contract by competitive bid in FY15. The contract was extended in FY17 to the end of calendar year 2018.

**Figure 10. Small Scale Incentive Program Advanced Wood Heat Pellet Project**

**Twinfield School Pellet Project**

In 2018, CEDF provided custom incentives such as the \$95,000 payment for a new pellet heating systems for space heating and hot water at the Twinfield Union School in Marshfield. This was the largest incentive available for advanced wood heating systems and the only project big enough to ever apply for the maximum incentive. The total project cost \$492,500 including installation of two new pellet boilers, one of which could be retrofitted to burn wood chips, and an expanded pellet silo.



## **Finance Programs**

The activities below also support the energy finance recommendations of the State's Comprehensive Energy Plan.

### **➤ THERMAL ENERGY FINANCE PILOT INTEREST RATE BUY DOWN PROGRAM**

In January 2018, the Department transferred its Thermal Energy Finance Pilot Program and its Heat Saver Loan product transitioned to Efficiency Vermont. Over the term of the pilot, CEDF and PSD resources supported an interest rate buy down on secured or unsecured loans to home owners in the state who sought affordable financing to install high efficiency heating systems such as wood pellet boilers and/or to weatherize their properties. By the time of transition, 550 loans valued at over \$6 million generated a leverage of nearly \$6.50 of private investment for each program dollar. Of that total, 54 percent of interest rate buy downs went to Vermonters with lower incomes, consistent with the new objective of the CEDF to support vulnerable Vermonters. This successful program will continue to help low and moderate income Vermonters gain access to affordable financing for thermal energy improvements that will save energy and money into the future.

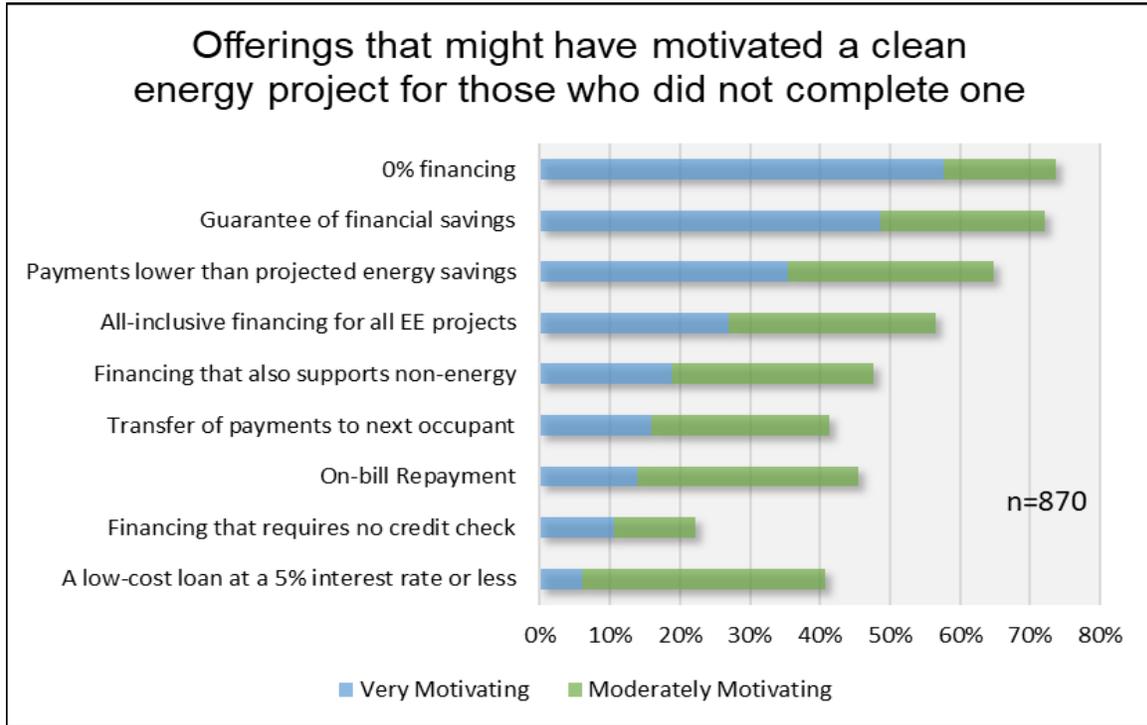
### **➤ CLEAN ENERGY FINANCE COLLABORATIVE**

The CEDF provided support for an initiative designed to coordinate with other state agencies, private finance institutions, and industry stakeholders to strengthen and expand access to financing tools for key technologies needed to advance State energy goals. In 2018, the Public Service Department continued to manage the Clean Energy Finance Collaborative launched in 2017. A group of more than 20 stakeholders completed their review of clean energy finance activities in the state, culminating with recommendations to pursue concept development for an energy savings guarantee, and supporting the advancement of energy efficiency activities by the State Energy Management Program at the Department of Buildings and General Services. The collaborative was established with the goal and purpose to improve the effectiveness and significantly increase the state's capacity for clean energy finance and investment to support State energy goals. The collaborative received a commitment of \$20,000 of funding from the CEDF in FY18 to support PSD's staffing requirements.

