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January 13, 2020

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

Dear Senators and Representatives:

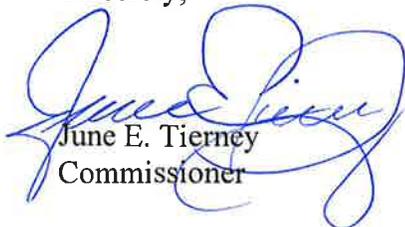
I am pleased to submit the Fiscal Year 2019 Annual Report of the Clean Energy Development Fund (“CEDF”), which includes information on the Fund’s activities and finances from July 1, 2018 through June 30, 2019.

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 Ed Delhagen, Clean Energy Finance & Program Manager at Ed.Delhagen@vermont.gov.

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 2019

[July 1, 2018 – June 30, 2019]

Published: January 2020

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 2019

The Clean Energy Development Fund (CEDF) continued its focus on growing Vermont's advanced wood heating market during fiscal year 2019 (FY19). The Fund's focus on wood heating has yielded substantive improvements in the emerging wood heating market, as evidenced by an evaluation of the wood investments made by CEDF since 2013. Even as low prices for fossil fuels continued to challenge the wood chips and pellet markets, participation and support for CEDF's advanced wood heating incentive programs remain strong.

In addition to offering incentives and grants, the CEDF maintained its involvement across State government and the private sector in efforts to develop the advanced wood heating market in Vermont. Work sponsored by the CEDF showed that it was possible to promote wood heating while also supporting low-income Vermonters, boosting economic development, improving air quality, maintaining forest health and saving Vermonters money on heating.

The CEDF completed its sixth annual clean energy employment survey, which revealed that there are about 18,886 workers employed in the clean energy market, with more than 14,600 employed full time.¹ This past year saw a shift in the proportion of part time to full time jobs with more than 70 percent of reported workers spending all of their time on clean energy activities. The overall number of jobs (full- and part-time) has increased by 27 percent since data collection began in 2013.

For programs implemented in FY19, the CEDF continued to require that wood heating systems meet efficiency standards and achieve low fine particulate air emission levels. With support from the Agency of Natural Resources Air Quality Division, specific emission and efficiency levels were developed for each wood heating technology that the CEDF incentivized (pellet boilers, chip boilers, and pellet/cord wood stoves).

During FY19 the CEDF incentive and grant payments totaled over \$1.07 million with just over \$400,000 of that paid out through the Fund's Small-Scale Renewable Energy Incentive Program (SSREIP). Here are highlights from Fund's activities during the year:

1. Created a new State-wide Wood Stove Change-out Program

The CEDF created a wood stove change-out program for Vermonters. The program changed-out over 130 old non-certified stoves for new advanced cord wood and wood pellet stoves, saving over 57,000 gallons of fossil fuel annually.

2. Continued Building the Automated Wood Heating Market

Coordinating with Efficiency Vermont, the CEDF supported the installation of 57 new automated wood pellet heating systems, almost all of which were residential. These systems will prevent over 467,000 gallons of fossil fuel from being burned annually.

3. Continued targeted low-income wood stove change-outs combined with thermal efficiency

The CEDF continued to use its federal funds for targeted low-income programs in Rutland

¹ [Vermont Clean Energy Industry Report 2019](#)

County as well as in starting a new state-wide low-income program with the Office of Economic Opportunity.

4. Contracted for a third-party evaluation of CEDF's advanced wood heating programs. The final report was issued in FY20, but results of the evaluation are included in this report.
5. Published the Sixth Vermont Clean Energy Industry Report
CEDF's sixth Clean Energy Industry Report describes trends and notable features of the state's clean energy workforce. As with prior reports, the 2019 edition provided a special analysis section, this year devoted to workforce development challenges and opportunities.
6. Published the Second Vermont Clean Energy Finance Report
Building on the work of the Department of Public Service's Clean Energy Finance Collaborative, the CEDF provided resources to fund the second of three annual reports designed to provide an understanding of activities and products for clean energy finance. This year's report focused on energy efficiency activities in the municipal market. The findings were intended to inform discussions in State government pertaining to interest in helping more municipalities to engage in deeper energy upgrades to their facilities.

This year continued the multi-year decrease in grant and incentive program activity for the CEDF as it spends down available funds. In FY19 the only new funding appropriated to the CEDF was \$200,000 for wood stove change-out incentives. When that and other programs and grants end in FY20 the CEDF will cease offering incentives but will have funds to sustain the CEDF program framework until additional funding is appropriated or a decision is made to eliminate the CEDF entirely.

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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, expenditures, and progress the CEDF made toward its goals and fulfilling its mission during FY19.

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.²

During FY19 the CEDF and the Clean Energy Development Board (CEDB) worked on priority strategies from the CEDF's Strategic Plan. In 2018 the CEDF created a multi-year strategic plan that recognizes that remaining funds are limited but that the CEDF program framework should be sustained until new funding is provided, or the CEDF is closed down.

For many years the CEDF framework has endeavored 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.

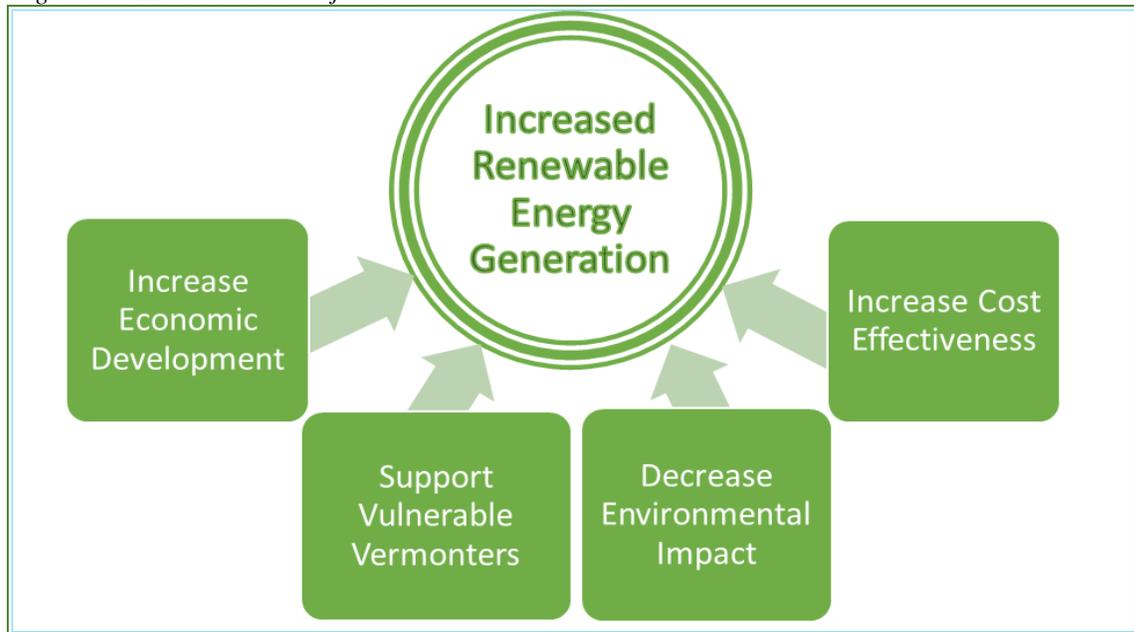
In support of CEDF's mission of increasing distributed, small-scale, community-supported thermal and electrical renewable energy generation, the CEDF has been guided by four goals:

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 visually shows the interaction between CEDF's Vision and its four supporting goals.

