SUSTAINABLE INVESTMENT: A WORKING PAPER ON USING FEDERAL ENERGY ASSISTANCE FOR SOLAR

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EXECUTIVE SUMMARY

This report provides an analysis and evaluation of the LIHEAP and WAP and the facilitation of solar energies incorporated within these programs to address energy burden in low-income communities. To date, very few state and local officials administering LIHEAP and WAP have taken advantage of the opportunity to integrate solar into these programs. One reason is that, until recently, solar prices were too high for the integration to represent a good investment. Additionally, the rules and regulations regarding the integration of solar into these programs have not been well understood.

In the last five years, federal energy assistance funding under LIHEAP and WAP totals approximately $15 billion. Both are important programs that assist low-income families in paying their energy bills, provide weatherization services, and install health and safety improvements for their homes. However, in the case of energy bill assistance, the important question being raised in this paper is: *are current energy assistance practices providing lasting solutions?*

The research draws attention to the fact that there is not only growing support for solar in low-income communities, but policy-makers at all levels are increasingly interested in making solar available for low-income families. State policy leaders are becoming increasingly attuned to the need for greater solar deployment in low-income communities, and legislation and programming to accomplish this is being introduced at the state level with more frequency. Local governments, too, are seeking ways to expand access to solar for their most vulnerable communities. This growing interest among policy leaders can be directed to the integration of solar into energy assistance programs such as LIHEAP and WAP. States that have successfully integrated solar with energy assistance funds are California and Colorado, with other states such as Minnesota and Oregon in the process of doing the same.

This report finds that there are patterns states have followed that can better assist state energy officers to incorporate solar in their state energy plans. These include advocating for policies for net metering, partnering with state utilities, forming partnerships with community action organizations, developing public/private partnership for innovative financing, building relationships with energy officials at every level, demonstrating measurable savings in energy costs, and gaining access to state utility renewable funds.

It is recommended that state energy officers: leverage state and federal energy policies to support low-income solar deployment; develop a financial model that works for low-income solar; are familiar with federal energy assistance policies; and build relationships with state energy offices and community advocacy groups.

INTRODUCTION

The expansion of solar technology is creating an abundance of benefits like a cleaner environment, improvements in health and wellness, opportunities for wealth generation and saving money, and access to a job market that provides livable wages. The possibilities produced from this burgeoning industry could assist historically marginalized communities with issues that have plagued their communities. People of color and low-income households are more likely to live near a coal power plant (NAACP & Wilson, "Coal Blooded: Putting Profits Before People", 2011), and thus more liable to suffer from higher incidents of adverse health effects, higher medical bills, more susceptibility to the consequences of climate change, and lower property values. Additionally, on an individual level, low-income households may spend an average of 15 to 20 percent of their income on energy bills compared to the average for middle-income families at 6 to 10 percent (Chandler, "Where the Poor Spend More Than 10 Percent of Their Income on Energy", 2016). Helping low-income households save money on electricity directly translates into a family's ability to cover other essential needs. Financial incentives give solar technology a tremendous opportunity to provide benefits to members of society that need them most.

There are some challenges to making solar energy accessible to low-income communities, and obtaining financial support is among the most difficult to overcome. Low-income families often have no upfront capital which translates into no money for down payments, have little credit or no credit history, which creates barriers that eliminate the ability to finance solar through loans or other financial products. Financial support is needed to overcome the lack of available cash and difficulty in obtaining loans or other financing tools that low-income families often face. And while the cost of solar has plummeted in recent years, the cost may still be out of reach for these households who stand to benefit from it the most.

Today, some energy assistance programs are in operation at the federal, state, and local government levels. These programs exist to help low-income households afford and pay their energy bills. Integrating solar into these programs could help to reduce and stabilize beneficiaries' utility bills, and over the long-term could contribute to reducing the overall need for energy assistance programming. These programs offer a pathway to filling in the gaps for the financial support that low-income families need to be able to participate in the benefits of solar.