### **➤ CLEAN ENERGY FINANCE REPORT: ENERGY FUTURES GROUP, INC. (THREE-YEAR CONTRACT: \$43,000)**

During that past fiscal year, the participants in the collaborative helped provide information to the Energy Futures Group, Inc., the company selected by competitive proposal contracted to produce the [\*Vermont Clean Energy Finance Report\*](#) by the CEDF. The first report, released in June 2018, established a baseline of clean energy finance activities in the residential, commercial, and institutional market segments of the state, and proffered select examples from other locales intended to inform future considerations. The study provided a substantial picture of how financing is being used to facilitate installations of clean energy technologies, data on gaps in the markets, and recommendations. (Figure 11). Future reports will cover select aspects of the broad clean energy market to gain insights into how they are evolving.

Figure 11. Example of data from the Clean Energy Finance Report 2018



**Other Projects and Activities**

➤ **STATE WOOD ENERGY TEAM (SWET)**

The CEDF continued to be active throughout the year in this inter-agency effort that facilitated participation of six key stakeholder groups. The SWET is led by the Department of Forest, Parks and Recreation.

➤ **CLEAN ENERGY STATES ALLIANCE**

On behalf of the CEDF, PSD staff worked with Clean Energy States Alliance to update the [Vermonters’ Guide to Residential Solar](#), which includes information to help consumers decide whether and how to “go solar.” The latest version of the guide, which was released in September 2018 includes an appendix that explains changes made to the state’s [net metering rules](#) in 2017 and how these changes affect compensation for PV system production.

➤ **CLEAN ENERGY STORAGE GRANT**

Act 53 of 2017 tasked the PSD with producing a report to the Legislature on the state of energy storage, its costs and benefits, and barriers to and opportunities for deployment. The act also authorized “energy storage projects that facilitate the utilization of renewable energy resources” as a category of eligible expenditures for the CEDF. The CEDF allocated \$50,000 in FY18 to support a clean energy storage competitive grant but the solicitation for this grant will be issued

in FY19. The overarching goal of any CEDF storage activity will be to help optimize the integration of renewable energy into the electric grid while realizing maximum benefits for ratepayers, and to potentially explore diversification of the types of storage technologies and applications in the state.

## Fiscal Year 2019 - First Half Preview

CEDF adopted a budget and program plan for FY19 in July of 2018. During the first half of FY19, CEDF continued to administer programs started in FY18, and began the process to contract for the CEDF evaluation. This section provides a brief synopsis of CEDF activities from July to December 2018.

- **Clean Energy Fund Evaluation** – The CEDF staff issued an RFP to solicit contractors to evaluate the performance of the CEDF’s recent activities, focused primarily on (but not limited to) the advanced wood heating sector in the state. The selection process has been completed and the selected contractor is scheduled to issue a report in 2019.
- **Vermont Clean Energy Industry Report 2019** – The CEDF commenced a sixth clean energy industry survey to continue to gain insight into trends in Vermont’s clean energy industry. This sixth report is slated for completion in the spring of 2019.
- **State-wide Stove Change-out** – The Legislature appropriated \$200,000 of CEDF funds to the Department of Environmental Conservation (DEC) for woodstove Change-outs to improve air quality and reduce air emissions related to woodstoves. The CEDF is adding \$200,000 of CEDF funds and has been working with DEC’s Division of Air Quality and Climate on a state-wide change-out program. The change-out program started on November 1, 2018.
- **New streamlined SSREIP Pellet Boiler Incentive** – Starting in July of 2018 the CEDF and Efficiency Vermont (EVT) coordinated their separate pellet boiler incentives for residential and commercial customers so that customers/pellet boiler contractors only need to use a one-page CEDF-EVT combined incentive form for residential pellet boiler installations. As EVT started a custom commercial incentive in 2018 CEDF ended its custom non-residential incentive and changed to a flat \$3,000 incentive for commercial systems. These changes greatly simplified the process and reduced paper-work, administrative costs, and confusion about the two incentives. EVT and CEDF are confident these changes will help to increase the number of systems installed.

