

Vermont Low Income Trust for Energy

VLITE

2016 - 2020 IMPACT REPORT



Letter From our Board Chair and Executive Director:

With great pleasure, we present this report on VLITE's impact in advancing our mission:

Our mission is to advance Vermont's Comprehensive Energy Plan by funding initiatives with particular emphasis on the energy needs of low-income Vermonters and by the appointment of three VELCO Board Members.

Since 2013, VLITE has invested in projects that advance state energy policy as set forth in the Comprehensive Energy Plan. Utilizing \$1 million in annual VELCO dividends, the board supports projects that advance the public's interest with a particular focus on the energy needs of low income Vermonters. VELCO dividends are derived from Vermont's electricity ratepayers: the public. VLITE makes investments to benefit the public good. This report will demonstrate some of these project successes and how they are positively impacting Vermonters individually and collectively in the face of changing climate and energy demands.

Thanks to VLITE's broad mandate, the board can work nimbly, supporting a variety of energy-related activities, including:

- Support for low income families to buy and install net zero modular homes.
- Cutting-edge research at Lyndon State (now Northern Vermont University) on severe weather events and protecting the electricity grid.
- Workforce training for the unemployed or underemployed in high-demand energy jobs.
- Renewable energy in multifamily affordable housing like solar PV and advanced biomass heat.

VLITE projects leverage a combination of state, federal and/or private funding sources providing a multiplier effect. One example is the state's Office of Economic Opportunity home vermiculite removal program. An equal or greater match of Zonolite Trust funds accompanies each VLITE award and enables weatherization state and federal sources to engage. It has become a model for other states around the country.

VLITE grantees generally come from the nonprofit, and state government sectors and represent well-established organizations with vision and capacity. Some have demonstrated amazing adaptability during the pandemic:

- Neighborworks arranged meetings in clients' yards so important conversations with homeowners could continue when they couldn't take place inside.
- When schools closed in March, the Vermont Energy Education Program quickly moved programs online so students could still access materials at home and teacher could provide quality content.
- Weatherization agencies worked hard during the summer to make up for three months in the spring where activities had to cease.

We are inspired by the hard work of these organizations and proud of the positive impacts these investments will continue to generate. Above all, we are thankful for the opportunity and trust you have provided in supporting this work.

Sincerely,

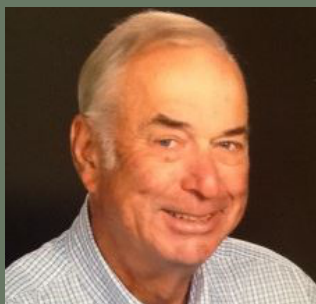
Dick Marron, Board Chair

Gabrielle Malina, Executive Director

BOARD OF DIRECTORS

The board consists of members drawn from state government service, and representatives from the energy policy, utility, and consumer / low-income advocacy sectors.

VLITE BOARD OF DIRECTORS



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PROJECTS

Since 2013 VLITE has invested in dozens of innovative projects that support the Comprehensive Energy Plan. The power of those projects and capacity of the organizations implementing them has led VLITE to fund several for multiple rounds. This 2020 Annual Report features summaries and highlights from many of those projects from 2016 until now.

VLITE's strategy is to address energy burden and energy equity. Energy burden is defined as the percentage of gross household income spent on energy costs. Energy equity describes ability to access clean and affordable energy. In 2018, the board engaged in a strategic planning process and determined that it would invest more than half of its annual income towards projects that focus on the energy needs of low income Vermonters. Over time we have done that successfully.

In July, 2020, the VLITE board convened with members of Governor Phil Scott's administration, Efficiency Vermont, staff from Senator Patrick Leahy's office and the Vermont Community Foundation to understand if there were opportunities for investment within VLITE's mission arising from the pandemic. The outcome of that meeting was a renewed commitment to continue in the vein of supporting energy transformation with a focus on energy equity and affordability.

FOCUS ON THE VERMONT OFFICE OF ECONOMIC OPPORTUNITY

Since it first started distributing grants in 2013, VLITE has had an essential and productive relationship with Vermont's Office of Economic Opportunity (OEO) investing over \$1,300,000 in projects that assist low income Vermonters with energy needs. This funding has allowed the Weatherization Program to enhance the service it provides low-income clients in a variety of ways, the most significant of which has been funding to remediate vermiculite insulation in weatherization clients' homes. VLITE's past support of vermiculite removal (totaling \$650,000 in investment) has allowed more than 150 households to receive weatherization services that they otherwise likely would not have. Other VLITE funds in the past have allowed the Weatherization Program to install solar hot air panels, heat pump hot water heaters, wood and pellet stoves, and provide Weatherization Plus Health consulting.

VERMICULITE REMOVAL

Vermiculite removal is a health and safety precondition that must be addressed so that state and federal funding for household weatherization can be accessed. Vermiculite insulation, found in one in ten Vermont homes, presents respiratory risks as well as providing poor insulative value. There is much more demand for weatherization services than OEO can serve, and homes with vermiculite cannot receive those services until the problem is addressed. VLITE funding for vermiculite removal leverages an equal or greater amount per household from the Zonolite Trust Fund. Together, these funds have augmented and enhanced the services the Vermont Weatherization Program can provide without supplanting a single dollar. All VLITE funds are used to pay subcontractors for direct services at clients' homes and OEO and the weatherization agencies do not list any expenses against those funds.

