



Clean Energy Development Fund

Annual Report

To the Vermont Legislature

Fiscal Year 2015
July 2014 – June 2015

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

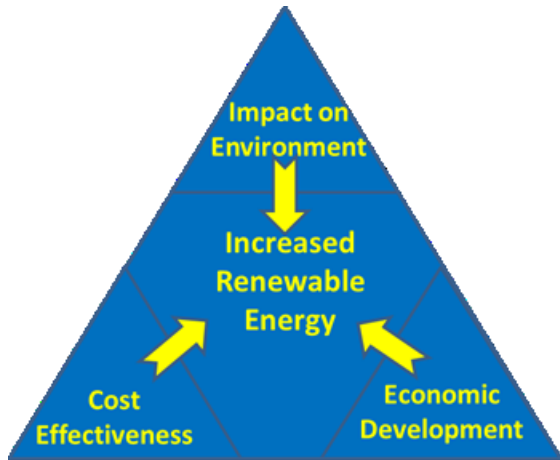
Published: January 2016

■ CEDF: Strategic Investment for the Clean Energy Economy

Adopted in the five-year Strategic Plan:

The Vision for the CEDF

is to serve the citizens of Vermont by increasing local small-scale renewable energy generation while maximizing associated economic development. The Fund coordinates with other state programs and private entities to integrate and advance renewable energy across all sectors of the State's energy economy.



The CEDF's primary goal is increased renewable energy generation in Vermont. Supporting the primary goal are three objectives:

- Advance development of the clean energy sector of the Vermont economy
- Increase cost effectiveness of clean energy
- Decrease environmental impacts of Vermont's energy use

In pursuit of the primary goal and three objectives, the CEDF focuses on the following strategies:

1. Identify deployment barriers to renewable energy development and coordinate with industry, state agencies, and private organizations to develop solutions that overcome those barriers
2. Strengthen and build the markets for select distributed renewable energy technologies
3. Build connections between the deployment of renewable energy and energy efficiency
4. Increase jobs and revenue in the Vermont Clean Energy (CE) industry sector
5. Educate and support CE developers and businesses in obtaining other incentives and financing
6. Support and strengthen CE finance and investment-related activities
7. Increase the leverage of CEDF monies while helping to drive the costs of CE projects down
8. Focus support on those CE technologies and CEDF programs that maximize the reduction of Vermont's energy related carbon emissions
9. Continually evaluate programs, activities, and outcomes in order to adjust programs as necessary to meet goals

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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 2015 (July 1, 2014 to June 30, 2015) by the Vermont Clean Energy Development Fund (CEDF). The report also provides information on progress the CEDF made toward its advancing its goals and fulfilling its purpose as directed by the Legislature. The report is intended to provide information to the Legislature, clean energy stakeholders, and the citizens of Vermont.

Fiscal Year 2015 Summary

Fiscal year 2015 (FY15) was the second full fiscal year in the implementation of the CEDF's 5-year Strategic Plan, adopted in January 2013. At that time, the CEDF was deploying what was assumed to be the last payment from Entergy Vermont Yankee (EVY). Overall the CEDF awarded \$3.38 million in competitive grants for projects estimated to have a total cost of \$6.38. The SSREIP paid \$1.91 million in incentives for total project costs of \$30.5 million while the Fund contracted for \$163,256 of services. Total activity amounted to \$5.46 million in awards that should yield total investments of \$37.04 million.

The Strategic Plan presented opportunities for the CEDF to help shape the next phase—post EVY—of clean energy investment in the state. The Strategic Plan forms the foundation for the CEDF's Annual Program Plans, including the FY15 plan.

Like the year before, FY15 showed strong growth in the Vermont clean energy economy. The number of workers involved with clean energy activities grew by 6.2% to reach 16,231, an increase of more than 1,400 since 2013.¹ This picture of the economy is now possible as a result of the second Vermont Clean Energy Industry Report sponsored by the CEDF and issued in the summer of 2015. The report drew attention to the rapid changes in clean energy markets affecting the state.

The CEDF continued its transition from broad-based support of all renewable energy technologies, to a focus on a strategically chosen renewable energy. In FY15 the focus was on advanced wood heating. As FY15 commenced, the CEDF wound down its residential PV incentive/rebate program, added new finance programs to support the PV market's transition away from the rebate program, and established new advanced wood heating programs.

In recognition of the continued demand for community solar PV among towns and schools, and the need to help make projects economical for these jurisdictions, the Fund made six awards for community supported and owned solar projects that added 462.5 kW of new generation capacity and projected costs savings. These were coupled with two grants for pilot projects that are developing food waste-to-energy projects that are also helping innovators chart viable pathways that will help advance towards the waste reduction goals set forth in Act 148.

FY15 was the first year the CEDF had a third party evaluation completed. The Fund hired NMR Group to evaluate and report on the impact of the CEDF's awards as well as the administrative processes of the Fund through 2013.

¹ Vermont Clean Energy Industry Report 2015, August 2015

Highlights for FY15 Include:

1. **Restructuring of the Small Scale Renewable Energy Incentive Program (SSREIP)**
FY 2015 saw the end of the solar PV incentive that the SSREIP had offered since 2004. On December 31, 2014 the PV incentive ended. There was a surge of reservations at the end of the program and projects were still being installed during the fourth quarter of the fiscal year that received incentive reservations in December. Despite the elimination of the incentive the SSREIP had another year of increased installations of residential PV projects.
2. **Focus on Advanced Wood Heating**
The 2013 Strategic Plan found that, in order to maximize its effectiveness, the CEDF needed to focus its efforts on one sector or technology of the broader clean energy market. As part of its FY15 Plan, the CEDF selected Advanced Wood Heating as that focus. The largest investment in this sector was a \$1.6 million grant to a consortium working to promote advanced wood heating in Windham County.
3. **Community Solar Projects**
Six community solar PV projects received CEDF grants this fiscal year, leading to the development of 462.5 kW of new PV capacity in the state. These projects represent the Fund's continued effort to support distributed net metering facilities with municipalities and schools that have community support and ownership.
4. **2nd Vermont Clean Energy Industry Report**
The CEDF commissioned the state's second report, which confirmed the growth of Vermont's clean energy sectors. This report showed that clean energy businesses employ 16,231 workers at 2,519 business establishments throughout the state, which represents approximately 4.8% of the state's workforce. This figure corresponds to a growth rate of 9.8% since 2013.
5. **Program Evaluation**
The NMR group conducted a process and impact evaluation of nearly 4,000 CEDF and ARRA awards totaling \$64.1 million. The evaluation revealed the CEDF's high net positive impact in the clean energy economic sector. While there were process recommendations for improvements, there were no major problems identified.

