



LOW-INCOME SOLAR OWNERSHIP IN VERMONT: OVERCOMING BARRIERS TO EQUITABLE ACCESS

A report for the Vermont Low Income Trust for Electricity, Inc.

I. ACKNOWLEDGEMENTS

The Energy Clinic at Vermont Law School authored this report. The Energy Clinic is a program of Vermont Law School's Institute for Energy and the Environment (vermontlaw.edu/energy). The Energy Clinic works to advance community ownership of renewable energy and has a focus on assisting underserved communities to gain access to clean, local, renewable energy.

The Energy Clinic prepared this report for the Vermont Low-Income Trust for Electricity (VLITE) to explore the barriers to low-income solar ownership for Vermonters and to offer policy recommendations that will help to overcome these barriers. Our research has included speaking with people from a range of sectors involved with energy policy including financial institutions, housing authorities, nonprofit organizations and low-income residents. The list of organizations interviewed in developing this report is included in Section IX. Additionally, we have investigated existing approaches used across the United States as well as ideas for innovative applications that are most appropriate for Vermont. The purpose of this report is to inform policymakers, industry and interested citizens and to prompt action towards addressing the low carbon energy needs of the low-income population in Vermont and throughout the country.

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164 Chelsea Street | PO Box 96
South Royalton, VT 05068
(802)-831-1000

vermontlaw.edu



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II. EXECUTIVE SUMMARY

Solar energy has become part of the Vermont landscape and the economy. For the second year this State led the country in solar jobs per capita. With lower costs, solar installations bring an economic as well as environmental benefit. Putting in place legislation that can help low-income Vermonters participate is an important policy objective for social justice and our economy. Three things are needed to enable equitable access to solar by Vermonters with lower incomes: understand the needs of the demographic; acknowledge the barriers; and implement solutions.

DEMOGRAPHIC

Though there are a number of ways to define the low-moderate income (LMI) demographic, it generally comprises about 40% of our population. One thing remains constant – they are in energy poverty – carrying the highest energy burden as a ratio of energy cost to income. With very little or no disposable income, many live week to week. This demographic lives in a large variety of housing situations and moves on average every two years compared to an average of ten years for middle and higher income Vermonters.

BARRIERS

- 1 UPFRONT CAPITAL COSTS** create an inability to pay for solar when there is
 - a) a difficulty accessing financing due to low or no credit score, or
 - b) lack of interest or unwillingness to take the risk of additional debt.
- 2 UNSUITABLE HOUSING** due either to the age and type of the home or to the individual being a renter. A large portion live in rental situations where they pay the electric bill but have no control over investment in the property by the landlord, referred to as the split incentive.
- 3 LACK OF INFORMATION, TIME AND TRUST** play a large role. This includes assumptions that the measures are unaffordable or beyond reach, a lack of time to review or understand opportunities, and a simple unawareness of potential programs.
- 4 EXISTING INCENTIVES** increase the challenge for LMI participation in solar. The federal Income Tax Credit (ITC) is geared to those with disposable income and inaccessible to more than 45% of the population. Recent changes in state net-metering incentives have increased the difficulty of creating community solar projects in which the LMI population can participate.

SOLUTIONS

The implementation of solutions should be approached in a comprehensive manner that provides long-term policy. This approach should consist of incentives, financing and education/training/workforce development. These form three legs of a stool that can create a solid structure for successful implementation and adaptation of sustainable energy for our most vulnerable neighbors.

Highlights of solutions that address the barriers identified above are:

- 1 INCENTIVES**
 - a) Create low-income specific adders to net-metering projects.
 - b) Reversal or modification of harmful 2017 changes to net-metering, including the punitive REC adjuster.
- 2 FINANCING**
 - a) Legislative mandate for PUC and utility implementation of an on-bill tariff program that lends to the meter instead of the person. This addresses three primary barriers: the split incentive in rental homes, access to financing, and an aversion to risk additional debt.
 - b) Support existing financing programs with increased access to loan guarantees and funding sources.
- 3 INFORMING**
 - a) Collaboration with community partners, utilities and providers is necessary to create a successful program that is promoted statewide.
 - b) Identify and inform targeted demographic based on volunteer answer to one question on state tax return.
 - c) Motivate citizens to inform neighbors on ways to save money and stay warm.

Vermont has an opportunity to advance its energy and climate goals, strengthen the economy and assist those with the highest energy burden. We can bring the benefits of solar ownership to a larger portion of the population by creating market specific incentives, leveraging that investment through financing, and informing them of opportunities.

III. INTRODUCTION

The purpose of this report is to identify potential solutions to the barriers of solar electric ownership by Vermont's low-income population. We urge policymakers, industry actors, utilities and interested citizens to take prompt action towards addressing the low carbon energy needs of the low-income population in Vermont. Enacting comprehensive solutions will address inequities in the current system, promote economic development and contribute to the attainment of Vermont's climate and energy goals.

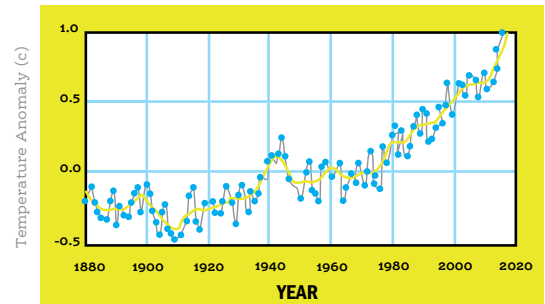
The State has described the pathway to meeting these goals as a clean energy revolution. Part of this revolution is the increased development of distributed renewable energy generation, specifically solar. Vermont's past solar net-metering laws have spurred economic development and participation in both individual and community solar projects.

This report will look at our current state of affairs that make the issue of facilitating low-income solar ownership important and timely. Doing so will help define and characterize the issue, the population and their barriers to participation. With those concepts in mind, the report will propose policy concepts that can help accelerate low-income involvement.

A. CLIMATE CHANGE IMPACTS VERMONT

We are each aware of the impacts of fossil fuel sources on climate change and our responsibility in today's political environment to promote action at the state and local level.

In Vermont, there has been broad support for Vermont's Energy and Climate goals. Climate change is our current reality. According to NASA, NOAA, and the Climatic Research Unit, sixteen of the seventeen warmest years have occurred since 2001.¹ The warming of the planet is continuing at a rate not experienced in the previous 1000 years, with new records being set nearly every year.² The 2014 *Vermont Climate Assessment* reported a 1.3 degree (F) increase in temperature. Just two years later, in August 2016, the EPA reported Vermont temperatures have risen by over 2 degrees (F)—“almost twice as much as the rest of the contiguous 48 states.”³ Vermonters are already experiencing the impacts of climate change with warmer and shorter winters, average annual precipitation increase by 5.9 inches since 1960, and more intense storms.⁴ These changes have economic impacts on our tourist and agriculture industry⁵; health impacts with the spread of ticks carrying Lyme disease; and a variety of environmental impacts.⁶ Intense storms adversely affect productivity and infrastructure costs.⁷ The State of Vermont and many of its residents have long recognized the importance of climate change and set goals to reduce green house gas emissions (GHG).⁸



Source: climate.nasa.gov



A mobile home in Vermont uprooted by a raging river following Hurricane Irene, August 2011. (Photo Credit: Lars Gange & Mansfield Heliflight)

¹ climate.nasa.gov/.

² Milman, Oliver, "NASA: Earth is warming at a pace unprecedented in 1,000 years." *The Guardian*, August 30, 2016. theguardian.com/environment/2016/aug/30/nasa-climate-change-warming-earth-temperature-warming. See also National Aeronautics and Space Administration, "NASA analysis finds August 2015 another record month," September 12, 2016, Goddard Institute for Space Studies, data.giss.nasa.gov/gistemp/news/20160912/.

³ U.S. Environmental Protection Agency, "What Climate Change Means for Vermont," August 2016. 19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-vt.pdf.

⁴ Gafford, Gillian. "Vermont Climate Assessment." Rubenstein School for Environment and Natural Resources, University of Vermont, 2014, vtclimate.org.

⁵ Grubinger, Vern, "Climate Change and Vermont Agriculture," *University of Vermont Extension*, May 2011, uvm.edu/vtvegandberry/factsheets/climatechange.html;

⁶ climatechange.vermont.gov/vermonts-changing-climate.

⁷ Freeman, Andrew, "Hurricane Irene ranked most costly Category 1 storm," Climate Central, May 10, 2012, climatecentral.org/news/hurricane-irene-ranked-most-costly-category-1-storm.

⁸ In 2006 Vermont legislators adopted goals to reduce 1990 GHG levels by 50% by 2028 and 75% by 2050. climatechange.vermont.gov/vermonts-goals.

B. ACHIEVING VERMONT'S ENERGY AND CLIMATE GOALS

The state has determined that to reach Vermont's current climate goals⁹ requires a 'clean energy revolution', aspiring to reach 90% of energy needs from renewables by 2050. Vermont has set in statute that it "is a goal of the State, by the year 2025, to produce 25 percent of the energy consumed within the State through the use of renewable energy sources."^{10, 11} Community solar provides an excellent opportunity for low-income residents to participate and benefit. All Vermonters need to participate to meet these climate and energy goals. This is an all-hands-on-deck, all-boats-rising opportunity.

In addition, Vermont policy has advanced solar development with 250 megawatt (MW) of solar capacity permitted as of November 2016.¹² Partially in response to this perceived solar boom, and along with concerns raised by certain constituents, the legislature modified the net-metering and group net-metering rules in 2017.¹³ Just at the point where solar has become affordable for most Vermonters, these legislative changes have made it more difficult for lower income Vermonters to participate in the 'clean energy revolution'. There are specific actions that can be taken to address the barriers to low-income participation. Consider the importance (for social equity, addressing our energy goals, providing a sound return on investment to the State of Vermont) of flipping the paradigm from using incentives to bring technology to the market to using incentives to actually provide those with the highest energy burden access to the benefits of this technology.



The Boardman Hill Solar Farm (BHSF) in West Rutland, Vermont, is directly owned by its customer members who purchase the low-carbon solar energy. BHSF was awarded a Governor's Award for Environmental Excellence, Vermont Energy and Climate Action Network's Project of the Year and was recognized by EPA's Green Power Partnership.

⁹ As of the 2016 Comprehensive Energy Plan, goals have been set to 40% GHG reduction from 1990 levels by 2030 and an 80% to 95% reduction by 2050 publicservice.vermont.gov/publications-resources/publications/energy_plan.

¹⁰ 10 V.S.A. § 580

¹¹ Of the \$2.4 billion spent on energy each year, 40% is for transportation, 35% is for electricity, and 25% is for heat and industrial. 2016 Comprehensive Energy Plan, p.5.

¹² eanvt.org/wp-content/uploads/2013/02/90-by-2050-Milestones-2017.pdf.

¹³ Over 7,000 net metering projects approved in Vermont for a total capacity of 135MW. publicservice.vermont.gov/renewable_energy/net_metering.

IV. A PRIMER ON SOLAR OWNERSHIP IN VERMONT

A. DEFINITIONS

It is important to clarify a number of definitions for the main concepts used in this report.

COMMUNITY SOLAR: A community solar array refers to a solar photovoltaic (PV) project built to allow a group of people to own a percentage of a solar array and to see the solar energy output reflected as a credit on their utility bills and to receive all of the environmental attributes for their portion of the energy produced by the community solar array. This type of solar energy project provides opportunities for solar energy ownership to renters or others who are unable to install rooftop solar due to the unsuitability of the roof's structural integrity or an insufficient amount of sunlight due to shading. This is an important avenue for participation by low and moderate income Vermonters.

GROUP NET-METERING: Group net metering enables individual customers within one utility service area to establish a group to construct and operate a renewable energy project, such as a community solar array, and to distribute the net metering credits and the environmental attributes to all of the members of the group.¹⁴ Under group net metering, customers sign up for a percentage of the output of an offsite solar facility and receive a monetary credit on their utility bills for their pro rata share of the output.

NET-METERING: Net metering allows distributed renewable generation to offset a customer's electricity consumption and provides credits for any excess renewable generation exported to the grid. Each month the renewable energy generated is netted against the customer's usage. In Vermont, if there are additional credits in excess of the customers usage at the end of the month they are carried forward to the next month for up to a twelve-month period. If credits have not been used within twelve months they are currently given to the utility without compensation to the customer.

RENEWABLE ENERGY CREDITS (RECS): Renewable Energy Credits (RECs) are a type of transferable commodity that represents the environmental attribute created when electricity is produced from a renewable source. RECS can be unbundled from the kilowatt hours of electricity produced and sold to third parties for compliance with state renewable mandates or for use as voluntary green claims. In order to legally claim that a customer consumes renewable or low carbon electricity the customer must retain the RECs. When you install solar panels but sell the RECs, the customer continues to consume electricity from their utility's average mix of resources such as fossil fuels and nuclear power, while the purchaser of the RECs from the electricity generated from your solar panels gets to claim the environmental benefit and the use of the solar electricity.¹⁵

SOLAR: In this report, consuming "solar" energy means electricity that is produced by photovoltaic panels, with the environmental attributes intact—not selling the RECs. This contributes to a reduction in the emissions of greenhouse gases along with the financial benefit of energy cost savings.

