

Increasing Energy Efficiency and Beneficial Electrification in Low-Income
Households in the Northeast Kingdom

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Introduction

Vermont has long been on the forefront of the transition to clean, renewable, and efficient energy sources. A crucial part of this transition is Vermont's dedication to make energy more affordable for households with the highest relative energy costs. The 2019 Energy Burden report by Efficiency Vermont recommends an expanded focus on low- and moderate-income Vermonters and helps identify exactly where that focus could be most beneficial. Of the dozen communities most burdened by energy in the state, the majority are located in the Northeast Kingdom (a three-county region located in Northeastern Vermont with the lowest median household incomes in the state). Households in the region spend 15% to 20% of their income on energy for heating, cooling, and transportation¹ and make difficult decisions daily between housing, medical care, food, transportation, and energy.

A variety of energy efficiency, weatherization, and clean energy initiatives are underway to help decrease energy costs and alleviate high energy burdens in the region. However, substantial opportunity exists to expand and scale up such initiatives in order to further assist those most in need and continuing to struggle with high energy burdens. A cost-effective and affordable transition to electrified heating and transportation could also help increase demand for the currently underutilized wind turbine power in the Sheffield-Highgate corridor of the Northeast Kingdom.

This report is the result of an eight-week summer internship project that involved researching current energy efficiency and clean energy offerings in the Northeast Kingdom, interviewing clean energy and climate leaders familiar with the region, and identifying future strategies that could further increase energy efficiency and beneficial electrification in low-income households in the region. This report:

- Outlines existing residential energy efficiency and clean energy programs in Vermont;
- Details structural and programmatic barriers to uptake in the programs, drawing from literature reviews and interviews with energy efficiency and clean energy professionals in Vermont; and
- Provides recommendations for increasing low-income household program participation in the Northeast Kingdom.

Existing Programs

Within Vermont there are existing programs aimed at helping low-income households implement energy upgrades. Further research and work in the Northeast Kingdom could help these programs increase in capacity, scale, and impact.

¹ Efficiency Vermont. 2019. Vermont Energy Burden Report, p.8.

Existing Weatherization Programs

- The federally-funded Low-Income Weatherization Assistance Program (WAP) provides no-cost, whole home weatherization retrofits to low-income households. This long-lived and popular program is often over-subscribed, with the waiting list often stretching from months to years long. Vermont has established a statewide goal of weatherizing 80,000 homes by 2020 with 20,000 of these being low-income homes². However, as of July 2020, it is estimated that only about 10,000 homes (of all incomes) have been weatherized³. In the Northeast Kingdom, the Northeast Employment and Training Organization (NETO) carries out weatherization projects for low-income recipients⁴.
- The NeighborWorks of Western Vermont founded and operates Heat Squad, which provides low-to- moderate income residents with low-cost energy audits and assistance in identifying, contracting, and financing Weatherization improvements. Heat Squad, recently expanded into the Northeast Kingdom with an estimate of completing 233 home energy retrofits⁵.
- 3E Thermal is a statewide program focusing on energy in affordable apartment housing⁶.
- Efficiency Vermont, through their Healthy Homes initiatives, began a pilot study in the Northeast Kingdom by partnering with the Northeastern Vermont Regional Hospital to provide joint weatherization and health services to ten low-income households containing at least one person with chronic respiratory issues⁷.
- Local town energy committees have had some success with Weatherize! and fuel-switching campaigns⁸, as has the Vermont Home Energy Challenge initiated by Efficiency Vermont⁹.

Efficiency Vermont

- Efficiency Vermont runs several programs aimed specifically at aiding low-income households. This includes partnering with state weatherization agencies to provide low-income home weatherization improvements and connect households with energy coaches

² Weatherization Assistance Program fact sheet, Vermont Legislature.

³ Kelly Lucci, Efficiency Vermont, in conversation with the author. 8 July 2020.

⁴ NVDA Regional Plan. 2018. p.36.

⁵ NVDA Regional Plan. 2018. p.36.

⁶ NVDA Regional Plan. 2018. p.36.

⁷ Vermont Department of Health. 2018. Weatherization + Health: Health and Climate Change Co-Benefits of Home Weatherization in Vermont.

⁸ Alison Lowe, NVDA, in conversation with the author. 7 July 2020.

⁹ Johanna Miller, VNRC, in conversation with the author. 1 July 2020.

who provide training on ways to reduce energy usage. Additionally, in recognition of the long WAP waiting list, Efficiency Vermont started the Low-Income Energy-Efficiency Program (LEEP) for those on the waiting list. For qualifying households (now determined based on energy burden), Efficiency Vermont changes out some appliances for energy-efficient alternatives while the household waits for a full weatherization project from WAP. For those who don't quite meet the energy burden requirement, Efficiency Vermont offers vouchers for a variety of home appliances. This program was very well subscribed in 2019¹⁰. Finally, the Heat Saver Loan provides low-interest loans that make energy-efficiency upgrades more financially attractive for some households¹¹.

