



ANNUAL REPORT TO THE LEGISLATURE

Fiscal Year 2017 *[July 1, 2016 – June 30 – 2017]*

Published: January 2018

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

Summary of Fiscal Year 2017

During fiscal year 2017 (FY17) the CEDF maintained its focus on building Vermont's advanced wood heating market. Despite a challenging environment of low fossil fuel prices and high capital costs for automated pellet heating systems the CEDF experienced success by getting more bulk pellet heating systems installed, and increasing the awareness of pellet heating and its many benefits. The CEDF was involved in dedicated cooperation across State government, and the private sector, to expand advanced wood heating. A growing consensus emerged during the year that the State can simultaneously advance wood heating while supporting low-income Vermonters, increasing renewable energy generation, boosting economic development, improving air quality, and maintaining sustainable forest health.

Importantly, the Vermont clean energy economy continued to show continued growth during the year. The number of workers involved with the clean energy industry reached 19,081, an increase of 29 percent over the last five years of CEDF reporting. This means that about one in every 16 working Vermonters spends at least some time working on clean energy activities. Even more promising is that almost 12,200 of these positions are full-time clean energy jobs¹.

During FY17 CEDF incentive and grant payments totaled over \$1.2 million with about half of that paid out through the Fund's Small Scale Renewable Energy Incentive Program (SSREIP). Here are highlights from the year:

1. Deployed a Successful Wood Stove Chang-out Program

Working with the Air Quality Division at the Agency of Natural Resources (ANR) the CEDF added a new wood stove change-out incentive to the SSREIP. The incentive was very popular with Vermonters ending with 249 Vermont home owners across the state replacing old wood stoves with new EPA certified cord wood or wood pellet stoves with help from the program. In addition to staff time ANR contributed \$100,000 to the \$200,000 of CEDF funds used in this program.

2. Advanced the Automated Wood Heating Market

Several schools and towns completed automated pellet heating system installations with CEDF awards reported in FY16. In addition, the Fund supported the installation of thirty-three new automated pellet systems, twenty-seven of which were residential. The CEDF and PSD also supported the creation of a new State Wood Energy Coordinator within the Department of Forests, Parks and Recreation that will help to further the State's coordinated effort to maximize wood heating in Vermont.

3. Published the Fourth Vermont Clean Energy Industry Report

The CEDF commissioned the state's fourth Clean Energy Industry Report, which demonstrated strong growth in Vermont's clean energy workforce. The report's statistics are often quoted and referenced in clean energy policy discussions and has led to a better understanding of the size and components of the clean energy industry in Vermont.

¹ [Vermont Clean Energy Industry Report 2017](#)

The CEDF ended the year with sufficient funding to operate most programs though FY18 but without any new appropriations or secured funding current incentive programs will run out of funding in FY18 and what is left would not allow for much new activity in FY19.

■ **Table of Contents**

- Summary of Fiscal Year 2017..... 1
- Purpose and Scope of This Report 3
- CEDF: Strategic Vision for the Clean Energy Economy 3
- Authority, Funding, & Resources..... 4
- New FY17 Awards & Activities 6
- Continuing Awards & Activities from Prior Fiscal Years 12
- Fiscal Year 2018 – First Half Preview 21
- Conclusion..... 22
- Appendix I – Statutory Authority & Clean Energy Development Board 24
- Appendix II – FY17 CEDF Financial Reports For CEDF & ARRA Funds 25
- Appendix III – All New CEDF Awards Announced in FY17 27
- Appendix IV – Carbon Reduction Metrics..... 28

■ Purpose and Scope of This Report

The purpose of this annual report is to detail the activities undertaken, the revenues collected, and the expenditures made for Fiscal Year 2017 (July 1, 2016 to June 30, 2017) by the Vermont Clean Energy Development Fund (CEDF). The report also provides information on progress the CEDF made toward its goals and fulfilling its purpose as directed by the Legislature. The report is intended to provide information to the Vermont Legislature, Governor, clean energy stakeholders, and the citizens of Vermont.

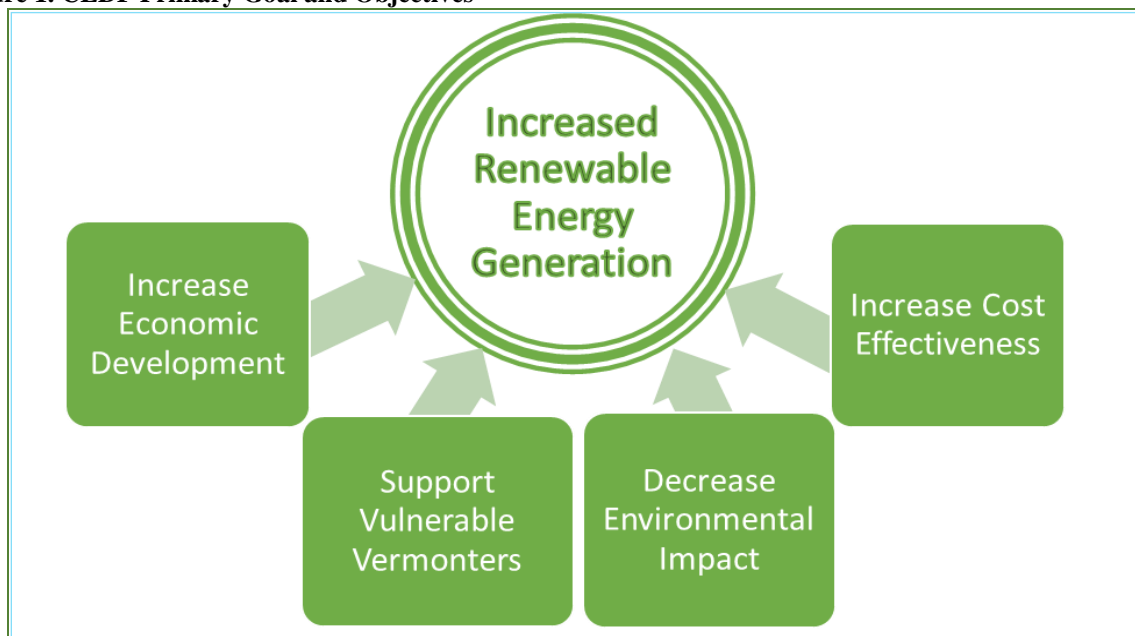
■ CEDF: Strategic Vision for the Clean Energy Economy

The Vision for the CEDF is to serve the citizens of Vermont by increasing local small-scale renewable energy generation and usage across all sectors.²

The CEDF vision focuses on a primary goal of increasing renewable energy generation in Vermont while maximizing associated economic development. Four objectives reinforce the primary goal, the fourth of which, "supporting vulnerable Vermonters," was added in FY17 to communicate the priority the CEDF now places on this. (Figure 1) The four objectives are:

1. Increase economic development
2. Support vulnerable Vermonters
3. Decrease environmental impacts of Vermont's energy use
4. Increase cost effectiveness of renewable energy technologies in Vermont

Figure 1. CEDF Primary Goal and Objectives



² CEDF 2012 5-year Strategic Plan, http://publicservice.vermont.gov/sites/dps/files/documents/Renewable_Energy/CEDF/Reports/CEDF%205%20Year%20Strategic%20Plan%20-%20January%202013.pdf

Strategies

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

- 1) Focus on a select renewable energy technology where funds can have the greatest impact in reaching the CEDF's goals and objectives
- 2) Identify deployment barriers preventing increased generation of the selected renewable energy technology and coordinate with industry, state agencies, and private organizations to develop solutions that overcome those barriers
- 3) Build connections between renewable energy and energy efficiency
- 4) Increase jobs and revenue in the Vermont clean energy industry sector
- 5) Design programs to increase access to renewable energy for low income Vermonters and/or that benefit vulnerable Vermonters
- 6) Educate and support clean energy developers, businesses, and home owners in obtaining other/non-CEDF incentives and financing for renewable energy projects
- 7) Support and strengthen clean energy finance and investment related activities
- 8) Increase the leverage of CEDF funds while helping to lower the costs of renewable energy
- 9) Focus support on the CEDF programs that maximize the reduction of Vermont's energy related greenhouse gas emissions, and other environmental impacts of our energy use
- 10) Promote lessons learned, success stories, impacts, and challenges associated with CEDF funding activities
- 11) Continually evaluate programs, activities, and outcomes in order to adjust programs as necessary to meet goals

Guided by its vision, goals and strategies the CEDF has focused for the past three years on building out and supporting the evolution of Vermont's nascent advanced wood heating sector. Growing a cost-effective advanced wood heating industry requires both consumer demand for wood heating as well as a supply chain capable of delivering wood fuel and installing effective heating systems. Although biomass fuels and modern combustion systems have been available for many years, elements of a fully mature supply stream have remained sparse in Vermont. The CEDF's completed FY17 efforts continue to help strengthen both the demand and supply side of the advanced wood market and value chain.