OEO now funds a dedicated staff person for each agency for the management of weatherization subcontractors including abaters. This allows for efficiency of scale so that more households can get work done for the same amount of VLITE funding.

The pandemic created challenges to any work done in-person in homes and this work was curtailed for several months. Weatherization agencies did their best to make up for lost time when they were allowed back in to people's homes but some funds were unspent and will now be rolled over to the next project year when the agencies are well-poised to complete the project goals.

The most recent project period for vermiculite removal (October 2019 through November 2020) saw the following outcomes:

- \$149,110 was spent remediating vermiculite insulation from Weatherization clients' homes (total spending for all 5 Weatherization Agencies). Every dollar was spent to pay abatement contractors to remediate vermiculite. No funds were spent on State or WAP expenses.
- 54 households had vermiculite removed from their homes using VLITE funds, at an average of \$2,761 per home.
- Weatherization services were provided to these 54 households, which resulted in an average energy savings of 31% or 271 gallons of oil per year per household. This equates to \$680 saved per year on a households heating bill.
- 135 tons of carbon was kept from entering the atmosphere from those 54 homes.
- Significant non-energy benefits were accrued to 54 low-income households. These benefits included improvement in comfort and indoor air quality, better occupant health and safety, and fewer missed school and workdays due to sickness/poor health.

Each abatement / remediation project costs an average of \$10,000 per home. VLITE funds cover about a quarter of the cost and allow the leveraging of other funding sources including the Zonolite Trust. Without the VLITE funds, most of these projects would not have occurred. As a result, weatherization would not have taken place and the homes would have missed out on the many benefits.

The board has approved \$125,000 for a new grant round of vermiculite removal support for 2021. This will ensure that the significant gains made by OEO and the weatherization agencies can continue and households can continue to access this important service.



Vermiculite abatement process.



Before and after:
abatement makes air
sealing easier and more
effective

HIGH EFFICIENCY WOOD OR PELLET STOVE PROGRAM

A \$100,000 VLITE grant allowed the five weatherization agencies to install efficient wood or pellet stoves in 20 low-income households.

Outcomes:

- All funds went to the installation of stoves and related safety repairs and accessories (hearths, chimney repair, fire extinguishers).
- 20 low-income weatherization households received a new high efficiency EPA certified low emitting wood or pellet stove.
- 20 non-EPA certified wood or pellet stoves were removed and recycled from these households, reducing fuel usage, and reducing the emittance of carbon and other pollutants into the atmosphere.

WX PLUS HEALTH PILOTS

In 2018 a \$20,000 VLITE grant supported a contract with environmental health consultant Ellen Tohn to provide services for OEO on Weatherization Plus Health Pilots. Many Vermonters in low-income households are at a greater risk of health problems due in part to the buildings in which they live. Several pilot projects sought to demonstrate the benefits to such households of partnering amongst three interrelated sectors: energy, health care and social services. In one pilot, the Rutland Regional Medical Center identified certain high risk asthmatic patients, where their asthma was resulting in substantial health care use, asthma is not well controlled, and where home conditions may be contributing to asthma triggers. BROC and Neighborworks provided weatherization plus health services to these homes identifying and addressing home asthma triggers such as moisture/mold, rodents, smoking in home, and pets. The results were then measured against certain metrics demonstrating positive health outcomes for people at risk of respiratory and other conditions exacerbated by inadequate housing conditions.

ENERGY IMPROVEMENTS FOR ALL

NeighborWorks of Western VT HEAT Squad's mission is to make energy efficiency available to all families by focusing on low and moderate income households who have not been taking advantage of, or who have not been aware of energy efficiency programs. HEAT Squad specializes in helping clients understand and navigate the myriad of choices that a homeowner must make to undergo efficiency upgrades. They concentrate efforts on grass-roots outreach to identify potential clients, provide education and coaching services to inform and empower them, offer expert technical assistance on science, regulations, or other challenges, and provide access to credit or financing to invest in one's home.

The HEAT Squad program has been designed to overcome barriers so that households who benefit the most from an energy project will enjoy the cost savings, increased comfort, and carbon reductions with support from HEAT Squad along the way. Each household that completes a project saves up to \$1000 every year on their energy costs and saves on average 5000lbs of carbon emissions.

A \$125,000 VLITE grant in 2019 and 2020 focused on homeowners who earn up to 120% of area median income in the Northeast Kingdom. Customers begin with an energy audit and evaluation and then decide if they want to pursue the upgrades, which may include air sealing, and attic, basement or wall insulation depending on the home's needs. VLITE homeowner rebates of \$1,000 per household were offered alongside generous Efficiency Vermont rebates and low cost financing options. In spite of the pandemic causing a three-month hiatus to work taking place in people's



homes, when work resumed, the program was very popular and saw a higher than usual rate of conversion from audits to executed projects.