- Efficiency Vermont is also piloting Pay-As-You-Save in the Northeast Kingdom, an on-bill financing program designed to make energy-efficiency upgrades more affordable for low-income households. On-bill financing involves loaning money to a household to pay for energy improvements, and having the household repay the loan through monthly payments included in the utility bill. When done properly, on-bill financing is designed to ensure that the value of the monthly payment due by a household to repay the loan is less than the value of the monthly energy savings achieved from energy efficiency improvements made with the loan. This approach results in net positive cash flow for a household and is a key feature for increasing uptake by low- to moderate-income households. The Pay-As-You-Save on-bill financing approach has had promising results in rural areas in other states¹².
- The 2019 Energy Burden Report completed by Efficiency Vermont is a key resource helping to better understand the extent of high energy burden in Vermont and new and improved ways for better serving low-income households. While in other states there are few programs that specifically target households such as high energy-burdened users, the explicit intention of the Energy Burden report is to help service providers identify which regions need increased levels of support¹³. Findings from the report help shape Efficiency Vermont's strategies for better addressing those most in need of additional assistance.

VSECU VGreen Loans

- The Vermont State Employee Credit Union (VSECU) is at the forefront of helping finance Vermonters upgrade their homes. The VGreen loans provide “financing for any project or purchase that improves the energy efficiency of your home or transportation¹⁴.”

¹⁰ Kelly Lucci, Efficiency Vermont, in conversation with the author. 8 July 2020.

¹¹ <https://www.encyvermont.com/services/income-based-assistance/energy-bill-reduction>

¹² Brown et al. 2019. Low-income energy affordability in an era of U.S. energy abundance.

¹³ Brown et al. 2019. Low-income energy affordability in an era of U.S. energy abundance; Efficiency Vermont. 2019. Vermont Energy Burden Report, p.3.

¹⁴ <https://www.vsecu.com/financial/clean-energy-loans/about>

VSECU finances both secured and unsecured loans and adapts the loans to best serve the needs of their customers (such as using a vehicle loan to help purchase an electric bicycle). While loans are available to any customer, they are particularly helpful for low- and moderate-income households and nontraditional borrowers. Rather than review credit score alone, VSECU considers a customer’s “whole situation” with the understanding that credit score is only one indicator and that a VSECU loan may help someone in need who might not otherwise appear credit-worthy based on credit score alone¹⁵.

- The Home Energy Loan (in partnership with Efficiency Vermont) is designed with income sensitivity in order to best help disadvantaged households. This loan finances energy upgrades in the home and connects households with Efficiency Vermont-approved contractors. If a household has an income of \$90,000 or less, it is eligible for 0% financing for up to five years. The average loan is about \$10,000. Figure 1 provides a snapshot program uptake in the Northeast Kingdom¹⁶. Households with incomes under \$90,000 are considered low- to moderate-income. Of the total 203 Home Energy Loans financed between October 2019 and June 2020, 24 were in the Northeast Kingdom and 18 of those were low- or moderate-income households.

Year/Month	Northeast Kingdom	Total - Vermont	Under \$90k
2019			
Oct	2	35	1
Nov	7	22	6
Dec	1	19	1
2020			
Jan	5	23	2
Feb	0	18	0
Mar	2	18	2
Apr	1	11	1
May	2	12	2
Jun	4	45	3

Figure 1. VSECU Home Energy Loans in the Northeast Kingdom

All of the above programs, policies, and initiatives are working to reach the most vulnerable and energy-burdened Vermonters in the Northeast Kingdom. Yet the continuing high energy burden in the region and the added uncertainty of the COVID-19 pandemic are reason for concern moving forward. There is urgent need for these programs to further expand their capacity and increase in scale and impact in order to more fully address the needs of the Northeast Kingdom’s most vulnerable residents. Research and initiatives in other states can help point to additional best practices and strategies for moving forward in Vermont.

¹⁵ Laurie Fielder, VSECU, in conversation with the author. 9 July 2020.

¹⁶ Data provided by Laurie Fielder, Director of VGreen Energy Savings Loan Program at VSECU.

Structural Barriers

This section summarizes structural barriers specific to the Northeast Kingdom that limit uptake of efficient, clean energy technologies. The findings reflect information identified in literature and through interviews with energy efficiency and clean energy professionals.