² [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.

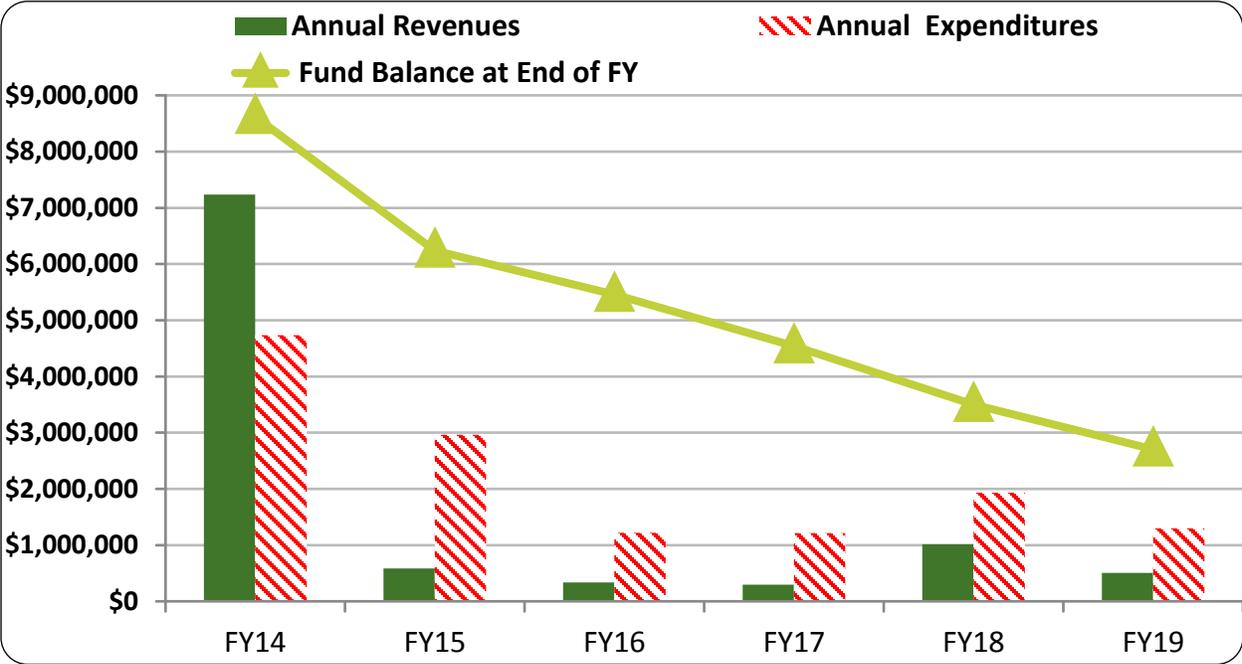
Both the CEDF's strategic and current annual plan call for continued efforts to grow Vermont's evolving advanced wood heating sector. The CEDF has worked to build consumer demand for wood heating together with strengthening businesses in the supply chain capable of delivering affordable, dependable wood fuel and installing cost-effective heating systems.

■ 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 Department of Public Service (PSD), which employs a CEDF Manager and dedicates additional PSD staff to CEDF tasks as needed (See Appendix I for more details on CEDF governance.)

Figure 2 below shows the revenue, expenses, and end-of-year balance of the Fund for the last six fiscal years. Figure 2 does not include any of the \$22 million in American Recovery and Reconstruction Act (ARRA) funds that were managed by the CEDF. Almost all of the funding the CEDF has received has come from agreements the State of Vermont had with Entergy Vermont Yankee that required Entergy to send payments of \$4-7 million per year directly to the CEDF. The last payment received directly from Entergy VT Yankee was for \$5.2 million in FY14.

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



At the end of FY19 the Fund had \$2 million in fiscal obligations (i.e. signed grant agreements, contracts, and program awards). The CEDF will continue to receive loan re-payments from the approximately \$1.0 million in outstanding loans from borrowers. Loan repayments to the CEDF for FY19 equaled almost \$427,000, including a one-time payment from a borrower of just over \$278,000. Loan repayments should continue annually for several more years, decreasing each year, unless there are any unexpected defaults. See Appendix II for a financial report of FY19 revenue and expenses.

The repayment of loan funds is projected to be the only incoming funds to the CEDF going forward. While the amount of returned loan funds to the CEDF will be minimal, it requires the

CEDF to continue administrative functions and a decision-making process for the expenditure of the funds returned if any remain after covering administrative functions.

There are five remaining CEDF loans and three CEDF-ARRA funded loans. At the end of FY19 one of the five remaining CEDF loans went into default. Green Mountain College stopped making payments on their CEDF loan when it ceased operations at the end of the school year. The college had paid off all but about \$230,000 of a \$750,000 loan that supported the construction of new wood chip heating plant for the campus. CEDF is not planning on being able to collect any of the remaining balance or any future interest or principle payments from this loan.

Payments on one of the active CEDF loans will end in FY 2020 and one of the ARRA loans will end in FY 2021 (when they will be fully paid off). The remaining loans have terms that last beyond FY 2023. The PSD has continuing obligations to report and administer any CEDF-ARRA funds (which retain all their original ARRA restrictions and obligations) that are paid back to the CEDF from borrowers.

During the 2019 fiscal year just over \$127,000 in CEDF-ARRA loan 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 FY19 the CEDF held approximately \$1.1 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 FY19 financial report for the ARRA funds held by the CEDF.

During the 2019 legislative session, the General Assembly appropriated \$200,000 to the CEDF for FY19 with the condition that it be used to offer incentives for a wood stove change-out program in coordination with the Department of Environmental Conservation.

As CEDF's current grants and programs come to an end its obligations and need for daily administration will be reduced. However, there will be some program activity extending into FY21, and statutory responsibilities that will require the PSD to maintain the CEDF's administrative ability.

Addressing the lack of on-going funding for the CEDF is outside the purpose of this report. Without new funding there will be a need for changes to the Vermont statute governing the CEDF. Until that happens the PSD will continue to meet its obligations to administer the CEDF under the current framework with the CEDF funding available.

■ Administration & Program Delivery

During FY19 the Fund spent \$154,520 on staff and internal administration expenses. The CEDF has been spending down its funds while continuing to administer and monitor programs, leading to higher total program management and administrative expenses as a percentage of its revenue.