The United States federal government oversees two programs that provide energy assistance to low-income households across the country: the Department of Health and Human Services' Low Income Home Energy Assistance Program (LIHEAP) and the Department of Energy's Weatherization Assistance Program (WAP). These programs, although both addressing energy concerns for low-income families, have different strategies for accomplishing this task. LIHEAP provides direct assistance to help households cover their energy costs and keep their utilities running (NASCSP, "LIHEAP and WAP-Two Sides of the Same Coin", 2016). Essentially, LIHEAP is a stop-gap, providing immediate support for families facing utility cutoff. LIHEAP gives money directly to utility companies for temporary relief and does not assist families for extended relief from unaffordable heating and electric bills.

WAP focuses on installing energy conservation and energy efficiency measures in low-income households, such as air sealing, exterior wall insulation, attic insulation, furnace repair or replacement, air sealing, duct sealing, refrigerator replacements, and other energy efficiency measures. (Benefits.gov, "Energy Assistance") WAP provides a long-term solution to low-income families energy bills. The weatherized home with services mentioned above results in an average savings of $300 per year. Over a

twenty-year payback period, WAP provides a measurable return on investments that make cost-effective sense.

Billions of dollars are awarded each year to subsidize energy bills for low-income families. Together, in 2017 alone, these programs were allocated $3.39 billion (LIHEAP Clearinghouse, "LIHEAP and WAP Funding") to help stabilize and support low-income household utility bills. The integration of solar into these programs presents an opportunity to reduce these families' energy burden on a long-term basis. This energy burden reduction could result in a reduced, or even eliminated, need for energy assistance on a per-customer basis. Over time, the incorporation of solar into these programs would prove to be a good investment of federal energy assistance funds and would result in a diminished need for these programs overall.

To date, very few state and local officials administering LIHEAP and WAP have taken advantage of the opportunity to integrate solar into these programs. One reason is that, until recently, solar prices were too high for the integration to represent a good investment. Additionally, the rules and regulations regarding the integration of solar into these programs have not been well understood. Moreover, the philosophies of both LIHEAP and WAP differ thus requiring different methods of evaluation and implementation.

This paper explores utilizing federal monies in the quest to make solar energy available to low-income families. The goal of this paper is to outline a path that can be followed to ensure the successful integration of solar into LIHEAP and WAP programs that are administered at the state level. This paper discusses guidance issued by the Department of Energy and the Department of Health and Human Services that allows solar to be incorporated into these programs. Additionally, this paper includes examples of state energy programs that have successfully utilized energy assistance funds for solar, to the benefit of clients.

GROWING SUPPORT FOR SOLAR ADOPTION AND EXPANSION IN LOW-INCOME COMMUNITIES

The federal and state governments are increasingly embracing policies that can help low-income families access solar electricity. Access to solar power could significantly reduce the energy burden of low-income household by providing electricity below local utility rates (Landey & Rzad, "Approaches to Low-Income Energy Assistance Funding in Selected States", 2017). Furthermore, as residential solar adoption becomes more prevalent and energy production from these systems increase, low-income families won't bear the burden of financing increasingly antiquated electrical systems. But for solar to become widely implemented and the benefits to be disseminated to low-income communities, innovative funding has to be the catalyst that spurs adoption.

With the price of solar equipment decreasing a whopping 70 percent since 2009, in conjunction with maturing financial models, solar penetration has proliferated over the past decade. For the most part, however, the segment of the US population that has widely adopted solar technologies for residential use has been middle class to upper middle-class families, leaving a gap for the adoption of solar technologies in low-income communities. In the four states that account for 65 percent of all residential solar installations in the country, California, Massachusetts, New Jersey and New York, over 70 percent of these households have a median income of $75,000 (Andorka, "Report: Middle-income homeowners make up 70% of solar customers (with 3 critical charts)", 2017). The adoption of solar technologies by middle-income populations has been heavily incentivized by policies that are most accessible to middle-income earners. Tax credits, rate structures that provide additional incentives for high consumption

households, and having financial resources to be early adopters have significantly assisted this segment of the population in advancing solar. With 49.1 million households earning less than $40,000 of income per year and accounting for 40 percent of all U.S. households, low-income families only account for less than 5 percent of solar installations ("Summary for Policymakers: Bridging the Solar Income Gap", 2014). For this reason, low-income customers need to have policies that allow them access within this energy divide.