■ Authority, Funding, & Resources

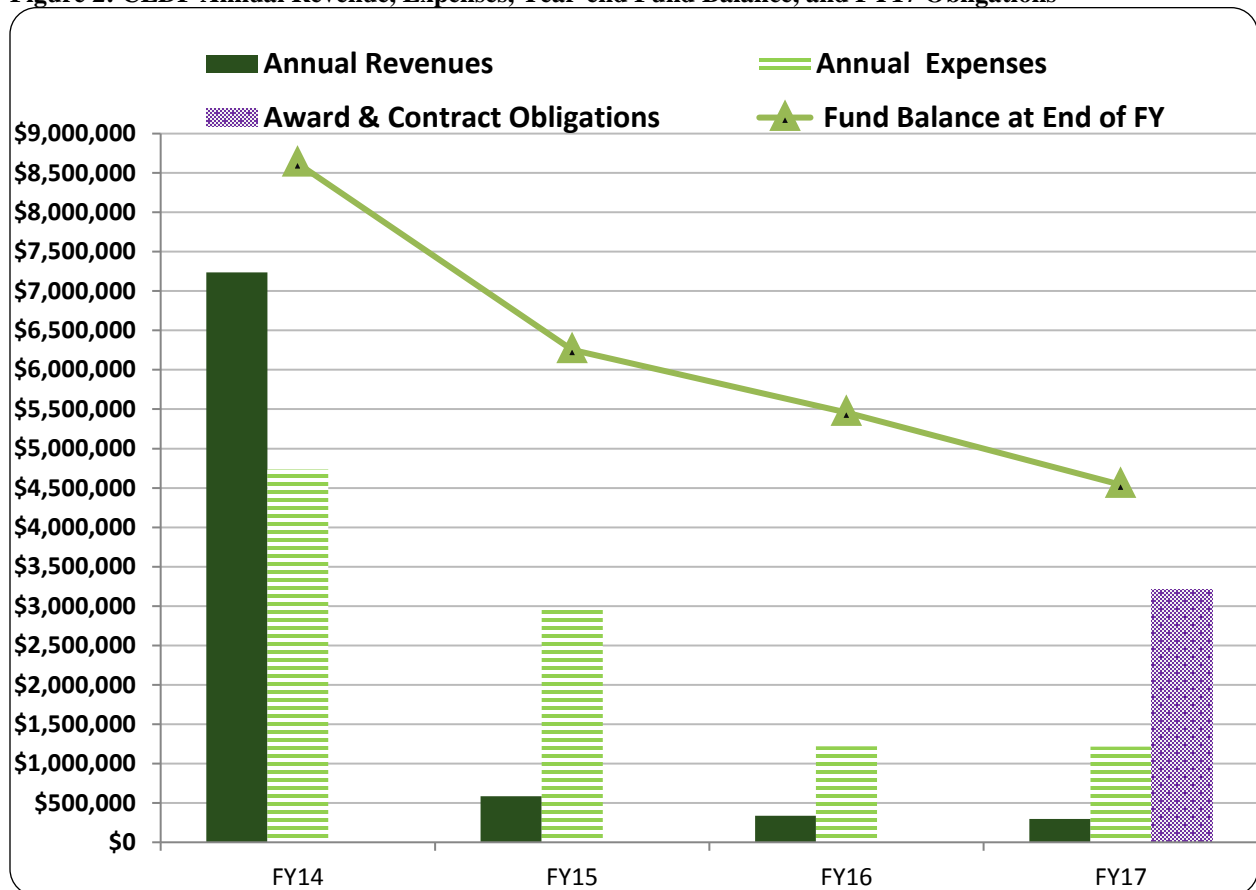
The Vermont General Assembly established the CEDF in 2005 through Act 74 (30 V.S.A. §8015). The CEDF is administered by the Public Service Department (PSD), which employs a CEDF Manager and dedicates additional PSD staff part-time to CEDF tasks as needed. (See Appendix I)

In FY2014 the CEDF received over \$7.5 million from the Legislature. Included in that total was a final one-time payment of \$5.2 million from Entergy Vermont Yankee (EVY). Half of that EVY payment (\$2.6 million) was allocated by the Legislature for projects in, and for the benefit of, Windham County. However, over the last three fiscal years (FY15–FY17) the CEDF has not received any funding from the Legislature or EVY.

The infusion of \$7.5 million in 2014 has enabled the CEDF to continue efforts to advance clean, renewable energy generation in Vermont, but additional funding will be required to continue this work. Figure 2 below shows the revenue, expenses, end-of-year balance of the Fund for last four fiscal years, and the amount of award and contract obligations at the end of the FY17.

Fund balances are declining. A large portion of remaining CEDF resources have been committed. Unless new funding is secured, the CEDF will be unable to provide the types of grants and incentives that have successfully supported the increasing role small scale renewable energy technologies have had in meeting Vermont's energy needs.

Figure 2: CEDF Annual Revenue, Expenses, Year-end Fund Balance, and FY17 Obligations



At the end of FY17 the Fund had over \$3.2 million in fiscal obligations (i.e. signed grant agreements or contracts). The CEDF will continue to receive loan re-payments from the ~\$1.4 million in outstanding loans from CEDF borrowers. Loan repayments to the CEDF for FY17 equaled \$263,903. 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 FY17 revenue and expenses.

The CEDF also receives federal funds from a revolving loan fund established with Vermont's American Recovery and Reinvestment Act (ARRA) funds³. By the end of FY17 these repayments had accumulated to approximately \$1.4 million. 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.

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). 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 FY17 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 spending. The Board members are appointed by State legislators and the Commissioner of the PSD.

During FY17, the Board consisted of the following members: Sam Swanson (co-Chair), Linda McGinnis (co-Chair), Jared Duval, Johanna Miller, Janice St. Onge, Gaye Symington, and Mark Whitworth. The CEDB reviews and approves the CEDF Annual Plan, Annual Budget, and programs developed by the PSD to carry out the CEDF mission⁴.

The Board met six times during FY17. The Board provided guidance and input on a variety of topics, including the FY18 Annual Program Plan and Budget, and program administration during the year. For more details on the CED Board, see Appendix I.

■ New FY17 Awards & Activities

There were few new grants during the year. The CEDF did not release any new grant solicitations in FY17. Grants and programs started in past fiscal years carried forward into FY17 and accounted for the bulk of CEDF activities. The CEDF has focused on advanced wood heating market development and this market in Vermont remains in an early development stage. In Vermont, the advanced wood heating market is about where Vermont's Solar PV market was ten years ago as measured by the number of installations and installation companies.

New awards (grants, incentives, and contracts) made by the CEDF in FY17 totaled just over \$2.4 million and are detailed below and in Appendix III. Of the total, the CEDF signed new grants, MOUs, and contracts worth a total of \$1.94 million. In addition, the Small Scale Renewable Energy Incentive Program (SSREIP) paid out \$515,997 in incentives for projects with total costs of \$2.02 million. Overall project costs were estimated to be \$5.56 million.

³ \$30 million in federal funds were granted to Vermont in 2009 as a part of the federal response to the 2008 financial crisis and recession. The VT General Assembly allocated management of these fund to the CEDF.