The CEDF statute allows that “*up to five percent of amounts appropriated to the Department of Public Service from the Fund may be used for administrative costs related to the Clean Energy Development Fund*”³. The CEDF statute doesn’t define “administrative costs”. In the past the PSD has considered the following to be the administrative costs for the CEDF:

- Wages and benefits of the CEDF Fund Manager and any other PSD non-administrative staff working on the developing and managing CEDF programs, grants, and contracts (*on a pro-rated basis based on hours worked on CEDF programs*).
- Costs such as travel, conferences, and trainings for the CEDF and PSD staff working on CEDF programs.

For administrative simplicity, the PSD has not used any CEDF funds to cover the costs incurred by PSD’s Administrative Services Division staff in providing services to the CEDF (such as processing invoices, financial reports and accounting, State budgeting, etc.), nor has the PSD used any CEDF funds to cover overhead expenses (i.e. rent, office equipment, internet, etc.).

Since the creation of the CEDF the PSD has not had any problems keeping the administrative costs (as defined above) for the CEDF under the required 5 percent cap. However, this will not be the case starting in FY21, assuming there are no additional allocations to the CEDF. The PSD would have likely gone over the 5 percent cap in FY 2019 if the current CEDF Fund Manager hadn’t taken a partial leave during the year, reducing the FY19 administration costs.

In order to have a more accurate accounting of the administrative costs of the CEDF, starting in FY20 the PSD will separate the time it’s staff, including the Fund Manager, spend on program delivery from program administration. It will also be investigating including in its administrative costs an indirect rate on expenditures that covers its Administrative Services Division staff time spent on CEDF grants, contracts, invoices, etc.

Starting in FY21 the PSD will not include staff time spent on program delivery as an administrative expense, as it has in the past. Staff time spent on program delivery and development will not be considered administrative expenses and therefore will not be part of the calculations determining the PSD’s administrative costs related to the CEDF.

State statutory language allows the PSD to use of up to 10 percent of CEDF-ARRA funds, (*to the extent allowable under ARRA, and PSD’s State Energy Program award agreement with the U.S. Department of Energy*) to be utilized for the purpose of administration of CEF-ARRA funded grants, contracts, loans, etc. The PSD has not used any of the CEDF-ARRA funds for its program delivery or administration costs since the ending of the original ARRA grant in 2012.

The PSD began to use CEDF-ARRA funds in FY 2020 to help cover administration costs of CEDF-ARRA funded grants, in order to keep the CEDF administration costs below the 5 percent threshold of the CEDF allocation.

As the CEDF budget allocations continue to shrink it will be more difficult for the PSD to keep program and administrative costs low as a percentage. The PSD suggests that the General

³ 30 V.S.A. § 8015 (e)

Assembly review the CEDF statute in light of the significant changes in the current financial support of the CEDF compared to when its statutory language was adopted in 2006.

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. The Board reviews and approves the CEDF Annual Plan, Annual Budget, and programs developed by the PSD to carry out the CEDF mission.⁴

For FY19, 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 served as co-chairs of the Board. At the end of FY19 Janice St. Onge completed her four-year term and Gaye Symington completed her second four-year term on the Board. They did not seek re-appointment to the Board. The PSD and the remaining Board members thanked Ms. Symington and Ms. St. Onge for their dedicated and valuable service on the CED Board.

Jared Duval and Sam Swanson also completed terms at the end of FY19. They were both re-appointed by the Commissioner of the PSD to new four-year terms at the start of FY20.

The Board met seven times during FY19, including a public hearing on the current activities and future of the CEDF. The Board provided guidance and input on a variety of topics, including: the 2019 Advanced Wood Heat Program Evaluation, considerations regarding the future of the Fund, the FY19 Annual Program Plan and Budget, program design, and administration. For more details on the Board, see Appendix I.

■ New FY19 Awards & Activities

The CEDF issued only one new contract (for a third-party evaluation of its programs) and entered a new Memorandum of Understanding with the Office of Economic Opportunities during the fiscal year. No new grant solicitations in FY19 were offered due to resource constraints. The Fund continued to support and administer a set of projects focused on advanced wood heating in the state, with grants and programs started in previous fiscal years continuing into FY19. These activities accounted for the bulk of CEDF activities and obligations. As detailed in the CEDF strategy, fostering development of the advanced wood heating market continues as the primary focus.

The CEDF defines “advanced wood heating” as 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,” and a “low level of emissions,” will evolve with technology improvements and “local wood” could fluctuate with changes in the local wood markets. Accordingly, the CEDF’s program requirements will be

⁴ 30 V.S.A. §8015(e)

adaptive to ensure its programs are always leading the wood energy market to be supportive of CEDF and State goals.

Awards (incentives, MOUs and contracts) issued by the CEDF in FY19 totaled approximately \$1.43 million (including CEDF-ARRA funds), which are detailed below and in Appendix III. Of the total, the CEDF signed new MOUs and contracts valued at \$781,410. In addition, the Small-Scale Renewable Energy Incentive Program (SSREIP) paid out \$346,296 in incentives for projects with total project costs of \$1.9 million. Total project costs for all awards were estimated to be approximately \$3 million. Thus, CEDF awards leveraged over \$1.6 million in private investment in Vermont's clean energy infrastructure. These investments demonstrate that the CEDF was able to generate about \$1.15 of private investment for each CEDF dollar awarded.

The renewable energy projects supported by the CEDF will not only produce renewable energy but will also have the following estimated environmental benefits:

- Annually eliminate the use of 525,000 gallons of fossil fuel (heating oil and propane)
- Annually reduce greenhouse gas emissions by 4,824 metric tons⁵

Separate from its work providing financial support to projects, the CEDF continued to tap into its network of service providers, grantees, and customers to better understand the evolution of Vermont's maturing clean energy industries.

Contracts & MOU's

The CEDF deployed most of its resources in FY19 to continue its support for the advanced wood heating market in the state. The contracted clean energy employment survey, clean energy finance report focusing on municipalities, and the evaluation of CEDF's advanced wood heating programs all yielded insights into the challenges and opportunities in clean energy markets in Vermont. Below is a description of the contracts and MOUs executed in FY19.

➤ ADVANCED WOOD HEATING PROGRAM EVALUATION: CADMUS GROUP, LLC (CONTRACT: \$81,409.50)

Early in 2019, the CEDF contracted with Cadmus to conduct an evaluation of the Fund's advanced wood heating activities during the period of 2013 to 2018. This included the Small-Scale Renewable Energy Incentive Program (SSREIP) and the Advanced Wood Heat grant programs. The evaluation focused on four objectives:

- Estimating CEDF SSREIP AWH achievements (i.e., energy savings and environmental benefits and impacts from development of an AWH systems' market)
- Assessing lessons learned from CEDF program experiences
- Improving CEDF's ability to evaluate program impacts and delivery effectiveness
- Identifying the role CEDF programs can play in developing a self-sustaining Vermont market for AWH systems

⁵ See Appendix IV for more information on the GHG accounting.

The evaluation included surveys and interviews of Vermont residents and stakeholders to assess program impacts and generate insights. The summary of findings states that CEDF’s Advanced Wood Heat (AWH) Program evaluation found that there would be many fewer installations of AWH systems if the CEDF incentives were not available. AWH suppliers surveyed commented that CEDF’s programs had a positive impact on the development of the Vermont market and that without them there would hardly be a Vermont market. The report also found that CEDF had very satisfied program participants. (See Figures 3 & 4)

“CEDF has promoted market growth of best-in-class systems.”