SOLAR OWNERSHIP: Direct ownership provides low-income residents with all of the opportunities available to possessing a solar energy system such as the solar panels, the hardware, the electricity generated and energy cost savings, the Renewable Energy Certificates (RECs) and environmental attributes associated with generating renewable energy in the form of solar power. Ownership includes solar panels on homes as well as participation in a community solar array.

¹⁴ Vermont Law School Energy Clinic. "Vermont Group Net Metering: Information & Guidelines for 150 kW (AC) Community Solar Projects," April 2016, [-assets.vermontlaw.edu/Assets/lee/Vermont%20Group%20Net%20Metering%20Information%20and%20Guidelines%20%202016.pdf](https://assets.vermontlaw.edu/Assets/lee/Vermont%20Group%20Net%20Metering%20Information%20and%20Guidelines%20%202016.pdf).

¹⁵ To read more about RECs, see the Energy Clinic's report: [-assets.vermontlaw.edu/Assets/lee/VLS%20Energy%20Clinic%20Report%20on%20RECs%20Final%20for%20SNRE.pdf](https://assets.vermontlaw.edu/Assets/lee/VLS%20Energy%20Clinic%20Report%20on%20RECs%20Final%20for%20SNRE.pdf).

See also, State of Vermont. (2016). "Vermont 2016 Comprehensive Energy Plan." Department of Public Service. Exhibit 9-8 page 189. Retrieved September 15, 2016, from publicservice.vermont.gov/publications-resources/publications/energy_plan/2015_plan.

B. SOLAR AND VERMONT NET-METERING

Solar power provides stable generation costs and more long-term certainty than traditional fossil fuel sources which have experienced considerable volatility in recent years.¹⁷ According to the GW Solar Institute at George Washington University in Washington, DC, the installation cost of solar energy has fallen more than 70 percent in the last ten years.¹⁸ Community solar brings additional economies of scale. These solar project developments are larger, lowering the average per customer cost of the project. Customers can also purchase a smaller amount of solar (either fewer number of arrays or kW) in a community project than the minimum practical size if the person were to install a photovoltaic array at home. Both the lower cost and the ability to buy fewer panels help make community solar more accessible to low-income individuals so they can reduce their electricity bills and reduce their carbon emissions.¹⁹

Vermont offers a net metering program that allows electric customers to generate renewable electricity and receive net metering credits that are included in their electric bill for the electricity they produce.²⁰ The State's net-metering program started in 1997. In 2011 a six cent (\$.06) per kilowatt-hour (kWh) incentive was added. At this time monetization of credits began and group systems became common.²¹ Act 99, passed by the Vermont State Legislature in 2014, sunset this net metering program at the end of 2016 and directed the Vermont Public Service Board²² to develop "Net Metering 2.0."²³ In 2016, the Vermont Public Service Board established a revised net-metering program under 30 V.S.A. Section 219a, pursuant to Act 99 of 2014, which took effect on January 1, 2017. While the directive was to advance Vermont's renewable energy goals, many of the revisions will actually make attainment of Vermont's energy and climate goals more difficult.

Vermonters who install solar PV after January 1, 2017, will find more challenges and fewer financial benefits as a result of the new net metering rule. Just as solar is becoming affordable, these rules make it more difficult for low-income individuals to own solar.²⁴ Under Net Metering 2.0 the net-metering credit is determined by using the blended residential rate plus or minus site and REC adjusters:

SITING ADJUSTERS	
TYPE OF PROJECT	ADJUSTER VALUE
< 15 kW	1 cent per kWh
15-150 kW preferred site	1 cent per kWh
15-150 kW non-preferred	(-1) cent per kWh
150-500 kW preferred site	(-3) cent per kWh

REC ADJUSTER	
Transfer REC to Utility	+3 cents per kWh
Customer retains REC	(-3) cents per kWh

¹⁷ Jospe, Christophe, Probst, Curtis, Burstein, Mara E., Deng, Tiancheng, Helson, Erica, Mayer, Channele, Palacios, Kim, Valdebenito, Igor, Verriest, Kirstin, Youn, Bora. "Ensuring New York Solar Programs Reach Low-Income Residents," School of International and Public Affairs, Columbia University, Spring 2014.

¹⁸ Dong, Xiumei, "Turning low-income neighborhoods on to solar power." 5/09/16, [usnews.com/news/articles/2016-05-09/turning-low-income-neighborhoods-on-to-solar-power](https://www.usnews.com/news/articles/2016-05-09/turning-low-income-neighborhoods-on-to-solar-power).

¹⁹ Dobos, Hillary M. & Artale, Emily, "Analysis of the Fulfillment of the Low-income Carveout for Community Solar Subscriber Organizations," Lotus Engineering & Sustainability, LLC, prepared for the Colorado Energy Office, colorado.gov/pacific/sites/default/files/atoms/files/Low-Income%20Community%20Solar%20Report-CEO.pdf.

²⁰ Freeman, Gregg, Huebner, Heather, Kelly, Aaron. "An Analysis of Renewable Energy Credits in Vermont." Energy Clinic, produced for the Vermont Senate Committee on Natural Resources and Energy, February 2016, assets.vermontlaw.edu/Assets/iee/VLS%20Energy%20Clinic%20Report%20on%20RECs%20Final%20for%20SNRE.pdf.

²¹ Vermont Public Service Board Rule 5.100 - Net-metering presentation. legislature.vermont.gov/assets/Documents/2018/WorkGroups/Senate%20Finance/Net%20Metering/W-Jake%20Marren%20-Vermont%20Public%20Service%20Board%20Net%20Metering%20Powerpoint%20-2-1-2017.pdf.

²² As of 2017, the Vermont Public Service Board is now referred to as the Vermont Public Utility Commission.

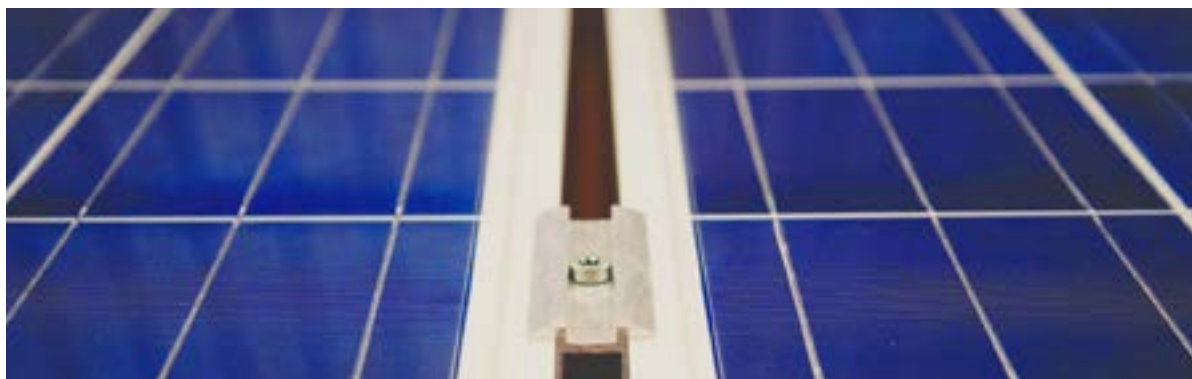
²³ Vermont Law School Energy Clinic, "Vermont PSB Rule 5.100 Revisions: Net Metering" April 2016, wordpress.vermontlaw.edu/energy/files/2016/04/Rule5.100-Fact-Sheet.pdf.

For example, a Vermont low-income net metering customer who chooses to purchase solar and retain their RECs, rather than transfer them to the utility for Vermont Renewable Energy Standard compliance, is penalized by losing six cents per kWh. In addition, if that customer were participating in a 150 kW or greater community solar array on a nonpreferred site they would lose an additional three cents per kWh.

C. THE IMPORTANCE OF RENEWABLE ENERGY CREDITS

Since the source of electricity consumed from the grid is not directly identifiable, Renewable Energy Credits have been created to represent the environmental attribute of the energy produced from renewable sources such as solar PV. It is important for those who are purchasing solar electricity, as well as entities marketing solar products to customers, to understand that unless the solar RECs remain bundled with the electricity product the electricity cannot be claimed to be renewable or low carbon electricity.²⁶ Since RECs have a monetary value some solar developers use them as a financing mechanism, selling them for economic benefit, usually to companies seeking to fulfill state-mandated RPS requirements. In fact, in 2014 of the 125 megawatts (MW) of solar registered as Class 1 RECs in the Massachusetts RPS, 84 MW of the RECs were from Vermont solar projects.²⁷

The Vermont Attorney General's Office has issued guidelines prohibiting companies from marketing products as solar or low carbon if they do not provide the renewable energy credits to the customer.²⁸ While these rules are in place, there is a proliferation of claims that customers can “go solar” with products that no longer have that environmental attribute. This highlights the need for additional consumer education and enforcement of deceptive marketing practices.²⁹ Since unbundling and separately selling RECs from solar energy does not ultimately provide the low-income customer with additional solar energy, this practice raises an important public policy question: What is the ultimate goal of a low-income solar program if it is only about bill credits and not providing the customer with solar energy?³⁰



²⁴ Because owning solar means retention of the RECs.

²⁵ The blended residential rate is the lower of 1) the utilities general residential service rate; 2) utilities blended residential rates (where block rates in use); or 3) the statewide average rate (14.9 cents)

²⁶ McDonnell, Tim, “The problem with rooftop solar that nobody is talking about” Mother Jones. January 2016, motherjones.com/environment/2016/01/green-energy-rec-rooftop-solar-panels.

²⁷ Jones and James, “Distributed Renewables in the New Economy: Lessons from Community Solar Development in Vermont,” in *Law and Policy for a New Economy: Sustainable, Just, and Democratic*, Edited by Melissa K. Scanlan, Edward Elgar 2017.

²⁸ Vermont Attorney General, “Guidance for Third-Party Solar Projects,” ago.vermont.gov/assets/files/PressReleases/Consumer/Guidance%20on%20Solar%20Marketing.pdf.

²⁹ See Jones and James, “Distributed Renewables in the New Economy: Lessons from Community Solar Development in Vermont,” in *Law and Policy for a New Economy: Sustainable, Just, and Democratic*, Edited by Melissa K. Scanlan, Edward Elgar 2017.

³⁰ Jones and James, “Distributed Renewables in the New Economy: Lessons from Community Solar Development in Vermont,” in *Law and Policy for a New Economy: Sustainable, Just, and Democratic*, Edited by Melissa K. Scanlan, Edward Elgar 2017.

V. LOW-INCOME POPULATIONS AND ENERGY BURDEN IN VERMONT

Defining the demographic policies seek to address is critical in determining scope, impact and cost. The term ‘low-income’ is defined and administered in many different ways at the state and federal level. Selection of the appropriate definition may be determined by how many Vermonters the policy is trying to address; the potential cost of the incentives to the selected population; and the administrative costs of identifying and confirming eligibility. In addition to defining the affected population, it is important to understand some of its unique characteristics, such as energy burden and housing.

A. DEFINING LOW-INCOME OR LOW-MODERATE INCOME

“Low-income” is defined in a myriad of ways by different federal, state, and community programs. The two most common approaches are based on 1) the relation to the federal poverty level (FPL) and 2) the relation to area median income (AMI). Low-income is typically considered up to 200% of FPL or 80% of the AMI. Moderate income is 80% to 120% of AMI. The common acronym LMI – low moderate income – is up to 120% AMI.

THE FEDERAL POVERTY LEVEL (FPL) GUIDELINES are often used as a benchmark for income classification for eligibility on items such as health care, food and fuel assistance.³² Of the 625,000 individuals in Vermont 11.9% or nearly 75,000 live in poverty³³, a 21% increase over the 61,000 in poverty the previous year.³⁴ Vermont had the distinction of being the only state to see its poverty rate increase from 2015 to 2016 (from 10.2% to 11.9%).³⁵

Low-income definitions often refer to 200% of the FPL as the income necessary to meet basic needs (\$23,760 for an individual, \$48,600 for a family of 4).³⁶ One quarter of Vermont’s population or roughly 156,000 people³⁷, about 75,000 households,³⁸ are considered low-income by this definition. Thirty-six percent of Vermont’s children live in these low-income families³⁹ Federally based food and fuel assistance is generally administered at 185% of the FPL.

PERCENTAGE OF AREA MEDIAN INCOME (AMI)⁴⁰ is another method of determining low-income eligibility for programs. Vermont has 257,167 households.⁴¹ The median household income for 2017 is \$55,700 (a paltry increase from 2016’s \$55,176). Eligibility for the Vermont Weatherization Program is based on 80% of AMI, but priority is given to those with incomes below 60% of AMI.⁴²

FOR FEDERAL FINANCING REGULATIONS⁴³ under the Home Mortgage Disclosure Act and the Community Reinvestment Act, the federal government has different definitions for what is low, moderate and middle income. The definitions are: low-income – below 50% AMI; moderate as 50% to 80%; and middle income as 80% - 120% of the tract incomes in the state. In Vermont there are 48 tracts with median incomes that range from \$38,448 to \$133,809.