Neighborworks completed 76 home energy audits and 45 weatherization projects, hitting the program goals. Of these 45 low-moderate income households that completed a weatherization project, they now live in warmer, healthier, and more energy efficiency homes saving almost \$45,000 a year combined on energy

costs, reducing carbon emissions by 225,000 lbs. a year combined, and providing over \$360,000 in revenue to local contractors in project costs. But for this VLITE grant, these 45 low and moderate income households would not have moved forward with projects. HEAT Squad's objective guidance, knowledge, and expertise helped homeowners gain access to VLITE and Efficiency VT rebates, as well as low-cost financing.



Based on HEAT Squad's project success in 2019 and 2020, VLITE approved a new contract for 2021 of \$125,000. Neighborworks will provide 60 educational comprehensive energy audits that will result in 35 completed weatherization projects for low-moderate income (LMI) households in Bennington County (10 projects) and the Northeast Kingdom (25 projects).

AFFORDABLE ZERO ENERGY HOMES

Two VLITE grants totaling \$450,000 to the Vermont Housing and Conservation Board (VHCB) have braced the adoption of zero energy-capable modular homes throughout the state.



Manufactured (mobile) homes have long presented a challenge from an energy consumption and resiliency perspective. Often poorly constructed from subpar materials and lacking energy efficiency, they nevertheless remain a popular and important option for low and moderate income families in Vermont and elsewhere. Tropical Storm Irene damaged or destroyed more than 500 mobile homes in Vermont triggering new energy and investment into this important housing issue. A new model of net-zero-capable high performance modular home was developed with both mobile home parks and owned land markets in mind. These homes have higher

upfront costs but long term sustainability and low operating costs for the owner. Unlike traditional mobile homes, they are expected to retain their value over time.

A \$150,000 VLITE grant in 2016 and 2017 to VHCB supported the ownership and construction of made-in Vermont Vermod zero energy modular homes. Specifically:

- \$70,000 supported 11 buyer incentives for low and moderate income households to ensure full net zero solar PV operation of homes.
- \$50,000 supported solar installation at 14 McKnight Lane duplex units in Wilder Vermont developed and managed by the Addison County Community Trust. McKnight Lane is the state's first net-zero small modular housing community for low and moderate income residents and has grid-tied on-site battery storage.
- \$20,000 in marketing costs including a demonstration model.
- \$10,000 to cover a portion of program assessment completed by the University of Vermont Center for Rural Studies.



An ongoing \$300,000 multi-year grant has allowed VHCB to continue bringing high performance and net zero homes within the reach of low and moderate income Vermonters. The goal continues to be providing an affordable long term value alternative for the traditional manufactured (mobile) home buyer. LMI buyers of these high performance homes have an opportunity to qualify for a typical mortgage and build equity. The VLITE funding is being used for 30 homeowner incentives towards solar PVs and high performance equipment in all electric homes. The project now extends to some stick-built houses constructed by Habitat for Humanity organizations along with high performance modular homes manufactured in Vermont and Maine.

VHCB estimates that the amount of fossil fuels avoided per home annually is 697 gallons and 8683 kWh are avoided leading to an annual energy savings per home of \$3,780.

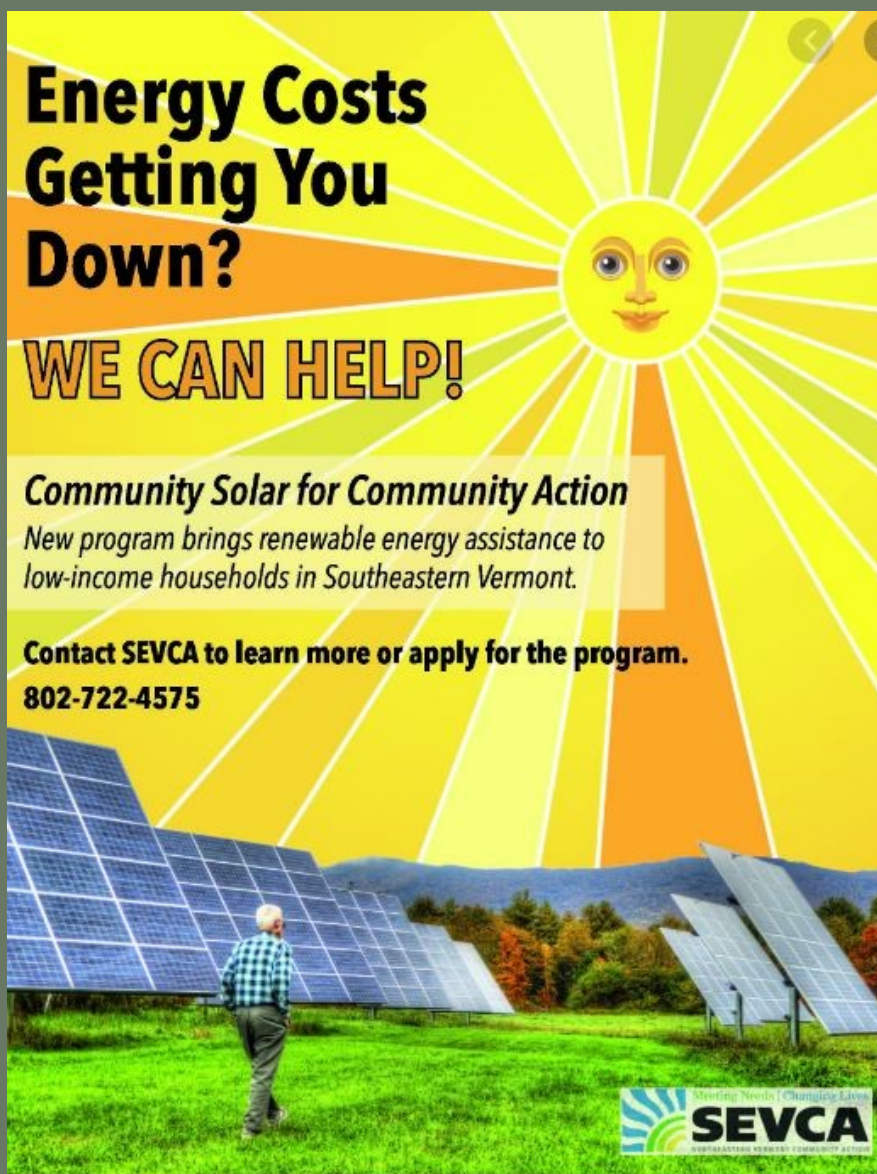
So far 11 net-zero-energy affordable homes (10 modular and one stick built) have been completed through this project, despite many challenges presented by the pandemic.