Authority, Funding, & Resources

The Vermont General Assembly established the CEDF through Act 74 of 2005 (30 V.S.A. §8015). The purpose of the CEDF is *"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."*

The CEDF is administered by the PSD, which employs a CEDF Manager and dedicates additional PSD staff time to CEDF tasks as needed. During the fiscal year, the CEDF spent \$146,120 on administration, or 4.9% of the total CEDF monies expended.

Clean Energy Development Board

The CEDF is overseen by a seven-person board appointed by legislators and the Commissioner of the Public Service Department. During FY15, the Board consisted of the following members: Gaye Symington (Chair), Sam Swanson (Vice Chair), Jo Bradley, Jennifer Hollar, Linda McGinnis, Johanna Miller, and Mark Whitworth. The CEDF Board guides CEDF activities in reference to its legislative purpose and the Strategic Plan approved by the Board in January of 2013. The Strategic Plan sets out a vision, goals, objectives, and strategies to promote the development and deployment of renewable energy resources in Vermont. The Board works with the PSD in the creation of the CEDF's plans and programs.

The Board met six times during the fiscal year. During the course of the year, the Board provided guidance and input on a variety of topics, including the work scope of the CEDF evaluation, the transition from solar PV to Advanced Wood Heating in the Small Scale Renewable Energy Incentive Program, allocation of remaining ARRA funds, and the FY16 annual budget and work plan.² For more details on the CEDF Board, see **Appendix One**.

■ Evaluation of the Clean Energy Development Fund (2006-2013)

The evaluation of the CEDF conducted in FY15 demonstrates the effectiveness of the Fund's clean energy investments made over the course of nearly a decade. The CED Board and staff engaged with the NMR Group to evaluate the Fund's energy, environmental and economic impacts as well as CEDF's management of the Fund, for the period 2006 through 2013. The findings document the benefits that accrued to the state as a result of support for clean energy development from the CEDF (**Table 1**).

In particular, the impact evaluation found that:

- ❖ CEDF-awarded projects resulted in 122.7 giga-watt hours per year in annual energy production and savings, including:
 - 59.8 GWh/yr in annual electric energy production;
 - 45.9 GWh/yr in annual thermal energy production; and
 - 17.0 GWh/yr in energy efficiency savings.
- ❖ CEDF awards totaled \$64.1 million, which leveraged \$3.20 in outside funds for every \$1 of CEDF awards. The total leveraged value of projects was \$196 million of outside funding.
- ❖ During the time period, the Fund issued 3,983 awards including 1,389 awards via American Recovery and Reinvestment Act (ARRA) funding totaling \$30,881,700 and 2,594 awards with non-ARRA resources totaling \$33,227,700. These awards included competitive grants, loans, incentive payments via the SSREIP, solar tax credits, feasibility studies, and contracts for services that were geographically distributed throughout the state.

² Minutes of the CEDF Board's meetings are posted on the PSD's CEDF web page (http://publicservice.vermont.gov/topics/renewable_energy/cedf/board).

- ❖ Total installed capacity of CEDF-awarded projects was 27.7 MW and 60.3 MMBtu/hr overall. This represents 2.5% of the state’s total installed electric capacity and 1% of total electric generation.
- ❖ CEDF investments yielded \$6.2 million per year of total avoided electric system costs, of which \$4.9 million were avoided energy costs and \$1.3 million were avoided capacity costs.
- ❖ CEDF-awarded projects resulted in 102 kilotons of CO₂e reductions per year. In addition, these projects reduced SO₂ emissions by 58.7 tons/yr and NO_x by 18.1 tons/yr.

Table 1: CEDF Award Summary Impacts (2006–2013)

Metric	Total
Award Funding (\$1,000)	\$64,109.4
Electric Energy Production (MWh/yr)	59,776.7
Thermal Energy Production (MWh/yr)	45,903.0
Energy Efficiency Savings (MWh / yr)	17,031.1
Total Energy Production and Savings (MWh/yr)	122,711.1
Electric Installed Capacity (MW)	27.7
Thermal Installed Capacity (MMBtu/hr)	60.3
Reduced CO ₂ e Emission (tons/yr)	102,014.3
Reduced SO ₂ Emissions (tons/yr)	58.7
Reduced NO _x Emissions (tons/yr)	18.1
Leveraged Funds (\$1,000)	\$196,595.7
Avoided Electric System Costs (\$1,000)	\$6,194.9

Source: *Evaluation of the Vt. Clean Energy Development Fund*, NRM Group, Inc., February 25, 2015

The process evaluation of the CEDF found that while the Fund was effective, improvements could be made. In particular the evaluation report mentioned that there was not a common understanding of what the role of the Clean Energy Development Board is, or should be. The report included the following key recommendations for improved program management:

- ❖ Consider developing an evaluation, monitoring, and verification plan for all its programs going forward
- ❖ Improve program tracking and reporting tools
- ❖ Develop a clear vision for the best and highest use of the CED Board
- ❖ Conduct great public outreach

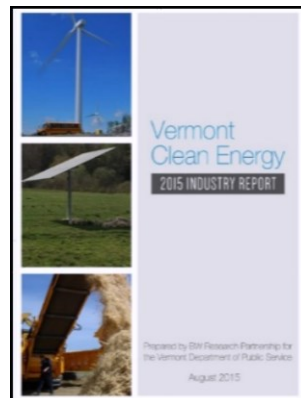
■ Awards & Activities

The awards (grants, incentives, and contracts) made by the CEDF in FY15 are described below. In addition, the CEDF continued to administer awards made in prior fiscal years. In total, the CEDF awarded \$5.46 million resulting in a reported \$37 million in total project costs representing a substantial investment in Vermont’s clean energy infrastructure. These investments demonstrate

that the CEDF was able to leverage about \$6.80 of private investment for each CEDF dollar awarded. The grants, contracts, and incentives made during FY15 are described below in greater detail and summarized at the end of this section in Table 2.