Policy-makers at all levels are increasingly interested in making solar available for low-income families. For example, in 2014, the executive branch of the federal government established a goal to triple some solar panels installed in low-income communities, and to provide "technical assistance to make it easier to install solar including clarifying how to use federal funding" ("FACT SHEET: Administration Announces New Initiative to Increase Solar Access for All Americans", 2015). Furthermore, to match the presidential initiative, in 2015 there was a commitment of $520 million from philanthropic and impact investors, and states to scale solar in low-income households. State policy leaders are becoming increasingly attuned to the need for greater solar deployment in low-income communities, and legislation and programming to accomplish this is being introduced at the state level with more frequency. Local governments, too, are seeking ways to expand access to solar for their most vulnerable communities. This growing interest among policy leaders can be directed to the integration of solar into energy assistance programs such as LIHEAP and WAP.

CHALLENGES FOR LOW-INCOME SOLAR DEPLOYMENT

A variety of obstacles impede progress toward bringing solar energy to low-income populations. One of the less well-known issues is pure awareness about solar technologies. Low-income communities may exhibit skepticism and a reluctance to accept solar technologies as a benefit because of prior negative experiences with industries that assumed a lack of sophistication within low-income communities. For this reason, low-income communities could regard the solar industry as an unethical way to manipulate them and take their money. Additionally, barriers exist with housing conditions. Low-income families are more likely to live in homes that present structural, health and safety issues, which decreases the feasibility for on-site solar installation ("Low- and Moderate-Income Solar Policy Basics"). Households that may qualify for low-income solar projects may not have the time to take off work for income verification and other paperwork, retrofits, and inspections. Moreover, any low-income families rent their homes. In such cases, installing solar panels for residential use is difficult because they lack ownership of their roofs.

However, the primary issue preventing low-income communities from reaping the benefits of solar is cost. Low-income families are unlikely to have the money available for large down payments to cover the upfront costs of solar. Furthermore, the financial system does not provide affordable credit options to low-income customers, who may have poor credit or no credit history. Because of the lack of credit, low-income families are perceived as higher-risk clients, and because of this, credit isn't made available for this population en masse.

THE CASE FOR ENERGY ASSISTANCE DOLLARS FOR SOLAR

In the last five years, federal energy assistance funding under LIHEAP and WAP totals approximately $15 billion ("LIHEAP and WAP Funding"). Both are important programs that assist low-income families in paying their energy bills, provide weatherization services, and install health and safety improvements for their homes. However, in the case of energy bill assistance, an important question has to be raised:

are current energy assistance practices providing lasting solutions? One way that energy assistance dollars becomes an excellent and sustainable solution for targeting families with unaffordable energy bills is by helping these families lower their energy burden and move toward energy self-sufficiency. Rather than paying families' unaffordable energy bills year after year, using these funds for solar installations, in addition to weatherization and health and safety improvements, creates lasting structural change by empowering families and fostering self-reliance. Decreasing families' energy burden and increasing their energy self-sufficiency can be accomplished by targeting LIHEAP and WAP funding for solar, resulting in a good investment over time.