⁴ 30 V.S.A. §8015(e)

Thus, CEDF awards leveraged over five and a half million dollars in private investment in Vermont's clean energy infrastructure. These investments demonstrate that the CEDF was able to leverage about \$2.13 of private investment for each CEDF dollar awarded.

The renewable energy projects supported by the CEDF will not only produce energy (the equivalent of 3,978 MWh/year) but will have the following environmental benefits:

- Eliminate the use of 43,898 gallons of fossil fuel (heating oil and propane) annually
- Reduce greenhouse gas emissions by 945 metric tons annually⁵

During FY17 the Fund spent \$137,289 on staff and internal administration expenses. This represents a greater percentage of the total monies expended (\$1.2 million) than CEDF's target of five percent. The CEDF anticipated a higher amount of grant reimbursements in FY17 than came through, resulting in a higher than normal administrative expenses as a percentage of expenses. The CEDF expects that in FY18 the administration costs will drop back to the average of below five percent of total expenditures. Maintaining administration expenses to 5 percent of expenditures will grow increasingly difficult as CEDF expenditures decline after FY18.

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 two contracts and one MOU executed in FY17.

➤ CLEAN ENERGY INDUSTRY REPORT: BW RESEARCH PARTNERSHIP, INC. (CONTRACT: \$7,990)

The characterization of the state's clean energy economy is possible due to the CEDF sponsoring the fourth edition of the [Vermont Clean Energy Industry Report](#) which came out in the spring of 2017.

For the fourth consecutive year, BW Research Partnership (BWR) prepared the Vermont Clean Energy Industry Report for the CEDF. This year's report drew from 2016 data developed at the national level by BWR in conjunction with the U.S. Department of Energy using a methodology derived from the original clean energy industry survey used in Vermont between 2013 and 2015. The report showed that the number of clean energy workers in the state continued to rise.

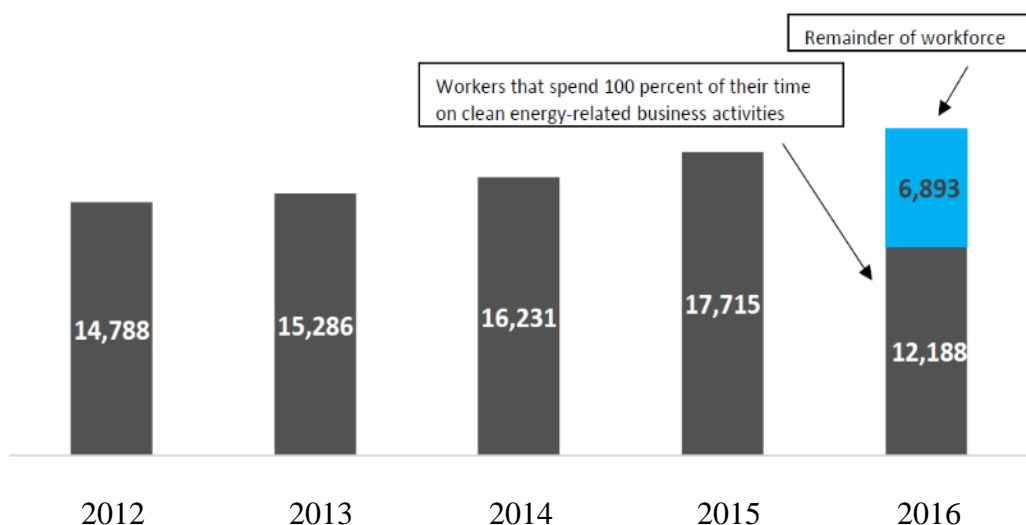
Since 2013, clean energy employment has grown by 29 percent in Vermont, which amounts to a total of just over 19,000 jobs that are at least in part clean energy-related. In 2016, clean energy-related employment grew by almost eight percent. This means that about one in every sixteen

⁵ See Appendix IV for more information on the GHG accounting

working Vermonters is employed, to some degree, in the clean energy industry. New to the 2017 report was a visual break-down of full-time vs. part time clean energy workers (Figure 3). About 64 percent of all the workers identified spend all of their time on clean energy-related business activities, translating to roughly 12,200 “full-time” clean energy jobs. The state is home to 3,751 establishments conducting clean energy work, an 18 percent increase over the 2015 data. The 2017 report showed that clean energy workers now account for six percent of total statewide employment, compared to just two percent for the nation.

The 2016 data indicates that the state’s clean energy economy is becoming increasingly specialized. Between 2015 and 2016, the percentage of renewable energy and energy efficiency workers that spend all of their time on clean energy-related work increased by 12 and 18 points respectively. In 2016, seven in ten renewable energy workers and six in ten energy efficiency workers spent all of their time on clean energy-related work, which translated to 4,509 renewable energy workers and 5,922 energy efficiency workers that spent all of their time supporting the clean energy portion of business.

Figure 3. Clean Energy Employment Growth Between 2012 and 2016



➤ DEPARTMENT OF FORESTS PARKS AND RECREATION (MOU: \$10,000)

The CEDF along with the Public Service Department, Agency of Commerce and Community Development, and the Department of Forests Parks and Recreation (FPR) each supplied a portion of the funding needed for FPR to hire a new Wood Energy Coordinator, a role that will provide technical assistance, market research and inter-agency coordination to promote and develop wood energy activities in the state. 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.

Specific duties for the position include design and delivery of a comprehensive modern wood heating information and education program in Vermont to reduce market barriers to adoption of

wood energy applications; implementation of Vermont's Comprehensive Energy Plan recommendations as they relate to wood energy and state policy for promoting sustainable forestry practices; and staff assistance to FPR Wood Utilization Program Leader, Division Director and Commissioner on issues related to wood energy. This work is also intended to expand markets for the variety of Vermont forest products. Duties include assistance to the forest products and wood energy community with advocacy, infrastructure development and technical assistance to support Vermont's working landscape and the use of low grade wood for energy.

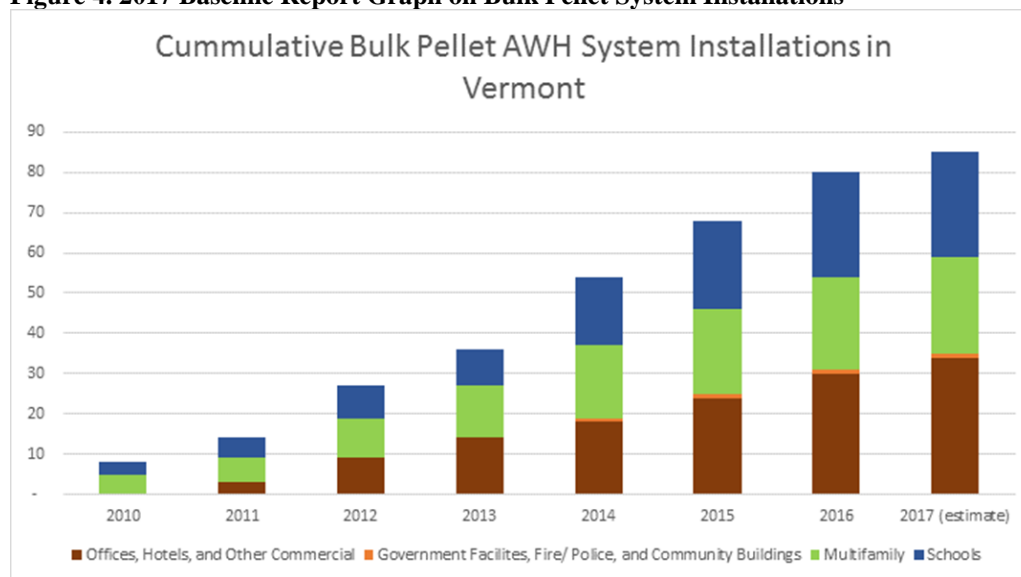
➤ **WOOD HEATING BASELINE REPORT - BIOMASS
ENERGY RESOURCE CENTER (CONTRACT: \$22,000)**

The Biomass Energy Resource Center at Vermont Energy Investment Corp. conducted an assessment of the current state of the advanced wood heating and traditional wood heat sectors in Vermont. The State has a goal of achieving 35 percent of the state's heating needs with advanced wood heating by 2030⁶. To reach this goal and to measure progress the State needed a baseline of wood heating as well as a clear understanding of the current state of the wood heat markets.