➤ **Vermont Clean Energy Industry Report 2015**
[BW Research, Inc. – \$48,266 for Year 2 under a \$149,957, 3-Year Contract]

Vermont now employs over 16,000 workers at business establishments that engage in clean energy activities. These and other findings were announced on September 14, 2015 via the release of the second *Vermont Clean Energy Industry Report (VCEIR)*, commissioned by the CEDF to establish a baseline for jobs in the state’s CE industry.³ The report is based on the second of three studies to be conducted by BW Research Partnership, Inc. under a three-year, competitively bid contract. This initiative is designed to replicate similar reports in other states that rely on direct employer feedback through a representative survey. Developed in partnership with the Agency of Commerce and Community Development, Department of Labor, and input from an advisory group, the report reflects a very similar approach taken elsewhere and allows comparisons with other states and regions.



Highlights

Select findings from the second report include:

- The Vermont CE cluster employs 16,231 workers at 2,519 business establishments throughout the state, which represents approximately 4.8% of the state’s workforce. Of these workers, 64.2% spend a majority of their time and 49.5% spend all of their time conducting CE work.
- The growth rate since 2013 was 9.8%, with respondents projecting roughly 1000 more jobs by March 2016.
- Installation accounts for 6,855 jobs or 42% of CE workers, but sales and distribution added 709 more jobs since 2014.
- Energy efficiency remains the largest segment, employing 49% of the CE workforce, but renewable energy workers expanded in 2015 by 12.4% for an additional 565 employees
- Among renewable energy technologies, the solar sub-sector increased by about 22% to 1,899 employees or 37% of all renewable energy workers. Biomass constituted 1,400 jobs followed by wind at 300 and all others, 1,522.
- The state’s CE market continues to be dominated by small businesses with about 81% of establishments having 10 or fewer employees.

The CEDF plans to issue the third edition of the VCEIR in 2016. The results from the VCEIR helped inform the state’s 2015 Comprehensive Energy Plan update, slated for release in January 2016.

³ Download the VCEIR 2015 at http://publicservice.vermont.gov/topics/renewable_energy/cedf

➤ **Advanced Wood Heating**
Windham County Advanced Wood Heating Program [Sustainable Energy Outreach Network – \$1,600,000 grant]

The Fund provided a substantial investment to assist with development of a viable biomass heating sector in Windham County in 2015. Under the umbrella of the Sustainable Energy Outreach Network (SEON), a consortium of groups with experience in economic development, advanced wood heating systems, and community engagement will offer the *Windham Wood Heat Initiative (WWHI)*. The initiative’s two year goal is to help schools and municipalities convert 20 buildings from fossil fuels to local, sustainable wood fuel using advanced wood heating systems over the next two years.

The program involves the Windham Regional Commission, Building Green, the Norther Forest Center and other businesses working together to assist with fuel switching and energy efficiency, increasing the capacity for high efficiency wood-based heating in the region, and contributing to the overall economy. With more than 2.2 million acres of timberland in the

vicinity, this program has the potential to model how communities can re-localize their fuel supply. Given the recent drops in oil prices and budget requirements for schools under Act 46, the pressure to change fuel systems appears to have diminished. However, the resources from the Fund and WWHI partners can help position schools and towns to be ready the next time volatile fuel prices return, and continue to help build a local fuel system whose benefits accrue directly to the local economy.

The 2015 Work Plan identifies “modern 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. For the CEDF to meet its goals it is important that all four of these conditions of modern wood heating are built into program designs.

What is considered “highly efficient”, a “low level of emissions”, a “heathy forest ecosystem” and/or “local wood” will evolve with technology improvements, and the CEDF’s program requirements will

Windham County Funding (2014-2016)

In April of 2014 an agreement between the State and Entergy Vermont Yankee resulted in the CEDF receiving over \$5.3 million in new funds. The agreement requires that at least 50 percent of those funds (~\$2.6 million) be spent in, or for the benefit of, Windham County. This represents a significant opportunity for Windham County to address the local effects of the closure of the Vermont Yankee power plant as well as the county’s energy and economic future.

In FY14 the CEDF held a public hearing in Windham County, at which the CEDF received oral and written comments, and the CEDF had discussions with regional stakeholders about the funds earmarked for Windham County. The hearing, discussions, and direct proposals received provided the CEDF with ideas used to deploy these funds. As a result, CEDF allocated funds for:

• Advanced Wood Heating Initiative	\$1,600,000
• Windham Co. Solar Finance Program	\$300,000
• Windham Co. Renewable Energy Grant Program.....	\$400,000
• <u>Anaerobic Digester Program</u>	<u>\$300,000</u>
Total	\$2,600,000

be adaptive in order that its programs are always leading the wood energy market to improve its performance.

For the purposes of programs such as the WWHI the CEDF required that modern wood heating systems meet a 80% efficiency standard and have best available emission control technologies that limit particulates to no more than a 0.2 lb/MMBtu output.⁴ The CEDF believes that wood heating can have a positive carbon emission impact through sustainable forest management practices that ensure long-term forest health, biodiversity, and carbon storage. To help ensure this is the case, the CEDF emphasizes the use of local wood, for example wood derived primarily within a fifty mile radius from where it is consumed. Using local wood also makes it possible for the State to sufficiently monitor and manage the forest resource used for wood heat.

State Wood Energy Team (Dept. of Forests Parks and Recreation – \$15,000 MOU)

The CEDF provided funding to FPR through an inter-agency agreement that facilitated participation of six key stakeholder groups in development of the State Wood Energy Team (SWET). The SWET received a grant from the US Forest Service to provide technical assistance and conduct outreach and education activities in support of advanced wood heating. The SWET is focusing its wood heat efforts on schools and low-income housing. The SWET assisted CEDF’s Advanced Wood Heating Initiative and other wood heat related activities of the Fund.

➤ ***CEDF Finance Programs***

In FY15, the CEDF introduced new finance programs designed to spur markets for clean energy



around the state. Through credit enhancements intended to reduce risk, the Fund provided resources to financial institutions to offer financing for solar PV, solar hot water, and modern pellet boilers and furnaces. Buying down interest rates and providing loan loss reserves to financial institutions enables customers to access capital for larger upfront expenditures at more affordable terms. Use of credit enhancements also allows the fund to target its resources to audiences that would benefit from reduced energy costs but could not otherwise afford

the investment. Adopting this new set of tools widens the Fund’s reach by leveraging additional private capital for clean energy investment.