Rural Region with Low Population Density

The rural character of the Northeast Kingdom presents a challenge on multiple levels. Because the region lacks natural gas infrastructure, fuel oil followed by propane and wood are the most common fuels used to heat homes¹⁷. Although a few heating fuel suppliers in the region may also provide weatherization services, such as Bourne's Energy, their primary goal is typically not to transition households away from delivered fuels towards more efficient use of non-delivered fuels for energy. That said, the Energy Co-Op of Vermont based in Northwestern Vermont has had success in decreasing reliance on delivered (fossil) fuels and increasing use of cold climate (electric) heat pumps for heating and cooling. Their innovative work as a leading heating fuel supplier transitioning to an energy service provider focused on decreasing fossil fuel use and increasing beneficial electrification is noteworthy and holds promise for other regions of Vermont. However, the Energy Co-Op is a unique organization and its business model is not (yet) common among other heating fuel suppliers in Vermont (including the Northeast Kingdom)¹⁸. In addition, over a third of owner-occupied households in the Northeast Kingdom use wood as a source of heat and in many cases, fuel oil is used as a backup to the wood heating¹⁹. In this rural and forested region, wood is a locally available and affordable heating source that is deeply ingrained in the culture and way of life in the region. The lack of innovative fuel suppliers, such as Bourne's Energy and the Energy Co-Op, also providing energy services that transition customers away from delivered fuels to efficiency use of electric heat pumps for heating and cooling is a barrier to further scaling up energy efficiency and beneficial electrification in the region, despite the good work being done by Efficiency Vermont, the local provider of WAP, and various statewide loan and financing programs.

The rural landscape of the Northeast Kingdom also presents challenges for energy efficiency and weatherization programs, heating fuel suppliers, and electric utilities serving the region. With a low population density, it is less cost-effective to inform customers, drive to homes, and install energy-efficient or clean energy technologies. Low population density is especially difficult for Vermont Electric Cooperative, the electric utility serving much of the Northeast Kingdom, because the Coop serves fewer customers per mile of line than a typical investor-owned utility or

¹⁷ NVDA Regional Plan. 2018. p.33.

¹⁸ Brian Gray, Energy Co-Op of Vermont, in conversation with the author. 30 July 2020.

¹⁹ NVDA Regional Plan. 2018. p.33.

municipal utility, making their services less economical²⁰. Finally, the Northeast Kingdom lacks consistent, widespread, high speed broadband access, which limits the ability to market energy efficiency and clean services as well as to deploy new, emerging connected energy-efficiency measures and devices, such as smart thermostats and home energy controls²¹. Broadband extension and other development is hampered by the large lot size of residential properties, which prevents more cost-effective development and expansion of broadband services: more than a third of residential properties in the region are on lots that are six acres or larger²².

Physical Home Attributes

- **Single family dwellings:** Homes described as 1-unit unattached and mobile homes make up a greater share of overall housing stock, compared to statewide figures²³. Related to rurality and large lot size, unattached low-density housing is more expensive to weatherize and electrify. Additionally, more than one out of five homes in the Northeast Kingdom is a vacant housing unit (for seasonal, recreational, or occasional use). However, these may become primary occupied homes in the coming decades, as retirees become full-time residents in Vermont²⁴. Home energy upgrades may not be a priority for the owners now.
- **Old housing stock:** Housing supply in the Northeast Kingdom is relatively old, with nearly a third of owner-occupied homes built before 1940, which makes heating efficiently difficult²⁵. Old homes are more expensive and less efficient to heat and can require complicated (and expensive) weatherization or other efficiency retrofits.
 - As a result of aging housing stock, homeowners may not be able to access home equity loans for weatherization and energy upgrades, as low home appraisal values can prevent homeowners from using home equity as collateral²⁶.
- **Safety of housing stock:** Related to housing stock age, older homes, including mobile homes, are more likely to be noncompliant with fire and safety codes²⁷. Energy audits or efficiency evaluations can uncover health and safety issues that must be addressed first, thus increasing the overall cost and dissuading homeowners or landlords from requesting an audit at all.

²⁰ Shoemaker et al. 2018. ACEEE Report: Reaching Rural Communities with Energy Efficiency Programs.

²¹ Northeast Kingdom Collaborative. NEK Broadband Action Plan. 2019.

²² NVDA Regional Plan. 2018. p.135.

²³ NVDA Regional Plan. 2018. p.134.

²⁴ NVDA Regional Plan. 2018. p.132.

²⁵ Alison Lowe, NVDA, in conversation with the author. 7 July 2020; NVDA Regional Plan. 2018. p.32 &136.