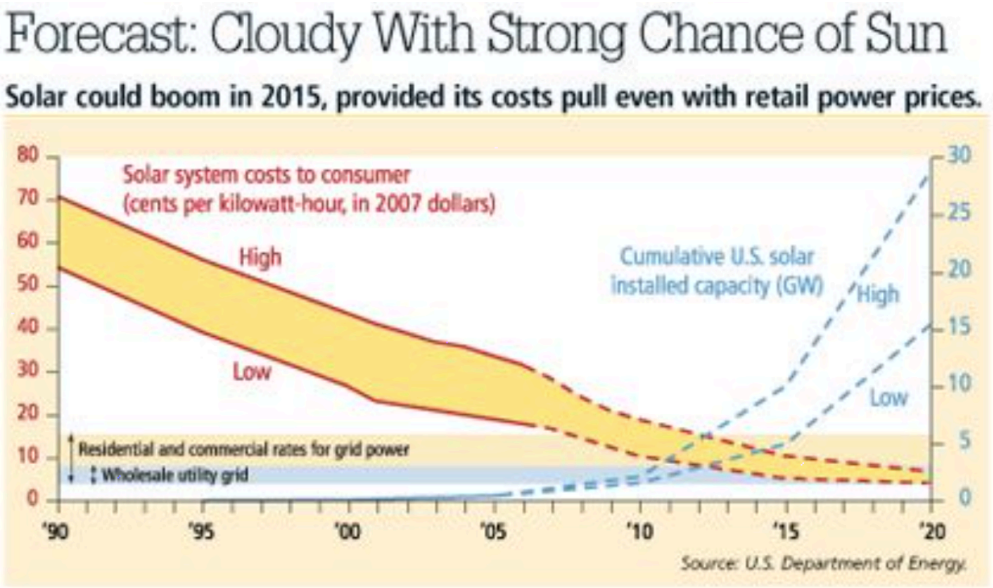


Figure 1: The graph shows the declining cost of consumer solar systems coming into parity with grid power, which is traditionally a combination of predominately coal and nuclear power. Solar becomes an attractive choice for investments from energy assistance funds because it offers prolonged reduction of energy bills in addition to being significantly more environmentally friendly.

LIHEAP and WAP

Two principal federal programs address the energy burden faced by low-income Americans: the Department of Health and Human Services' Low Income Home Energy Assistance Program (LIHEAP) and the Department of Energy's Weatherization Assistance Program (WAP). LIHEAP provides direct assistance to help households cover their energy costs and keep their utilities running. LIHEAP has historically received between $2.5 and $4.5 billion per year in congressional appropriations and provides roughly 6.7 million households with heating or cooling assistance in a typical year.

LIHEAP is a program of the Department of Health & Human Services but is administered by state and local agencies. LIHEAP helps families with home energy bills, energy crises, and weatherization and energy-related minor home repairs. Families with incomes between 150% - 185% of the federal poverty income guidelines or, if greater, 60% of the state median income, are federally eligible for LIHEAP benefits. States may adopt lower income limits, but no household with income below 110% of the poverty guidelines may be considered ineligible. The federal LIHEAP program allows state administering offices to transfer 15 percent, and up to 25 percent with a waiver, of LIHEAP monies to weatherization

activities and works closely with utility companies and nonprofits to pilot solar energy technologies for improving the energy efficiency of low- and moderate-income households and to better coordinate state and federal weatherization initiatives.

The Weatherization Assistance Program (WAP), funded by the U.S. Department of Energy, provides technical and financial assistance to help low-income residents reduce their energy bills by making their homes more energy efficient. WAP performs energy audits and installs audit-recommended energy efficiency measures to help families maintain energy-efficient, safe and healthy homes. Additionally, WAP focuses on establishing energy conservation and energy efficiency measures in low-income households. Typical weatherization measures may include insulation, duct sealing, refrigerator replacements, heating and cooling systems repairs or replacement, air infiltration mitigation; and reducing electric baseload consumption through measures such as energy efficient lighting and appliances. These services can save a low-income family between $250 and $450 annually in energy costs for up to 30 years. For renewable technologies, WAP allows for approximately half of the available benefits for families receiving weatherization services to be used for solar. However, a primary focus of WAP is to ensure families receive maximum benefits stemming from weatherization; solar can be a part of the WAP toolkit to offer relief to families suffering from high energy burdens.