These finance initiatives are part of the Fund’s effort to increase access to solar energy for middle and lower income Vermonters, and foster a transition from incentives toward cost effective financing. Some programs offer tiered interest rate buy down based on the income levels. The intended results include increased rates of investment in solar systems, increased supplies of

⁴ For the SSREIP program these requirements were increased to 85% and 0.08 lb/MMBtu.

distributed net-metered renewable power, and greater confidence in the technology among financial institutions leading to more participation in this market segment.

Thermal Energy Finance Pilot Program (VSECU – \$240,000 grant)

The CEDF contributed funding from the DOE to buy-down interest rates for homeowners seeking financing for qualified clean energy activities under the *DPS Thermal Energy Finance Pilot Program*. This pilot engages VSECU and other partners in a program designed to reach middle and lower income Vermonters with the affordable “Heat Saver Loan” product that helps save energy and money. The two-year pilot is slated to run through the middle of 2016. Loans under this program can be for amounts up to \$35,000 either secured or unsecured. Interest rates can be as low as 0% with terms to 15 years for income-qualified borrowers.



Windham County Solar Finance Program [VSECU – \$300,000 grant]

In April 2015, the CEDF expanded on its prior finance activities to form a new program for homeowners in Windham County seeking finance to install residential PV and solar hot water systems. The CEDF awarded \$300,000 to VSECU to buy down interest rates from regular residential lending levels. This funding package is one part of the CEDF’s Windham County allocation.

Community Solar Finance Program [VSECU – \$100,000 DOE subgrant & \$25,000 CEDF grant]

In 2014, CEDF received funding from the US DOE via the Clean Energy States Alliance in support of the *New England Solar Cost-Reduction Partnership* under the Rooftop Solar Challenge II. In June 2015, the CEDF awarded \$125,000 to VSECU to construct a statewide community solar finance program with an interest rate buy down. This effort was designed for residents of the state who would be off-takers of net metering credits that lack access to sufficient solar exposure, who are renters or are not able to install solar on their properties, or want to participate in a community project. Individuals may seek financing through this program to participate in group net metered solar PV projects.

Interest Rate Buy-Down Fund (NeighborWorks of Western Vermont – \$255,167 grant)

CEDF provided resources to NeighborWorks for an interest rate buy-down fund for qualified energy efficiency retrofits on qualifying properties to lower the net cost of borrowing to eligible homeowners in order to promote energy efficiency. As with the Thermal Energy Finance Pilot, this program offers loans for amounts up to \$35,000 with interest rates as low as 0% for income-qualified borrowers.

Residential Property Assessed Clean Energy “PACE” Interest Rate Buy-Down Fund (Vermont Energy Investment Corporation – \$200,000 grant)

Rounding out the set of finance programs is an interest rate buy down fund allocated to support the state’s Property Assessed Clean Energy (PACE) program, operated by VEIC. The IRB supports investment in energy efficiency retrofits on residential properties as defined by the Vermont Department of Financial Regulation, and meeting low and moderate income eligibility requirements.

➤ **Food Waste Pilot Projects**

[Casella Resource Solutions' \$139,000 grant and Grow Compost's \$131,549 grant]

The passage of Vermont's Universal Recycling Law (Act 148 of 2012) bans disposal of food scraps by 2020 and requires solid waste haulers and facilities to accept these same materials. Organics constitute over a quarter of the municipal solid waste with 60,000 tons of food residuals. CEDF provided two grants in 2015 for innovative solutions designed to demonstrate the anaerobic digestion of food waste, which will help meet the goals for renewable energy and waste reduction. \$35,000 of each project's total award came from a grant to the CEDF from Green Mountain Power.

Casella received its grant to support the Rutland Organics Recovery Facility slated to receive source separated food scraps from businesses and institutions in the Rutland area and produce a clean, pumpable slurry capable of being received for anaerobic digestion at the Blue Spruce Farm in Bridport, VT. The facility would be designed to process 2 to 7 tons of food scraps and be capable of expansion to larger scale operation serving the Rutland area.

Grow Compost received an award to test the feasibility of modifying a food waste collection truck to process pre- and post-consumer food residuals while enroute to an on-farm anaerobic digester. Working in conjunction with Vermont Technical College, the team intends compare enroute grinding and pasteurization with on-site grinding and pasteurization at the college anaerobic digester facility. This will help determine the safety of this organic feedstock, its ability to boost energy output, and its effect on the physical and biochemical properties of solids and effluent produced by co-digestion.

➤ **Community-based Solar PV Projects**

[6 School and Municipal Grant Awards – Totaling \$394,000]

To help Vermont communities invest in solar PV generation, the CEDF offered six awards in FY15 for solar PV development around the state identified through competitive solicitation. These projects ranged from schools to municipal arrays and collectively represent 462.5 kW of clean energy capacity. All of the projects committed to not selling their renewable energy certificates and will offset about 250 tons of carbon dioxide.

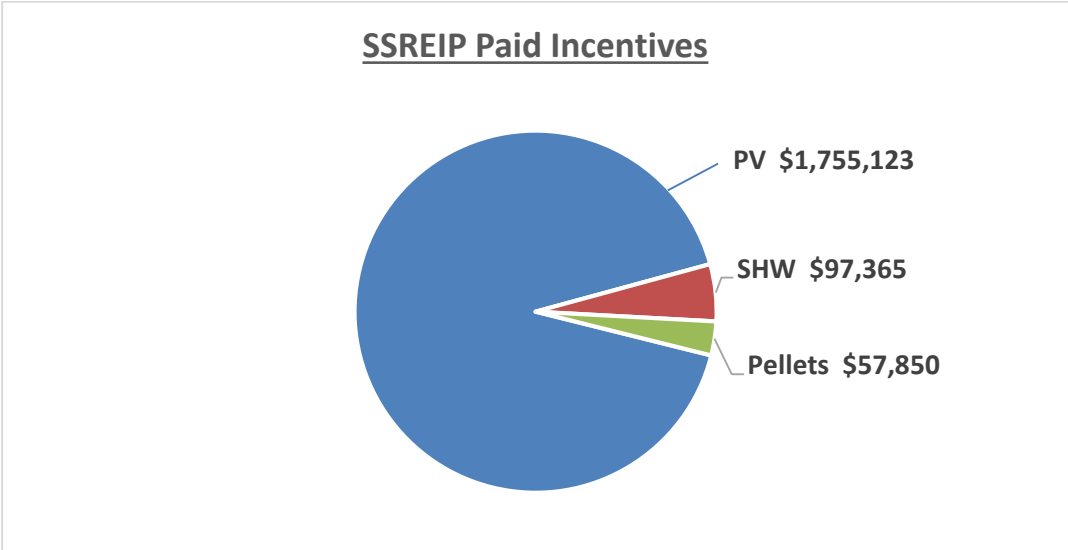
- **Richford High School Solar Array** (54 kW AC) – \$45,500 grant
- **Shrewsbury Mountain School Solar Installation** (22.5 kW AC) – \$31,250 grant
- **Strafford Energy Community Solar Project** (55 kW AC) – \$32,250 grant
- **Thetford School District Elementary School Solar Project** (120 kW AC) – \$125,000 grant
- **Waitsfield Community Solar Project** (85 kW AC) – \$80,000 grant
- **Warren Municipal Photovoltaic Array** (126 kW AC) – \$80,000 grant