ROOFTOP SOLAR PANELS FOR COMMUNITY SOLAR

A \$50,000 VLITE grant to Southeast Vermont Community Action Agency (SEVCA) helped put solar rooftop panels on their headquarters in Westminster VT. The panels are part of the Community Solar for Community Action (CS4CA) project. This "virtual net metering" solar project helps low-income households with their electric bills by receiving net metering credits as a form of energy assistance. Other funders in the \$293,000 project were the Windham Regional Commission.

The roof-mounted portion of the project has a capacity of 90.7 kW and with the addition of a ground-mounted array, total project capacity is 150 kW. The roof-mounted array, as an integral part of the overall CS4CA project, contributes the energy it produces to the entire program, 85% of which goes to the 50 low-income households with high energy burdens enrolled in the program, and the remaining 15% goes to reduce SEVCA's electric bill. The system is projected to produce 196,284 kWh per year and save approximately 161 tons of greenhouse gas emissions annually. Qualified households receive an annual credit of about \$400 a year toward their electric bills, thanks to the electricity being generated by the SEVCA solar installation.



Energy Costs Getting You Down?

WE CAN HELP!

Community Solar for Community Action
New program brings renewable energy assistance to low-income households in Southeastern Vermont.

Contact SEVCA to learn more or apply for the program.
802-722-4575

SEVCA
Meeting Needs | Changing Lives
SOUTHEAST VERMONT COMMUNITY ACTION AGENCY



BIOMASS HEAT IN BENNINGTON COUNTY

A \$200,000 VLITE grant to Housing Vermont (now called Evernorth) supported the construction of a \$1.6 million central biomass wood chip heating system to provide heat and domestic hot water to 104 units of low-income housing at the Applegate Apartment complex in Bennington. This biomass project was co-funded by CEDF, USDA RD, 3E Thermal, and various finance and equity sources, and was part of a larger energy efficiency retrofit and rehab of the property. The renewable system replaced 23 oil boilers using an average of 50,000 gallons of fuel oil per year at an annual cost of over \$175,000 per year - and was the highest residential fuel oil user in the county.

The 104-unit Applegate Apartments in Bennington is among the largest properties in the state's nonprofit affordable housing portfolio. Applegate Apartments is a low-income property that targets rents primarily for tenants earning less than 60% of the area median income (AMI). Unsustainable heating costs and the impact of unpredictable fuel oil costs threatened the long-term financial health of this low-income rental property.

In July, 2016 construction started on the 1.8 MMBtu Veissmann wood chip boiler, chip storage and conveyance, buffer tanks, pumps and controls. By summer of 2017 the underground piping had been laid, the five main trunk lines installed and the 23 buildings were connected thus completing the project.

A feasibility study estimated that a fuel switch from oil to biomass is equivalent to 422 tons of CO₂ annually. A two-year operational analysis done in 2019 shows that annual energy costs at Applegate have been reduced by 60%.

WORKFORCE TRAINING IN CONSTRUCTION AND WEATHERIZATION

VLITE has supported Youthbuild a program of ReSOURCE through several grants in 2013, 2015, 2016 and 2018 totaling \$495,000 in funding.

YouthBuild is a 10-month program serving 16 to 24-year-old men and women who need comprehensive development and job training, while earning a high school diploma. They are trained in construction skills while building affordable housing and learning energy efficiency through weatherization and solar installations. In addition to diplomas, students receive PACT (Pre-Apprenticeship Certification Training) through the National Homebuilder's Association, and, in some cases Americorps awards.



Through both the classroom training and job site construction work projects, trainees are developing skills that will enable them to meet the employment needs of Vermont's workforce and will allow them to continue to support Vermont's construction and energy efficiency transition to clean energy.



The VLITE grants have enabled ReSOURCE to leverage and match significant federal funds to support the YouthBuild program in particular. When these funds were not available, VLITE funding provided an important bridge allowing program operations to continue and even expand during funding gap years. Similarly this funding has enabled ReSOURCE to support and leverage partnerships with Champlain Housing Trust, Downstreet Affordable Housing, Habitat, and Champlain

Valley Office of Economic Opportunity (among others) to build, rehab, and weatherize affordable housing projects.