²⁶ NVDA Regional Plan. 2018. p.137.

²⁷ NVDA Regional Plan. 2018. p.138.

- Mobile or manufactured homes: Compared to statewide figures, mobile homes make up a greater share of overall housing stock in the Northeast Kingdom. In certain counties and municipalities, this share is even greater. Mobile homes in the region are almost exclusively heated by kerosene or propane and have limited energy retrofit potential²⁸.

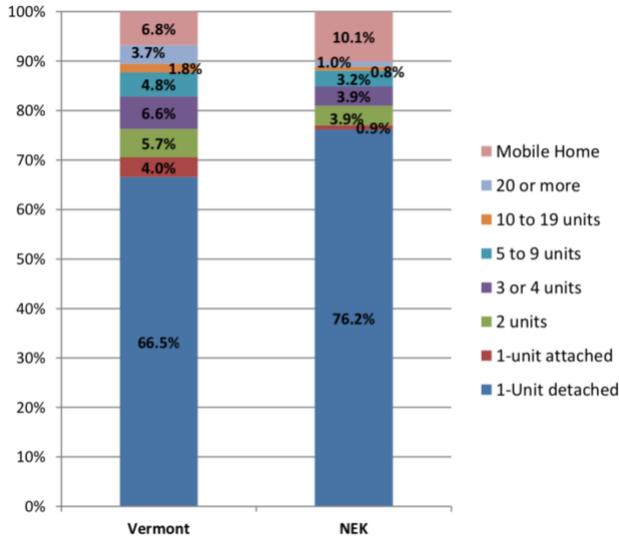


Figure 2. Housing Types - # of Units in Structure

Data Measures	Caledonia	Essex	Orleans	VT
Population 2010	31,227	6,306	27,231	625,741
Estimated Pop. 2014	30,981	6,125	27,082	626,562
Median Age 2010	42.1	47.4	43.7	41.5
Median Age 2000	38.5	39.0	39.3	37.7
Households 2010	12,553	2,818	11,320	256,442
Avg. Household Size (2010)	2.4	2.2	2.3	2.3
Avg. Household Size (2000)	2.5	2.5	2.5	2.4
Housing Units	15,942	5,019	16,162	322,539
Occupied	12,553	2,818	11,320	256,442
... Owner Occupied	73.6%	80.2%	75.6%	70.7%
... Renter Occupied	26.4%	19.8%	24.4%	29.3%
Vacant units for seasonal, recreational or occasional use	14.9%	38.4%	24.4%	15.6%

Source: US Census Bureau, 2010 Census
 *US Census Bureau, Population Division: Annual Estimate of the Resident Population, July 1 2014

Figure 3. Northeast Kingdom Population and Housing Units by County

Caledonia County		Orleans County	
Municipality	%	Municipality	%
Stannard	29%	Coventry	33%
Sutton	30%	Brownington	21%
Sheffield	21%		

Figure 4. Mobile Homes as a % of Total Housing Units, (20% or more)

- Home ownership: The Northeast Kingdom counties have high rates of home ownership. Of the occupied housing units, 75.1% are owner-occupied. However, this is not necessarily an indicator of regional economic well-being; it may reflect the lack of alternatives to home ownership such as apartments or home shares²⁹. A relatively larger proportion of income may go towards paying mortgage or maintaining the home, leaving less disposable income available for energy upgrades. Additionally, there is a significant portion of housing that is renter-occupied, discussed further below (see Figure 3).

²⁸ Brain Gray, Energy Co-Op of Vermont, in conversation with the author. 30 July 2020.

²⁹ NVDA Regional Plan. 2018. p.138.

- Living alone: in 2010, 35% of all households in the Northeast Kingdom were non-family households (not related by birth, adoption, or marriage) and 79% of these households were individuals living alone, a significant proportion of them aged 65 or older³⁰. These households may be less likely or able to invest income in energy upgrades.

Psychological Barriers

Psychological studies in the field of energy efficiency and renewable energy uptake are revealing numerous cognitive barriers in addition to physical ones. For instance, multiple studies highlight ‘inattention’ and ‘bounded rationality’, both of which apply to low-income households³¹.

Inattention is the failure to notice something that is fully visible because attention is engaged in another task or object. For low- and moderate-income households, attention may be on a number of other pressing concerns, such as job security or medical care. Thus while energy-efficient or clean energy upgrades are readily available, these households are far more concerned about other costs. Bounded rationality is the process by which people seek and make satisfactory decisions rather than optimal ones. Given limits of time, mental energy, or income, people may settle for heating sources that satisfy their needs, even if an upgrade may save them money. Considering other demands on a household’s time and attention is crucial when designing energy upgrade programs and is discussed further in this report.