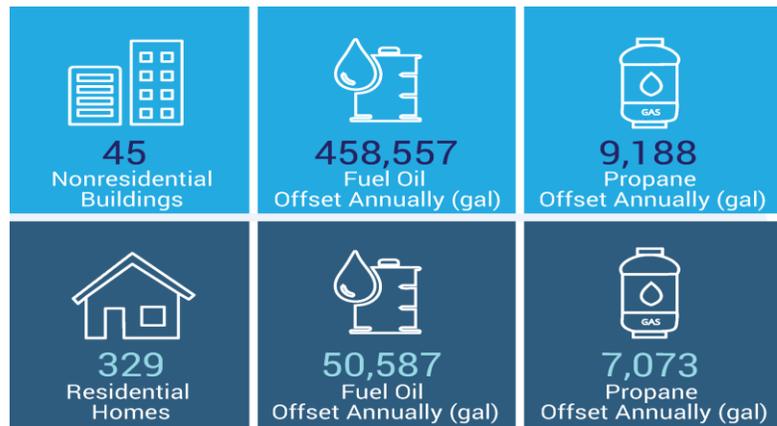
“This has been an extraordinary investment! Thank you!”

-Nonresidential Customer

Specific findings from CEDF evaluation include:

- ✓ Contributions toward the reduction of over 500,000 gallons of heating oil and propane annually, translating into over 6,400 metric tons of CO₂e avoided emissions. In aggregate, the programs reduced particulate matter (PM) 2.5 by 43,000 pounds and sulfur dioxide by 20,000 pounds every year, with a net increase in nitrogen dioxide.

Figure 3. Advanced Wood Heating Evaluation Findings



Source: Vermont Clean Energy Development Fund - Wood Heating Programs Advanced Wood Heat Program Evaluation Final Report, October 24, 2019; Cadmus

- ✓ Residential wood stove participants mainly offset cord wood use with their new systems, reporting an average reduction of nearly a whole cord annually, plus a small amount of

Figure 4. Total Advanced Wood Heating Program Summary

Total Advanced Wood Heating Program Summary (Program Years 2015-2018)		
Sector/Measure	Number of Systems	Total Incentives
Residential Cord Wood Stoves	219	\$266,000
Residential Pellet Stoves	28	\$40,500
Residential Pellet Boilers	82	\$257,345
Nonresidential	45	\$1,494,574
Total	374	\$2,058,419

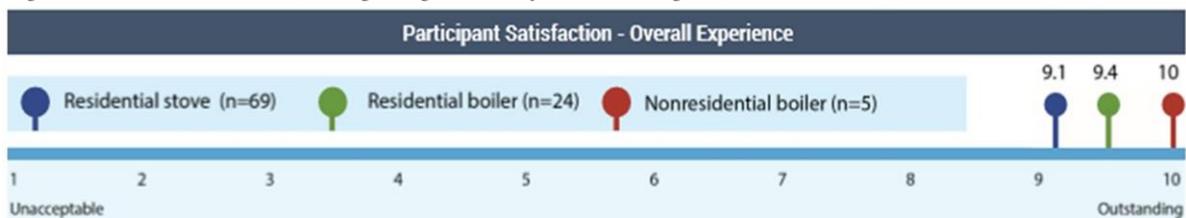
Nonresidential = Affordable Housing (15), School (15), Other (15)

Source: Vermont Clean Energy Development Fund - Wood Heating Programs Advanced Wood Heat Program Evaluation Final Report, October 24, 2019; Cadmus

fuel oil. Pellet stove participants replaced nearly four cords of wood with just under three tons of pellets. Pellet boiler participants saved on use of a wider variety of fuels, including fuel oil and propane. Pellet boiler participants reduced on average nearly two cords, over 500 gallons of oil, and over 80 gallons of propane annually.

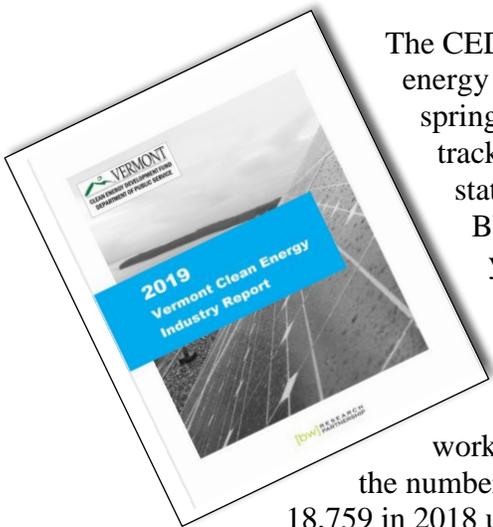
The report concluded, “AWH participants were highly satisfied with the program, their new equipment, and the incentive. Vermonters are driven to program participation for efficiency and environmental reasons, and market actors are committed to furthering the market in Vermont. The AWH market continues to see large benefits from the program activities. (Figure 5) Program equipment and service providers are satisfied with the program, and some reported that sales would not be able to maintain current levels without the program.”

Figure 5. Advanced Wood Heating Program Satisfaction Ratings



Source: Vermont Clean Energy Development Fund - Wood Heating Programs Advanced Wood Heat Program Evaluation Final Report, October 24, 2019; Cadmus

➤ **CLEAN ENERGY INDUSTRY REPORT: BW RESEARCH PARTNERSHIP, INC. (2nd YEAR OF A TWO-YEAR CONTRACT)**

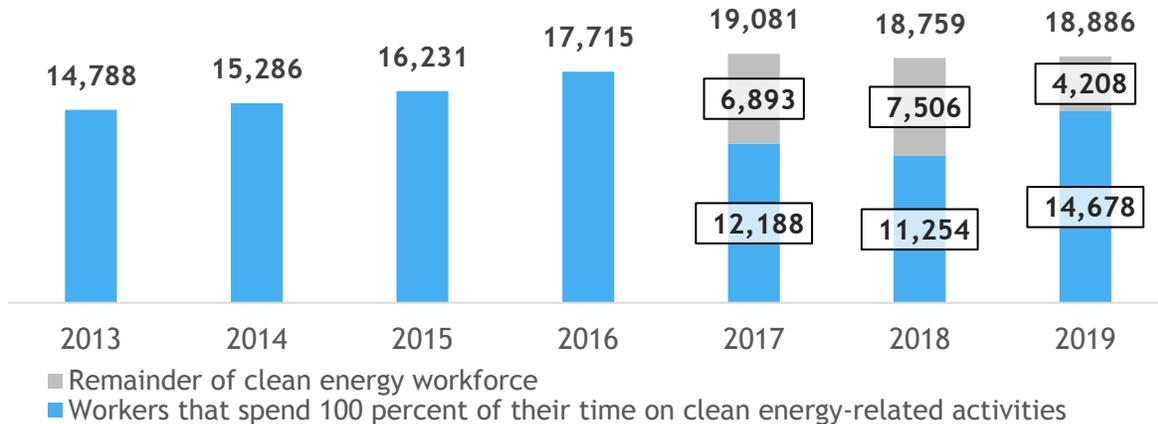


The CEDF released the most recent characterization of the state’s clean energy economy in the *Vermont Clean Energy Industry Report* during the spring of 2019. This is the second of two contracted reports that help track the evolution of employment in the clean energy industry in the state. For the sixth consecutive year, BW Research Partnership – BWR) prepared the report for the CEDF. As in prior years, this year’s report drew from a pool of national data gathered in 2018 via a coalition of funders seeking to continue the effort supported previously by the U.S. Department of Energy.