The assessment quantified the number of wood heat businesses in Vermont that manufacture pellets, sell/deliver bulk pellets, bulk pellet storage locations, and the number of employees working at these various establishments. The Report provides the CEDF with valuable information on the advanced wood energy sector that sharpened the picture about how many advanced wood heating units are installed in the state annually by each market segment (residential, commercial, municipal and institutional) and many other key metrics. Figures 4 and 5 below show the increasing number of bulk pellet systems being installed but that annually installations, especially for the residential sector, have remained flat.

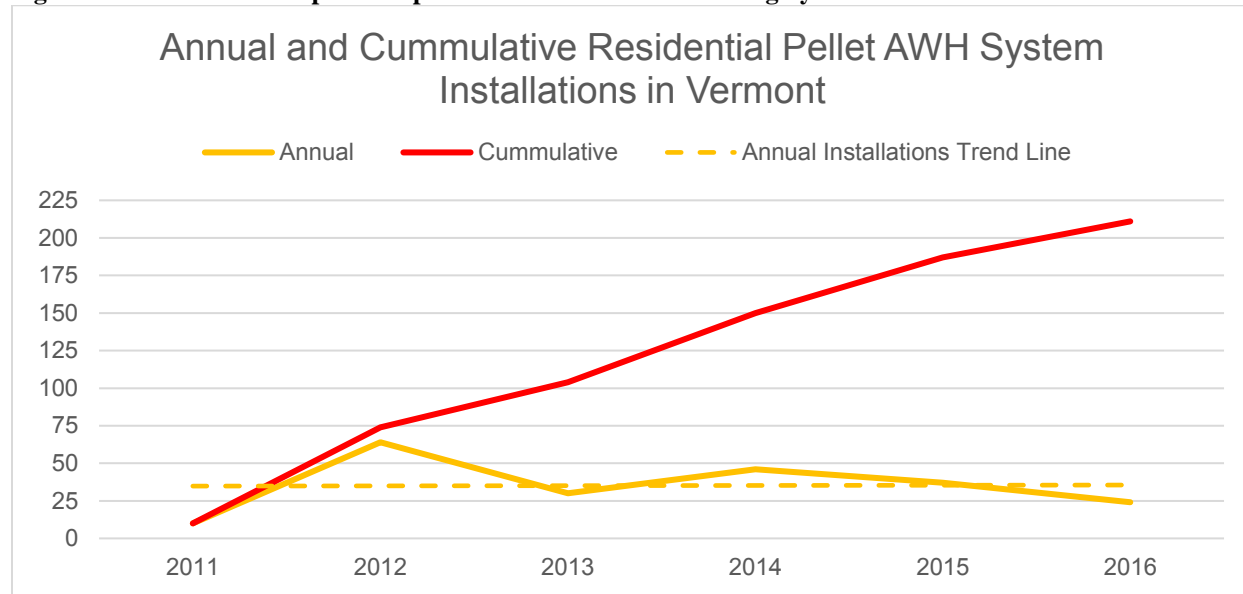
Figure 4. 2017 Baseline Report Graph on Bulk Pellet System Installations



⁶ Vermont's 2016 Comprehensive Energy Plan.

The Baseline report released in July 2017 can be downloaded from the CEDF web page:
http://publicservice.vermont.gov/renewable_energy/cedf/reports

Figure 5. 2017 Baseline Report Graph on Residential Pellet Heating System Installations



Grants

The CEDF deployed funds this past year for select solar PV and biomass projects described below.

➤ HYDE PARK ELECTRIC COMMUNITY SOLAR TARIFF PILOT PROJECT (GRANT: \$76,000)

Although originally awarded in FY15 as part of the Community Solar Grants solicitation, this project did not actually start under a signed grant agreement until FY17. The award supported the creation of a pilot community solar tariff and information/billing requirements by the Village of Hyde Park Electric Department. Ultimately, this project is intended to support access to community solar PV owned by the municipality, and serve as a model for other municipal utilities interested in offering community solar electricity to their customers.

The funding enabled Hyde Park to work with the Vermont Public Power Supply Authority (VPPSA) on the development and evaluation of the tariff. At the end of the project, the participants will evaluate and report on the strengths and weaknesses of the tariff and billing process, and hurdles and best practices. The CEDF provided a \$76,000 grant matched by the grantee with \$83,871 for a total project cost of \$159,871.

➤ **VERMONT NATURAL AG PRODUCTS, INC. (GRANT: \$40,490)**

Composting operations generate substantial amounts of waste heat. This project entailed installation of a compost heat recovery system at the grantee's location in Middlebury. The award supported installation of a system by Agrilab Technologies of Vermont to convert raw animal manure and local food waste into stable, value added soil amendments for use in



agricultural, commercial and residential agriculture applications. The installation will include upgrading an existing heat recovery unit with a permanently installed and insulated vapor recovery system. The captured compost heat would be used for on-site drying of compost prior to bagging, space heating for the bagging building, and hot water equipment washing needs of the facility. The project was selected through

the competitive farm energy program solicitation in 2016. The system will be designed to generate 280,000 Btu/hr for hot water pre-heating and 174,000 Btu/hr for space heating or product drying applications, saving approximately 1,524 MMBtu/year and \$30,485 per year of propane. The project was scheduled to be completed in the first half of FY18.

➤ **NORTHERN FOREST CENTER, INC. (SUB-GRANT – \$76,667)**

The CEDF and the Northern Forest Center teamed up to offer financial support for installation of advanced wood pellet heating systems for municipal buildings and public-serving institutions in the Northern Border Region. Using grant funds provided by the Northern Border Regional Commission, this program is open to units of local government and non-profit 501(c)(3) organizations that serve the public and promote



economic development. Projects must be located in Grand Isle, Franklin, Lamoille, Orleans, Caledonia and Essex counties. Funds were made available only for new, high-efficiency automated wood boilers or furnaces utilized as primary central heating systems. The CEDF and NFC have made grants agreements, or preliminary agreements, of \$12,600 to each of the five entities listed below in Figure 6. These five entities are also eligible for incentives from the CEDF's Small-Scale Renewable Energy Incentive Program.

Figure 6. Northern Border Regional Commission Funded Wood Heat Grants

Organization	Type of Organization	Town
Foresteille Foundation dba Craftsbury Public House	Public Serving Institution	Craftsbury
Lunenburg Town Garage /Fire Station	Municipality	Lunenburg
Newark Street School	Municipality - School	Newark
Peacham Elementary School	Municipality - School	Peacham
Lyndon Institute	Public Serving Institution - School	Lyndon

■ Continuing Awards & Activities from Prior Fiscal Years

Windham County Dedicated Funds

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 FY17: the Windham Wood Heating Initiative, and the Windham Renewable Energy Grant Program.

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

While this grant was signed in FY17 it is a continuation of a program now in its third year. The Windham Wood Heat Initiative was originally a \$1.6 million program designed to support the development of modern wood heating systems for schools located in Windham County. This year, under new administrative control of the Windham Regional Commission (WRC), the Initiative expanded its program eligibility, timeline and technical assistance as it entered the implementation phase of the program. With augmented eligibility, the program assisted municipal, school, and now non-profit buildings to convert to heating with automated, high-efficiency wood boilers while also addressing those buildings' energy efficiency needs.

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 in FY17.

Additional grant funds were available for projects that installed wood heating systems and also completed energy efficiency measures recommended by the audit.