Distrust and skepticism also present a challenge for utilities or others seeking to convince residents to do energy upgrades. In low-income communities, there can be skepticism around ‘free programs’ from the government or other entities and distrust of utilities stemming from experience with disconnections³². For these reasons it is especially important to work with local community action agencies, both to determine the real needs of the community and build trust.

Workforce

Uptake of energy technologies depends not only on availability or affordability, but also on the actual physical implementation. Unfortunately, both Vermont in general and the Northeast Kingdom specifically suffer from a lack of qualified contractors³³. To help address this shortage, Efficiency Vermont has invested in and trained contractors from out-of-state in order to help meet the demand for services³⁴. Despite these efforts, households may still have to wait months before acquiring a contractor’s time. This also prevents program implementers from being able

³⁰ NVDA Regional Plan. 2018. p.139.

³¹ Fowlie et al. 2018. Do Energy Efficiency Investments Deliver?: Evidence from the Weatherization Assistance Program; Gerarden et al. 2017. Assessing the Energy-Efficiency Gap.

³² Brown et al. 2019. Low-income energy affordability in an era of U.S. energy abundance.

³³ Ian Hitchcock, VNRC, in conversation with the author. 9 July 2020.

³⁴ Kelly Lucci, Efficiency Vermont, in conversation with the author. 8 July 2020.

to invest in the local rural economy³⁵. Contractors themselves are challenged by the lack of a workforce to hire as well as the lack of significant and stable state funding for thermal efficiency, which hinders business development in that direction.

Town Energy Committees

In Vermont, local energy committees have proven to be crucial for achieving local education and outreach about energy efficiency and clean energy opportunities, and for stimulating uptake in program offerings. Town Energy Committees help develop strategic plans that encourage a community to think about energy expansively and over the long-term³⁶. Although there are many Town Energy Committees throughout Vermont, there are very few in the Northeast Kingdom³⁷. Low population density is one barrier to forming local committees, as is the need to have time available to volunteer, which may be a factor for some low-income households. In the Northeast Kingdom, the Regional Planning Commission carries out most energy planning work, and towns are encouraged to partner with each other to provide services on a larger scale³⁸ than would be possible for a town acting on its own.

Split incentives

Also referred to as the “principal-agent problem”, the term “split incentives” refers to a situation when the person paying the energy bill is not the same person making capital investment decisions; that is, when a property is rented and the building owner does not pay the energy bills for the tenants³⁹. In such cases, the building owner is not necessarily motivated (or “incentivized”) to invest in and do energy-efficiency upgrades because the owner does not pay the electricity or heating bills, and the tenants or renters may not be allowed (or able to afford) to pay for and do the improvements themselves. While the Northeast Kingdom has relatively high rates of home ownership, about 20% to 25% of housing units are renter-occupied across the three counties⁴⁰. Although it is beyond the scope of this report to address the issues of split incentives in the Northeast Kingdom, many of the recommendations for home owners could benefit landlords as well.

³⁵ Shoemaker et al. 2018. ACEEE Report: Reaching Rural Communities with Energy Efficiency Programs.

³⁶ Alison Lowe, NVDA, in conversation with the author. 7 July 2020.

³⁷ <https://vecan.net/energy-committees/>

³⁸ Johanna Miller, VNRC, in conversation with the author. 1 July 2020.

³⁹ Gerarden et al. 2017. Assessing the Energy-Efficiency Gap.

⁴⁰ NVDA and the Center for an Agricultural Economy. 2016. Northeast Kingdom Food System Plan. p.12.

Program Barriers

A variety of barriers exist to increased uptake and expansion of current energy efficiency and clean energy offerings in the Northeast Kingdom. Discussed below are examples of key barriers both for program implementers and program participants.

Upfront Cost

Although discounts and rebates may reduce the cost of an energy-efficient technology, the immediate, upfront cost can be prohibitive. This “liquidity restraint” suggests that even if the technology will save a household money over time, many households can’t afford to wait until it does⁴¹. For instance, Efficiency Vermont offers up to \$800 cash back on heat pump water heaters. But even the lower-priced efficient water heaters are still around \$1,200, and those few hundred dollars up front can be too much for a household to invest⁴². Additionally, traditional financing may not work for them either; the household may be limited in their ability to apply for creditor have multiple, competing demands on their income⁴³. All of these factors can make people risk-averse and less likely to invest in a new technology even in cases where the investment would ultimately be cost-effective.