VLITE has approved a new grant for 2021 for \$80,000. In addition to Youthbuild this grant will support new Weatherization 101 and Construction 101 6-week training modules that are



targeted to adults with barriers to employment (unemployed, ex-offenders, immigrants, low-income). The intensives will offer four weeks of mixed hands-on/virtual training, and two weeks of employer sponsored short-term trial placements. The training is based on DOE's Weatherization Technician Curriculum, NCCER Hand/Power Tools and Const. Math, and OSHA-10.

TESLA POWERWALL BATTERIES IN LOW INCOME HOUSEHOLDS

An ongoing VLITE grant beginning in 2018 to Green Mountain Power of \$150,000 is helping build resiliency for some of GMP's most vulnerable customers.



The project is providing 100 low-income households with Tesla Powerwall battery storage. Some of the households were selected based on having health complications and so the reliability of electrical service provided by the battery allows certain health services to be unaffected by power outages. To date, 55 families have received a Powerwall through this grant. GMP is also working with the Vermont State Housing Authority and the Housing Foundation Inc. to identify key facilities in low-income housing communities for batteries to be installed as backup power.

"I remain grateful for your assistance last year in installing batteries in the home of my disabled son..."

A participant in the GMP/VLITE Powerwall program recently provided feedback to GMP about the program saying, "I remain grateful for your assistance last year in installing batteries in the home of my disabled son. The batteries appear to be working well. My son and his home provider have been unaware when the battery kicks in. But living next door I have looked out my window and seen lights on in their house when mine was in the dark."

VERMONT'S FIRST ELECTRIC TRANSIT BUSES



A VLITE grant of \$175,000 to Burlington Electric Department (BED) and Green Mountain Transit (GMT) went towards the purchase of the state's first two electric-powered transit buses (E-buses). Burlington Electric also provided significant incentives and, together with the Vermont Agency of Transportation, helped secure further funding from the federal government for GMT to expand electric transit options in Burlington. The E-buses began service on March 2, 2020.



The two buses have traveled over 16,000 miles cumulatively. GMT estimates that the miles driven are approximately 50% of the amount that would have been driven absent the pandemic. One bus has operated continually since March 2 and traveled 12,000 miles (42 per day). The second Proterra bus has had quality control issues that were covered by the warranty. However, travel restrictions due to COVID-19 delayed repairs to the bus by several months.

GMT's charging facilities (two 125kW systems) are served under BED's Large User Time-of- Use rate, resulting in dramatically reduced charging costs for off-peak charging. Night-time charging is providing sufficient range for day-time operations. Estimated range per charge is 180 miles, while expected average daily range during normal use is 80 miles.

In Vermont, nearly half of the emissions that contribute to climate change come from the transportation sector. The buses help reduce carbon emissions in Burlington and Chittenden County while providing clean, quiet transit along GMT service area routes. The E-buses are powered by BED's 100 percent renewably sourced electricity instead of fossil fuels and will improve air quality.



POWERSHIFT FLEXIBLE LOAD CONTROL PILOT

A \$70,000 VLITE award to Washington Electric Coop allowed the rural, residential-focused utility to move forward with the Powershift pilot flexible load control (FLC) initiative. Load flexibility controls electricity usage in real time, using household appliances like smart thermostats, water heaters and electric vehicle supply equipment (EVSE). FLC is important as the grid faces issues balancing supply and demand with the use of more wind and solar energy. Load flexibility may help by quickly lowering demand to balance the grid.



WEC's pilot project, in collaboration with Efficiency Vermont, was designed to introduce the Co-op and its members to a twenty first century "load control" project. For two decades WEC had no load control process or option in the field. With developments in heat pump water heaters (HPWH) and EVSE to allow the utility to share control of the particular end use the time was ripe to begin to build WEC's

operational capacity to work with members and control peak demand costs. If peak-related costs can be shaved by even ten percent, that can represent real savings for ratepayers.

The grant supports the work of two vendors: Packetized Energy Technology of Winooski and Virtual Peaker of Kentucky who support the Powershift pilot with their proprietary "software as a service" ("SaaS") platforms. Participating homes with conventional electric hot water heaters received an after-market wifi-enabled thermostat while those with heat pump water heaters (HPWH) were provided with a mobile app. The software then allows EVT and WEC to "choreograph" when peak demand events are likely, which then causes an "event" to be called, to aggregate all participants' hot water systems to allow their thermal "storage" to "ride through" a peak demand period. A final report will be issued in early 2021.

WEC reports that the most difficult lesson so far is finding the scale of participation necessary for a relatively low yield per location/residential market (WEC is 98% residential) to make sense, and breakeven or better. That said, WEC fully expects to continue its FLC initiatives and support peak demand control opportunities.

HOME ENERGY FINANCING

The Department of Public Service (PSD) in partnership with the Clean Energy Development Fund, and VLITE launched a thermal energy finance program in 2014 for homeowners undergoing energy improvement work. Over the life of the project, VLITE has invested \$450,000 in grant funding. The program led to the successful introduction of the Home Energy Loan (formerly called the Heat Saver Loan), which is offered by Efficiency Vermont, VSECU, Opportunities Credit Union, and Neighborworks of Western Vermont. The Thermal Energy Finance Pilot demonstrated a successful collaboration between the Department, private partners and other funders to identify and fill finance-related gaps in support of the goals set forth in the Comprehensive Energy Plan.