LOW-INCOME HOUSING QUALIFICATIONS under HUD⁴⁴ is up to 80% of the county AMI (which ranges from \$47,400 in Essex county to \$82,400 in Chittenden, Franklin and Grand Isle).⁴⁵ The American Council for an Energy-Efficient Economy (ACEEE) also designates low-income as up to 80% of AMI.⁴⁶ The HUD and ACEEE designation of low-income is equivalent to what is referred to as LMI or Low-Moderate Income bracket by financial institutions.

LIHEAP USES BOTH FPL AND AMI. LIHEAP is the Low-income Home Energy Assistance Program.⁴⁷ LIHEAP benefits in Vermont include Fuel Assistance to help pay for heating bills⁴⁸ and Crisis Fuel for crisis situations during the winter months.⁴⁹

31 This number is updated periodically in the Federal Register by the U.S. Department of Health and Human Services under the authority of 42 U.S.C. 9902(2)

32 aspe.hhs.gov/frequently-asked-questions-related-poverty-guidelines-and-poverty.

33 census.gov/quickfacts/VT.

34 talkpoverty.org/state-year-report/vermont-2016-report/.

35 vermontbiz.com/news/2017/september/15/vermont-poverty-rate-income-barely-gains.

36 nccp.org/profiles/VT_profile_7.html.

37 kff.org/other/state-indicator/population-up-to-200-fpl.

38 homeenergyaffordabilitygap.com/03a_affordabilityData.html 2017 Fisher, Sheehan & Colton.

39 nccp.org/profiles/VT_profile_6.html.

40 In Vermont the AMI is calculated at the county level (rather than municipal) due to population densities.

41 census.gov/quickfacts/VT.

42 dcf.vermont.gov/benefits/weatherization. Unfortunately, the program reaches under 1000 homes per year. legislature.vermont.gov/assets/Legislative-Reports/2017-Wx-Legislative-Report-2017.01.12.pdf.

43 The designation used by the Federal Financial Institutions Examination Council (FFIEC) corresponds to that used under the Home Mortgage Disclosure Act (HMDA) and the Community Reinvestment Act (CRA). ffiec.gov/geocode/help3.aspx and ffiec.gov/census/report.aspx?year=2017&county=ALL&msa=15540&state=50&report=demographic

44 U.S. Department of Housing and Urban Development.

45 huduser.gov/portal/datasets/ii/ii2017/select_Geography.odn.

46 aceee.org/files/proceedings/2016/data/papers/11_326.pdf.

47 acf.hhs.gov/ocs/programs/liheap.

48 dcf.vermont.gov/benefits/fuel-assistance.

49 dcf.vermont.gov/benefits/crisis-fuel.

The federal LIHEAP statute states that the income limit is 150% of FPL unless 60% of the State median is higher. For a family of 4 in Vermont, 150% FPL is \$36,450 and 60% of the State median for FY 2018 is \$51,700. This means VT can pick a qualification number up to \$51,700. Vermont is currently qualifying eligibility for LIHEAP benefits at 185% of the FPL or \$44,955.

FEDERAL POVERTY LEVELS		SINGLE	2 PERSON	4 PERSON	% in VT	# in VT	POPULATION: 624, 594	
100%	Poverty	\$11,880	\$16,020	\$24,300	11.9%	74, 326	HeadStart ⁵⁰	
133%							Medicaid 19-64 ⁵¹	
150%		\$17,820	\$24,030	\$26,450			GMP Energy Assistance ⁵²	
185%		\$21,978	\$29,970	\$44,955			3SquaresVT, SNAP ⁵³ ; Fuel Assistance ⁵⁴	
200%	Low-Income	\$23,760	\$32,040	\$48,600	25%	~156k	Energy Affordability Gap ⁵⁵ ; Crisis Fuel ⁵⁶	
300%	Low-Moderate	\$35,640	\$48,060	\$72,900			IN NH SB129 for solar ⁵⁷	
MEDIAN INCOME LEVELS								
<60%	Priority HWAP	\$29-35k	\$33-40k	\$41-50k				
<80%	Low-Income	\$38-46k	\$44-53k	\$55-66k			HWAP-weatherization ⁵⁸	
<80%	Low-Income	Based on County Median Income (\$47k to 82k)						HUD Section 8 Housing ⁵⁹
<80%	Low-Income	As defined by ACEEE - American Council for an Energy-Efficient Economy ⁶⁰						
<50%	Low	Federal Financial Institutions Examination Council FFIEC ⁶¹ FFIEC-under the Home Mortgage Disclosure Act and Community Reinvestment Act.						
>50 <80%	Moderate							
>80 <120%	Middle							
>120%	Upper							

B. ENERGY BURDEN

In assessing energy affordability one measure that is useful is energy burden. Energy burden is defined as expenditure on energy as a percentage of income. Quantity of energy consumed, energy price and income are the three relevant variables.⁶¹ When energy burdens are significant, those experiencing the heavy burden are said to be in “fuel poverty.”⁶² A reasonable threshold for when energy burden results in fuel poverty is 10%.⁶³ The low-income segment of the population carries the highest energy burden sending them into fuel poverty with 10-46% of their income (not including transportation) as energy expenditures as compared to 2-7% of the remainder of the population.⁶⁴

FEDERAL POVERTY LEVEL - % FPL	BELOW 50%	50% - 100%	100%-125%	125%-150%	150%-185%	185%-200%
ENERGY BURDEN	46%	25%	17%	14%	11%	10%
VT HOUSEHOLDS	12,804	16,878	11,033	10,597	16,916	6,882

50 vermontheadstart.org/parents/enrollment/.

51 info.healthconnect.vermont.gov/thresholds2017.

52 dcf.vermont.gov/benefits/eap; dcf.vermont.gov/benefits/eap/gmp.

53 vermontfoodhelp.com/do-i-qualify.

54 150% of FPL is the maximum income under LIHEAP statute, except where the 60% of the state median is higher LIHEAP statute dcf.vermont.gov/benefits/fuel-assistance.

55 Vermont Home Energy Affordability Gap; 2017 Fisher, Sheehan & Colton. homeenergyaffordabilitygap.com/03a_affordabilityData.html.

56 gencourt.state.nh.us/bill_status/billText.aspx?sy=2017&id=957&txtFormat=html.

57 dcf.vermont.gov/sites/DCF/files/OEO/Docs/Wx-Income-Guidelines.pdf.

58 www.hud.gov/topics/rental_assistance/phprog.

59 aceee.org/files/proceedings/2016/data/papers/11_326.pdf.

60 ffiec.gov/geocode/help3.aspx.

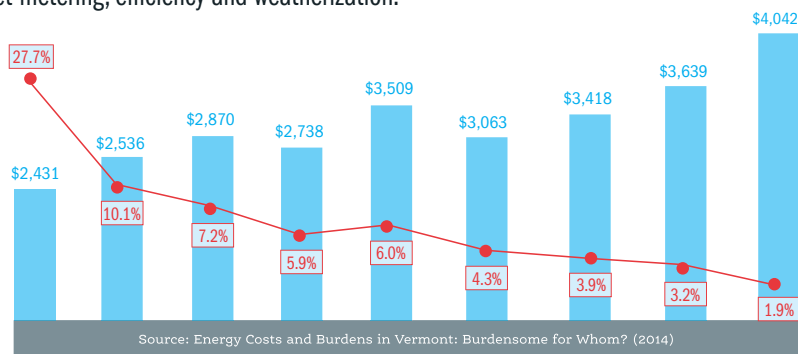
61 Teller-Elsberg, J. (Jonathan), Sovacool, B. (Benjamin), Smith, T. (Taylor) & Laine, E. (Emily), “Energy costs and burdens in Vermont: Burdensome for whom?” Institute for Energy and the Environment, report prepared for the Vermont Low Income Trust for Electricity, Inc. December 2016, p. 10. assets.vermontlaw.edu/Assets/iee/VLS%20IEE%20Energy%20Burden%20Report.pdf.

62 Ibid.

63 Ibid.

64 Ibid. assets.vermontlaw.edu/Assets/iee/VLS%20IEE%20Energy%20Burden%20Report.pdf.

VOLATILITY IN FOSSIL FUEL PRICING, as well as the number and severity of heating and cooling days, can have an impact on energy burden. The volatility of fossil fuel pricing can be substantial: during the 2015/2016 heating season natural gas prices rose 35.3% while fuel oil fell 37%.⁶⁵ From 2000 to 2012, the lower-income half of Vermonters saw an increase in energy expenditures of 37.4%.⁶⁶ This impact can be most severe for low-income individuals that sometimes face a heat or eat situation. Energy poverty has impacts on hunger, health, education, addiction and even death. Low-income Vermonters deserve to benefit from the financial savings and resulting price stability of net-metering, efficiency and weatherization.⁶⁷



C. LOW-INCOME HOUSING AND DIVERSITY

Even here in Vermont, there is diversity amongst those with high energy burdens: diversity in income, race and housing situation. Energy burdens extend even beyond the income range identified in the above table. Though Vermont is primarily white (94.6%), the African American population faces a poverty rate of 28.9%, compared to the 11.9% State average.

Low-income Vermonters live in a variety of housing situations in the second oldest housing stock in the country. Policies, incentives and regulations should address the range, not just one segment. The variety of housing situations contributes to the barriers to solar ownership faced by low-income families. Below is a list of different housing situations. The challenges for each of these situations are identified in section VI. B. below.

1. Own the house and the land, home may be structurally compromised
2. Own a home with no land (mobile home, apartment, condo)
3. Rental homes – where the electric bill is in the tenant’s name
4. Rental homes/rooms – where the landlord is responsible for the electric/fuel bills
5. HUD sponsored; Section 8 subsidized housing

Forty percent of Vermont households at the bottom 50% of income are renters compared to 15% of households in the top 50% of income.⁶⁸

INCOME DECILE:	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
RENTERS	46.4%	48%	35.6%	34.5%	33.7%	20.5%	27.4%	11.3%	10.8%	4.2%
	AVERAGE: 39.7%					AVERAGE: 14.8%				

⁶⁵ Vermont Home Energy Affordability Gap; 2017 Fisher, Sheehan & Colton homeenergyaffordabilitygap.com/03a_affordabilityData.html.

⁶⁶ “Energy Costs and Burdens in Vermont: Burdensome for Whom?”, Vermont Law School, Institute for Energy and the Environment, page 8. assets.vermontlaw.edu/Assets/iee/VLS%20IEE%20Energy%20Burden%20Report.pdf.

⁶⁷ For example, those Vermonters with solar avoid paying for a portion of future utility rate hikes when their energy supply is partly provided by solar.

⁶⁸ Teller-Elsberg, J. (Jonathan), Sovacool, B. (Benjamin), Smith, T. (Taylor) & Laine, E. (Emily), “Energy costs and burdens in Vermont: Burdensome for whom?” Institute for Energy and the Environment, report prepared for the Vermont Low Income Trust for Electricity, Inc. December 2016, p. 10. assets.vermontlaw.edu/Assets/iee/VLS%20IEE%20Energy%20Burden%20Report.pdf.

VI. BARRIERS TO LOW-INCOME OWNERSHIP OF SOLAR ENERGY

There are four primary categories of barriers to low-income ownership of solar energy:

1) upfront costs; 2) suitability of housing; 3) lack of awareness; and 4) barriers from existing incentives. These were areas raised by the various individuals, companies and non-profits interviewed by the Vermont Law School Energy Clinic and confirmed in our review of the literature. Within each of these categories there are more specific barriers. Cost concerns include not just disposable income, but issues regarding access to incentives and financing. Housing issues include the types of housing as well as the condition of housing. The category of awareness encompasses education, familiarity, training, trust, and time. Though these issues seem simple on the surface, understanding the nuance particular to low-income is important in considering how to address the problems.



A. BARRIERS FROM UPFRONT COSTS

1 UPFRONT CAPITAL COSTS

Though solar investments may provide favorable returns as well as lower and stabilized long-term energy costs, these purchases are often limited to those with disposable income. A lack of upfront capital has traditionally excluded lower income individuals from solar ownership. All disposable income tends to go to basic life necessities such as food, transportation, health needs, insurance, and clothing. Even putting together a down payment toward a system can be out of reach. The response to upfront cost concerns is generally answered with incentives, financing, and alternatives to ownership. Unfortunately, many solutions for some segments of the population can also be barriers for the financially challenged.

2 COST OF SOLAR

The cost of solar has dropped dramatically in recent years, with costs decreasing by more than half from 2012 to 2016.⁶⁹ The key for low-income earners is the possibility that projects can be cashflow positive from day one. However, in October 2017 the U.S. International Trade Commission recommended a 30% tariff on most imported photovoltaic modules.⁷⁰ Increasing costs again will bring back barriers. Even with a reduction in solar pricing the average project for an individual can range from \$10,000 to \$20,000 depending on their household electricity usage and what percentage they decide to replace with solar net metering. With an inability to pay for solar projects upfront, the alternatives, short of full subsidization, are financing or leasing.