➤ **Small Scale Renewable Energy Incentive Program**

The Vermont Small Scale Renewable Energy Incentive Program (SSREIP), created in 2004, shifted its emphasis at the end of 2014 with the winding down of the solar PV incentives. As in prior years, the CEDF contracted the administration of the program by competitive bid to the Renewable Energy Resource Center (a unit within the Vermont Energy Investment Corporation, or VEIC).

This market-based program continued to provide rebates to individuals, businesses, municipalities, and multi-family low-income housing projects for solar hot water systems but this year added modern wood heat pellet systems to the list of eligible technologies (see **Figure 1** below). This year, as with the previous two years, all of the funding for the SSREIP came from the CEDF. The total cost of all the systems installed through the SSREIP was \$30,501,274, resulting in a leverage of nearly 16 to 1. This investment yielded 6,526 kilowatts (kW AC) in new renewable energy electricity generating capacity from small-scale, distributed solar PV systems. In addition, 61 solar hot water systems and 21 wood pellet systems were installed through the SSREIP resulting in expanded renewable heating capacity.

Figure 1 – Fiscal Year 2015 SSREIP Incentives Paid by Technology



The CEDF worked to emphasize the availability of the SSREIP incentives to the schools, municipalities and non-profit affordable housing organizations. As non-profits, these entities were not able to take advantage of federal tax credits for solar projects and therefore the SSREIP increased the incentives for specific non-profit customers.

The SSREIP provided a total of \$171,732 for the installation of PV and solar thermal projects on non-profit affordable housing, schools, or municipal buildings. Table 2 below shows the 23 systems installed with SSREIP incentives for municipalities and non-profit:

Table 2: SSREIP FY15 Incentives to Municipalities and Affordable Housing

SSREIP Incentive \$	Town	Tchnology	Non-Profit Recipient
6,000	Bennington	PV	Shires Housing – VERMOD
2,736	Brattleboro	Solar Hot Water	Windham-Windsor Housing Trust
2,836	Brattleboro	Solar Hot Water	Windham-Windsor Housing Trust
2,836	Brattleboro	Solar Hot Water	Windham-Windsor Housing Trust
15,000	Burlington	PV	University of Vermont
8,100	Craftsbury	PV	Town of Craftsbury
8,400	Ferrisburgh	PV	Kingsland Bay State Park
12,200	Guilford	PV	Guilford Fire Department
6,000	Hardwick	PV	Lamoille Housing Partnership
12,500	Marlboro	PV	Town of Marlboro
7,500	Middlebury	PV	Addison County Community Trust
4,222	Middlebury	Solar Hot Water	Town of Middlbury
12,500	Mount Holly	PV	Town of Mount Holly
4,726	Putney	Solar Hot Water	Windham-Windsor Housing Trust
12,500	Richmond	PV	Richmond Terrace Partnership (Cathedral Square)
6,000	Shelburne	PV	Shelburnewood – VERMOD
15,000	Shelburne	PV	Cathedral Square dba SH Limited Partnership
9,000	South Royalton	PV	Twin Pines Housing Trust - VERMOD
4,200	St. Johnsbury	Solar Hot Water	Gilman Housing Trust DBA Rural Edge
7,500	Vergennes	PV	Addison County Community Trust – VERMOD
6,000	Wilder	PV	Twin Pines Housing Trust - VERMOD
3,240	Williamstown	Solar Hot Water	Town of Williamstown
2,736	Wilmington	Solar Hot Water	Windham-Windsor Housing Trust

Figures 2 and 3 present PV data from the SSREIP. These graphs show the dramatic growth in small-scale PV over the past few years, which has continued even as the CEDF has reduced the level of incentives provided.



Guilford Fire Department's 10kW system.

Figure 2 shows the amount of new capacity (kW DC) of PV installed by projects that received an incentive through the SSREIP, the total cost of those systems, and the portion of those dollars that came from the SSREIP - the incentives paid out – for FY15 as well as the past eight fiscal years for comparison.

As the solar PV market matured the CEDF was able to leverage more private funds and eventually end the solar PV incentive that had been

available in Vermont since 2004. The total dollar amount the CEDF has invested in PV projects decreased in FY14 and FY15 but the amount of solar PV installed continued to grow. Over the past nine years the CEDF has leveraged private investment of **\$127,982,324** in solar PV projects through the SSREIP alone.