The most recent report showed that the number of clean energy workers in the state increased once again in 2019 (Figure 6). In 2019, the number of clean energy workers rose about 0.5 percent from a total of 18,759 in 2018 up to 18,886. The number of workers who spent all their time on clean energy related activities increased from 11,254 to 14,678 over the same period. A new labor intensity metric introduced this year shows that intensity-adjusted employment grew 8% over the last year. This change can be attributed to expanding roles for workers to become fully focused on clean energy activities. The overall number of jobs (full- and part-time) has increased by 27 percent since data collection began in 2013.

Vermont now hosts 3,678 establishments conducting clean energy work, about 1.8 percent higher than the previous year’s 3,612, which is 46 percent more than in 2015.

Figure 6. Clean Energy Employment Growth, 2013-2019



The most recent report revealed insights related to employment trends in different parts of the state. Hiring difficulty increased again for the third year in a row. As appears with national data, the same trends show that specialty trade contractors in energy efficiency are the most difficult for employers to hire for. “Lack of experience, training, or technical skills,” “insufficient qualifications” and “location” are the top three reasons cited for hiring difficulties. See the report for a complete description of the findings and other details about the state’s clean energy workforce.

➤ **DEPARTMENT OF FORESTS PARKS AND RECREATION (MOU: 3rd YEAR OF A THREE-YEAR AGREEMENT)**

The CEDF, along with the Department of Public Service, Agency of Commerce and Community Development, and the Department of Forests Parks and Recreation (FPR), again supported a wood energy position at FPR. The Wood Energy Development Coordinator provides technical assistance, market research and inter-agency coordination focused on 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 contributes \$10,000 for each of the three years of the agreement, with FY19 as the third and final period.

In FY19, the State Wood Energy Coordinator:

- Coordinated meetings of the State Wood Energy Team
- Built database of 400+ firewood dealers
- Provided feedback on PSD’s thermal energy clearinghouse website
- Collected wood fuel price data and provided to the PSD
- Wrote Request for Proposals to update the Vermont Wood Fuel Supply Study, which led to a contract with the Biomass Energy Resource Center (BERC) to update the study
- Collaborated with Renewable Energy Vermont (REV) and on the report, Expanded Use of Advanced Wood Heating in Vermont, otherwise known as the “Roadmap”
- Drafted renewability standard, which is under review by FPR counsel

- Presented regularly to community groups and conferences
- Created a Wood Pellet Buying Guide
- Wrote successful Wood Innovations Grant (\$250,000) to fund rebates on Advanced Wood Heating in commercial and institutional new construction that will be transferred to CEDF for distribution

The Coordinator also provides staff assistance to FPR’s Wood Utilization Program Leader, Division Director, and Commissioner on issues related to wood heating.

➤ **RESIDENTIAL WOOD STOVE CHANGE-OUT PROGRAM WITH THE OFFICE OF ECONOMIC OPPORTUNITY (MOU: \$500,000 ARRA FUNDS)**

In February 2019, CEDF and the Office of Economic Opportunities (OEO) at the Department of Children and Families entered into a Memorandum of Understanding (MOU) to develop and administer a wood stove change out program for families eligible to participate in the Vermont Home Weatherization Assistance Program (WAP). The goal is to swap out old, dangerous, inefficient and polluting wood and other solid fuel heating appliances with newer, safer and cleaner EPA-certified cord wood or pellet stoves, or to install new pellet stoves to displace fossil fuels. The program will make use of \$500,00 of ARRA funds repurposed via the US Department of Energy to support the program objectives of the CEDF and OEO.

By the end of the fiscal year, OEO and the agencies participating in the WAP had installed 10 new wood and pellet stoves around the state with over \$39.7k of incentive payments. All stoves are rated at or below the standard of 2.0 grams per hour of particulate matter (PM 2.5) at efficiencies of no less than 70 percent. These new units will reduce ambient air pollution and save homeowners on their fuel bills. The program is slated to run through June 2020 or until funds are depleted.

Grants

➤ **RUTLAND WEST NEIGHBORHOOD HOUSING SERVICES INC. DBA NEIGHBORWORKS OF SOUTHWESTERN VERMONT (CONTINUATION OF PREVIOUS GRANT & \$309,330 NEW FUNDING)**

There was only one grant awarded in FY19, and it was an extension of time and an increase of funding for an existing grant to NeighborWorks of Western Vermont. CEDF awarded an additional \$309,330 for the project. CEDF used ARRA funds for \$300,000 and the \$9,330 was a grant from GMP to the CEDF as part of GMP’s 2019 Nuclear Electricity Insurance Liability (NEIL) Fund plan as approved by the VT Public Utilities Commission.

NeighborWorks of Western Vermont continued its program helping low- and moderate-income families lower their heating costs. The program focused on residents of Rutland County to install wood/pellet stoves (or change-out old ones) coordinated with thermal energy efficiency audits and retrofits to reduce energy consumption and save money.

NeighborWorks ended an interest rate buy-down component of the program due to the lack of uptake. The program's service territory was expanded to include Bennington County in addition to Rutland County towns and Vermont towns bordering Rutland County.

NeighborWorks' program installed 108 units during the fiscal year with CEDF funds, which when added to previous installations led to a total of 132 new units leveraging \$506,576 of the State, federal and private funding awarded. The program also completed 11 audits this year for a program total of 56.

As with CEDF's other wood heating grants new heating systems must be EPA certified with particulate emissions of not more than 2.0 grams per hour and at least a 70 percent efficiency rating. Of the 108 property owners who received support for a new wood/pellet stove, 98 had incomes of below 100% of the area median income (AMI) for the Rutland region. Older stoves typically have efficiencies in the range of 30-40 percent, while new stoves fall between 78 and 83 percent, and emissions of fine particulates (at 2.5 microns in size) known to cause lung ailments decreased from the range of 4 to 6 grams per hour down to 1.0 to 1.9 grams per hour.

When coupled with health and safety upgrades to accommodate new stoves in the homes, the investment in new wood stoves provides substantial opportunity for improvement to human health and the local environment, while continuing to stimulate the emerging advanced wood heating market.

■ Continuing Awards & Activities from Prior Fiscal Years

Windham County Dedicated Funds

The funds allocated for use in Windham County continue to help area residents achieve energy savings and environmental improvements. In FY2014 the General Assembly appropriated over \$7.5 million to the CEDF, including a 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.