Transaction Costs

Transaction costs are non-monetary costs that prevent households from taking what may appear to program implementers as a smart, economical decision. One of the most common transaction costs is having the time or “mental energy” to even think about an option. In many cases, a program or application may be experienced as too difficult, complicated, or confusing, especially for someone with limited time and attention available to explore the option. Even if a project requires \$0 out-of-pocket or offers 0% financing and makes economic sense, other factors besides energy savings and monetary costs drive adoption. Some households may be put off by the possibility of another monthly bill, even if it saves money in the long term. Likewise, although transitioning from fuel oil to efficient heat pump electric heating and cooling, may decrease overall energy costs, it will likely increase monthly electric bills which can cause some households to hesitate⁴⁴.

It can also take a long time to research and learn about various programs, discounts, rebates, and offerings and fill out the necessary applications. One study found that the Weatherization Assistance Program application was onerous and difficult to fill out and required a lot of

⁴¹ Gerarden et al. 2017. Assessing the Energy-Efficiency Gap.

⁴² <https://marketplace.encyvermont.com/electric-water-heaters/>

⁴³ Laurie Fielder, VSECU, in conversation with the author. 9 July 2020.

⁴⁴ Brian Gray, Energy Co-Op of Vermont, in conversation with the author. 30 July 2020.

information to be submitted⁴⁵. Once submitted, time on the WAP waiting list can be long, ranging from 6 to 18 months⁴⁶. The cumulative time and energy required to be served by WAP may make some households decide that it's not worth it.

Other non-monetary barriers that can prevent uptake are the active decisions required to begin participation, engage with staff and/or contractors, and endure a construction team in the home. These have been found to outweigh the expected benefits of increased efficiency and savings. However, reducing or minimizing these barriers can increase participation rates⁴⁷. In Vermont, the Heat Squad program implemented by Neighborworks helps streamline the weatherization process and makes it more accessible for households. In addition, VSECU makes their loan application process as simple as possible, including offering assistance in filling out the application⁴⁸. These findings suggest that energy-efficiency and clean energy programs should be designed with consideration given to both the variety of barriers and impacts on households in addition to other conventional monetary factors⁴⁹.

Besides transaction costs, ineffective information or outreach about programs may also prevent uptake. Lack of knowledge may not just concern program opportunities, but also factors like quality of the housing stock and ways to reduce energy consumption.

Data Limitations

Because the Northeast Kingdom is a sparsely populated area within a small state, representative data is hard to come by. Small rural utilities may find it difficult to use the same metrics as larger utilities for participation in a program. For instance, a common metric for success in utility-implemented efficiency programs is the percent of a neighborhood enrolled, which is far more difficult to meet in a rural and dispersed community. Additionally, small utilities simply don't have as much data to extrapolate from⁵⁰.

The Northeast Kingdom lacks concrete analyses in at least two specific areas crucial to designing effective low-income energy efficiency and clean energy programs: primary fuel type and housing characteristics⁵¹. Data on both of these subjects determines what kinds of technologies

⁴⁵ Fowlie et al. 2015. Are the Non-monetary Costs of Energy Efficiency Investments Large? Understanding Low Take-Up of a Free Energy Efficiency Program.

⁴⁶ Vermont Department of Health. 2018. Weatherization + Health: Health and Climate Change Co-Benefits of Home Weatherization in Vermont.

⁴⁷ Fowlie et al. 2015. Are the Non-monetary Costs of Energy Efficiency Investments Large? Understanding Low Take-Up of a Free Energy Efficiency Program.

⁴⁸ Laurie Fielder, VSECU, in conversation with the author. 9 July 2020.

⁴⁹ Allcott and Greenstone. 2017. Measuring the Welfare Effects of Residential Energy Efficiency Programs.

⁵⁰ Shoemaker et al. 2018. ACEEE Report: Reaching Rural Communities with Energy Efficiency Programs.

⁵¹ Energy and Inequity Burden in Vermont. 2020. EAN study.

are possible and make sense for specific households. NVDA Regional Plan also contains information detailing housing characteristics such as building age and number of mobile or manufactured homes, both of which are necessary to understand what retrofits are possible⁵². However, it is not certain how much this data is used and reflected upon, when developing and implementing various energy efficiency and clean energy programs.

Funding

Though electric efficiency programs in Vermont are funded through a surcharge on electric bills, there is no significant and stable source of funding for thermal efficiency (building heating) measures⁵³. Previously, funding has come through the Regional Greenhouse Gas Initiative (RGGI), but revenues are declining. This lack of reliable funding limits and slows down the possibilities for Vermont, especially in the low-income sector. Without reliable funding, contractors in Vermont are hesitant to hire and train new employees knowing that they may have to lay them off a few months or a year later. This compounds the aging workforce problem in Vermont and prevents local economic investment and development.