## Conclusion

The CEDF finished FY18 continuing in support of its statutory mission with activities substantively improving the lives of Vermonters, especially those vulnerable to the effects of air pollution and fluctuating fossil fuel prices. CEDF funded projects will avoid the use of over 191,000 gallons of fossil fuel and reduce greenhouse gas emissions by approximately 2,900

metric tons of carbon dioxide equivalent. CEDF incentives and efforts also resulted in increasing amounts of locally generated renewable energy and vital economic development in local industries.

In addition to offering financial incentives, the CEDF helped many citizens, towns, schools, businesses, non-profit organizations, and businesses gain essential knowledge and practical experience with renewable energy technologies. Such experience and understanding will support the State's continuing efforts to grow the State's clean energy economy.

While the number of installations of advanced wood heating systems in FY19 continues to be lower than the CEDF would like it to be, the Fund continues to see great promise in the advanced wood heating sector. Vermont can drastically reduce fossil fuel use for heating, secure long-term fuel cost savings, reduce carbon emissions, and grow the State's economy—especially in the forest products and wood heating sectors.

Achieving the CEDF's renewable energy goals while targeting local economic development and protecting the vulnerable Vermonters can be challenging, but the CEDF, with help from other State agencies and active stakeholders, continues to demonstrate its capacity to reach multiple goals simultaneously in a cost-effective and efficient manner. The CEDF will strive to retain its capacities as it winds down CEDF functions during the next fiscal year. The CEDF will seek to be a resource and be available to the PSD, and other State agencies, as they seek to meet the State's clean energy goals and be ready to quickly re-start programs if new funding for the CEDF is secured.

## ■ Appendix I - Statutory Authority & Clean Energy Development Board

In 2005, the Vermont General Assembly established the Vermont Clean Energy Development Fund (CEDF) through Act 74.

### **PURPOSE** (30 V.S.A. § 8015(c))

The purposes of the Fund shall be to promote the development and deployment of cost-effective and environmentally sustainable electric power and thermal energy or geothermal resources for the long-term benefit of Vermont consumers, primarily with respect to renewable energy resources, and the use of combined heat and power technologies.

### **ADMINISTRATION**

The Public Service Department (PSD) administers the CEDF to facilitate the development and implementation of clean energy resources. The PSD hires a Fund Manager to oversee the day-to-day operations of the fund.

Assisting the PSD is a Clean Energy Development Board with decision-making and approval authority with respect to the plans, budget, and program designs of the CEDF. The Board also serves in an advisory function to the Commissioner of the PSD. The Board consists of seven members appointed in the following manner:

- Three members appointed by the Commissioner of the Public Service Department
- Two members appointed by the chair of the Senate Natural Resources and Energy Committee
- Two members appointed by the chair of the House Natural Resources and Energy Committee

### **CED Board Members During FY18, Appointing Authority, and Year Term Ends:**

- Jared Duval, PSD Commissioner, 2019
- David Farnsworth, PSD Commissioner, 2021
- Ken Jones, Senate Energy Committee Chair, 2021
- Johanna Miller, House Energy Committee Chair, 2021
- Janice St. Onge, PSD Commissioner, 2019
- Sam Swanson, Co-Chair, Senate Energy Committee Chair, 2019
- Gaye Symington, House Energy Committee Chair, 2019

### **Public Service Department & CEDF Personnel**

June E. Tierney – PSD Commissioner  
Riley Allen – PSD Deputy Commissioner  
Ed McNamara – Director, Energy Policy and Planning  
Kelly Launder – Assistant Director, Energy Policy and Planning  
Andrew Perchlik – CEDF Fund Manager  
Edward Delhagen – Clean Energy Finance and Program Manager  
Anne Margolis – Renewable Energy Development Director  
Stacy Drinkwine – Financial Manager  
Tod Zeigler – Financial Analyst

## Appendix II - FY18 CEDF Financial Reports for CEDF & ARRA Funds

### VERMONT CLEAN ENERGY DEVELOPMENT FUND STATEMENT OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE Fiscal Year 2018

<b>21991 CEDF FUND:</b>	As of June 30, 2018
<b>REVENUES</b>	
Interest Income	\$48,330
Loan Interest Income	\$27,997
Loan Repayments	\$214,319
Grants	\$270,000
<b>Total Revenues</b>	<b>\$560,646</b>
<b>EXPENDITURES</b>	
Wages & Benefits	\$155,703
Per Diem	\$200
Meetings & Conferences	\$200
Dues	\$10,000
Travel	\$0
Misc. Administration	\$21,217
<b>Total Administrative</b>	<b>\$187,320</b>
VEDA Loan Program Exp.	\$14,884
SSREIP Program (including VEIC admin contract)	\$676,106
Contract - Other	\$51,472
Grants	\$1,030,644
<b>Total Expenditures</b>	<b>\$1,959,427</b>
Net change in fund balance FY17 to FY18	<b>\$(1,398,781)</b>
Fund balance, June 30, 2017	<b>\$4,540,061</b>
<b>Fund balance on June 30, 2018</b>	<b>\$3,141,280</b>