Solar costs have declined significantly and the U.S. Department of Energy's Sunshot Program has helped decrease the cost of installed solar by promoting reduced permitting and installation costs.

⁶⁹ greentechmedia.com/articles/read/5-takeaways-itc-injury-vote-solar-trade-tariffs-suniva#gs.rhJ6078.

⁷⁰ greentechmedia.com/articles/read/itc-solar-trade-case-recommendations#gs.K6usf0s.

3 ACCESSING FINANCING OR LEASING

Unfortunately there are multiple barriers to financing for low-income individuals. Many financing programs have relatively short terms making it nearly impossible to be cashflow positive from the beginning. Often, low-income individuals do not have sufficient credit standing or credit history to access a loan. In December 2016, the Consumer Financial Protection Bureau identified that 45 million people are either credit invisible or have insufficient records to be scorable.⁷¹ Not surprisingly, 75% of the 45 million have low-moderate income. In addition to the 46% of low-income individuals with no credit score,⁷² those with credit scores below 650 are unlikely to qualify for borrowing. Similarly, third party leasing arrangements, such as Solar City, which “eliminate” upfront cost and borrowing, typically require credit scores in this range.⁷³ Even if we decrease the barriers to qualify, other reasons can, or even should, prevent financing. For example, accepting financing may over-leverage the individual. A lack of certainty for the future, a concern for fiscal responsibility or awareness of options may prevent the individual from even applying. On the positive side, local financial institutions, particularly credit unions in Vermont, have begun to offer favorable rates to finance direct ownership of solar. Some of these loans even allow the solar array to be the collateral. Whether these lending opportunities will be fully accessible to low-income Vermonters remains to be demonstrated.

4 FINANCING RISKS

BECOMING OVER-LEVERAGED. In addition to credit score, lending decisions are often based on debt to income ratios. If a low-income person borrows to purchase solar they may find themselves overleveraged because the next time they need a loan, the bank is not going to put a reduction in utility bill expense as an income on the application. Without recognizing the offsetting income, the debt from the energy investment may become a liability when additional financing is required. What if their car breaks down or there is another emergency need and the individual no longer qualifies for a loan because the solar financing has overleveraged them in the eyes of the bank?

UNCERTAINTY ABOUT THE FUTURE. Uncertainty about the future is a powerful barrier that often prevents people from making investments. People may not know if their job will last, or where they will be working next. This, alongside other life experiences, contributes to the uncertainty of how long they will be living in a particular place. *Low-income families are twice as likely to have moved in the last year compared to other families.*⁷⁴ It is reasonable for people to be concerned whether they will be in the same place long enough to see the return on the investment.

5 THIRD PARTY LEASING

Leasing solar has become a popular alternative. As mentioned above, often leasing also requires a credit score and may not be a viable option. Even if it is an option, it may not be in the best interest of the individual. There are two advantages that a solar leasing program offers: 1) there is no upfront cost and 2) there is no responsibility for maintenance. The lessor company can leverage the ITC as well as benefit from IRS deductions for accelerated depreciation under the Modified Accelerated Cost-Recovery System (MACRS) and a 50% bonus depreciation.⁷⁵ The company performs the installation and maintains the equipment. However, there is often a steep price to pay for this service. For example: small savings from current electric bills; year after year price increases of 3% that may not be offset by utility rate increases;

⁷¹ “Who are the credit invisibles?”, Consumer Financial Protection Bureau, December 2016. s3.amazonaws.com/files.consumerfinance.gov/f/documents/201612_cfpb_credit_invisible_policy_report.pdf.

⁷² “Data Point: Credit Invisibles,” The CFPB Office of Research, May 2015. files.consumerfinance.gov/f/201505_cfpb_data-point-credit-invisibles.pdf.

⁷³ Vitter, Scott and Deetjen, Thomas “How to Overcome the Greatest Barriers to Rooftop Solar Power,” Scientific American, June 8, 2016. blogs.scientificamerican.com/plugged-in/how-to-overcome-the-greatest-barriers-to-rooftop-solar-power/.

⁷⁴ nccp.org/publications/pub_1074.html.

⁷⁵ Bonus depreciation is decreasing to 40% in 2018 and to 30% in 2019. programs.dsireusa.org/system/program/detail/676.

relinquishing the renewable energy credit (REC), the environmental attribute that makes the energy be solar; the necessity of purchasing all production regardless of energy use; and not owning the system when it is paid off. Even if the contract allows for the buy back of the unit after a period of time (usually the 5 or 6 years that is needed for the other entity to take the ITC and the MACRS), the buyer must pay fair market value regardless of whether their lease payments have already paid for the unit. The idea that this product is a good one because the low-income person is able to save a little money is a false positive that penalizes their inability to invest directly in the technology. Ultimately these customers pay a much higher financing cost compared to direct ownership. As a result, though they face a significantly higher energy burden, they are not able to benefit from the financial returns and long-term price stability of their wealthier counterparts.

B. BARRIERS FROM HOUSING SITUATIONS

Housing situations help elucidate why serving this vulnerable population is so challenging. The three main issues in housing are 1) *suitability of home and/or land*; 2) *renting versus owning*; and 3) *living in multi-family housing*. Regardless of income level, over half the population in the United States cannot participate in solar net-metering.⁷⁶ Lack of home ownership and roof access are primary barriers for low-income families in gaining access to solar energy.⁷⁷

1 SUITABILITY OF HOUSE AND/OR LAND

Some own both a home and property. Many of these homes are unsuitable for a solar installation either because 1) the property or roof is too shaded; or 2) the tendency for low-income families to live in older homes with unmet maintenance upgrades and repairs.⁷⁸ This can result in homes that are inappropriate, cannot structurally support solar without additional cost, or where other investments are more pressing but may not increase economic stability. Some programs will not provide assistance if the building is not to code.⁷⁹ In Vermont, 44% of the housing stock was built before 1950. The expense of a roof upgrade is a barrier for many low-income residents, but may also be necessary for the long-term viability of the home. Others own a home with no land, such as apartments or mobile homes on leased land. These manufactured homes are known for their energy inefficiency. Addressing heating and electricity costs through weatherization and efficiency is often a first priority to address the health and comfort of the homeowner.⁸⁰

2 COMPLICATIONS FROM RENTING

Many rent, some live in subsidized affordable housing.⁸¹ Roughly 30% of the 330,000 housing units in Vermont are rented.⁸² In Vermont, roughly 40% of the lower-income half of Vermonters rent their homes; compared to 15% of the upper-income half of Vermonters.⁸³ This results in split incentives and future uncertainty. In rental housing the landlord often does not pay the utility bills so has no incentive to

⁷⁶ O'Shaughnessy, Eric, "Community Solar, Status, Trends, Legal and Financial Issues," NREL, March 8, 2016, [epa.gov/sites/production/files/2016-03/documents/webinar_20160309_oshughnessy.pdf](https://www.epa.gov/sites/production/files/2016-03/documents/webinar_20160309_oshughnessy.pdf).

⁷⁷ consumersunion.org/2016/07/breaking-barriers-helping-low-to-moderate-income-families-go-solar/.

⁷⁸ Low Income Solar Policy Guide; lowincomesolar.org/.

⁷⁹ legislature.vermont.gov/assets/Legislative-Reports/2017-Wk-Legislative-Report-2017.01.12.pdf.

⁸⁰ consumersunion.org/2016/07/breaking-barriers-helping-low-to-moderate-income-families-go-solar/.

⁸¹ Section 8 Housing from the agency of Housing and Urban Development (HUD). HUD rules can complicate investments that lower energy because when the expenses are decreased the subsidy from HUD is decreased.

⁸² census.gov/quickfacts/VT.

⁸³ This data is from 2012. Teller-Elsberg, J. (Jonathan), Sovacool, B. (Benjamin), Smith, T. (Taylor) & Laine, E. (Emily), "Energy costs and burdens in Vermont: Burdensome for whom?" Institute for Energy and the Environment, report prepared for the Vermont Low Income Trust for Electricity, Inc. December 2016, p. 10. assets.vermontlaw.edu/Assets/iee/VLS%20IEE%20Energy%20Burden%20Report.pdf.

invest capital in money saving measures, resulting in the so-called split incentive.⁸⁴ This is referred to as the split incentive issue because the potential for a return (on the renter's utility bill) is split from the (landlord's) capital investment. In addition, low-income families move on average every two years compared to ten years for the remainder of the population. If your lease is for 12 months or you are uncertain whether you will have the job to keep the home you own, are you going to take a loan to invest in efficiency or solar on someone else's property? Even if accessibility to financing is increased by way of education, relaxed credit requirements, and lower to zero interest rates, there will still be a large portion of individuals that cannot get a loan or will not take a loan because they do not own the home or are unsure how long they will own the home.

Subsidized housing often includes the utility bill with the rent. The individual then pays a portion of the total commensurate with their income. The best option for increasing future price stability is the investment by the affordable housing entity. Housing Vermont has led by example in this regard with several solar projects to support their properties and tenants.⁸⁵

C. LACK OF INFORMATION, FAMILIARITY, TIME AND TRUST

Lack of information, familiarity, time and trust contributes to the challenge of reaching almost half of our population.

PERCEPTION AND AWARENESS. Many low-income individuals assume that efficiency and renewable measures are simply unaffordable and not worth considering because they have no disposable income, are unable to use available incentives such as the ITC, and are unwilling or unable to borrow. Spreading awareness of existing programs, new technologies, or even the impact of small do-it-yourself changes is still a challenge. When individuals do look into existing programs they can face two- to three-year waits for weatherization. Complicating the challenge, many of the no upfront cost alternatives that may be more accessible, often sell the RECs and do not even provide solar energy to the customer.

TIME CONSTRAINTS. Individuals are often working multiple jobs, taking care of kids, and generally trying to cope with the hardships of life. Most time is consumed facing the basic challenges of putting food on the table, keeping warm and staying healthy. They often do not have the time to research and evaluate whether or not something is a good idea. There is a fear of being taken advantage of and not having the resources to determine if something is fair or 'too good to be true'. Put bluntly, most low-income individuals are concerned with the "now," - how do I pay the bill 'now', how do I get warm 'now', where do I get food 'now'. This makes it difficult to think about longer-term investments. The key is ensuring the longer-term investment can address the now.

EDUCATION AND TRAINING. Increasing understanding of how solar, efficiency and weatherization programs can be cashflow positive and help individuals in the 'now' is a necessary step. Part of the distrust is not having the tools or education to understand the mathematical calculations to evaluate the project.

⁸⁴ This is referred to as the split incentive issue because the potential for a return is split from the investment.

⁸⁵ vt.digger.org/2016/02/22/housing-vermont-throws-the-switch-on-solar-energy-facilities/.

D. BARRIERS FROM EXISTING INCENTIVES

1 CHALLENGES WITH FEDERAL INCENTIVES

The largest of all incentives for significantly reducing the upfront cost of solar investment is the federal Investment Tax Credit (ITC). The federal ITC was introduced in the Energy Policy Act of 1992 and it altered the landscape for renewable energy development. The investment tax credit provides a 30% tax credit for renewable energy projects, including solar PV.⁸⁶ ITC eligibility is based on when the facility began construction and when it is placed in service. The ITC was renewed in December 2015⁸⁷ and is set to reduce to 10% of commercial projects where construction is commenced before December 31, 2022.⁸⁸ The ITC for residential systems ends in 2021. The ITC extension is expected to produce \$40 billion of investment in solar between 2016 and 2020.⁸⁹ To claim the ITC, parties must have sufficient taxable incomes to claim the credit. This requirement is responsible for the creation of a new class of tax equity investors.

The ITC incentive has had a massive impact on the growth of solar investment in the United States.⁹⁰ However, because they do not earn sufficient income to have the requisite tax liability to benefit from the credit, 45% of the U.S. population is unable to directly capitalize on an incentive that reduces the cost of the solar investment by 30 percent.⁹¹ Municipalities and non-profit organizations that seek to support these communities are also unable to capitalize on this incentive. While the ITC is often not directly useful for low-income solar ownership, it can serve to reduce the costs of community solar projects. “Making tax-based incentives work for low-income consumers requires availability of a refund option or third-party financing entity that can monetize the credits.”⁹²

The reliance on third-party tax equity investors has pushed the solar marketplace away from individual and community owned projects. As a result, distributed solar, which was once almost exclusively owned by the customer is now dominated by third-party ownership. In 2014, third parties owned 72 percent of the 1.2gigawatts (GW) of residential solar installed that year.⁹³ Tax equity financing also increases the overall cost of capital as compared to debt financing.⁹⁴ As a result, the ITC is a barrier to low-income access to solar.

⁸⁶ Department of Energy, Business Energy Investment Tax Credit (ITC), energy.gov/savings/business-energy-investment-tax-credit-itc.