PSD is now using the remaining VLITE grant funds for the creation of an energy savings guarantee (ESG) initiative. The ESG approach will address the problem of lack of confidence in projected energy and cost savings that forms a barrier holding some back from investing in energy projects for their homes. The remaining grant funds will support research, financial modeling, contractor engagement, customer testing and other services needed to determine the parameters and designs for a potential Energy Saving Guarantee Pilot program. The Department continues these efforts and plans to launch in 2021 but reports that overall progress has slowed on this initiative due to the pandemic.

ENERGY AND CLIMATE EDUCATION FOR STUDENTS AND TEACHERS

VLITE has supported the Vermont Energy Education Program (VEEP) with three grants totaling \$131,500 beginning in 2015. VEEP is a statewide organization that supports students, teachers, schools, and families with an adaptive suite of energy and climate education offerings including in-school, hybrid, and remote learning supports. VEEP receives additional funding from Efficiency Vermont and the Vermont Community Foundation, as well as other smaller grants. The following are highlights from those projects.



In 2015-2016 VEEP brought interactive energy education to K-12 schools in Southern Vermont. This included in-class workshops, teacher professional development, and Green School Energy Challenges. VEEP delivered 156 in-class workshops reaching more than 3000 students and teachers. These workshops served 40 schools in Windham, Bennington, Windsor, Rutland and Orange Counties.

The VLITE-VEEP 2017 grant supported more than 2000 Vermont students through a variety of innovative programs including The Green School Energy Challenge (GSEC) professional development program providing curriculum resources, equipment, and technical and educational support to teachers who commit to undertaking projects designed to

reduce energy use. VEEP reached 18 schools through this engagement. Students at Albany Community School studied heat transfer. Using VEEP's infrared cameras to understand what was happening with heat in the school building they discovered inadequate and compressed insulation in the attic. Students made the case to the principal for more insulation to be added when an upcoming roof repair was due.

The Change-A-Light program reached 64 classes in 26 schools. VEEP educators brought in-class workshops addressing energy efficiency to participating schools which serve the lowest-income communities in the state. After the workshops, these classes presented information about energy efficiency to the other classes in their school. Students in the school also received free LED bulbs. In all 1246 students received lessons about energy efficiency. More than 5500 mostly low income households received free LED light bulbs along with information about efficiency.

VEEP also offered student-centered, energy project pilots (supporting 14 schools) and began a new program Youth Climate Leaders Academy (YCLA). With YCLA, VEEP brought together 62 students from 9 high schools to guide and support students in planning and implementing projects related to energy or climate change.





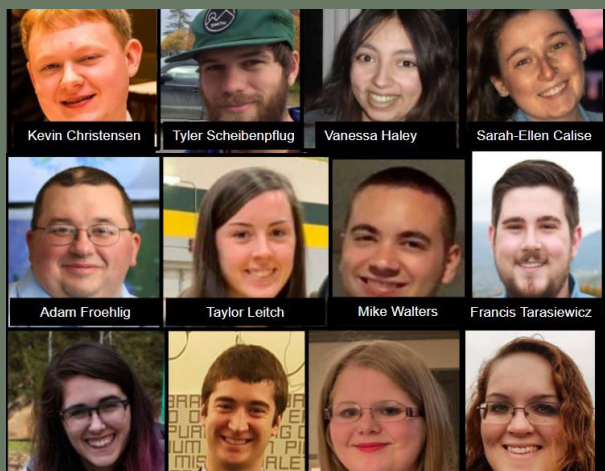
In 2020, VLITE funds helped VEEP reach 85 low to moderate income schools (defined as those serving students near or below the average income for the state). This was accomplished despite the major disruptions from COVID-19 from mid-March through November, and ongoing. VEEP pivoted quickly to developing online learning resources, transitioning in-person teacher PD to virtual trainings, and developing a new online STEM lab program for kids. When schools moved online because of COVID-19 in mid-March, VEEP quickly developed at-home learning modules for teachers to use with their students, and has continued to develop and adapt resources as teachers' needs have changed through the pandemic.

VEEP provided PD to 66 teachers from more than 30 lower income schools who collectively teach more than 1500 students each year. VEEP partners with Castleton University to provide graduate credits for PD courses and dual enrollment credits for students. Some Vermont businesses and nonprofits have partnered as project consultants and occasional project mentors including Central Vermont Solid Waste Management District, VPIRG, Vital Communities, Vermont Land Trust, Suncommon, Norwich Technologies, and Catamount Solar.

Based on VEEP's successes and demonstrated ability to adapt to the changing learning environment of the pandemic, the VLITE board awarded a fourth grant of \$50,000 for work in 2021. The new grant will continue to support VEEP in offering high-quality, interactive opportunities to students, teachers, schools, and families across the state that would otherwise be unavailable due to the COVID-19 pandemic.

CUTTING EDGE RESEARCH ON WEATHER TO BENEFIT THE GRID

Two VLITE grants to Lyndon State College, now Northern Vermont University, totaling \$370,000 were focused on conducting research on the impacts of extreme weather and solar energy on the electric grid.