The CEDF continued with three active awards using the dedicated Windham County funds in FY19:

➤ **WINDHAM WOOD HEAT INITIATIVE (CONTINUATION OF PREVIOUS GRANT)**

The Windham Wood Heat Initiative (WWHI), originally signed with the Windham Regional (WRC) commission in FY17, continues adding new advanced wood equipment into the regional marketplace. This award was designed for development of advanced wood heating systems for schools, municipalities, and public-serving non-profits located in Windham County. In FY19 the program was opened to for-profit entities as well.

During the past fiscal year, 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 7).

As in previous years, 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, budgeting, 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 which installed wood heating systems that also completed energy efficiency measures recommended by the audit. One new institution and one commercial enterprise were awarded grants to install a wood heating system and energy efficiency measures during the year, two received financial assistance for audits, and four commissioning activities were performed.

Figure 7. Windham Wood Heat Initiative Grantees (FY19)

Grantee Name	Town	Type of Organization	Cost (Est'd)	Grant - based on cost	Type of wood or Activity	Fossil Fuel Displace (unit/yr Est'd)
Leland and Gray Union High School	Townshend	School	\$8,000	\$6,000	Audit	7,565 gal Heating Oil
Leland and Gray HS	Townshend	School	\$500,000	\$150,000	Green Chip	
Leland and Gray HS	Townshend	School	\$8,200	\$8,200	Commissioning	
Mayo Building Kurn Hattin Homes for Children	Westminster	School	\$3,000	\$1,000	Audit	Audit Only
Bellows Falls Middle School	Rockingham	School	\$4,500	\$4,500	Commissioning	Reported in FY18
Putney Central School	Putney	School	\$3,700	\$3,700	Commissioning	Reported in FY18
King Properties (Lamplighter Annex)	Brattleboro	Commercial	\$72,028	\$18,007	Pellet	15 tons/year Coal
King Properties (Lamplighter Annex)	Brattleboro	Commercial	\$5,200	\$5,200	Commissioning	
Fiscal Year 2019 Award Totals			\$604,628	\$196,607		

➤ **WINDHAM RENEWABLE ENERGY GRANT PROGRAM (CONTINUATION OF PREVIOUS GRANT)**

During FY19, the Windham Regional Commissioner continued to manage funding provided in FY17 and FY18 for the Renewable Energy Grant Program. In FY19, the WRC awarded one new grant under this program totaling \$66,000. The grant was for a rooftop solar PV system on a low-income housing development in Brattleboro called the Red Clover Commons. (Figure 8) This project is expected to generate about 115,526 kWh/year with over \$21,000 of savings projected.

Figure 8. Windham Regional Commission Renewable Energy Grant Program Grants (FY19)

Grantee Name	Project Type	Size	Town	Type of Org	Estimated Project Cost	WRC Grant \$ Amount
Red Clover Commons	Solar PV rooftop on low income housing development	94.2 kW	Brattleboro	Non-profit	\$205,850	\$66,000
Fiscal Year 2019 Totals					\$205,850	\$66,000

➤ **WINDHAM & WINDSOR HOUSING TRUST (CONTINUATION OF PREVIOUS GRANT)**

In FY18, 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- to 4-unit owner-occupied multi-family properties. (Figure 9)

The program has continued to issue incentive payments for new EPA-compliant stoves with an emission rating for particulate matter of no more than 2.0 grams per hour and an efficiency rating of at least 70 percent.

By the end of FY19, the program had completed 107 new wood or pellet stove installations after having received 150 applications.

Figure 9. Old wood stove with new replacement stove completed by Windham & Windsor Housing Trust



Before



After

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 getting renewable energy systems installed. In FY19 it provided \$346,298 in incentives for advanced wood heating systems for homes, business, and institutions; and one solar thermal system. As shown in the map, participation in the SSREI Program was well distributed across the state. (Figure 11)

The CEDF used the SSREIP to administer the legislatively required residential wood stove change-out program that started in November of 2018. The program removed old, highly polluting wood heating appliances currently being used in Vermont, replacing them with new, cleaner EPA-certified cord wood or wood pellet stoves. The program helped reduce air pollution emissions associated with wood heating. Old stoves removed under the program are to be destroyed or scrapped for recycling.

The FY19 SSREIP incentives supported the installation of the following 196 renewable energy systems: 1 solar hot water system, 57 advanced wood pellet heating systems (boilers or furnaces), and 138 clean, efficient cord wood or pellet stoves. The CEDF awarded these incentives to residential and non-residential customers in the state. See Figure 10 for an example of a pellet boiler system.

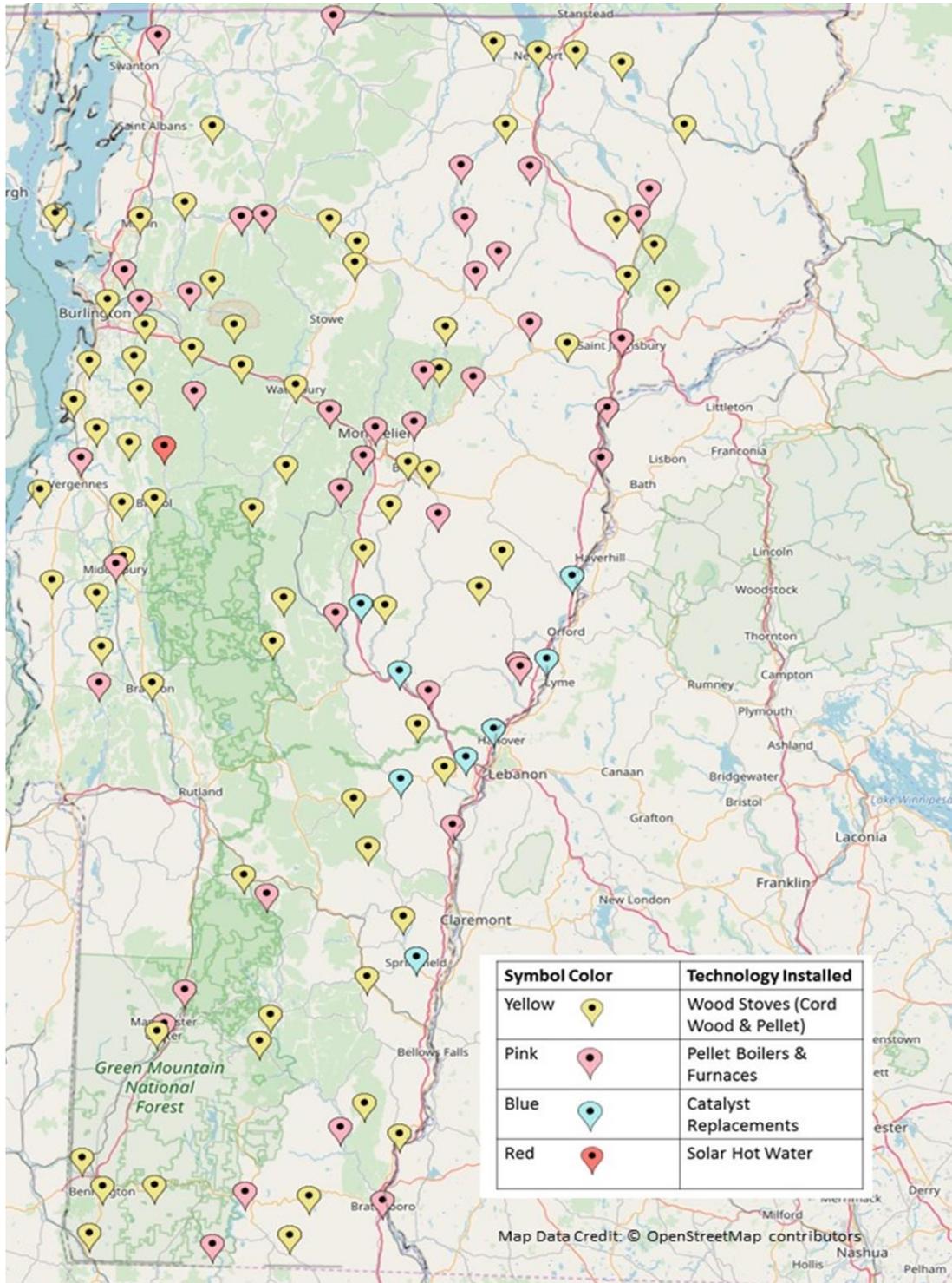
Figure 10. SSREIP Advanced Wood Heat Pellet Installation at Nelson's Hardware in Barre. Photos are of the hardware store building and the owner of the store and building, Bob Nelson happily standing next to his new pellet boiler.