⁸⁷ Consolidated Appropriations Act, signed December 2015.

⁸⁸ Department of Energy, Business Energy Investment Tax Credit (ITC), energy.gov/savings/business-energy-investment-tax-credit-itc.

⁸⁹ Greentech Media, “Investment Tax Credit Extension Would Increase US Solar Installations 54% Through 2020,” December 16, 2015, greentechmedia.com/articles/read/investment-tax-credit-extension-will-increase-solar-installations-54-through.

⁹⁰ For a simple description of the ITC and it's impact see: seia.org/initiatives/solar-investment-tax-credit-itc.

⁹¹ taxpolicycenter.org/taxvox/new-estimates-how-many-households-pay-no-federal-income-tax.

⁹² lowincomesolar.org/toolbox/investment-tax-credit-state-tax-credits/.

⁹³ Mike Munsell, “72% of US Residential Solar Installed in 2014 was Third-Party Owned, GREENTECH MEDIA 29 July 2015, at greentechmedia.com/articles/read/72-of-us-residential-solar-installed-in-2014-was-third-party-owned.

⁹⁴ Fisher, et al., U.S. Partnership for Renewable Energy Finance, “Tax Credits, Tax Equity and Alternatives to Spur Clean Energy Financing,” 2011, uspref.org/wp-content/uploads/2011/09/Tax-Credits-Tax-Equity-for-Clean-Energy-Financing.pdf.

2 BARRIERS FROM STATE INCENTIVES

As discussed in Section III - A Primer on Solar Ownership in Vermont - there are several ways in which Net Metering 2.0 makes it more difficult to develop community solar projects and consequently increases the barrier to low-income solar ownership.

- **RECs.** Customers who retain and retire their RECs to reduce their own carbon footprints face a \$0.06 per kWh penalty. This penalty is over three times the market price for Class 1 RECs in New England and has no economic justification. This creates a punitive and unnecessary barrier to low-income and community ownership of solar and should be ended through legislative or regulatory action. No other state penalizes a solar customer in this way. This penalty strongly discourages customers from going beyond the minimum level of solar contained in the state's Renewable Energy Standard which falls far short of Vermont's overall 90% renewable energy goal.
- **CREDITS.** Net metering credits can no longer be used to pay customer service charges or energy efficiency charges (non-bypassable charges), but instead can only be used to pay for electric usage.
- **SITING.** Unless a single customer will be using more than 50% of the project output, projects larger than 150kW can only be located on building structures, paved parking lot canopies, brownfields, sanitary landfills, disturbed gravel pit/quarry, or a specific site duly adopted in a municipal plan. This severely limits the ability to site community solar arrays, for example, near a mobile home park or in the field of a local church. Projects from 15kW to 150kW are penalized two cents for not locating in one of the restricted preferred sites. This makes it more difficult to locate a project that has the necessary monetary incentives for a cashflow positive return.
- **PERMITTING.** Projects between 50kW and 150kW no longer qualify for the application permitting procedure under the Certificate of Public Good (CPG). Costs for petition permitting are generally tens of thousands of dollars more costly. This is a significant cost increase to project sizes that work well for community solar.
- **SIZE.** Customers are no longer allowed to purchase more than 500kW of net metered solar. This restricts larger non-profit entities such as multi-unit affordable housing organizations from meeting the needs of the community.

These changes are expected to largely halt direct low-income solar ownership opportunities.



VII. A COMPREHENSIVE APPROACH TO SOLUTIONS

Vermont has an opportunity to advance its energy and climate goals, strengthen the economy and assist those with the highest energy burden. This can be accomplished by shaping comprehensive legislation and regulation to help low and moderate income Vermonters access sustainable energy in the state.⁹⁵ The declining cost and distributed nature of solar suggests that it is an energy resource that should help reduce income inequality, not shut out low-income citizens and add to greater injustice.⁹⁶

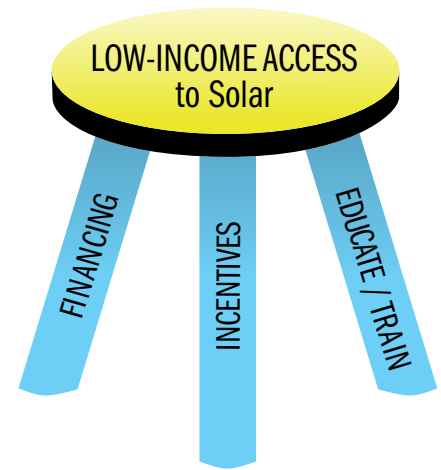
A comprehensive approach should consist of incentives, financing and education/training/workforce development. These form three legs of a stool that can create a solid structure for successful implementation and adaptation of sustainable energy for our most vulnerable neighbors. This trifecta is even more necessary for our low-income populations as together they address the identified barriers of high upfront costs, housing issues, split incentives in rentals, lack of credit, and lack of information.

⁹⁵ Sustainable energy refers to a combination of renewable energy, energy efficiency, weatherization and storage. It is not limited to electricity, but should encompass heating (including switching fuels from fossil fuels to more sustainable sources such as biomass and cold climate heat pumps) and transportation (including biofuel and electric vehicles).

⁹⁶ See Julian Spector, "How to Fix Solar Power's Inequality Problem," citylab.com/life/2016/03/shared-renewable-energy-community-solar-low-income-families-inequality/473103/

A. INCENTIVES

If strong policies are not in place to create solar incentives across all income levels, then it is inevitable that the result will lead to solar access only for people with higher incomes. Incentives can be in the form of rebates, net-metering credits, or subsidized measures. Incentives are often viewed as a way to help bring a technology to market. Consider using incentives to provide the low-income market access to the technology.



1 REBATES

Programs that lower the upfront cost of solar will make it easier for more low and moderate income customers to participate.

FEDERAL. As mentioned above, the Income Tax Credit (ITC) is fundamentally discriminatory against lower income individuals. Moving to a rebate system can rectify this inequity. For example, for a brief period from 2009 to 2011, the Section 1603 Treasury program, established in the American Recovery and Reinvestment Act, provided a direct cash payment in lieu of the ITC.⁹⁷ A comparable grant provision that would be applicable to not-for-profit, municipal and low-income participants would eliminate the complication of reliance on third parties to access the incentive.

STATE. Improve direct subsidies for low-income participation in shared solar. These subsidies could track historic programs such as \$/Watt incentives, \$/kWh adders, or grants for percentage of LMI participation in community solar projects. A state rebate for qualifying individuals could provide a down payment to facilitate financing the project. Consider a rebate for solar that is installed on a Vermont (zero-energy single manufactured home paired with storage and solar).⁹⁸ Unused net-metering credits require that utilities apply net-metering credits that are about to expire to non-profits serving low-income or directly to low-income individuals. Allow customers to specify which organization or person.

2 NET-METERING

The continuation of net-metering and group net-metering is critical. It is ironic that utilities are using the low-income community as the scape goat for hampering net-metering. Instead we should be creating an equal opportunity for low-income individuals to participate in individual and group net-metering so they can have the monthly savings, price stability and, when the panels are paid off, considerably lower electric payments. Last year's legislation resulted in the inability to apply net-metering credits to the non-bypassable charges. Low-income participants should be able to have their credits attribute to these fixed cost portions of the bill, as their wealthier predecessors did. (See section VII. C. 3. Increasing Participation for suggestions on qualifying low-income residents for energy benefits.)

⁹⁷ Recovery Act: 1603 Program: Payments for Specified Energy Property in Lieu of Tax Credits, US. Treasury [treasury.gov/initiatives/recovery/pages/1603.aspx](https://www.treasury.gov/initiatives/recovery/pages/1603.aspx); Michael Mendelsohn, "1603 Treasury Grant Expiration: Industry Insight on Financing and Market Implications," [nrel.gov/docs/fy12osti/53720.pdf](https://www.nrel.gov/docs/fy12osti/53720.pdf) See also: See Jones and James, "Distributed Renewables in the New Economy: Lessons from Community Solar Development in Vermont," in *Law and Policy for a New Economy: Sustainable, Just, and Democratic*, Edited by Melissa K. Scanlan, Edward Elgar 2017. [uspref.org/wp-content/uploads/2011/09/Tax-Credits-Tax-Equity-for-Clean-Energy-Financing.pdf](https://www.uspref.org/wp-content/uploads/2011/09/Tax-Credits-Tax-Equity-for-Clean-Energy-Financing.pdf).

⁹⁸ [renewableenergyworld.com/ugc/articles/2016/11/14/vermont-affordable-housing-development-sets-new-standard-for-resilient-zeroenergy-homes.html](https://www.renewableenergyworld.com/ugc/articles/2016/11/14/vermont-affordable-housing-development-sets-new-standard-for-resilient-zeroenergy-homes.html).

For individual net-metering projects, a low-income adder can help make the project accessible by reducing the number of years to pay off the system while maintaining a cashflow positive project. This can also help address the inequity and uncertainty regarding the applicability of tax credits. Creating adders can help make serving this population more enticing to solar developers.

3 ENCOURAGE LOW-INCOME PARTICIPATION IN GROUP NET-METERING

Community solar can be a great solution for low-income utility customers that don't have suitable property or live in rental housing. There are two ways that community solar can be a solution: 1) for individual participation and 2) for participation by a multi-family housing provider.

Eliminate the 500kW limit for non-profit institutions. As mentioned above in housing, some renters live in affordable housing where the electric bill is included in the rent. The 500kW size limit hinders the development of projects for affordable housing.

In addition, at a state level, *create incentives for projects that have a minimum percentage of participation from either Vermonters that qualify as low-income and/or the non-profits and institutions that primarily benefit low-income Vermonters.* The legislature should set the participation requirements for the low-income adder to be significant (in Colorado the legislature simply instructed the PUC to set an allocation for low-income participation, which the PUC then set at 5%)⁹⁹. Simply creating minimum participation requirements does not work if other barriers are not addressed. The incentive adder, financing options, and information dissemination help address these barriers.

Two potential incentives: 1) low-income adder to the net-metering credit for the entire project, and 2) consider the site of any project with over 50% low-income participation to be a preferred site. These adjusters or adders can help 1) cover additional up front and administrative costs in order to properly market for participation and structure the contract for the flexibility to withdraw if the individual needs to move, etc., and 2) motivate communities, developers, and non-profits to include these residents in their community solar projects.

At a municipal level, communities can be encouraged to put policies in place with model paragraphs to require a certain percentage of low-income/non-profit participation in order to qualify for the municipal approved preferred siting adder or the use of scarce municipal land for community solar projects.¹⁰⁰

4 RENEWABLE ENERGY CREDITS

Studies have shown that low-income Vermonters are also concerned about climate change and would like the opportunity to help make a difference. So, it is important to allow customers to retain their renewable energy credits (RECs) without penalty if they agree to retire them or keep them bundled with their solar energy.¹⁰¹

⁹⁹ Shalanda H. Baker, "Unlocking the Energy Commons: Expanding Community Energy Generation," in *Law and Policy for a New Economy: Sustainable, Just, and Democratic* edited by Melissa Scanlan, Edward Elgar, 2017

¹⁰⁰ Under current legislation sites are designated preferred sites and eligible for an adder if they are a gravel pit, landfill, parking lot, rooftop, or a site designated by town officials.

¹⁰¹ Renewable energy credits (REC) are the environmental attribute associated with a unit of energy that is produced from renewable energy. They can be sold separately from the unit of energy. However, in selling a REC the unit of energy no longer represents the solar or wind source, but only the energy mix of the utility. The current legislation provides a three-cent penalty if an individual keeps the REC for themselves and a three-cent bonus if the individual sells the REC to the utility. So if someone wants to hold onto the renewable energy attribute of the energy being produced they will receive 6 cents less than the individual that sells the attribute to the utility. While the law requires that the utility "retire" that REC, that REC counts toward the utility's RPS goals and allows the utility to sell the environmental attributes of other renewable energy projects.

Require more vigorous enforcement of deceptive solar practices. There continues to be significant confusion regarding products marketed as solar when the customer does not receive the RECs. There is a need for increased federal and state deterrents so that when companies market that customers can “go solar” with their products, they can count on the fact that they will legally be provided the solar electricity.

B. FINANCING OPTIONS

1 SUPPORT EXISTING FINANCING PROGRAMS

Incentives, while absolutely necessary, are not enough. They are only one leg of the stool. Low-income residents need alternative financing mechanisms that don't rely on credit and don't over-leverage them. There are a number of financing options in Vermont that try to increase availability to Vermonters by lowering interest rates and credit qualifications: the State of Vermont Heat Saver Loan,¹⁰² Neighborworks of Western Vermont Energy Loan¹⁰³, and VSECU's VGreen program.¹⁰⁴ These programs are all meaningful and serve an important segment of Vermont's population. They should continue to grow in size and help leverage investments.