New England Center for Circus Arts storage silo for advanced modern wood pellet heating system in Brattleboro

A total of seven institutions were awarded grants to install wood heating systems and energy efficiency measures during the year. (Figure 7)

Figure 7. Windham Wood Heat Initiative Grantees for FY17

Grantee Name	Town	Type of Organization	System Cost (Estimated)	Grant - based on cost	Type of wood	Oil Displace (Estimated gal/yr)	Estimated Completion Date
Flood Brook School	Londonderry	School	\$231,500	\$102,429	Pellet	13,600	Nov-17
Marlboro School	Marlboro	School	\$137,586	\$48,155	Pellet	5,659	Nov-17
Green Street School	Brattleboro	School	\$679,800	\$100,000	semi-dry chip	8,500	Nov-17
Oak Grove School	Brattleboro	School	TBD	\$100,000	TBD	8,800	Nov-18
Guilford Central School	Guilford	School	\$226,125	\$91,144	Pellet	8,810	Nov-17
New England Center for Circus Arts	Brattleboro	Non-profit	\$74,530	\$18,633	Pellet	New Construction	Nov-17
Windham Windsor Housing Trust - Putney Landing	Putney	Non-profit	\$150,000	\$37,500	Pellet	New Construction	Feb-18
Fiscal Year 2017 Award Totals			\$1,499,541	\$497,860		45,369	

➤ **WINDHAM RENEWABLE ENERGY GRANT PROGRAM (GRANT: \$400,000)**

The Windham Regional Commission was issued a grant for this program at the end of FY16. In early FY17 WRC investigated options and conducted a public comment/engagement process regarding program design and started to issue grants in the second half of FY17.

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***

After receiving twelve applications requesting over \$1M the WRC awarded five grants totaling \$363,523. (Figure 8)

Figure 8. Windham Regional Commission Renewable Energy Grant Program Awardees (FY17)

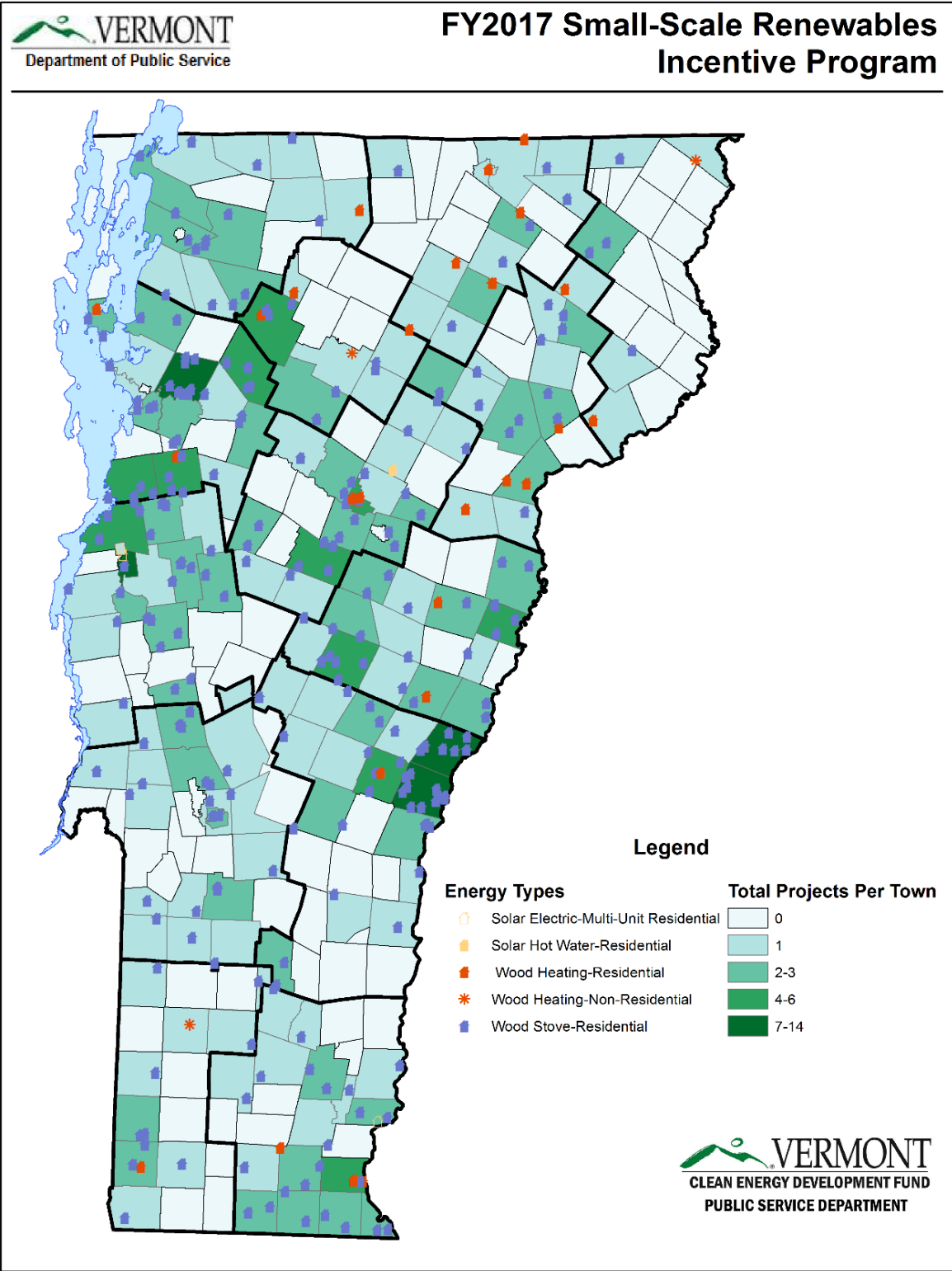
Grantee Name	Project Type	Town	Type of Org	Estimated Project Cost	WRC Grant \$ Amount
Allard Lumber	CHP Wood Chip Installation	Dummerston	Business	\$559,410	160,000
School for Int'l Training	Solar PV Array Installation	Dummerston	Non-Profit	\$294,000	100,000
Hogback Mountain Properties	Solar PV Array Installation	Marlborough	Business	\$41,108	20,500
Windham Windsor Housing Trust	Solar PV Array Installation	Brattleboro	Non-Profit	\$56,046	28,023
Windham Solid Waste District	Food Waste Anaerobic Digester Study	Brattleboro	Municipality	\$150,000	50,000
Algiers Village (Guilford)	Living Community Challenge Study	Guilford	Municipality	\$15,000	5,000
Fiscal Year 2017 Totals				\$1,115,564	\$363,523

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 FY17 it provided \$628,078 in incentives for: wood stove change-outs; advanced wood heating systems for homes,

business, and institutions; low-income solar PV; and solar thermal systems. As can be seen in Figure 9 participation in the SSREI Program was well distributed across the state.

Figure 9. SSREIP Installation Map for FY17



The FY17 incentive payments supported the installation of the following renewable energy systems: 14 new PV systems for low-income energy efficiency homes, one solar hot water system, 33 wood pellet heating systems, and 247 wood stove change-outs.

New to the SSREIP in FY17 was a wood stove change-out incentive and an incentive for wood pellet maple sap evaporators (Figure 10). The evaporator incentive was started later in FY17 and there was only one reservation for a pellet fired evaporator by the end of the fiscal year. The CEDF will be promoting the incentive during the 2018 sugaring season to encourage more sugaring operations to switch from fossil fuels to pellets in FY18.

Figure 10. Wood Pellet Fired Sap Evaporator



The wood stove change out program was funded and designed in partnership with the Agency of Natural Resources, Air Quality & Climate Division (AQCD). ANR contributed \$100,000 and AQCD staff, who had administered a stove change-out program before, helped to design the program and to overcome problems as the CEDF encountered them during program administration.

CEDF engaged with twenty-one different participating wood stove dealers/stores to implement the stove change-outs. Figure 11 shows an example of one of the program's old non-EPA wood stoves that was replaced with a new EPA certified stove. Figure 12 provides the number and details of the stove change-out incentives awarded in calendar year 2017 through the SSREIP wood stove change-out program.