Nelson's Hardware on Main Street in Barre, VT installed a pellet boiler to heat the entire 25,524 sq. ft. building. The pellet boiler installation, which also included thermal efficiency measures, will eliminate almost 10,000 gallons of heating oil annually. The system includes a 15-ton pellet storage bin. Efficiency Vermont provided a custom incentive to this project in addition to CEDF's flat \$3,000 incentive.



Figure 11. Towns with Small-Scale Renewable Energy Incentive Program Recipients in FY19



Note: Map does not show wood heating systems installed by Windham & Windsor Housing Trust in Southeastern Vermont or NeighborWorks of Western Vermont in the Rutland to Bennington region.

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 FY19 to the end of FY20.

Finance Programs

For the past few years the CEDF, identified opportunities and promising finance tools used to advance clean energy financing in Vermont in conjunction with other State agencies and private entities. In FY19 there was one such project.

➤ CLEAN ENERGY FINANCE REPORT: ENERGY FUTURES GROUP, INC. (SECOND REPORT UNDER THREE-YEAR CONTRACT)

From 2017 to 2018, participants in the Clean Energy Finance Collaborative helped provide information to the Energy Futures Group, Inc., the company selected by competitive proposal to produce the second *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 second study in June 2019 provided examples of finance tools and related activities used by local government to improve the energy fitness of their buildings. The report was submitted to the Department of Buildings and General Services as a resource to inform potential expansions of building-related energy improvements focused on municipalities. A final report in 2020 will review select aspects of the emerging clean energy market to gain insights into how they are evolving.

Other Projects and Activities

➤ LOW-INCOME SOLAR: \$150,000 GRANT

In FY18 the CEDF received a \$150,000 grant from Green Mountain Power to support the development and implementation of a Pilot to help GMP's low-income customers reduce and stabilize their home energy costs with solar energy installations.

CEDF and GMP created a pilot project together with the non-profit Housing Foundation that will install a solar installation on a Housing Foundation owned property in Berlin, VT. The power generated from the project will exclusively benefit GMP's customers participating in GMP's Electric Assistance Program (EAP).

The solar system was not completed in FY19 and thus CEDF continued this project into FY20.

➤ STATE WOOD ENERGY TEAM (SWET)

The CEDF continued to be active throughout the year in this inter-agency effort that works to facilitate active collaboration and participation of several key stakeholder groups in the promotion of advanced wood heating in Vermont. The SWET is led by the Department of Forest, Parks and Recreation.

Fiscal Year 2020 - First Half Preview

CEDF adopted a budget and program plan for FY20 in July of 2019. During the first half of FY20, CEDF continued to administer programs started in FY18 or earlier and solicited interest in a potential grant round via a “Letter of Intent” submission process for advanced wood heating supply systems. This section provides a brief synopsis of CEDF activities from July to December 2019.

- **Vermont Clean Energy Industry Report 2020** – The CEDF commenced a seventh clean energy industry survey to continue to gain insight into trends in Vermont’s clean energy industry. This report is slated for completion in the spring of 2020.
- **Bulk Wood Pellet & Dried-Chip Supply Infrastructure Grant Letter of Intent** – In the fall of 2019, CEDF issued a “Request for Letters of Intent” solicitation in the fall of 2019, which garnered eight responses. A subset of respondents was asked to submit full grant proposals seeking funds to build out discreet elements of the advanced wood heating market. Eligible projects include: new wood pellet mills, expansion/improvements of existing pellet mills, new dried chip fabrication and/or chip drying facilities, bulk pellet or chip delivery trucks, bulk delivery depots/silos, or other projects that will expand the amount of pellets and/or dried chips available for bulk delivery to Vermont customers, and/or projects deemed to support the bulk wood pellet and dried chip markets in Vermont. Total amount of funding available through this solicitation is \$350,000 with a maximum grant of \$250,000 with a 60 percent cost share by the grantee.
- **State-wide Stove Change-out** – This program continued into FY20 and will shut-down at the end of the 2019 calendar year. The CEDF continued working with DEC’s Division of Air Quality and Climate on the state-wide change-out program.

Conclusion

The CEDF finished FY19 continuing to support 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 347 renewable energy installations which will avoid the burning of over 525,000 gallons of fossil fuel annually.

The CEDF incentives and other Fund-supported efforts resulted in increasing local renewable energy activities that supported vital economic development in Vermont’s renewable energy business sector. Achieving the CEDF’s renewable energy goals while targeting local economic development and protecting vulnerable Vermonters is challenging, but the CEDF, with help from other State agencies and active stakeholders, continues to demonstrate that the State can reach multiple goals simultaneously in a cost-effective and efficient manner.