LOAN GUARANTEES. Insuring that funds are available for interest rate buy downs or loan guarantees is important. Simplify/improve loan guarantees to increase credit access for low-income customers. Stable net metering policies lead to predictable revenues and low risk in residential lending for community solar projects. Private lenders, once familiar with these provisions, should be able to reduce credit requirements for low-income participants.

EXPAND FUNDING for low-income Vermonters through existing federal programs. For example, the United States Department of Agriculture (USDA) Rural Development's Rural Energy for America Program (REAP), created in 2008 and reauthorized in the 2014 Farm Bill, successfully promotes the use of solar technologies for eligible agricultural producers with at least 50 percent of gross income coming from agricultural operations and rural small businesses.¹⁰⁵ Money for financing projects is also available to utilities from the USDA Rural Utility Service (RUS) Energy Efficiency and Conservation Loan Program.¹⁰⁶ Use a revolving loan fund to support existing low-income programs and utility on-bill tariff programs.

However, these financing solutions do not solve many of the barriers faced by low-income Vermonters. As mentioned above, a large portion of this population segment cannot or will not borrow directly for capital investments because they either a) rent rather than own; b) are not eligible for credit; and/or c) are unwilling to borrow because they are uncertain of the future and how long they will be living at their current location.

2 PROMOTE “GREEN LEASE” OR “ENERGY ALIGNED” CLAUSES

One mechanism for approaching the split incentive situation is to provide model language that promotes “green lease” or “energy aligned” clauses. Green lease clauses encourage landlords to install solar or invest in energy efficiency measures by providing a mechanism to collect the difference. A successful program would

¹⁰² efficiencyvermont.com/services/financing/homes.

¹⁰³ nwwt.org/energy-loan/.

¹⁰⁴ vsecu.com/financial/clean-energy-loans/about.

¹⁰⁵ United States Department of Agriculture, “USDA invests \$68 million in 540 renewable energy and energy efficiency projects nationwide.” News Release, September 18, 2014, usda.gov/wps/portal/usda/usdahome?contentid=2014/09/0202.xml. See also, United States Department of Agriculture. “Rural Energy for America Program Renewable Energy Systems & Energy Efficiency Improvement Loans & Grants: Program 101,” 2016, rd.usda.gov/programs-services/rural-energy-america-program-renewable-energy-systems-energy-efficiency.

¹⁰⁶ rd.usda.gov/programs-services/energy-efficiency-and-conservation-loan-program.

need a neutral third party such as Efficiency Vermont to set example terms for specific investments. For example, an efficient appliance might save on average \$25 dollars a month – so perhaps the landlord collects \$15-\$20 per month. The net to the tenant is a lower cost per month and the landlord has the potential for a return on the investment. (New York City developed an Energy Aligned Clause: “Base owners’ cost recovery on predicted savings, but limit owners’ capital expense pass-through to 80% of such predicted savings in any given year. This is called the 20% “Performance Buffer.”)¹⁰⁷ This approach to landlord investment and the model language for a lease could be included in the Renting in Vermont, Information Handbook for Tenants & Landlords¹⁰⁸ and on the State’s “Resources for Renters and Landlords” website page.¹⁰⁹ Short of requiring landlords to provide these services, this approach may help some who wish to “do the right thing,” but is unlikely to be widely adopted.

3 ON-BILL TARIFF AND ON-BILL FINANCING

There are three mechanisms of on-bill financing: on-bill lending, on-bill collections and on-bill tariff.¹¹⁰ The on-bill tariff addresses the barriers identified above surrounding rentals, lack of credit, and future uncertainty.

- **On-bill lending is when a utility lends money to the individual and collects payment on the bill.**
- **On-bill collection is when a third party lends the money (such as a credit union or lending program like Neighborworks of Western Vermont) and the utility (such as GMP) collects the payment on the bill.**¹¹¹
- **On-bill tariff is when a utility invests in efficiency or renewables at a home by “lending” to the meter rather than to the individual. The utility collects the payment on the bill in the form of a tariff.**

On-bill collections and on-bill lending have benefits. They can help simplify payment for the homeowner by reducing the number of bills to pay. On-bill collections have a track record of lower default rates and are being used to a small degree in Vermont.

AN ON-BILL TARIFF CAN ADDRESS MANY IDENTIFIED LOW-INCOME BARRIERS by providing a legal mechanism for utilities to “lend” to the meter in a house instead of to a person. This allows an investment in the infrastructure without creating a personal debt for the customer. As mentioned above in Barriers, there are many reasons that a low-income person won’t, can’t or shouldn’t take on debt. Taking on personal debt for energy or efficiency projects may prevent the individual from a future loan that is needed for transportation, health, moving, job loss, disability, or other circumstances. It is critical to not over-leverage low-income Vermonters in a way that could prevent access to vital necessities. In addition, lending to the meter addresses the rental/landlord split incentive problem. The landlord agrees to the investment made by the utility on the property, the tenant saves and pays on the utility bill, and the landlord benefits from a long-term upgrade to the property.

¹⁰⁷ nyc.gov/html/gbee/downloads/pdf/121115_eac.pdf.

¹⁰⁸ cvoeo.org/fileLibrary/file_99.pdf.

¹⁰⁹ accd.vermont.gov/housing/resources-rules/renters-landlords.

¹¹⁰ For a good description of the differences see: aceee.org/sector/state-policy/toolkit/on-bill-financing.

¹¹¹ nwwvt.org/energy-loan/.

THE MECHANICS. The Public Utility Commission approves the tariff class for the utility. The upfront cost of efficiency and renewable measures are paid for by the utility.¹¹² A portion of the monthly savings is used to repay the investment as a voluntary tariff on the customer's utility bill. The individual, in accepting the investment, volunteers for the tariff. The tariff on the bill is a rate specific to the investment in that property (in accordance with the PUC order approving the tariff class). Because the risk of default is so low and the payment stays with the meter and not the individual, the loan can be made for a longer period than conventional loans. This can ensure that the project is truly cash-flow positive for the customer.

THE VOLUNTEER TARIFF is collected in the same manner as other utility services—non-payment may result in a shut-off of services. Since the bill is not higher than it was before the investment, the customer is in a same or better position as they were originally. The customer benefits from improvements to the home and has net savings (because they are saving more money than the tariff on the bill). The utility has a very low default risk.

PROPOSED ACTION. Legislation should be adopted that requires utilities to offer these tariff investments. To alleviate any question of authority, the legislation should specifically authorize the PUC to approve this class of tariffs for distribution utilities.¹¹³ Each utility would submit a proposed tariff class with the utility specific details regarding implementation. Individual projects will follow the protocols outlined in the approved tariff class to assure consumer protection.

CONSUMER PROTECTION. When collecting the money via tariff, the consumer is susceptible to disconnection, so consumer protection guidelines are paramount. At least five states use the Pay as You Save (PAYS) program.¹¹⁴ In the PAYS program consumer protection is put in place by collecting a tariff that is less than 80% of the actual savings and not collecting the tariff if the measure is not delivering savings. Consequently, the consumer has a lower electric bill. Utilities should recoup administrative costs, plus the cost of capital plus a fraction of percent for the utility. This will ensure that a higher portion of the savings benefits the utility customer.¹¹⁵

FUTURE CROSS FUEL CHALLENGE. Current usage of the on-bill tariff is only for the investment of measures that displace usage on the electric bill such as solar or more efficient refrigerators, water heaters or air-conditioning. However, to meet Vermont's energy and climate goals Vermonters need to shift away from fossil fuel sources in heating and transportation. The most effective way to do this is through strategic electrification. Using on-bill tariffs to fund investments in this type of electrification requires the development of additional consumer protections because the utility and the PUC can only compare the consumers past and present electric bills—not the myriad of places they may be getting other fuels. How to solve this challenge is not addressed in this report.

¹¹² The utility may be supported by third party financing such as its own bond financing, USDA or credit-unions.

¹¹³ See Nancy Wasserman, Sleeping Lion Associates, Discussion Paper for On-bill Financing prepared for High Meadows Fund in January 2012.

¹¹⁴ eeivt.com/wordpress/commission-orders-establishing-pays-precedents/ (NH, MI, HI, KY, KS)

¹¹⁵ Many leasing products have come to the market to address the inability of most Americans to pay upfront for efficiency and renewable measures. Unfortunately the financing costs paid by the customer often are significantly higher than what wealthier customers can access. Many of these programs put a substantial amount of the return on investment in the lessor's pocket, leaving the homeowner with a small return and the inability to capitalize on the financial benefit of a project paid in full. Utilities and third party leasing companies have often used the argument that they are saving the customer some money. However, it is fundamentally unfair for the portion of our population that most needs savings to realize only a fraction of savings and price stability of their wealthier counterparts.

4 CLARIFY LEGAL REQUIREMENTS

It is important for market participants to understand when certain complex legal requirements such as federal and state securities regulations and consumer lending laws apply. It is also important to work with state authorities to develop simplified methods and models for certain size projects to facilitate community solar.

C. COLLABORATION, INFORMATION DISSEMINATION, AND WORKFORCE DEVELOPMENT

The final leg of the stool is education and training, which leads to work force development.

1 COLLABORATE TO DEVELOP PATHWAYS FOR PARTICIPATION

The development of these solutions and pathways for participation should be done as a collaboration between various constituents.¹¹⁶ If possible this should include local government and government agencies, utilities, industry groups, vendors, developers, financial institutions, community action groups, affordable housing entities, educational institutions, and other people interested in forwarding social equity for our low-income population.¹¹⁷ This working group could help inform and develop necessary legal, financial and technical assistance. We should also work to improve collaboration between town energy committees, schools, and other community-based organizations on education and development of community renewables.

2 FUND COMMUNICATION OUTREACH

Communication and information dissemination take time and money. It is critical that funding be available for the development of materials and an outreach program so that efforts can be scaled to reach the low-income communities that are often in remote locations, difficult to reach, and unaware of the options available to them.¹¹⁸ Utilities and state regulatory authorities should be required to offer increased education to underserved communities on the benefits of solar, how net metering and related programs work and what to look out for in regards to deceptive marketing. Funding should not be provided to just one entity, but support should be provided to programs providing assistance, such as community-based organizations currently working directly with low-income people.

3 EDUCATE AND INFORM

INFORM PARTNERS. Once we have created a pathway for participation, it is critical that we get the information about potential benefits and opportunities for solar energy participation to Vermonters. In addition to our distribution and efficiency utilities, we should leverage our housing organizations, community action networks, community development corporations, and other low-income service providers. Making sure that the workers on the ground throughout our communities are aware of new opportunities is key to spreading the word. Inform Industry. There are a variety of different programs that can be leveraged to help industry if they

¹¹⁶ Environmental Protection Agency, EPA's Environmental Justice Collaborative Problem-Solving Model, 2008, [19january2017snapshot.epa.gov/sites/production/files/2015-04/documents/ejproblemcollaborativesolvingmodel.pdf](https://www.epa.gov/sites/production/files/2015-04/documents/ejproblemcollaborativesolvingmodel.pdf).

¹¹⁷ An Energy Access Coalition is in the process of being formed to focus on these issues with its first meeting on December 20, 2017.

¹¹⁸ Mueller, James and Ronen, Amit, "Bridging the solar income gap." GW Solar Institute, George Washington University, 2015, [researchgate.net/publication/279853335_BRIDGING_THE_SOLAR_INCOME_GAP](https://www.researchgate.net/publication/279853335_BRIDGING_THE_SOLAR_INCOME_GAP).

are aware of their existence and how they work. The State, without endorsement, should provide an online clearinghouse of available programs and materials. Continually informing and reminding industry what deceptive marketing practices look like is an important part of providing equitable access to solar.

INCREASE PARTICIPATION. Only a small fraction of qualified individuals access available support. With a low-income solar program that leverages long term investments with an on-bill tariff and fair net-metering program, we can afford and need greater participation. This could be achieved by adding two questions on the State Income Tax Return: 1) inquire about their interest in receiving information regarding cashflow positive efficiency and renewable opportunities if they are income qualified; 2) ensure that benefits stay with low-income by asking them to verify they don't have more than a determined amount of money in liquid assets. Those that do qualify should receive a Letter of Qualification for Energy Programs that outlines the programs they qualify for, provides ways to get additional information, and becomes a verification mechanism for utilities.

COMMUNICATE DIRECTLY. *Get permission to provide product neutral information regarding programs for qualifying low-income individuals.* Provide information that helps people understand the economics of their various options, including direct ownership, third party financing, utility products and leasing. Make information available in multiple languages.

MOTIVATE NEIGHBORS. So many Vermonters need the benefits of weatherization, energy efficiency, and solar. Once an effective program is in place, let's motivate individuals in low-income communities to help inform their neighbors. Perhaps create an information distribution system that is rewarded. The incentive (say through Efficiency Vermont) for the individual to get training and then encourage their community members to participate is free measures in their home (rather than cash that may push them over their benefits cliff). We need informed neighbors helping neighbors understand the opportunities to save money and get warm. There are benefits to training people to inform their neighbors about efficiency, weatherization, and renewable energy options: people may be more willing to listen or trust someone from their community, and the individual gains a skill that may translate to a higher paying job.