**22041 ARRA REVOLVING LOAN FUND:**As of  
June 30, 2018**REVENUES**

Interest on Cash Balance (State only)	19,162
Interest on Cash Balance (VEDA only)	2,189
Loan Interest (from VEDA)	\$17,871
Loan Repayments (Principle only)	\$117,409
<b>Total Revenues</b>	<b>\$156,631</b>

**EXPENDITURES**

Solar and AWH Interest Rate Loss Fund	-
Residential Credit Enhancement-Heat Saver	\$134,101
VEDA ARRA Loan Administration Fees	\$13,858
<b>Total Expenses</b>	<b>\$147,959</b>

Net change in fund balance	\$8,673
Fund balances, Trail balance June 30, 2017	\$1,158,032
Plus: Monies at VEDA Un-encumbered	\$265,655
<b>Fund balance on June 30, 2018</b>	<b>\$1,432,360</b>

## Appendix III - New CEDF Awards Announced in FY18

Funding Type	Award Recipient (# of Awards)	# of Projects	Technology, Capital Type Type of Activity	Funds Awarded	Total Project Cost (Estimated Upon Award)	Estimated Annual Energy Production (MWh/yr) or Improvement
<b>Contracts &amp; MOUs</b>						
	-BW Research, Inc. (Contract)	1	• Vt. Clean Energy Industry Report 2017 and 2018 (Years 5 & 6)	\$38,940	\$38,940	NA
	-Energy Futures Group (Contract)	1	• Clean Energy Finance Report (3 Annual Reports 2018 - 2020)	\$48,000	\$48,000	NA
	-Dept. of Forests Parks & Recreation (MOU)	1	• Wood Energy Coordinator (1 Year Support)	\$90,000	\$241,500	NA
<b>NETOTAL Contracts &amp; MOUs</b>		<b>3</b>		<b>\$112,940</b>	<b>\$324,440</b>	
<b>Grants</b>						
<b>Advanced Wood Heating (Pellet or Chip Systems)</b>	-Rutland West Neighborhood Housing Services Inc. dba "NeighborWorks of Western Vermont"	54	• Low Income Wood Stove Change-Out Program	\$715,000	\$1,646,406	11% Improvement in ave. efficiency of stoves; 36% reduction in ave. emissions rates
<b>Farm Energy</b>	Tamarlane Farm LLC (dba "Kingdom View Compost")	1	• Compost Heat Recovery (165 kbtu/yr)	\$53,000	\$216,971	106
<b>NETOTAL Grants</b>		<b>55</b>		<b>\$768,000</b>	<b>\$1,863,377</b>	<b>106</b>
<b>Carry-Over Re-Grants</b>						
<b>Windham County Programs</b>	<b>-Windham Wood Heat Initiative [\$1,193,143 in FY17]</b>					
	Bellows Falls Middle School	1	• Wood Chip Boiler	[\$48,500]	[\$155,000]	423.0
	Brattleboro Transportation Center	1	• Wood Pellet Boiler	[\$69,480.25]	[\$175,145]	115.4
	Putney Central School	1	• Wood Pellet Boiler	[\$90,010]	[\$89,100]	196.1
	6 Schools and Municipal Facilities	6	• Energy Audits	[\$97,000]	[\$48,000]	NA
	<b>-Windham Renewable Energy Grant Program [\$400,000 in FY16]</b>					
	Grafton Community Solar	1	• Solar PV array & incentive program (360 kW)	[\$26,000]	[\$1,155,000]	441.5
	Southeast Vermont Community Action (SEVCA)	1	• PV array credits to low income community (150 kW)	[\$111,000]	[\$975,000]	184.0
	Windham Co. Integrated Resource Recovery Ctr.	1	• Anaerobic Digester (300 kW)	[\$101,000]	[\$1,500,000]	1,839.6
	Windham and Windsor Housing Trust Flat Street	1	• Solar PV array (20 kW)	[\$26,000]	[\$70,000]	34.5
<b>NETOTAL Carry-Over Re-Grants</b>		<b>13</b>		<b>[\$440,001]</b>	<b>[\$3,967,246]</b>	<b>3,224.0</b>
	<b>-Windham Renewable Energy Grant Program [\$300,000 in FY18]</b>		• Expanded funding for Renewable Energy Grant Program	\$300,000.00	\$630,000.00	NA
	<b>-Windham and Windsor Housing Trust Low Income Residential Pellet Heating Program</b>	77	• Residential Change Out Program for low to moderate income homeowners in Windham and Windsor Counties	\$270,500.00	\$912,575.00	88.7
<b>NETOTAL New Windham Grants</b>		<b>77</b>		<b>\$570,500</b>	<b>\$942,575</b>	<b>88.7</b>
<b>Incentives</b>	<b>Renewable Energy Resource Center</b>	16	Solar PV (kW-AC)	\$309,400	\$906,002	152.3
<b>Small Scale Renewable Energy Incentive Program</b>		3	Solar Thermal (MWh/yr)	\$4,430	\$35,035	12.3
		43	Advanced Wood Heating (MWh/yr)	\$547,428	\$2,976,425	3,695.5
		2	Evaporator	\$6,000	\$32,153	49.2
<b>NETOTAL Incentives</b>		<b>63</b>		<b>\$867,258</b>	<b>\$3,949,615</b>	<b>3,909.28</b>
<b>TOTAL</b>		<b>288</b>	<b>948.6 Electric (kW-AC)</b>	<b>\$2,118,699</b>	<b>\$6,480,026</b>	<b>Electric (MWh/yr) 2,641.8</b>
				<b>Funds Awarded</b>	<b>Total Project Cost</b>	<b>Thermal (MWh/yr) 4,686.3</b>
				<b>Leverage</b>	<b>\$2.06</b>	<b>Combined (MWh/yr) 7,328.1</b>