Figure 2 – Fiscal Year SSREIP Incentives, Expenditures, and kW installed for Solar PV

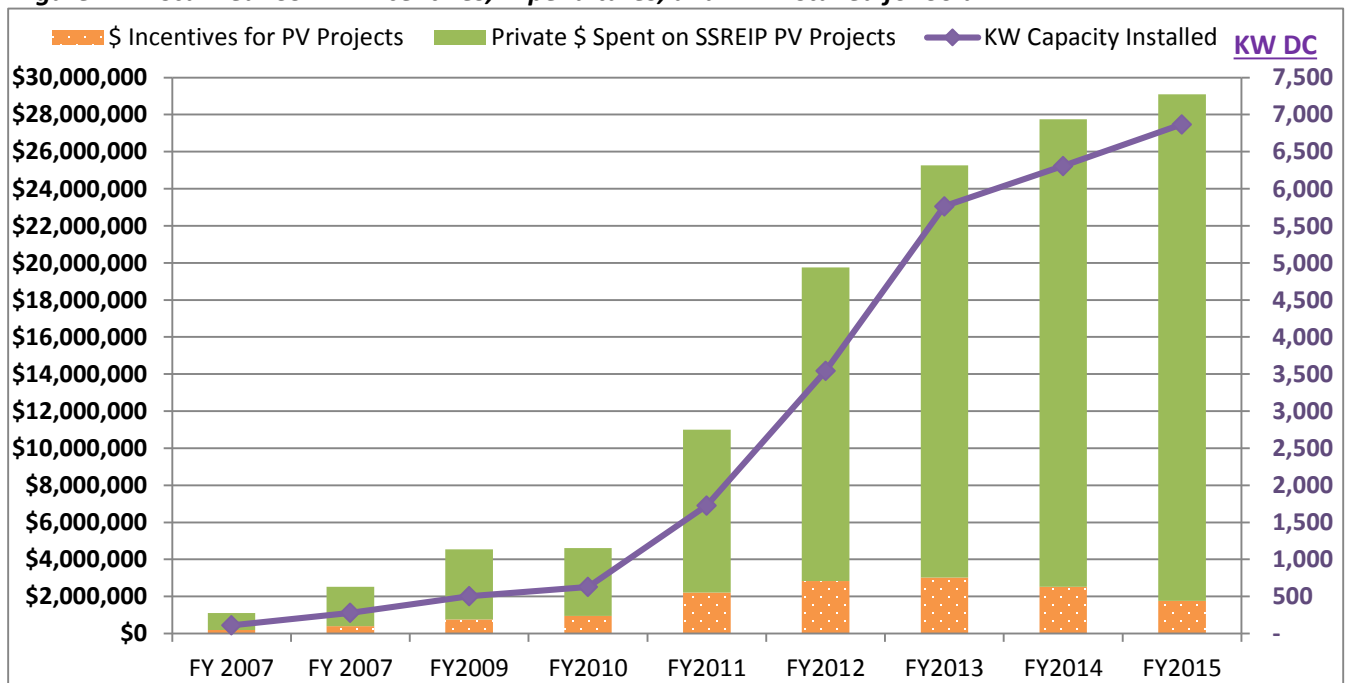


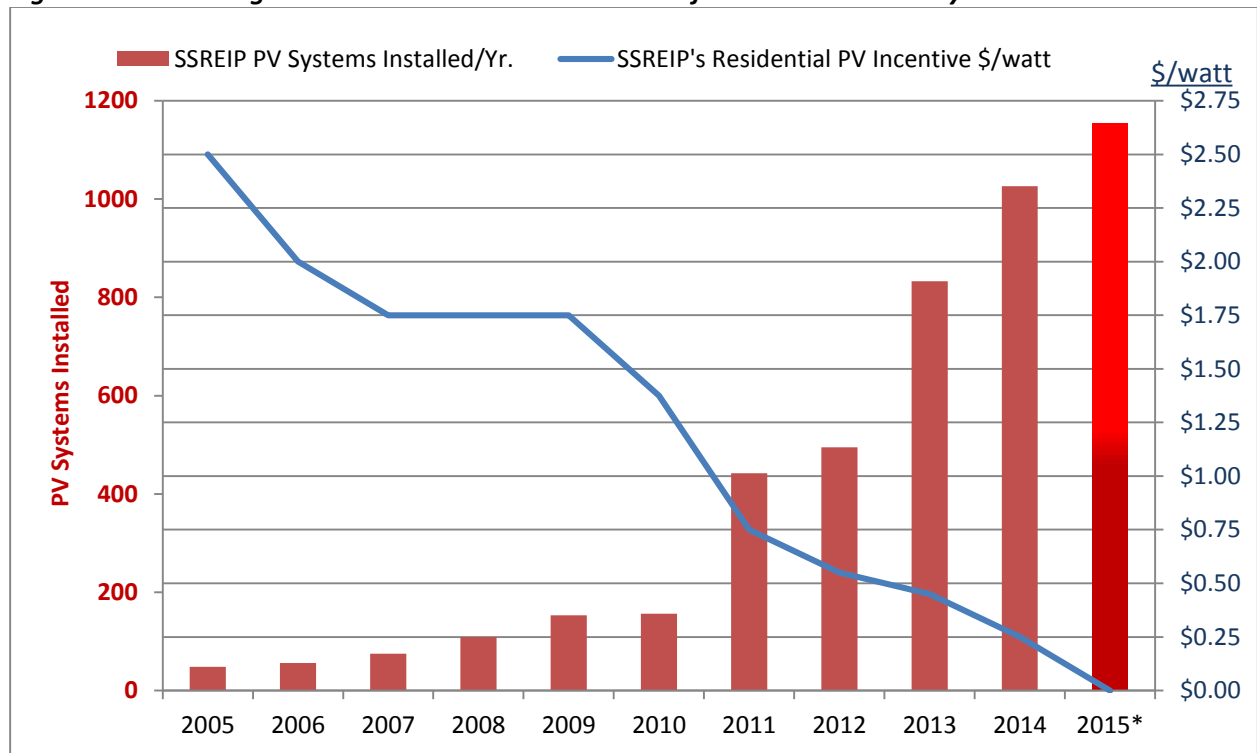
Figure 3 shows the number of PV systems that received an incentive from the SSREIP from 2005 through 2014 calendar years. The data in the figure for 2015 includes the SSREIP systems installed plus additional projects that applied for Certificates of Public Good that would have received a SSREIP incentive had it continued into 2015. Almost all of these systems were small residential systems under 10 kW. As with the trend of increased private investment shown in Figure 2, the CEDF has seen a very rapid increase in the number of PV systems going through the program, even while it has greatly reduced the incentives (total dollars in the program and per watt) and the size of eligible systems.



6 kW PV system on a net zero home for the Twin Pines Housing Trust.

At the end of calendar year 2014, the residential incentive for PV was eliminated altogether. The CEDF will continue to keep a close watch on the local PV sector to see how the market progresses without the SSREIP rebate, which has been helping build the PV industry in the state for the past 10 years.

Figure 3 – SSREI Program Incentive Levels and Number of Solar Photovoltaic systems installed⁵



⁵ SSREIP and DPS data. 2015 data includes net metered CPG applications for solar PV systems (of 15kW or less) that would have been eligible for an SSREIP incentive had such incentives been available in 2015.