The first grant spanned three years (2015-2017) and focused on two research areas: examining the relationships between power outages and wet snow and ice storms, and examining better methods for estimating solar energy variability. This funding helped to support two faculty members at Lyndon and 10 undergraduate students.

The second grant ran from 2018 to 2019 and focused on taking research results learned from the first grant and developing a prototype prediction system that could be used for operational prediction for electric utilities. The intent was to help electric utilities be better prepared for storms so they could restore power quickly and reduce costs. Several undergraduate students and a new Post-

Doc position were funded to conduct research on emergency preparedness and communication, and solar energy predictability methods using artificial intelligence.

Both grants featured a high level of local stakeholder engagement at various meetings, with much knowledge sharing happening at these events.

The VLITE funding allowed for the following major accomplishments:

- Engaged 13 undergraduate students in high-impact experiential learning through research experiences that were paid through grant support (all project alumni are employed full time or in graduate school).
- Published research on trends in annual solar radiation across the Northeast US.
- Presented research at numerous conferences and local meetings, educating a variety of end users as GMP, VEC, and VELCO on predictability of wet snow and ice as it pertains to electric grid reliability.
- Developed predictive technology for power outages on the electric distribution system that was able to be commercialized.
- Helped to seed a new local business, Northview Weather, which now employs five people full or part time in Lyndonville, VT, and provides VT electric utilities storm predictive services.

ACCELERATOR PROGRAM FOR ENERGY AND CLIMATE BUSINESSES

The Vermont Sustainable Jobs Fund facilitated four energy and climate business accelerator programs since 2016 with support from \$375,000 from VLITE. The accelerator programs bring together innovative products and services related to energy consumption, and deploy those technologies in Vermont through pilot projects. Cumulatively these accelerator programs have supported the development of 32 start-up companies in the renewable energy/efficiency / climate economy sector. The 2020 DeltaClimateVT program was supported by a \$75,000 grant from VLITE, and matching amounts from Jane's Trust Foundation as well as corporate sponsorships from Vermont utilities and energy related companies.

Nine startups were selected that offer “products or services, including smart home and building technologies, aimed at reducing fossil fuel use and greenhouse gas emissions in buildings, enable better integration of distributed resources and smart building technologies, increase resiliency and/or support demand management strategies that avoid peak time energy usage.”

The pandemic derailed plans for in-person cohort sessions and the program took place remotely. In spite of missing out on the in-person dynamic, the program yielded five pilot projects with Vermont utilities:

- BED, GMP, VPPSA: Agreed to work with ThermoAI to deploy AI technology to optimize combustion at the McNeil plant in Burlington.
- GMP: Agreed to participate with Switched Source in a large NREL grant application for their Tie Controller which allows more DERs on the grid and provides resiliency during outages.
- BED: Contracted with Wex Energy to deploy their WindowSkin window inserts to low and moderate income residential units to reduce thermal heat loss and reduce heating costs and greenhouse gases.
- BED: Contracted with Medley Thermal to deploy Medley's hybrid electric boiler product and management software to enable use of electricity to run BEDs boiler during high renewable production windows and to reduce peak load.
- VT Public Power Supply Authority: Entering into an Letter of Intent to deploy multiple 85kw Pecos Wind Power distributed wind turbines to bring distributed wind to rural, municipal electric utility customers.

INTERACTIVE ART DISPLAYS ENGAGE ON ENERGY



A \$30,000 grant helped the ECHO Center install four interactive energy resiliency-focused exhibits in their outdoor public campus, located on the Burlington Waterfront. The exhibits are accessible to the public and free of charge. Exhibits include Gravity Bells, Flywheel, Maypole, and the Light Mill.

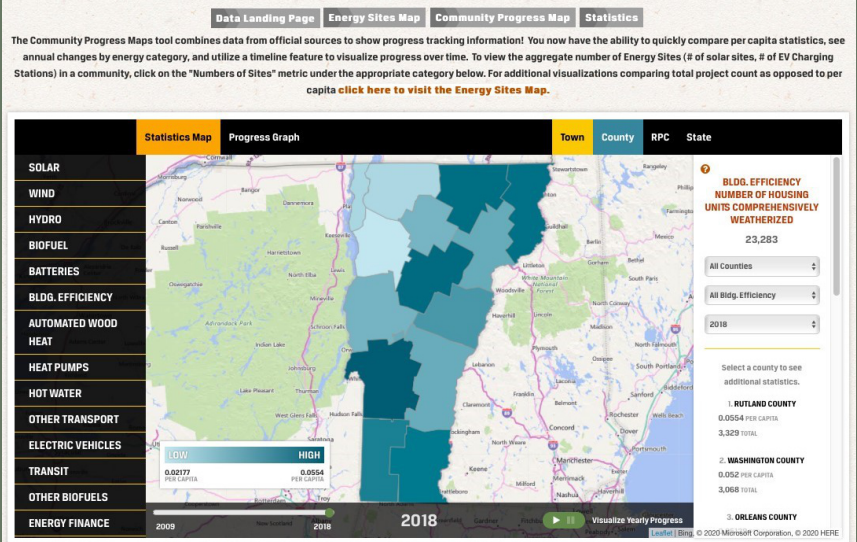
ONLINE ENERGY DASHBOARD

VLITE has supported Energy Action Network's (EAN) Dashboard tool with \$450,000 in investment over four grant cycles since 2014. The most recent commitment covers a two-year period that will see management and stewardship of the Dashboard transfer from EAN to the Vermont Public Service Department in 2021. This project is a good example of how partnerships between nonprofits and state governmental entities can lead to innovations that benefit the public in the long term.