OPPORTUNITY FOR SOLAR WITHIN ENERGY ASSISTANCE POLICIES

Incorporating solar investments into energy assistance programs can provide long-lasting reductions in low-income household energy spending, therefore reducing overall demand for help over time. Billions of dollars are allocated for LIHEAP each year from the federal government, but that money does not diminish energy burdens of recipients. LIHEAP and other programs that directly help to pay unaffordable bills do nothing to alleviate the need for families to get help in reducing their energy expenditures. The current structure of energy assistance perpetuates an unfortunate cycle of high energy burden, and the spending of taxpayer dollars to pay unaffordable bills. With the addition of solar, the face of energy assistance can change significantly. Solar offers the opportunity to deliver energy assistance without hemorrhaging taxpayer dollars.

Policy Facilitation for Solar

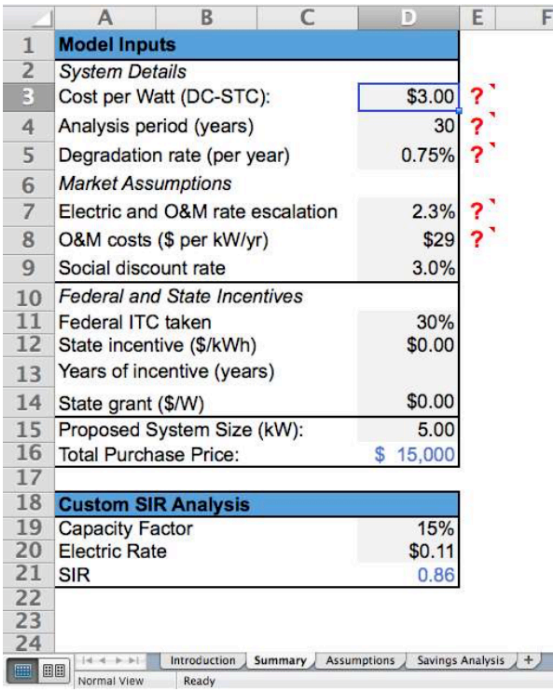
Within current energy assistance policies, rules and regulations, there are a few places that might help facilitate the use of solar energy. The LIHEAP enabling statute requires that states consider a household's energy need and energy burden at three programmatic points: outreach activities, eligibility determination, and provision of assistance ("Targeting LIHEAP Benefits", 2010). The LIHEAP statute allows for energy aid agencies to use up to 15 percent of funds for residential weatherization measures, which can include solar. And, with a special waiver from the Department of Health and Human Services, energy assistance agencies can use up to 25 percent of their funding for measures such as solar. To be able to do this, the LIHEAP statute specifies that states need to be able to demonstrate "measurable savings in energy expenditures by low-income households." LIHEAP administrators can allocate these weatherization funds for solar using the rules for the WAP, LIHEAP rules drafted by the states, or a combination of both. An individual LIHEAP rule commonly known as Assurance 16, allows LIHEAP grantees to use up to five percent of their funds to provide services that help households reduce their energy needs and, thereby, reduce their need for energy assistance. By using LIHEAP funds for renewable energy projects, it would be possible for grantees to use some Assurance 16 funds to provide education about the project and the impact it could have on clients' energy consumption and bills.

Solar usage has been approved in WAP even though the rules and regulations are more stringent. As detailed in WAP Memorandum 024, a memo issued in January of 2017 by the Department of Energy, the use of renewable energy systems within the WAP was authorized by the 2005 Energy Policy Act ("WAP Memorandum 024", 2017). WAP Memorandum 024 outlines a series of steps states must take in order to use WAP funds for solar. One of the important steps involves a demonstration that the technology can achieve a Savings to Investment Ratio (SIR) of 1.0 or greater in their state energy plans. Simply put, a critical step for using WAP funds for solar is to demonstrate that, over the life of the system, the value of the system will be at least as high as the investment.

Residential Energy Assistance Challenge Option (R.E.A.C.H.)