As the CEDF spends down its existing grant funds over the next year it will strive to retain its administrative capacities going forward. The CEDF will be winding-down most functions but, at least for the next couple years, has funding to maintain its basic administrative capacities so that it can be available to the PSD, and other State agencies, to meet the State’s clean energy goals. By maintaining the CEDF the PSD will be prepared to quickly re-start CEDF’s clean energy incentive 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 Department of Public Service (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 FY19, Appointing Authority, and Fiscal 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

Department of Public Service Personnel Involved in CEDF Management & Administration

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 - FY19 CEDF Financial Reports for CEDF & ARRA Funds

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

CEDF FUND:	FY19 Totals
REVENUES	
Interest Income	68,645
Loan Interest Income	19,148
Loan Repayments	407,849
Grant	9,330
Total Revenues	504,971
EXPENDITURES	
Wages & Benefits	142,807
Per Diem	400
Meetings & Conferences	455
Dues	10,000
Misc Administration	863
Total Administrative	154,525
VEDA Loan Program	10,549
SSREIP Program (including VEIC admin contract)	406,581
Contract - Other	62,802
Grants & MOUs	666,136
Total Expenditures	1,300,592
End of FY19 Fund balance	2,703,287

ARRA REVOLVING LOAN FUND:	FY19 Totals
REVENUES	
Interest on Cash Balance	19,886.53
Interest on Cash Balance	12,616.02
Loan Interest	16,689.22
Loan Repayments (Principle)	111,024.24
Total Revenues	160,216.01
EXPENDITURES	
PSD administrative expense	-
ARRA Grant Expenses	
NeighborWorks - Low Income Stove Change-out	408,791
ARRA Loan Administration Fees	12,606.70
Total Expenses	421,397
ARRA Revolving Loan Fund monies at VEDA	265,655
End of FY19 Fund Balance	1,171,179
ARRA NON-revolving FUND	FY19 Totals
EXPENDITURES	
Net change in fund balance	0
Fund balances, June 30, 2018	277,386
YTD Fund balances	277,386

Appendix III - New CEDF Awards Announced & New Activities (FY19)

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 (MWh/yr) or Improvement
Contracts & MOUs						
	-BW Research, Inc. (Contract continuation)	1	• Vt. Clean Energy Industry Report 2017 and 2018 (Years 5 & 6)	Reported in FY18	-	Not Applicable
	-Energy Futures Group (Contract continuation)	1	• Clean Energy Finance Report (3 Annual Reports 2018 - 2020)	Reported in FY18	-	Not Applicable
	-Dept. of Forests Parks & Recreation (MOU continuation)	1	• Wood Energy Coordinator (1 Year Support)	Reported in FY18	-	Not Applicable
	-Dept. of Forests Parks & Recreation (MOU continuation)	1	• Residential wood stove change out program	\$200,000	\$200,000	Not Applicable
	-Cadmus Group, LLC (Contract)	1	• Evaluation of CEDF advanced wood heating activities	\$81,410	\$81,410	Not Applicable
	-Office of Economic Opportunity, Dept. of Children and Families (MOU) (1)	1	• Wood stove change-out program for VT Weatherization Assistance Prgm	\$500,000	\$500,000	Not Available
	SUBTOTAL: Contracts & MOUs	6		\$781,410	\$781,410	
Grants						
	<i>Advanced Wood Heating (Pellet or Chip Systems)</i> -Rutland West Neighborhood Housing Services Inc. dba "NeighborWorks of Western Vermont" (continuation and new funding) (1)	108	• Low Income Wood Stove Change-Out Program	\$309,330	NA	Not Available
	SUBTOTAL: Grants	108		\$309,330	\$0	
Carry-Over Re-Grants						
	<i>Windham County Programs</i> -Windham Wood Heat Initiative [\$1,193,143 in FY17]					
	<i>Leland and Gray Union High School</i>	1	• Audit, Green Chip Boiler & Commissioning	[\$164,200]	[\$516,200]	1,403.5
	<i>Mayo Building Kurn Hattin Homes for Children</i>	1	• Audit	[\$1,000]	[\$3,000]	Not Applicable
	<i>Bellows Falls Middle School</i>	1	• Commissioning	[\$4,500]	[\$4,500]	Not Applicable
	<i>Putney Central School</i>	1	• Commissioning	[\$3,700]	[\$3,700]	Not Applicable
	<i>King Properties (Lampighter Annex)</i>	1	• Commercial Pellet System & Commissioning	[\$23,207]	[\$77,228]	83.1
	-Windham Renewable Energy Grant Program [\$700,000 total FY 16 & FY18] <i>Red Clover Commons</i>	1	• Solar PV array on low income housing development (94.2 kW)	[\$66,000]	[\$205,850]	115.5
	SUBTOTAL: Carry-Over WRC Grants (2)	6		[\$262,607]	[810,478]	1,602.1
	-Windham and Windsor Housing Trust Low Income Residential Pellet Heating Program [\$270,500 in FY18]	31	• Residential Wood Stove Change Out Program for low to moderate income homeowners in Windham and Windsor Counties	[\$98,028]	[\$141,040]	Not Available
	SUBTOTAL: Carry-Over WWHT Grants (2)	31		[\$98,028]	[\$141,040]	
Incentives						
	<i>Small Scale Renewable Energy Incentive Program</i> -Renewable Energy Resource Center	1	Solar Thermal (MMBtu/yr)			
		57	9.1 Advanced Wood Heating (kW)	\$1,002	\$7,693	2.7
		138	1,570 Pellet & Wood Stoves (MMBtu/hr)	\$236,594	\$1,417,527	655.0
			NA	\$108,700	\$482,044	Not Available
	SUBTOTAL: Incentives	196		\$346,296	\$1,907,264	657.70
	TOTAL	347		\$1,437,036	\$2,688,674	Electric (MWh/yr) 115.5
				Leverage: \$0.87		Thermal (MWh/yr) 2,144.3
						Combined (MWh/yr) 2,259.8

(1) The funding source for the stove change out programs is Department of Energy State Energy Program - ARRA funding

(2) The Windham Regional Commission and Windham & Windsor Housing Trust grants were reported in previous fiscal years. Number shown in [brackets] show FY19 expenditures from those grants.

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.⁶ The renewable energy activities funded during the CEDF FY19 contribute toward the 2028 goal.

In FY19, CEDF conducted an evaluation of its wood heating programs, which constituted nearly all the activities in the fiscal year. The results of the analysis showed that CEDF non-residential wood programs saved over 458,000 gallons of fuel oil and 9,100 gallons of propane annually. Residential programs reduced fuel oil consumption at least 50,000 gallons and propane 7,000 gallons per year. All programs combined to yield net carbon dioxide equivalent reductions of approximately 4,842 metric tons per year.⁷

FY19 Annual Greenhouse Gas Metrics

Projects Funded by CEDF	Technologies	Fuel Saved (gallons/yr) Fuel Oil	Fuel Saved (gallons/yr) Propane	Greenhouse Gas Reductions (Metric Tons CO₂ equivalent/yr)
*Windham Wood Heat Initiative *Windham Regional Commission *Windham & Windsor Housing Trust *Small-Scale Renewable Energy Incentive Program (SSREIP)	*Wood Pellet Boilers, Furnaces & Stoves *Cord Wood Stoves	Non- Residential 458,857 Residential 50,587	Non- Residential 9,188 Residential 7,073	Non- Residential 4,200 Residential 623
TOTALS		509,144 gallons/yr	16,231 gallons/yr	4,824 MT CO₂e Net Savings

⁶ 2016 Vermont Comprehensive Energy Plan, January 2016. Vermont Department of Public Service, Pg. 34.

⁷ Vermont Clean Energy Development Fund – Wood Heating Programs Advanced Wood Heat Program Evaluation Final Report. October 23, 2019. Cadmus Group, LLC.