EDUCATE CHILDREN. While this policy solution takes time to mature, introducing children of all economic backgrounds to the importance and accessibility of solar energy would familiarize them with the technology and its economic and environmental attributes.

4 WORKFORCE DEVELOPMENT

Let's invest in training and workforce development to meet these needs. As we do, consider including a gender lens to promote participation by women in the technical fields. This may actually help with interest, acceptance and implementation. This training can lead to workforce development for jobs that enable folks to increase their economic opportunities.

VIII. CONCLUSION

The growing disparity in access to solar energy has been acknowledged as a serious problem. As we create a comprehensive approach to empower low-income residents to attain a cashflow positive benefit from solar ownership, let's keep two things in mind: 1) Addressing this portion of the population comes with specific challenges and takes time. Policies need to provide longer term predictability so that programs and education can be built up, adopted, and expanded. 2) Low-income Vermonters live in a variety of housing situations and our policies, incentives and regulations should address the entire range. Let's use the three legs of the stool—incentives, financing, and education—to create a solid step up to greater energy stability for struggling Vermonters.

IX. LIST OF ORGANIZATIONS INTERVIEWED

BURLINGTON HOUSING AUTHORITY

Paul Dettman, Executive Director

4/12/2016

CAPSTONE COMMUNITY ACTION

Anita Kelman, Energy Efficiency Coach

2/18/2016

CHAMPLAIN VALLEY OFFICE OF ECONOMIC OPPORTUNITY

Jenn Wood, Director

3/31/2016

CLEAN ENERGY DEVELOPMENT FUND (CEDF), VERMONT DEPARTMENT OF PUBLIC SERVICE

Andy Perchlik, Manager

8/11/2016

LAKE SUNAPEE BANK

J. Tyler Gilday, Senior V.P. and Director of Retail Lending

5/9/2016

NEIGHBORWORKS OF WESTERN VERMONT

Thad Ormand, Chief Financial Officer

4/6/2016

SOUTHEASTERN VERMONT COMMUNITY ACTION (SEVCA)

Harold Schmidke, Director

4/19/2016

VERMONT ENERGY INVESTMENT CORPORATION (VEIC)

Beth Sachs, Founder

7/15/2016

VERMONT HOUSING AND CONSERVATION BOARD (VHCB)

Gus Seelig, Executive Director

2/24/2016

VERMONT HOUSING AND CONSERVATION BOARD (VHCB)

Craig Peltier, Director of Asset Management

2/24/2016

VERMONT OFFICE OF HOUSING AND URBAN DEVELOPMENT

Michael McNamara, Field Office Director

3/2/2016

VERMONT STATE EMPLOYEES CREDIT UNION (VSECU)

Laurie Fielder, Director of VGreen Program

2/25/2016

IV. REFERENCES

American Council for an Energy-Efficient Economy (AEEE) (April 20, 2016). "Report: 'Energy burden' on low-income, African American, & Latino households up to three times as high as other homes, more energy efficiency needed. aceee.org/press/2016/04/report-energy-burden-low-income.

Blustein, D. (Danielle). (July 26, 2016). "Breaking barriers: Helping low-to-moderate income families go solar." Consumers Union. consumersunion.org/2016/07/breaking-barriers-helping-low-to-moderate-income-families-go-solar/.

Bovarnick, B. (Ben) and Banks, D. (Darryl). (September 23, 2014). "State policies to increase low-income communities' access to solar power." Center for American Progress. americanprogress.org/issues/green/report/2014/09/23/97632/state-policies-to-increase-low-income-communities-access-to-solar-power/.

Bovarnick, B. (Ben), and Banks, D. (Darryl). (September 2014). "State policies to increase low-income communities' access to solar power: Report." GW Solar Institute, George Washington University. cdn.americanprogress.org/wp-content/uploads/2014/09/LowIncomeSolar-brief.pdf.

Bovarnick, B. (Ben), and Banks, D. (Darryl). (September 2014). "State policies to increase low-income communities' access to solar power: Summary." GW Solar Institute, George Washington University. solar.gwu.edu/research/state-policies-increase-low-income-communities%E2%80%99-access-solar-power.

Calechman, S. (Steve). (March 14, 2016). "Making community solar work for low-income customers." greentechmedia.com/articles/read/making-community-solar-work-for-low-income-customers-is-crucial-for-growth.

California Department of Community Services and Development. (??). "Solar for All California." csd.ca.gov/Services/HelpPayingUtilityBills/SolarForAllCalifornia.aspx.

California Energy Commission. (2016). Low-Income Barriers Study, Part A: Overcoming barriers to energy efficiency and renewables for low-income customers and small business contracting opportunities in disadvantaged communities. energy.ca.gov/business_meetings/2016_packets/2016-12-14/Item_08/Item_08.pdf.

Center for American Progress. (2015). "Talk Poverty." talkpoverty.org/state-year-report/vermont-2015-report/.

Clean States Energy Alliance. (July 2016). "A directory of state clean energy programs and policies for low-income residents." cesa.org/assets/Uploads/State-Low-Income-Programs-Dec2015.pdf.

Clean States Energy Alliance. (January 2016). "A directory of state clean energy programs and policies for low-income residents." Retrieved from cesa.org/projects/Clean-Energy-for-Low-Income-Communities/resources/resource/directory-of-state-clean-energy-programs-and-policies-for-low-income-residents.

Coalition for Community Solar Access. (July 2016). "Residential Consumer Guide to Community Solar." Retrieved from communitysolarhub.com/images/uploads/general/Residential_Consumer_Guide_to_Community_Solar_-_FINAL.pdf.

Colorado Community Solar Gardens Act. (September 2010). House Bill 10-1342. solargardens.org/legislation-news-2/colorado-community-solar-gardens-act/.

Community Power Network. "Why solar for low-income communities?" communitypowernetwork.com/node/9486.

Database of State Incentives for Renewables and Efficiency. (DSIRE). "Incentives/Policies for Solar, State of Vermont." programs.dsireusa.org/system/program?state=VT.

Database for State Incentives for Renewables and Efficiency (DSIRE). (May 19, 2016). "Standard Offer Program." programs.dsireusa.org/system/program/detail/5680.

Database for State Incentives for Renewables and Efficiency (DSIRE). (July 1, 2015). Sustainable Price Energy Enterprise Development (SPEED) Program Goals. programs.dsireusa.org/system/program/detail/1141.

Database for State Incentives for Renewables and Efficiency (DSIRE). Vermont: Renewable Energy Standard. programs.dsireusa.org/system/program/detail/5786.

Dobos, H. (Hillary M.) & Artale, E. (Emily). (November 2015). "Analysis of the fulfillment of the low-income carve-out for community solar subscriber organizations." Lotus Engineering & Sustainability, LLC, prepared for the Colorado Energy Office. colorado.gov/pacific/sites/default/files/atoms/files/Low-Income%20Community%20Solar%20Report-CEO.pdf.

Dong, X. (Xiumei) (5/09/16). "Turning low-income neighborhoods on to solar power." usnews.com/news/articles/2016-05-09/turning-low-income-neighborhoods-on-to-solar-power.

Drehobl, A. (Ariel) and Ross, L. (Lauren). (April 2016). "Lifting the high energy burden in America's largest cities: How energy efficiency can improve low-income and underserved communities," American Council for an Energy-Efficient Economy (ACEEE). energyefficiencyforall.org/sites/default/files/Lifting%20the%20High%20Energy%20Burden_0.pdf.

Engineering.com. “Why solar?” engineering.com/SustainableEngineering/RenewableEnergyEngineering/SolarEnergyEngineering/WhySolarEnergy/tabid/3893/Default.aspx.

Environmental Protection Agency. (2016). “Climate and health resources: Vermont.” 3.epa.gov/climatechange/Downloads/impacts-adaptation/vermont-fact-sheet.pdf.

Environmental Protection Agency (EPA). (2008). EPA’s Environmental Justice Collaborative Problem-Solving Model. epa.gov/communityhealth/environmental-justice-collaborative-problem-solving-model.

Environmental Protection Agency (EPA). “Understanding third-party ownership financing structures for renewable energy.” epa.gov/repowertoolbox/understanding-third-party-ownership-financing-structures-renewable-energy.

Freeman, A. (Andrew). (May 10, 2012). “Hurricane Irene ranked most costly Category 1 storm. Climate Central. climatecentral.org/news/hurricane-irene-ranked-most-costly-category-1-storm.

Freeman, G. (Gregg), Huebner, H. (Heather), Kelly, A. (Aaron). (February 2016). “An analysis of renewable energy credits in Vermont.” Vermont Law School Energy Clinic, produced for the Vermont Senate Committee on Natural Resources and Energy. assets.vermontlaw.edu/Assets/iee/VLS%20Energy%20Clinic%20Report%20on%20RECs%20Final%20for%20SNRE.pdf.

Galford, G. (Gillian). (2014). “Vermont Climate Assessment.” Rubenstein School for Environment and Natural Resources, University of Vermont. vtclimate.org.

Greentech Media Research. (June 2015). “U.S. Community Solar Market Outlook 2015-2020.” greentechmedia.com/research/report/us-community-solar-market-outlook-2015-2020.

GRID Alternatives. (no year given for website information). About SASH. gridalternatives.org/learn/sash.

GRID Alternatives, Vote Solar Initiatives, and Center for Social Inclusion. (March 2016). “Low-income solar policy guide.” lowincomesolar.org/wp-content/uploads/2016/03/Low-Income-Solar-Policy-Guide_3.11.16.pdf.

GRID Alternatives, Vote Solar Initiatives, and Center for Social Inclusion. (March 2016). “Low-income solar policy guide website.” lowincomesolar.org/.

Grubinger, V. (Vern) (May 2011). “Climate Change and Vermont Agriculture.” University of Vermont Extension. uvm.edu/vtvegandberry/factsheets/climatechange.html.

Hernandez, M. (Mari). (October 21, 2013). “Solar power to the people: The rise of rooftop solar among the middle class.” Center for American Progress. americanprogress.org/issues/green/report/2013/10/21/76013/solar-power-to-the-people-the-rise-of-rooftop-solar-among-the-middle-class/.

Institute for Poverty and Research. (2016). “How is poverty measured in the United States?” irp.wisc.edu/faqs/faq2.htm.

International Fund for Agricultural Development (IFAD). “The untold story: Climate change sinks below the headlines.” Retrieved from: ifad.org/documents/10180/6173b0cf-3423-408c-aac6-e6da78f01239.

Interstate Renewable Energy Council (IREC). (March 2016). “Shared renewable energy for low- to moderate-income customers: Policy guidelines and model provisions.” irecusa.org/publications/shared-renewable-energy-for-low-to-moderate-income-consumers-policy-guidelines-and-model-provisions/.

Jospé, C. (Christophe), Probst, C. (Curtis), Burstein, M. E. (Mara Elana), Deng, T. (Tiancheng), Helson, E. (Erica), Mayer, C. (Chanelle), Palacios, K. (Kim), Valdebenito, I. (Igor), Verriest, K. (Kirstin), Youn, B. (Bora). (Spring 2014). “Ensuring New York solar programs reach low-income residents.” School of International and Public Affairs, Columbia University. mpaenvironment.ei.columbia.edu/files/2014/06/GRIDAlternativesProject.Final_.pdf.

Kowalski, K. (Kathiann) (3/05/16). “Report: Big benefits possible with solar on low-income homes.” midwestenergynews.com/2016/03/15/report-big-benefits-possible-with-more-low-income-solar-energy/.

Leon, W. (Walter). (June 2015). “Clean energy champions: The importance of state programs and policies.” Clean Energy States Alliance. cesa.org/assets/2015-Files/Clean-Energy-Champions-LR.pdf.

Lotus Engineering and Sustainability, LLC. (November 2016). Analysis of the fulfillment of the low-income carve-out for community solar subscriber organizations. colorado.gov/pacific/sites/default/files/atoms/files/Low-Income%20Community%20Solar%20Report-CEO.pdf.

MacLean, J. (John). (January 15, 2010). "Structuring Loan Loss Reserve Funds." Energy Efficiency Finance Corp. [1.eere.energy.gov/wip/solutioncenter/pdfs/Loss_Reserve_Funds_MacLean_Presentation_011510.pdf](http://eere.energy.gov/wip/solutioncenter/pdfs/Loss_Reserve_Funds_MacLean_Presentation_011510.pdf).

Magill, B. (Bobby). (March 18, 2014.) "Wood burning for home heating trendy in Northeast." Climate Central. climatecentral.org/news/burning-wood-for-home-heating-now-a-new-england-trend-17191.

Massachusetts Executive Office of Energy and Environmental Affairs. (2017). Massachusetts Solar Loan Program. mass.gov/eea/energy-utilities-clean-tech/renewable-energy/solar/residential-solar-loan-program.html.

McConnell, T. (Tim). (January/February 2016). "The problem with rooftop solar that nobody is talking about." Mother Jones. motherjones.com/environment/2016/01/green-energy-rec-rooftop-solar-panels.