The Dashboard is the primary resource available to track local and regional progress toward Comprehensive Energy Plan (CEP) goals over time, while also providing the ability to visualize geographic variation in energy progress to help inform more geographically and economically equitable energy program and policy design.

The primary users of the Dashboard are state officials, regional planning commissions, towns and town energy committees, and distribution and efficiency utilities. In consultation with the Dashboard Advisory Committee in order to enhance the value of the Dashboard, EAN has prioritized the core users listed above, which has led to the decision to create resources like the data landing page and the Community Progress Maps tool.

Community Progress Maps



A screen shot of the cumulative number of housing units comprehensively weatherized across Vermont, shown by county with a per capita heat map view (darker shades show higher levels of housing unit weatherization, per capita).

ENGAGING COMMUNITIES ON CLIMATE AND ENERGY

With the support of a \$240,000 VLITE, in 2017 Vermont Council on Rural Development (VCRD) launched the Climate Economy Model Communities Program. Since launch, VCRD has worked successfully in six communities in all corners of Vermont. Over 900 individuals have participated in the Model Communities Program in these six communities and over 300 signed up to serve on task forces that rallied together to implement local climate economy initiatives.

The Task Forces that emerged in participating communities have coordinated a multitude of energy saving activities consistent with Vermont's Comprehensive Energy Plan. A sampling of some of this work includes:

- In Middlebury, a team coordinated a neighborhood energy project that resulted in over 40 home energy visits and multiple measures including heat pump installations and the purchase of an electric vehicle.
- In Swanton, Efficiency Vermont, Vermont Gas Systems, and Swanton Electric collaborated to deliver a combined 109 home and business energy visits.
- In Marshfield/Plainfield, significant efficiency projects were completed at the Old Town Hall and Opera House, Twin Valley Senior Center, and the Twinfield School.
- Twinfield school is also in the process of securing participation in a net-metered solar project.
- Randolph, Dorset, and Marshfield/Plainfield coordinated multiple workshops promoting weatherization, electric vehicles, electric bikes and cold climate heat pumps.

In many of the participating communities, the organizations created as a result of the Model Communities Program outlive VCRD's formal support. For example, in Middlebury, the Climate Economy Action Center of Addison County has formed and is taking on projects including a new [website](#) promoting green businesses.

In 2020, with a new grant of \$160,000 from VLITE, VCRD launched the Climate Catalysts Leadership Program. An initial cohort of 12 local leaders met over the course of 2020, building skills and connection and implementing local climate and energy projects. Given the challenges posed by COVID-19, this initial cohort showed great adaptability and persistence. A second class of 16 individuals was selected late in 2020 and will continue to work together on projects through 2021. In 2021, a new community will be recruited for the Climate Economy Model Communities Program and another cohort of Climate Catalysts will be initiated.

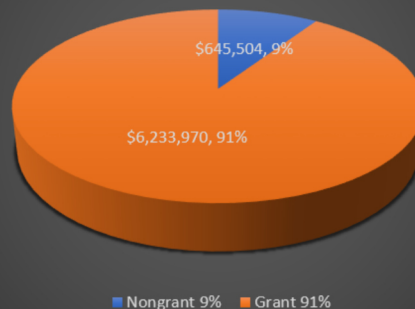


BALANCE SHEET & SOURCES AND USES

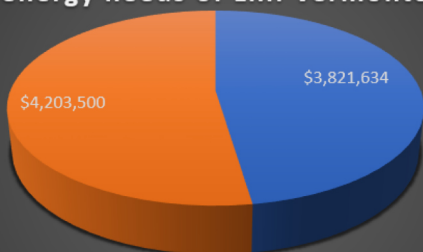
		December 31, 2020	December 31, 2019
ASSETS			
	Current Assets	\$1,647,875	\$1,532,259
	Other Assets		
	Common Stock - VELCO	\$8,990,300	\$8,990,300
TOTAL ASSETS		\$10,638,175	\$10,522,559
LIABILITIES & EQUITY			
	Liabilities		
	Total Current Liabilities	\$457,000	\$471,500
	Total Liabilities	\$457,000.00	\$471,500.00
	Equity		
	Total Equity	\$10,181,174.54	\$10,051,059.13
TOTAL LIABILITIES & EQUITY		\$10,638,174.54	\$10,522,559.13

VLITE receives VELCO dividends of around \$1,000,000 per year and maintains operational and administrative expenses of below ten percent. This means that more than 90 percent of revenues goes towards VLITE's mission - energy projects that benefit the public.

Expenses by Category
Nongrant spending remains below 10 percent.



More than half of VLITE projects address energy needs of LMI Vermonters



■ Comprehensive Energy Plan ■ Energy Needs of LMI Vermonters

Of the \$8 million that VLITE has invested in the Comprehensive Energy Plan, more than half is focused on addressing the energy needs of low income Vermonters.