\*Note: The Windham grants were reported in previous fiscal years; the energy production from the sub-grants is reported here

\*\*Note: This is the equivalent annual generation using a 100% capacity factor

## Appendix IV - Carbon Reduction Metrics

The State of Vermont greenhouse gas reduction goals stipulate that the state shall reduce greenhouse gas emissions from the 1990 baseline by 50 percent by 2028 (10 V.S.A. §578). While the state's greenhouse gas emissions have decreased since 2004, further steep reductions are still required to meet the 2028 goal of 50 percent reduction.<sup>6</sup> The renewable energy activities funded during the CEDF FY18 contribute toward the 2028 goal.

In FY18, CEDF projects showed estimated greenhouse gas reductions of approximately 2,281 metric tons (CO<sub>2</sub> equivalents), based on yearly generation of approximately 2,642 MWh in renewable electricity and 4,686 MWh of renewable heat, as reflected in the table below. All CEDF electricity generation projects are required to be grid-connected. The renewable electricity generation projects represent about 949 kW AC in capacity.

### *FY18 Newly Funded Projects Annual Greenhouse Gas Metrics*

Project or Activity	Technology	Fuel Saved (gallons/yr) & Type	Estimated Electricity or Heat Generated (kWh/yr)	Greenhouse Gas Reductions (Metric Tons CO <sub>2</sub> equivalent/yr)
Farm Energy Grant	Compost Heat Re-Capture	2,607 Propane	106,165	26.7
Windham Wood Heat Initiative	Pellet Boilers	23,324 oil	734,235	232.7
Windham Regional Commission Grants	Solar PV & Anaerobic Digester	NA	2,489,592	985.6
Windham & Windsor Housing Trust Stove Change-out Grant	Wood Pellet Stoves	21,000 Oil & propane	88,663	182.3
SSREIP	Solar PV	NA	152,257	60.3
SSREIP	Solar Thermal	205 oil & propane	12,309	1.6
SSREIP	Wood Pellet Heating	144,499 oil & propane	3,695,512	791.9
<b>TOTALS</b>		<b>191,635 Gal (oil &amp; propane)</b>		<b>2,281.1 MT CO<sub>2</sub>e</b>

\* The CO<sub>2</sub> equivalent emissions from this advanced wood heating project assumes the wood used in the project is harvested using sustainable forest management practices to ensure a renewable supply of wood fuel. With sustainable harvest and forest management practices in place the carbon that is emitted from the combustion of the wood fuel is not included in the GHG calculations, but the methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) emitted are included. In cases where the wood fuel is not being harvested renewably, the CO<sub>2</sub> emissions from wood heating should be included in the calculations of any GHG reductions achieved from reduced fossil fuel emissions.

<sup>6</sup> 2016 Vermont Comprehensive Energy Plan, January 2016. Vermont Public Service Department, Pg. 34.