McKie, R. (Robin). (August 6, 2016). "Scientists warn world will miss key climate target." The Guardian. theguardian.com/science/2016/aug/06/global-warming-target-miss-scientists-warn.

Meyers, G. (Glenn). (March 17, 2016). "Low-income solar policy guide launched by national nonprofits." Clean Technica. cleantechnica.com/2016/03/17/low-income-solar-policy-guide-launched-national-nonprofits/.

Milman, O. (Oliver). (August 30, 2016). "NASA: Earth is warming at a pace unprecedented in 1,000 years." The Guardian. theguardian.com/environment/2016/aug/30/nasa-climate-change-warning-earth-temperature-warming.

Munsell, M. (Mike). (July 29, 2014). "72% of residential solar installed in 2014 was third-party owned." Greentech Media. greentechmedia.com/articles/read/72-of-us-residential-solar-installed-in-2014-was-third-party-owned.

Munsell, M. (Mike). (June 23, 2015). "U.S. community solar market to grow fivefold in 2015, top 500 MW in 2020." Greentech Media. greentechmedia.com/articles/read/us-community-solar-market-to-grow-fivefold-in-2015-top-500-mw-in-2020.

Mueller, J. (James) and Ronen, A. (Amit). (2015). "Bridging the solar income gap." GW Solar Institute, George Washington University. researchgate.net/publication/279853335_BRIDGING_THE_SOLAR_INCOME_GAP.

National Aeronautics and Space Administration. (September 12, 2016). "NASA analysis finds August 2015 another record month." Goddard Institute for Space Studies. data.giss.nasa.gov/gistemp/news/20160912/.

National Center for Children in Poverty. (2014). "Vermont Demographics of Poor Children." nccp.org/profiles/VT_profile_7.html.

Ortiz, W. (Wendy). (August 19, 2015). "Lessons on climate change and poverty from the California drought." Center for American Progress. americanprogress.org/issues/poverty/report/2015/08/19/119446/lessons-on-climate-change-and-poverty-from-the-california-drought/.

Pyper, J. (Julia). (March 16, 2016). "Millions of Americans stand to benefit from targeted low-income solar policies." Greentech Media. greentechmedia.com/articles/read/Millions-of-Americans-Stand-to-Benefit-from-Targeted-Low-Income-Solar-Polic.

Rathke, L., (Lisa). (September 18, 2014). "Poverty rate rises, median income falls in Vermont." The Washington Times. washingtontimes.com/news/2014/sep/18/census-poverty-rate-rises-in-vermont/.

Renewable Energy World, editors. (July 8, 2016). "Report: Solar + Storage could eliminate electric bills for California's affordable housing projects." cesa.org/assets/Uploads/State-Low-Income-Programs-Dec2015.pdf.

Ronen, Amit and Schoolman, Anya. (2014). Consensus recommendations on how to catalyze low-income solar in DC. GW Solar Institute. solar.gwu.edu/research/consensus-recommendations-how-catalyze-low-income-solar-dc.

Roselund, C. (Christian) (3/15/16). "Reports focus on low-income solar in the United States." pv-magazine.com/news/details/beitrag/reports-focus-on-low-income-solar-in-the-united-states_100023695/#axzz4DeqKZZK2.

Sears, J. (Justine). (March 2016). Mapping total energy burden in Vermont: Investigating patterns in Vermonters' thermal, electric and transportation energy use. Vermont Energy Investment Corporation, Transportation Efficiency Group. efficiencyvermont.com/Media/Default/docs/white-papers/efficiency-vermont-mapping-energy-burden-vermont-white-paper.pdf.

Shahyd, K. (Khalil). (April 20, 2016). "Study highlights energy burden for households and how energy efficiency can help." NRDC. nrdc.org/experts/khalil-shahyd/study-highlights-energy-burden-households-and-how-energy-efficiency-can-help.

Shallenberger, K. (Krysti). (April 11, 2016). "Massachusetts Gov. Baker signs bill lifting solar cap, lowering net metering rates." Utility Dive. utilitydive.com/news/massachusetts-gov-baker-signs-bill-lifting-solar-cap-lowering-net-metering-rates-1/417201/.

Shayd, K. (Khalil). (April 20, 2016). "Study highlights energy burden for households and how energy efficiency can help." NRDC. nrdc.org/experts/khalil-shahyd/study-highlights-energy-burden-households-and-how-energy-efficiency-can-help.

Solar Energy Industries Association (SEIA). (September 2011). "Integrating photovoltaic systems into low-income housing developments." nrel.gov/docs/fy11osti/51075.pdf.

Solar Industries Energy Association (SIEA). (2016). "Solar industry data." seia.org/research-resources/solar-industry-data.

Solar Energy Industries Association (SEIA). (June 15, 2016). "Solar Spotlight: Vermont." seia.org/state-solar-policy/vermont.

Solar Energy Industries Association (SEIA). Issues and policies: Third-party financing. seia.org/policy/finance-tax/third-party-financing.

Solar Energy Industries Association (SEIA). (2016). "The Solar Investment Tax Credit (ITC)." seia.org/sites/default/files/ITC%20101%20Fact%20Sheet%20-%2004-19-2016.pdf.

Solar Power Rocks. (2016). "2016 United States solar power rankings." solarpowerrocks.com/2016-state-solar-power-rankings/.

Solis, Gustavo. (February 2016). "El Barrio is going green." WDC Solar. wdcsolar.com/news.

Spector, J. (Julian). (March 11, 2016). "How to fix solar power's inequality problem." citylab.com/tech/2016/03/shared-renewable-energy-community-solar-low-income-families-inequality/473103/.

State of Vermont. (2016). "Climate change in Vermont: Health." Agency of Natural Resources. climatechange.vermont.gov/our-changing-climate/what-it-means/health.

State of Vermont. (2016). "Vermont 2016 Comprehensive Energy Plan." Department of Public Service. Exhibit 9-8 page 189. publicservice.vermont.gov/publications-resources/publications/energy_plan/2015_plan.

State of Vermont. (2016). "Vermont 2016 Comprehensive Energy Plan: Executive Summary." Department of Public Service. Retrieved from: publicservice.vermont.gov/sites/dps/files/documents/Pubs_Plans_Reports/State_Plans/Comp_Energy_Plan/2015/2016CEP_ES_Final.pdf.

Steward, D., Doris, E., Krasko, V. and Hillman, D. (March 2014). "The effectiveness of state-level policies on solar market development in different state contexts." National Renewable Energy Laboratory (NREL). nrel.gov/docs/fy14osti/61029.pdf.

"Sunrun launches national partnership with GRID Alternatives." (September 22, 2016). sunrun.com/why-sunrun/about/news/press-releases/sunrun-launches-national-partnership-grid-alternatives.

Tax Policy Center. (2016). "Tax Units with Zero or Negative Income Tax." taxpolicycenter.org/model-estimates/tax-units-zero-or-negative-income-tax/tax-units-zero-or-negative-income-tax.

Teller-Elsberg, J. (Jonathan), Sovacool, B. (Benjamin), Smith, T. (Taylor) & Laine, E. (Emily). (December 2016). "Energy costs and burdens in Vermont: Burdensome for whom?" Institute for Energy and the Environment, report prepared for the Vermont Low Income Trust for Electricity, Inc. assets.vermontlaw.edu/Assets/iee/VLS%20IEE%20Energy%20Burden%20Report.pdf.

Thompson, A. (Andrea). (June 12, 2014). "Climate Impact on Vermont May Have Benefits." Climate Central. climatecentral.org/news/vermont-on-path-of-warmer-wetter-future-17548.

The White House. (July 2015). "FACT SHEET: Administration Announces New Initiative to Increase Solar Access for All Americans." whitehouse.gov/the-press-office/2015/07/07/fact-sheet-administration-announces-new-initiative-increase-solar-access.

Tweed, K. (Katherine). (September 25, 2015). "SolarCity launches solar service for affordable housing." Green Tech Media, greentechmedia.com/articles/read/solarcity-launches-solar-for-affordable-housing.

Union of Concerned Scientists. (2016). "Renewable Electricity Standards Toolkit." ucsusa.org/clean_energy/res/abouttoolkit.html#.V9rqvCDFHw.

United States Census Bureau. (2015). “Welcome to QuickFacts: Vermont.” [census.gov/quickfacts/table/PST045215/50/accessible](https://www.census.gov/quickfacts/table/PST045215/50/accessible).

United States Department of Agriculture (USDA). (2016). “Rural Energy for America Program Renewable Energy Systems & Energy Efficiency Improvement Loans & Grants: Program 101.” rd.usda.gov/programs-services/rural-energy-america-program-renewable-energy-systems-energy-efficiency.

United States Department of Agriculture (USDA). (September 18, 2014). “USDA invests \$68 million in 540 renewable energy and energy efficiency projects nationwide.” News Release. usda.gov/wps/portal/usda/usdahome?contentid=2014/09/0202.xml.

United States Department of Energy. (no date) “Solar energy in the United States.” Office of Energy Efficiency & Renewable Energy. energy.gov/eere/solarpoweringamerica/solar-energy-united-states.

United States Department of Energy. (September 29, 2010). “Using loan loss reserves to support financing programs.” DOE Technical Assistance Program. www1.eere.energy.gov/wip/solutioncenter/pdfs/Loan_Loss_Reserves_Lessons_from_the_Field_Presentation.pdf.

United States Department of Health and Human Services. (January 19, 2016). “LIHEAP frequently asked questions for consumers.” [acf.hhs.gov/ocs/resource/consumer-frequently-asked-questions](https://www.acf.hhs.gov/ocs/resource/consumer-frequently-asked-questions).

United States Department of Health and Human Services. (June 2014). “LIHEAP Home Energy Notebook for FY 2011: Executive Summary.” Office of Community Services, Division of Energy Assistance. [acf.hhs.gov/sites/default/files/ocs/fy2011_hen_final.pdf](https://www.acf.hhs.gov/sites/default/files/ocs/fy2011_hen_final.pdf).

U.S. Department of Housing and Urban Development. (2016). “Fiscal Year 2015 Income Limits.” [huduser.gov/portal/datasets/il/il15/](https://www.huduser.gov/portal/datasets/il/il15/).

U.S. Energy Information Administration (EIA). (June 2016). “Vermont: State profile and energy estimates.” [eia.gov/state/?sid=vt](https://www.eia.gov/state/?sid=vt).

U. S. Senator, Bernie Sanders, (2016). “Combating climate change to save the planet.” [berniesanders.com/issues/climate-change/](https://www.berniesanders.com/issues/climate-change/).

U.S. Senator Bernie Sanders, July 2015, “Low-income Solar Act of 2015.” [sanders.senate.gov/download/lisasummary/?inline=file](https://www.sanders.senate.gov/download/lisasummary/?inline=file).

U.S. Senator Bernie Sanders, July 2015, “Low-income Solar Act of 2015.” [thinkprogress.org/bernie-sanders-plan-to-make-solar-power-more-accessible-a29dac8f083c#.j2gqt787i](https://www.thinkprogress.org/bernie-sanders-plan-to-make-solar-power-more-accessible-a29dac8f083c#.j2gqt787i).

U.S. Senator Bernie Sanders Introduces Solar Initiative. (July 7 2015.) [sanders.senate.gov/newsroom/recent-business/sanders-introduces-solar-initiative?utm_content=buffer6dd73&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer](https://www.sanders.senate.gov/newsroom/recent-business/sanders-introduces-solar-initiative?utm_content=buffer6dd73&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer).

Vermont Housing Finance Agency. (2010). “2010 Vermont Housing Needs Assessment: Vermont’s Housing Stock Challenge.” [vhfa.org/documents/hna2010/03-stock.pdf](https://www.vhfa.org/documents/hna2010/03-stock.pdf).

Vermont Law School Energy Clinic. (April 2016). “Vermont Group Net Metering: Information & Guidelines for 150 kW (AC) Community Solar Projects.” [assets.vermontlaw.edu/Assets/iee/Vermont%20Group%20Net%20Metering%20Information%20and%20Guidelines%20%202016.pdf](https://www.assets.vermontlaw.edu/Assets/iee/Vermont%20Group%20Net%20Metering%20Information%20and%20Guidelines%20%202016.pdf).

Vermont Law School Energy Clinic. (April 2016). “Vermont PSB Rule 5.100 Revisions: Net Metering.” [wordpress.vermontlaw.edu/energy/files/2016/04/Rule5.100-Fact-Sheet.pdf](https://www.vermontlaw.edu/energy/files/2016/04/Rule5.100-Fact-Sheet.pdf).

Villarreal, J. (Jorge). (August 12, 2016). “Tackling climate change equitably.” [inequality.org/stop-climate-change-redistribute-wealth/](https://www.inequality.org/stop-climate-change-redistribute-wealth/).



vermontlaw.edu/energy
energyclinic@vermontlaw.edu

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Christa Shute - Laura Schieb - Kevin B. Jones
Casey Mckee - Lyanne Sierra Mendez - Brandon Oldham - Maxwell Krieger