Within the LIHEAP statute, the R.E.A.C.H program was included to get states to become innovative with energy assistance. R.E.A.C.H.'s objectives are to tackle health and safety risks that result from high energy burdens on low-income Americans, prevention of homelessness from the inability to pay energy bills, target energy assistance to individuals who are in most need, and increase the efficiency of energy usage by low-income families. Increasing the efficiency of energy usage by low-income households could be another inroad for the adoption of solar technologies in energy assistance policy. The funding for this initiative is not to exceed 25% of the yearly allocation of LIHEAP dollars. Most importantly, the R.E.A.C.H. program must have the potential to be replicated. Solar easily fits the description and can rapidly scale and be replicated just about anywhere in the United States. Currently, R.E.A.C.H. funding is on-hold federally, but it can still be considered for policy facilitation and as a potential funding option for LIHEAP integrated solar.

SAVINGS TO INVESTMENT RATIO (SIR) CALCULATOR



	A	B	C	D	E	F
1	**Model Inputs**					
2	*System Details*					
3	Cost per Watt (DC-STC):			$3.00	?	
4	Analysis period (years)			30	?	
5	Degradation rate (per year)			0.75%	?	
6	*Market Assumptions*					
7	Electric and O&M rate escalation			2.3%	?	
8	O&M costs ($ per kW/yr)			$29	?	
9	Social discount rate			3.0%		
10	*Federal and State Incentives*					
11	Federal ITC taken			30%		
12	State incentive ($/kWh)			$0.00		
13	Years of incentive (years)					
14	State grant ($/W)			$0.00		
15	Proposed System Size (kW):			5.00		
16	Total Purchase Price:			$ 15,000		
17						
18	**Custom SIR Analysis**					
19	Capacity Factor			15%		
20	Electric Rate			$0.11		
21	SIR			0.86		
22						
23						
24						

Introduction | Summary | Assumptions | Savings Analysis | +

Normal View | Ready

As mentioned above, a critical step that states must take in order to persuade WAP to allow some funds to be used for solar involves demonstrating that the investment will be cost effective. The National Renewable Energy Laboratory (NREL) developed a tool to demonstrate the Savings to Investment Ratio (SIR), a metric used to measure the ability of solar technology to recover the investment in solar via the cost savings achieved from customer utility cost reduction. The ratio divides the savings by the investment; a SIR score above 1 indicates the WAP administering agency will recover their investment.

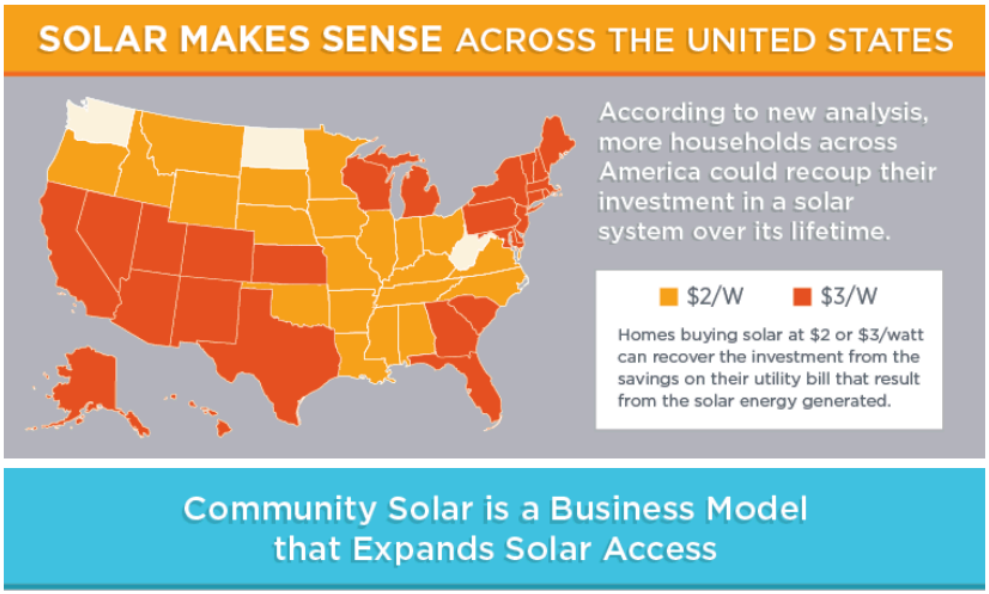
The SIR calculates whether a PV system recovers its investment through electricity savings and federal and state incentives. NREL built this tool to calculate the SIR for a residential PV system in all 50 states using the following formula:

$$\text{Savings to Investment Ratio for PV Systems} = \frac{\text{Lifetime Present Value of: } \mathbf{1)} \text{ Electricity bill savings } \mathbf{2)} \text{ O\&M costs, } \mathbf{3)} \text{ State incentives, if any (\$/kWh)}}{\mathbf{1)} \text{ Upfront PV system investment } \mathbf{2)} \text{ tax credit, if any, } \mathbf{3)} \text{ state grant}}$$

There are assumptions made with the SIR model. The default assumptions are that customers receive full net-metering credit at the state average electricity price as listed by EIA. These assumptions also include a default residential PV system price range of residential of $2/W-$4/W based on costs reported in both the NREL Benchmark Report and the GTM report for distributed PV systems, the PV system useful life estimated to have a range between 25 - 40 years based on research from NREL, default operations and maintenance costs and degradation rate from the technical report "The Role of Advancements in Solar Photovoltaic Efficiency, Reliability, and Costs" (NREL 2016), state-level capacity

factors based on NREL internal analysis of average capacity factor of a residential PV system in that particular state, default electricity escalation rate based on EIA Annual Energy Outlook 2016, National Average Residential End-Use Electricity Price increase from 2015-2040, and a 3 percent social discount rate assumed to capture the time value of the savings over the lifetime of the system.

The SIR metric has been used in studies to prove its effectiveness in predicting the return of investment of solar for both single-family homes and community solar. A new solar data analysis from the National Renewable Energy Laboratory (NREL) explored the affordability of solar using the SIR metric. NREL conducted a simple SIR analysis for all 50 states by assuming that U.S. residential PV systems today cost between $3.00 per watt and $3.50 per watt and last 25 to 35 years. In this data run, NREL stated: “It could be cost-effective for households to make a shift to solar in a quarter to half of the states without any state or local incentives.” (McGregor, "New Analysis Shows National Potential for Solar Power in Low-Income Communities", 2016) NREL examined community solar and concluded that the number of states with positive SIRs increases to 35-48 states if the cost for installation stays in line with wholesale costs of $2.00 per watt to $2.50 per watt. Through this analysis, solar is proving to be one of the most cost-effective sources of energy for low-income population and will result in providing a decreased need for energy assistance funds thus being able to serve more families.



The map above shows the analysis NREL conducted that resulted in positive SIRs for all but three states when solar is priced between $2 and $3 per watt. (McGregor, "New Analysis Shows National Potential for Solar Power in Low-Income Communities", 2016)

Approval of Solar In Energy Plans

To gain approval to use energy assistance funds for solar, there are processes that must be followed. For approval to use LIHEAP monies for solar, state LIHEAP administrators must include the solar as a measure in their state energy plans. Beyond this, the LIHEAP program has not outlined any guidance. Accordingly, while it is easy to include solar in a state LIHEAP plan, it is not clear whether the LIHEAP program may require more steps or demonstration of customer benefits at a later time.

The process for gaining approval to use WAP funds for solar is more complicated. As an initial matter, WAP has not given blanket approval for this use of funds; the program will review each request on a project-by-project basis. Further, WAP will only approve pilot projects for the time being. The request to include Solar PV as an approved measure in the state's WAP program must be submitted to the state's DOE program officer. As outlined in Memorandum 024, the first step in making a request is to show that a pilot project can achieve a SIR of 1.0 or better somewhere in the state. After getting confirmation of the SIR analysis, the state must submit a pilot project to WAP, and it must be included in the state plan. The pilot project application must demonstrate with a fair amount of granularity that the project will be cost-effective and that the planning has taken into account various financial and equipment requirements and considerations. At the end of the approval process, WAP may grant approval for approximately $3,600 to be used for solar, for each home (or unit in a multifamily dwelling). Accordingly, WAP expects that a pilot project application will include other sources of funding.