Figure 11. Old stove taken out of service and replaced with a new EPA certified stove

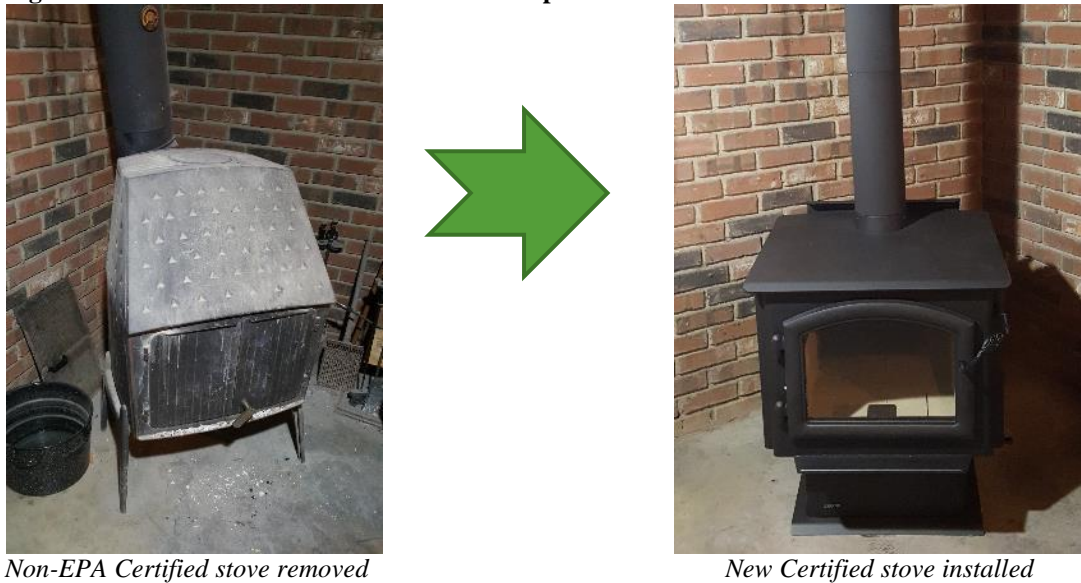


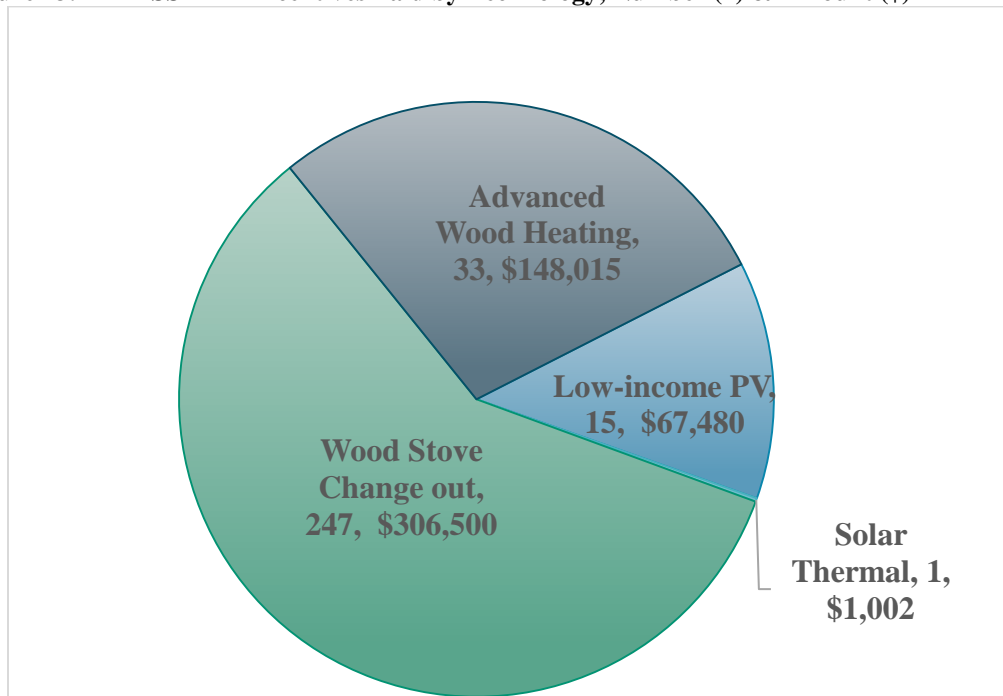
Figure 12. SSREIP Wood Stove Change-out Program Data

Wood Stove Change-out Results	Number
Total Number of Stoves change-out & New installations	247
Number of Installs (Pellet)	28
Number of Installs (Cord)	219
Number of Reservations	268
Number of Withdrawals	21
Sum of Installed Cost	\$851,428
Sum of Incentives Paid	\$306,500
Avg. System Cost (Pellet)	\$4,445
Avg. System Cost (Cord)	\$3,319
Incentive/Cost % (Pellet)	32.54%
Incentive/Cost % (Cord)	36.59%
Leveraged Dollars (Pellet)	\$2.07
Leveraged Dollars (Cord)	\$1.73

The SSREIP expended the \$200,000 that it had budgeted for the stove change-outs so quickly that it added another \$100,000 to the program. Even with the additional funds all the program funds were fully expended in roughly four months. When the program ended in March 2017 the CEDF evaluated the program and began planning change-out programs that it could offer in FY18.

In addition to the stove change-out, the SSREIP continued to offer its other incentives for advanced wood heating and made incentive payments for low-income solar PV projects that were reserved incentives in FY16 but didn't get completed until FY17. Figures 13 and 15 show the type of customers and technologies that used the SSREIP in FY17.

Figure 13. FY17 SSREIP Incentives Paid by Technology, Number (#) & Amount (\$)



During FY17, the SSREIP extended wood heat incentives to institutional customers. In prior fiscal years these larger customers were offered grants to install chip or pellet systems on a competitive basis. Based on the two grant solicitations issued prior to FY17 the CEDF established a formula incentive to use in the SSREIP for FY17 for institutional organizations such as schools, municipalities, businesses, and others with larger buildings. The incentive formula was \$1.25 per sq. ft. of heated space. Several low-income housing organizations, non-profits, and towns reserved funds through this new incentive. The incentive program offers a more efficient and effective vehicle for deploying resources for certain renewable technologies when compared to competitive grants.

One such incentive from FY17 was the \$19,246 provided to the Housing Foundation's five building district heating system at the "Colonial Manor", an affordable housing complex in Morrisville. Below are images of the two pellet boilers installed in the new boiler building and one of the five buildings now heated with the pellet boilers. (Figure 14)