Fiscal Year Funding

Table 3 provides a summary of the funding activities conducted by CEDF in FY15. Clean energy competitive grants awarded totaled \$3.38 million during the fiscal year for projects estimated to total \$6.38 million in costs. The SSREIP issued \$1.91 million of incentives for total project costs of \$30.5 million while the Fund contracted for \$163,256 of services. Total activity amounted to \$5.46 million in awards that should yield total investments of \$37.04 million.

Table 3. CEDF Awards for FY15

Funding Type	Award Recipient, (# of Awards)	Technology, Capacity or Type of Activity	Funds Awarded	Total Project Cost Estimated Upon Award	Estimated Annual Energy Production
CONTRACTS & MOUS	-BW Research, Inc.	• Vt. Clean Energy Industry Report	Yr-2: \$48,266 (For a 3-yr \$149,957 contract)	\$48,266	NA
	-NMR, Inc.	• CEDF Evaluation	\$99,990	\$99,990	NA
	-Dept. of Forests Parks and Recreation (MOU)	• State Wood Energy Team	\$15,000	\$15,000	NA
SUBTOTAL: Contracts	2		\$163,256	\$ 163,256	
GRANTS <i>SOLAR PV</i>	-Franklin NE Supervisory Union (Richford High School)	• 54 kW Solar PV System	\$45,500	\$130,000	52,623 kWh/yr
	-Shrewsbury Mountain School	• 22.5 kW Solar PV System	\$31,250	\$98,350	29,486 kWh/yr
	-Strafford Energy LLC	• 55 kW Solar PV System	\$32,250	\$238,500	76,000 kWh/yr
	-Thetford School Board	• 120 kW Solar PV System	\$125,000	\$470,000	170,000 kWh/yr
	-Town of Waitsfield	• 85 kW Solar PV System	\$80,000	\$306,609	102,106 kWh/yr
-Town of Warren	• 126 kW Solar PV System	\$80,000	\$462,829	165,304 kWh/yr	
<i>BIOMASS ENERGY</i>	-Sustainable Energy Outreach Network	• Modern Wood Heating Initiative	\$1,600,000	\$3,200,000	
	-Casella Waste Management	• Food Waste Pilot	\$139,000	\$179,500	
	-Grow Compost	• Food Waste Pilot	\$131,549	\$172,349	
<i>FINANCE PROGRAMS</i>	-VSECU	• Windham Co. Solar Finance Program	\$300,000	\$300,000	
	-NeighborWorks of Western Vermont	• Community Solar Finance Program	\$125,000	\$125,000	
	-Vermont Energy Investment Corp.	• Interest Rate Buy-Down Fund	\$255,167	\$255,167	
	-Thermal Energy Finance Pilot Program	• PACE Interest Rate Buy-Down Fund • Interest Rate Buy-Down Fund	\$200,000 \$240,000	\$200,000 \$240,000	
SUBTOTAL: Grants		462.5 kW Solar PV	\$3,384,716	\$6,378,304	595.5 MWh/yr
INCENTIVES	SSREIP Installations 1014	Solar PV 6,526 kW (AC)	\$1,755,123	\$29,099,945	7,971 MWh/yr
	61	Solar Thermal 4,155 kBtu/day	\$97,365	\$796,913	270.2 MWh/yr
	21	Wood Pellet 683 kW	\$57,850	\$604,416	1,360.6 MWh/yr
SUBTOTAL: Incentives	1,096		\$1,910,338	\$30,501,274	9,601.8 MWh/yr
TOTAL		Electric 6.99 MW (AC) Thermal 4,155 kBtu/day 683 kWh/day	\$5,458,310	\$37,042,834	Electric 8,566.5 MWh/yr Thermal 1,630.8MWh/yr Combined 10,197.3 MWh/yr

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% 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% reduction.⁶ The renewable energy activities funded during the CEDF FY15 contribute toward the 2028 goal.

The CEDF FY15 projects show potential reductions in greenhouse gas emissions of approximately 4,064 metric tons (CO₂ equivalents), based on yearly generation of approximately 9,602 MWh in renewable electricity and renewable heat, as reflected in Table 4 below.⁷ All CEDF electricity generation projects are required to be grid-connected. The renewable electricity generation projects represent over 6,989 kW AC or about 6.9 MW in capacity.

Table 4. FY15 CEDF-Funded Projects Annual Greenhouse Gas Metrics

Funding Source	Project	Technology	Fuel Saved/yr	Estimated Electricity or Heat Generated	Greenhouse Gas Reductions (Metric Tons CO ₂ equivalent/yr)
CEDF	6 Community Projects	Solar PV	NA	595,519 Kilowatt-hours (kWh)/yr	251.6
CEDF	Multiple SSREIP Projects	PV	NA	7,970,091 kWh/yr	3,404.4
CEDF	Multiple SSREIP Projects	Solar Thermal	8,569 gallons of fuel oil	922.36 MMBTU/yr	87.8
CEDF	Multiple SSREIP Projects	Biomass – Wood Pellets	36,151 gallons of oil & propane	4,642.63 MMBTU/yr	320.2
Total GHG Reduction					~4,064

* 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.

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

⁷ The estimates included assumptions and are based on preliminary analysis and subject to revision.

Fiscal Year 2016

During the first half of FY16, additional elements of CEDF's Strategic Plan were put into action. This section provides a brief synopsis of CEDF activities from July to December 2015.