Recommendations

Drawing from the literature, case studies in other states, and conversations with relevant professionals, this report makes several recommendations for expanding and further scaling energy efficiency and clean energy initiatives in the Northeast Kingdom. While developing the recommendations, consideration was given to the Energy Action Networks four strategic leverage areas: policy and regulatory reform, public engagement, capital mobilization, and technology innovation. The recommendations are designed to address multiple barriers. They should be implemented in recognition of existing efforts to diminish low-income barrier and will likely require further consideration and analysis by multiple stakeholders, program implementers, and policymakers.

1. **Develop a specific area focus in the Northeast Kingdom and create an advisory committee made up of a diverse group of stakeholders.** This advisory committee should emphasize the voices of local partners and form a feedback link between energy-efficiency and clean energy program implementers and low-income households. The most effective energy programs coordinate through local community action agencies and cultural groups like faith-based organizations. Doing so allows the utility to better understand their customers' needs as well as gain their trust and

⁵² NVDA Regional Plan. 2018.

⁵³ Kelly Lucci, Efficiency Vermont, in conversation with the author. 8 July 2020.

cooperation through established and recognized community groups⁵⁴. The following are recommendations for tasks the advisory committee could undertake:

- a. Expand this report into a full study on low-income barriers to energy-efficiency and clean energy technology adoption in the Northeast Kingdom, including a rigorous review of programs from the perspective of low-income households and a follow-up on completed projects to determine if actual energy savings match projected energy savings.
 - i. Take into consideration the NVDA Northeast Kingdom Regional Plan and Northeast Kingdom Collaborative initiatives and how energy-efficiency and electrification might integrate with their stated evaluations and goals.
- b. Gather and analyze data on primary fuel types and housing characteristics in the Northeast Kingdom, which will inform further action. Housing type and age of buildings and typical HVAC and lighting installations should inform the types of technologies and updates recommended to Northeast Kingdom residents.
- c. Identify and adapt best practices from rural areas in other states, as Vermont and the Northeast Kingdom in particular have low population density and representative data is difficult to obtain.
- d. Conduct a review to determine whether the value of non-energy benefits should be reassessed within cost-effectiveness tests. Many low-income-targeted programs suffer from traditional cost-effectiveness metrics and though Efficiency Vermont recognizes non-energy benefits, research continues to uncover unrecognized non-energy benefits. Other states continue to reassess cost-effectiveness measures at the policy levels⁵⁵.

2. **Align multiple home improvement programs to better serve those most in need by providing a variety of services simultaneously, similarly to how human services programs operate.** Collaborative programs with coordinated delivery of services such as energy-efficiency, renewable energy, water efficiency, air quality, housing, community development, hazard abatement, financing, and resiliency will improve access by reducing the number and severity of disruptions in homes. When programs are able to meet a variety of needs, they are seen as more valuable and reduce the time, effort, and mental energy needed to undertake retrofits. Customers tend to think about their utility bill as a whole rather than segmented by technology,

⁵⁴ Shoemaker et al. 2018. ACEEE Report: Reaching Rural Communities with Energy Efficiency Programs; California Energy Commission. 2016. Low-Income Barriers Study, Part A.

⁵⁵ For instance, The California Public Utilities Commission (CPUC) incentivizes utilities to serve disadvantaged communities by allowing them to claim a higher “net-to-gross” ratio for serving hard to reach customers, such as those who face barriers to other program participation because of geography, language, income, housing type, home ownership, or lack of access to program information. From California Energy Commission. 2016. Low-Income Barriers Study, Part A.

offering a package of technologies and options simultaneously is useful for the customer⁵⁶.

- a. Draw on the report completed by the Vermont Department of Health on the benefits of weatherization for health to expand the scale and capacity of health/weatherization programs and pilot studies already under way in Vermont. Warmth and energy efficiency interventions can lead to improvements in general health, respiratory health, and mental health, especially when targeting homes with inadequate warmth and individuals with existing chronic respiratory disease. Low-income recipients of weatherization also showed greater improvements in health and energy-efficiency improvements resulted in higher perceived autonomy and enhanced social status as a result of feeling that the house was a “safe haven”⁵⁷.
- b. Ensure that any energy retrofit programs can access funding for health improvements if necessary, such as funding for asbestos, lead, or mold removal.

3. Organize and implement a targeted informational and outreach program in the Northeast Kingdom, using improved data and the advisory committee to identify and meet community needs.