Figure 14. New Boiler Installation for District Heating in Morrisville



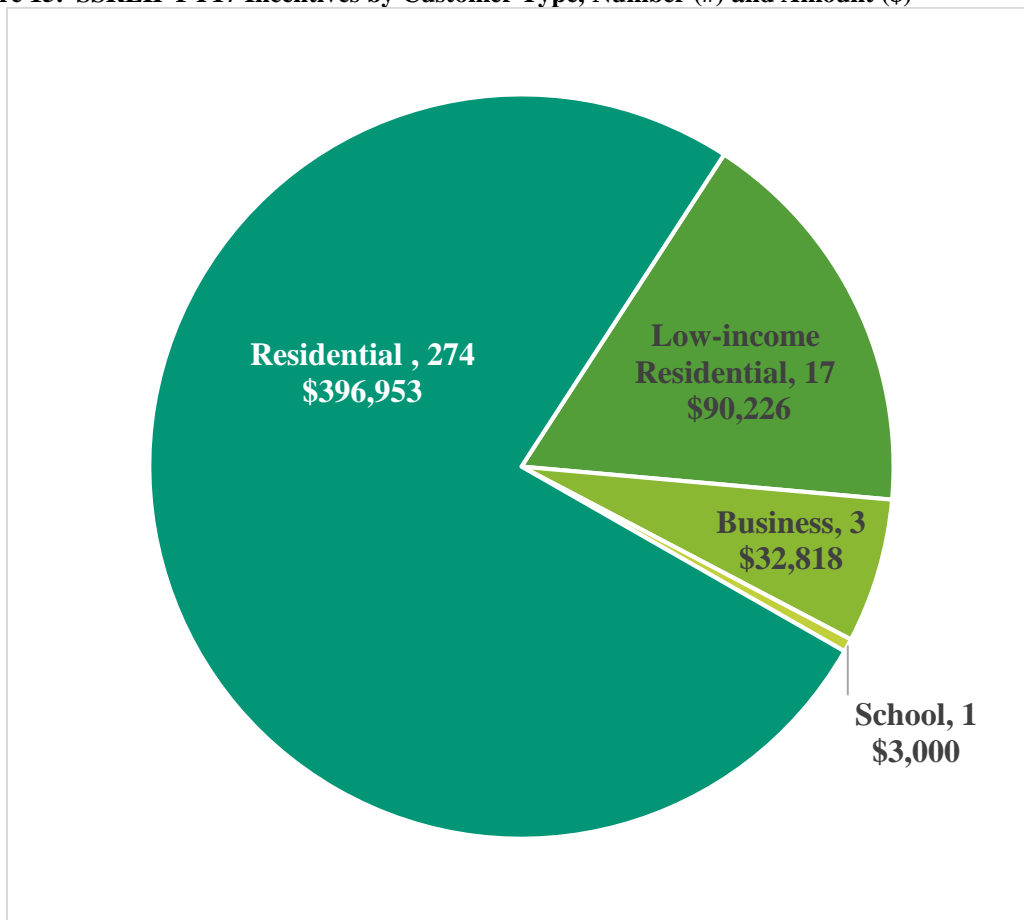
Colonial Manor boiler room



One of Colonial Manor's Five Buildings

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 15. SSREIP FY17 Incentives by Customer Type, Number (#) and Amount (\$)



Finance Programs

The 2012 CEDF Five Year Strategic Plan called for support and strengthening of clean energy finance activities:

The CEDF seeks to increase private investment and financing in clean energy over the next five years, by leveraging its resources to the greatest extent practicable while retaining the momentum created over the past seven years. The CEDF will seek to provide credit enhancements such as loan loss reserves and subordinated and/or patient debt. Central to this strategy is the creation of an integrated clean energy finance collaborative with other financing entities in the State.

➤ THERMAL ENERGY FINANCE PILOT INTEREST RATE BUY DOWN PROGRAM – (GRANT: \$177,000)

One way the fund has fulfilled this element of the plan is through consistent support over the past four years for the Thermal Energy Finance Pilot Program of the PSD. With U.S. Department of Energy funds, the CEDF provided 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 weatherizing their properties. Previously, the CEDF awarded the program \$390,000, which along with the addition of \$177,000 for FY17 brought the support for credit enhanced loans up to \$567,000. The pilot program has achieved success with more than 400 loans closed by June 2017 and valued at \$4.4 million. The program will be transitioned in FY18 to a new, permanent home where low and moderate income Vermonters will continue to have access to affordable financing for thermal energy improvements that will save energy and money for years to come.

➤ CLEAN ENERGY FINANCE COLLABORATIVE

The second element related to finance activities entailed development of a collaborative initiative designed to coordinate with other state agencies and private finance institutions to strengthen and expand access to finance for key technologies needed to advance State energy goals. Under the leadership of the Public Service Department, CEDF staff organized and launched the Clean Energy Finance Collaborative in 2017 with participation from over 20 stakeholder groups including representatives from credit unions, banks, renewable energy companies, building efficiency contractors, fuel dealers, community development finance institutions, Vermont utilities and State partners including the Office of the Treasurer, Vermont Economic Development Authority and the Agency of Commerce and Community Development. 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 formed three work groups focused on residential, commercial and institutional market segments to assess the status of clean energy finance coverage. The collaborative received a commitment of \$63,000 of funding from the CEDF for FY18 to support staff coordination of the collaborative, and to produce the first clean energy finance report in 2018 to generate a baseline review of the market place. The support from the CEDF will provide a solid

foundation for participants who will draw from the data to inform future activities needed to accelerate clean energy development in the state.

Other Projects

➤ 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. The team received a grant from the US Forest Service prior to FY16. The grant was extended into FY17 to provide technical assistance and conduct outreach and education activities in support of advanced wood heating across the state with a focus on schools and non-profit affordable housing.

The SWET, and its connection with the US Forest Service's technical assistance program assisted CEDF in reviewing grant applications and final system designs submitted to the CEDF as part of its advanced wood heating grant program. During FY17 the CEDF was also able to engage the US Forest Service's technical assistance program to conduct a review of, and provide recommendations for, the wood chip combined heat and power plant at Green Mountain College.

➤ FOOD WASTE PILOT PROJECTS [CASELLA RESOURCE SOLUTIONS AND GROW COMPOST]

These two grants were extended into FY17 and were completed in the summer of 2017. The CEDF worked with both grantees to see the pilot projects through completion and to report on the lessons learned about the challenges of post-consumer food waste material handling. The two projects had innovative approaches to developing food waste collection and delivery systems to farm manure anaerobic digesters.

The lessons learned from these two projects will aid waste haulers and facilities as they work to meet the requirements of Vermont's Universal Recycling Law that bans disposal of food scraps by 2020 and requires solid waste haulers and facilities to accept these same materials. The CEDF was able to fund both (instead of just one) of these food waste projects with a grant from Green Mountain Power.

■ Fiscal Year 2018 - First Half Preview

CEDF adopted a budget and program plan for FY18 in July of 2017. During the first half of FY18, CEDF continued to administer programs started in FY17 and develop new awards and programs. This section provides a brief synopsis of CEDF activities from July to December 2017.

- **Vermont Clean Energy Industry Report 2018** – The CEDF commenced a fifth clean energy industry survey to continue to gain insight into trends in Vermont's clean energy industry. This fifth report is slated for completion in the spring of 2018.

- **Windham County Renewable Energy Grant Program Expanded by \$300,000** – The additional funding allocated to Windham County has allowed the Windham Regional Commission to issue a second round of their successful grant program from FY17.
- **SSREIP** – The maximum Pellet Boiler incentive for large systems was lowered to \$25,000 from \$75,000. This lower maximum will result in the incentive provided to be a smaller percentage of the total cost for larger systems which may in turn hinder entities from going forward with larger, more costly, projects. However, the lower cap will allow the CEDF to provide incentives to more projects. In December the program discontinued the solar thermal incentive due to a lack of participation, declining market potential, and the waning availability of funds.
- **Windham Low Income Wood Stove Change-out and Pellet Program RFP** The CEDF released a request for proposals to design and implement a wood stove change-out and pellet heating program in Windham County. The grant for this program will come from the Windham County dedicated Funds. The Windham and Windsor Housing Trust was selected for this award.
- **Rutland low income wood stove change out and Pellet Program RFP** – The CEDF released a request for proposals to design and implement a wood stove change-out and thermal energy efficiency program for low-income Vermonters in Rutland County. CEDF will use federal ARRA-CEDF funds for this award.

Conclusion

The CEDF finished FY17 continuing to improve 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 43,000 gallons of fossil fuel and reduce greenhouse gas emissions by over 945 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, planners, non-profit organizations, and businesses gain essential knowledge and practical experience with clean energy technologies and the clean energy business sector in Vermont. Such experience and understanding will be invaluable in the State's efforts to continue the growth and advancement of the State's clean energy economy.

Looking back on the year the Fund sees particular promise in the advanced wood heating sector to drastically reduce fossil fuel use for heating and continue to reduce the State's carbon footprint. Based on the information gained from the CEDF's programs the CEDF sees abundant potential to increase jobs and economic activity throughout the wood heating sector value chain from forest to furnace.

While the number of installations and grants in the advanced wood heat sector continues to be low compared to solar PV, the advanced wood heating market is about where solar PV was in Vermont ten years ago, in regards to the numbers of annual installations and active installation companies. As the Fund continues to collect market information and experience it will develop and adapt programs to best transform the advanced wood energy market in Vermont. The CEDF will continue to build the advanced wood heating industry to maximize clean renewable energy production, increase the cost effectiveness of the technologies, and boost related economic development for the betterment of the lives of Vermonters in pursuit of the CEDF goals.