- **Vermont Clean Energy Industry Report 2016** – The CEDF has commenced the third of the three clean energy industry surveys to yield insight into trends in the clean energy industry. The third report is slated for completion in the spring of 2016. The final in the series will explore the biomass subsector as a part of the Fund's current focus. At the end of 2015, the CEDF learned that the methodology employed in Vermont is now being used as part of a national survey on energy jobs.
- **New Board Members**
Four of the seven Clean Energy Development Board members completed their terms at the end of the fiscal year. Sam Swanson and Gaye Symington were reappointed to new terms. Jo Bradley and Jennifer Hollar concluded their many years of service on the Board. Two new members were appointed: Jared Duval from the Vermont Agency of Commerce and Community Development and Janice St. Onge from the VSJF Flex Capital Fund.
- **Windham County Renewable Energy Program**
In December, CEDF issued a solicitation to invite businesses, government entities and organizations to submit a Letter of Intent to apply for a CEDF grant to create and administer a \$400,000 renewable energy grant program for Windham County. This program is intended to help accelerate deployment of solar PV, advanced wood heating and other renewable energy technologies in the southeastern portion of the state.
- **Wood Pellet Bulk Delivery Program**
Part of the task for building a viable wood pellet industry entails transitioning pellet consumers from individual bag storage to bulk storage through which fuel companies can readily supply larger volumes of pellets to their customers. Doing so requires investment in infrastructure such as bulk pellet delivery trucks, delivery depots, and bulk filling stations at pellet mills. In the fall of 2015, CEDF issued a Letter of Intent seeking companies interested in applying for grants to support development of this infrastructure. Support for the bulk pellet delivery market is required to follow the four components of CEDF's definition of advanced wood heating: 1) uses highly efficient combustion technology, 2) emits low levels of particulates and pollution, 3) supports healthy forest ecosystems, and 4) produced using local wood. The total available through this LOI is \$600,000 with a maximum award of \$250,000 and a 65% cost share.
- **Clean Heat Community Challenge Grants**
In the fall of 2015, CEDF offered preliminary grant awards to six entities to install advanced wood heating (pellet or chip) systems in their facilities. These included:
 - **Barre Supervisory Union** – Barre Town Schools: \$20,000 grant
 - **Downstreet Housing & Community Development** – River Station Housing: \$40,000 grant
 - **Housing Vermont** –
 - Applegate Apartments: \$25,000 grant
 - Union Square: \$25,000 grant
 - **Pittsford School District** – Pittsford Town School: \$10,000 grant

- **Shire Housing** – Bennington Historic Rehabilitation: \$13,300 grant
- **Windham & Windsor Housing Trust** – Brattleboro Neighborhood Housing: \$20,000 grant

Conclusion

During FY15, the CEDF conducted a retrospective glance at its funding activities between 2006 and 2013. The Fund's programs and resources have contributed over \$64 million to advance clean energy development in the state, leveraging more than \$196 million in the process. These resources have added 27.7 MW of renewable energy capacity and 60.3 MMBtu/hr worth of installed thermal capacity. All told, the Fund has helped reduce carbon dioxide emissions by 102,000 tons per year.

The CEDF expanded on its toolkit with development of new solar finance programs using credit enhancements to facilitate private financings of solar PV systems. The Fund provided substantial resources to help transition public facilities in Windham County to advanced wood heating technologies, in turn stimulating the local economy. The second edition of the Clean Energy Industry Report gained widespread attention as the clean energy industry continued to grow in 2015. This report provides an important set of data for use by policy makers and business leaders in tracking changes among businesses that are forging the new clean energy pathways.

The CEDF and PSD continue to demonstrate the ability to advance the development of renewable technologies throughout Vermont's communities and make improvements in the lives of Vermonters. The CEDF and PSD have worked to help many citizens, towns, schools, developers, installers, planners, regulators, and legislators who express their desire for a clean, renewable energy future gain essential practical experience with CE in Vermont. Such experience will be necessary for the continued growth and advancement of the State's CE economy. There is still a challenging distance yet to cover to reach the state's energy goals, but the CEDF continues to demonstrate its capacity to assist in reaching those goals while growing a prosperous and effective CE economy.

Appendix One – CEDF Statutes and Board

In 2005, the Vermont General Assembly established the Vermont Clean Energy Development Fund (CEDF) through Act 74 (30 V.S.A. §8015).

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 CE 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 FY15 (affiliations), Appointing Authority, and Year Term Ends:

1. Gaye Symington, Chair (High Meadows Fund), House Energy Committee Chair, 2015
2. Sam Swanson, Vice Chair (Pace Energy and Climate Center), Senate Energy Committee Chair, 2015
3. Jo Bradley (Vermont Economic Development Authority), PSD Commissioner, 2015
4. Jennifer Hollar (VT Department of Economic, Housing and Community Development), PSD Commissioner, 2015
5. Linda McGinnis (Energy Action Network), PSD Commissioner, 2017
6. Johanna Miller (Vermont Natural Resources Council), House Energy Committee Chair, 2017
7. Mark Whitworth (Energize Vermont), Senate Energy Committee Chair, 2017

Public Service Department & CEDF Personnel Working on CEDF Projects in FY15

Christopher Recchia – Commissioner
Darren Springer – Deputy Commissioner
Asa Hopkins – 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
Sheri Rockcastle – Administrative Services Manager
Stacy Drinkwine – Financial Administrator

Appendix Two – FY 2015 CEDF Financial Reports

**VERMONT CLEAN ENERGY DEVELOPMENT FUND
STATEMENT OF REVENUES, EXPENDITURES AND
CHANGES IN FUND BALANCE
Fiscal Year 2015**

REVENUES	FY 2015 \$
Entergy VT Yankee Payments	0
Interest Income	8,604
Loan Interest Income	40,904
Loan Repayments	463,395
Other Revenue	82,033
Total Revenues	594,935
EXPENDITURES	
Wages & Benefits	144,623
Board Per Diem	450
Meetings & Conferences	587
Dues	10,000
Travel	460
SSREIP Program	2,066,833
Loan Program Fees	23,624
Contract (non-SSREIP)	133,073
Grants	584,820
Total Expenditures	2,964,470
Net change in fund balance	(2,369,535)
Fund balance June 30, 2014	8,620,415
Fund balance June 30, 2015	6,250,880

VERMONT CLEAN ENERGY DEVELOPMENT FUND	
FY15 FUND BALANCE STATEMENT	
	\$ Totals
FUND BALANCE AT FY 2015 END:	6,250,880
Less The Remaining Obligation of Awarded and Budgeted	
Grants & Contracts	633,263
SSREIP	920,282
Loan program admin. fee (VEDA)	1,376
Remaining Budgeted Programs and Admin	4,695,958
TOTAL Remaining Obligations and Budget	6,250,880
CEDF and ARRA Loan Funds at FY End	
CEDF Outstanding Loans, Principle	1,935,991
ARRA RLF Outstanding Loans, Principle	1,615,800
ARRA Revolving Loan Fund	
Cash Balance ARRA Revolving Loan Fund	1,205,250
Plus: Monies at VEDA Un-encumbered	265,655
ARRA RLF Program Funds	1,470,905