- a. Partner with and empower local community action partnerships, town energy committees, contractors, and other community- and faith-based organizations to build trust and establish relationships in communities.
- b. Consider critical differences in sub-segments of the population and design smart targeted outreach based on these analyses.
 - i. For example, programs should consider home ownership, household size, physical home attributes, income source, and demographic information to ensure that outreach is appropriate and useful for each household.
- c. Diversify framing tactics of weatherization and energy-efficiency upgrades to include justifications of health, safety, comfort, and aging based on the needs and preferences of the target population.
- d. Optimize appropriate forms of media to reach specific segments of the population.
 - i. For instance, in-person campaigns, though more time-consuming than Internet- or mail-based outreach, have been effective in educating low-income communities. Lower-income adults, especially women and homeowners, are interested in learning how they might save money on

⁵⁶ Shoemaker et al. 2018. ACEEE Report: Reaching Rural Communities with Energy Efficiency Programs.

⁵⁷ Vermont Department of Health. 2018. Weatherization + Health: Health and Climate Change Co-Benefits of Home Weatherization in Vermont.

electric or heating bills and avoid paying late fees and reconnection charges⁵⁸.

- e. Consider the benefits and feasibility of targeting an entire community for energy retrofits rather than individual or qualifying households, following the example of Vital Communities in Vermont and New Hampshire.
 - i. While no campaign can effectively interact with every single household in a given area, using a geographical limit is beneficial in changing mental barriers and cultural perceptions of a change. By targeting a community, change is more visible or recognized within the population. The change is normalized faster when everyone knows someone who has had weatherization in their home or solar panels installed⁵⁹.

4. Investigate opportunities for energy upgrade financing designed for low- and moderate-income households, including:

- a. The expansion and promotion of VSECU's VGreen loans and Home Energy Loans.
- b. Analyze data from the upcoming Efficiency Vermont Pay-As-You-Save on-bill investment pilot program in the Northeast Kingdom to explore its feasibility for low-income customers and utilities.
 - i. In on-bill lending, utilities perform energy upgrades and finance the up-front cost. The debt is then paid back through the utility bill⁶⁰. This type of financing is attractive for customers who are not able to pay the up-front cost of a new technology. However, because it requires seed capital to get started, on-bill financing is expensive for utilities, especially rural energy cooperative utilities like the Vermont Electric Cooperative, which serves much of the Northeast Kingdom⁶¹.

5. In addition to securing a reliable source of funding for thermal efficiency programs in Vermont, develop a broad and collaborative base of financial support drawing from a range of partnerships. The most effective low-income targeted energy-efficiency programs draw from a variety of funding sources, such as ratepayer, state, federal, private, and philanthropic⁶². Possible partnerships in Vermont include:

- a. Healthcare: Expand existing partnerships such as those between NeighborWorks of Western Vermont and the Rutland Regional Medical Center, and Efficiency Vermont's Healthy Homes pilot program with the

⁵⁸ Brown et al. 2019. Low-income energy affordability in an era of U.S. energy abundance.

⁵⁹ Sarah Brock, Vital Communities, in conversation with the author. 23 July 2020.

⁶⁰ Brown et al. 2019. Low-income energy affordability in an era of U.S. energy abundance.

⁶¹ Kelly Lucci, Efficiency Vermont, in conversation with the author. 8 July 2020.

⁶² Cooperative utilities, which may receive less from ratepayer funds, can benefit from pooling funds to offer energy-efficiency programs at a higher level or greater scale. From Shoemaker et al. 2018. ACEEE Report: Reaching Rural Communities with Energy Efficiency Programs.

Northeastern Vermont Regional Hospital; explore new opportunities for joint-funded weatherization projects that decrease both energy burden and adverse health effects. Reference a recent ACEEE report on how to leverage health resources for energy programs⁶³.

- b. Housing: The Vermont Housing and Conservation Board and the Vermont Department of Housing and Community Development offer grants and funds for the rehabilitation of existing homes.
- c. USDA: The Energy Efficiency and Conservation Loan Program provides financing to rural utilities for energy efficiency projects (such as on-bill financing programs).

6. **Identify or create a significant and steady source of funding for thermal efficiency programs, which will largely target those who aren't able to pay the full amount for home energy upgrades.** This is increasingly being recognized as an essential gap that needs to be filled in order for Vermont to achieve its total energy goals, for not just building heating, cooling, and electrification but also for electrification of transportation. While it is beyond the scope of this report, to identify the source(s) of funding to achieve this, it is important to acknowledge this significant ongoing need and to point out that urgency for this need to be addressed, as soon as possible. It is difficult to envision a pathway for achieving a sustainable, affordable, clean energy economy without this need being fulfilled.

⁶³ ACEEE. 2020. Braiding Energy and Health Funding for In-Home Programs: Federal Funding Opportunities.

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