To achieve 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 assist in reaching multiple goals simultaneously in a cost effective and efficient manner. However, this capacity is in danger of going unused without further funding for the CEDF. The successful programs that the CEDF managed in FY17 will, for the most part, continue throughout FY18, and partially into FY19. Without new funding the current CEDF programs will end in FY19 and the CEDF will then evaluate what the best use is with the limited funds remaining beyond FY19.

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 during FY17, Appointing Authority, and Year Term Ends:

- Jared Duval PSD Commissioner, 2019
- Linda McGinnis, Co-Chair, PSD Commissioner, 2017
- Johanna Miller, House Energy Committee Chair, 2017
- Janice St. Onge, PSD Commissioner, 2019
- Sam Swanson, Co-Chair, Senate Energy Committee Chair, 2019
- Gaye Symington, House Energy Committee Chair, 2019
- Mark Whitworth, Senate Energy Committee Chair, 2017

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
Sheri Rockcastle – Administrative Services Manager

Appendix II - FY17 CEDF Financial Reports For CEDF & ARRA Funds

VERMONT CLEAN ENERGY DEVELOPMENT FUND STATEMENT OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE Fiscal Year 2017

CEDF FUND:	As of June 30, 2017
REVENUES	
Interest Income on Fund Balance	\$ 33,703
Loan Interest Paid	\$ 32,665
Loan Principal Repaid	\$ 231,239
Total Revenues	\$ 297,606
EXPENDITURES	
Total Administrative	137,289
VEDA Loan Program Exp	17,132
SSREI Program	536,754
Contracts	23,742
Grant Payments	499,945
Total Expenditures	1,214,862
Fund Balances	
Net change in fund balance FY16 to FY17	(917,256)
Fund balance on July 1, 2016	5,457,317
Fund balance on June 30, 2017	4,540,060

ARRA FUND:**June 30, 2017****REVENUES**

Interest on Cash Balance	9,816
Loan Interest Paid	20,142
Loan Principal Repayments	144,440
Total Revenues	174,399

EXPENDITURES

Residential Credit Enhancement-Heat Saver	132,808
ARRA Loan Administration Fees	15,131
Total Expenses	147,939

Net change in fund balance	26,460
-----------------------------------	---------------

Fund balances

July 1, 2016	1,130,634
Monies at VEDA Un-encumbered	265,655
June 30, 2017 Fund balance	1,422,749

Appendix III - All New CEDF Awards Announced in FY17

Funding Type	Award Recipient (# of Awards)	# of Projects	Technology, Capacity or Type of Activity	Funds Awarded	Total Project Cost (Estimated Upon Award)	Estimated Annual Energy Production
Contracts & MOUs	-BW Research, Inc. (Contract)	1	• Vt. Clean Energy Industry Report 2017 (Year 4)	\$7,990	\$7,990	NA
	-Vt. Energy Investment Corp. Biomass Resource Center (Contract)	1	• Wood Baseline Report	\$22,000	\$22,000	NA
	-Dept. of Forests Parks & Recreation (MOU)	1	• Wood Energy Coordinator	\$10,000	\$80,500	NA
	SUBTOTAL: Contracts & MOUs	3		\$39,990	\$110,490	
Grants						
<i>Solar PV</i>	-Village of Hyde Park Electric Department	1	• Community Solar PV Tariff Pilot	\$76,000	\$159,871	NA
<i>Advanced Wood Heating (Pellet or Chip Systems)</i>	-Northern Forest Center grant (via Northern Border Regional Commission)	5	• Wood Heat for Public-Serving Institutions in Northern Vt.	\$13,667	\$13,667	NA
<i>Windham County Programs</i>	-Windham Wood Heat Initiative		• Pellet and chip systems (awarded but not sub-awarded)	\$695,883	\$1,391,766	NA
		7	5 School & 2 Non-profit Systems Sub-awarded	\$497,860	\$1,499,540	NA
	-Windham Commission Renewable Energy Program		• Renewable Energy Systems (awarded but not sub-awarded)	\$36,477	\$72,954	NA
	<i>Allard Lumber</i>	1	CHP Wood Chip Boiler	\$160,000	\$559,410	1,200,000 kWh/yr
	<i>School for International Training</i>	1	Solar PV Array (150kw)	\$100,000	\$294,000	165, 564 kWh/yr
	<i>Hogback Mountain Properties</i>	1	Solar PV Array (15.5 kW)	\$20,500	\$41,108	19,040 kWh/yr
	<i>Windham Windsor Housing Trust (Great River Terrace)</i>	1	Solar PV Array (18.1 kW)	\$28,023	\$56,046	20,027 kWh/yr
	<i>Windham Solid Waste District</i>	1	Food Waste Anaerobic Digester Feasibility	\$50,000	\$150,000	NA
	<i>Algiers Village (Guilford)</i>	1	Living Community Challenge	\$5,000	\$15,000	NA
<i>Farm Energy</i>	-Vermont Natural Ag Products, Inc.	1	• Compost Heat Recovery	\$40,490	\$217,488	1,524.25 MMBtu/yr
	-Vermont Compost Company*	1	• Compost Heat Recovery	*	*	NA
Finance Programs	-Heat Saver Loan (Thermal Energy Finance Pilot) VSECU Amendment #2	115	• Interest Rate Buy-Down Fund (via US DOE)	\$177,000	\$1,089,376	NA
SUBTOTAL: Grants		136		\$1,900,900	\$5,560,226	
Incentives						
<i>Small Scale Renewable Energy Incentive Program</i>		14	Solar PV (kW-AC)	\$60,480	\$245,000	91.7
			75.6			MWh/yr
		1	Solar Thermal (MWh/yr)	\$1,002	\$10,299	1.7
			2.5			MWh/yr
		33	Advanced Wood Heating (MWh/yr)	\$148,015	\$915,974	1,770.7
			7,661.9			MWh/yr
		247	Wood Stove Change Out Program	\$306,500	\$851,428	NA
			NA			
SUBTOTAL: Incentives		295		\$515,997	\$2,022,701	
TOTAL		434	259.3	\$2,456,887	\$7,693,417	Electric (MWh/yr)
			Electric (kW-AC)	Funds Awarded	Total Project Cost	1,496.4
			7,664.4			Thermal (MWh/yr)
			Thermal (MWh/yr)**	Leverage:	\$2.13	2,219.1
						Combined (MWh/yr)
						3,715.5

* This grant award was cancelled by the grantee after the award was made. **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.⁷ The renewable energy activities funded during the CEDF FY17 contribute toward the 2028 goal.

In FY17, CEDF projects showed estimated greenhouse gas reductions of approximately 945 metric tons (CO₂ equivalents), based on yearly generation of approximately 1,496 MWh in renewable electricity and 2,219 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 259 kW AC in capacity. GHG reductions have not been adjusted to reflect the Vermont Renewable Energy Standard, which requires that Vermont's electric utilities meet 55% of load in 2017 through renewable resources.

FY17 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 CO₂ equivalent/yr.)
Farm Energy Grant	Compost Heat Re-Capture	16,640 propane	446,714	92.5
Multiple SSREIP Projects	Solar PV	NA	91,735	41.5
SSREIP Project	Solar Thermal	55 oil & propane	1,730	0.6
Multiple SSREIP Projects	Wood Pellet Heating	27,203 oil & propane	1,770,689	239.4
Windham Regional Commission Grants	Solar PV & Wood CHP	NA	204,631 & 1,200,000	92.6 & 478.5
TOTALS		43,898 (oil and propane)	3,715,499	945.1

* The CO₂ 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 (CH₄) and nitrous oxide (N₂O) emitted are included. In cases where the wood fuel is not being harvested renewably, the CO₂ emissions from wood heating should be included in the calculations of any GHG reductions achieved from reduced fossil fuel emissions.

⁷ 2016 Vermont Comprehensive Energy Plan, January 2016. Vermont Public Service Department, Pg. 34.