The request for solar approval can be made at any time, but the intention to implement a Solar Pilot Program should be included in the Annual Plan Submission to DOE.

STATES UTILIZING ENERGY ASSISTANCE FOR SOLAR

Oregon

Oregon is in the early stages of attempting to use energy assistance dollars for solar installations in low-income communities. This project is being pursued through the Community Action Partnership of Oregon (CAPO), which is the association for community action agencies in 36 counties across Oregon. The proposed project is scheduled for 2018 and includes utilizing WAP funding for approvals in Oregon's state plan. Oregon highly depends on oil for heating homes. Oil for heating is highly inefficient so the idea of utilizing energy assistance funds for solar would not only prove efficient, but also result in savings for the taxpayer, prove beneficial for the environment, and offer savings for low-income families.

CAPO will be implementing their proposed project through affordable multifamily housing using community solar. CAPO's proposed project will cost approximately $211,000 to build and will be an 85,000 kW system that will benefit 36 housing units.

Using the existing community action network is proving key to Oregon's proposal to leverage private funds. The public/private partnership Oregon is pursuing poses both benefit to tenants, building owners, developers, and taxpayers. The benefits for the building owner would allow for tax credits to be applied to the primary loan on the property and help reduce tax liability. The benefits to the developer would be through receiving the Investor Tax Credit (ITC) and requires a developer with a tax appetite. The third-party developer is essential to this project because of the gap funding needed to cover costs that energy assistance dollars won't cover. Benefits to the tenant could result in savings by paying less than the required 30% of their income for their HUD housing, and the taxpayer benefits over the long term because of the return over a 20 year period being greater than the invested amount.

Colorado

The Colorado Energy Office successfully utilized energy assistance funds through the WAP program to implement single-family rooftop solar and solar community projects. In doing so, Colorado was the first state to install solar as part of WAP. When the Department of Energy authorized the states to integrate rooftop solar into weatherization services, the DOE gave states a chance to demonstrate feasibility in

combining renewable energy with weatherization. The project wanted to accomplish three goals: address energy burden by reducing both home heating and electric costs, enhance opportunities for distributed generation, and demonstrate the viability for rooftop solar for low-income families. Since there is a year-round dependence on energy assistance in Colorado, both heating and cooling needed to be addressed to reduce Colorado's dependence on natural gas.

Colorado's use of energy assistance funds for solar was rooted in a data-driven approach. The Colorado Energy Office (CEO) launched research that examined client data of 5000 recipients of weatherization services. After tabulating the results, the CEO wanted to know how could they assist low-income customers to save even more money to address their other needs. They turned to solar as a possible mechanism.

SIR modeling showed the cost-effectiveness of solar electric systems was above 1 meaning the project paid for itself over its lifetime. By installing 3.5kW and 4.5 kW systems, total generation of each system on a per home basis exhibited a high return on investment over a 25-year period resulting in savings between $400 and 600 dollars per year per household. Achieving this metric was the result of bargaining with utility companies to receive the full net metering credit. Going forward, funds for renewable energy projects are capped under the WAP rules at $3598 for a low-income solar project. This cap could prove problematic by potentially limiting the expansion of single-family home solar systems. Additionally, this could steer WAP dollars towards community solar as the primary model for low-income solar for energy assistance recipients.

In the final analysis, the CEO has an extensive network of weatherization providers and utility partners that serviced counties across the state. Relationships with the Energy Resource Center, Colorado Springs Utilities, and other agencies proved invaluable. Including solar installations, the project also provided the host of weatherization services to these families such as insulation, air sealing, storm windows, low-flow showerheads, LED bulbs, and other energy efficiency measures. Funding for this project came not only from WAP alone. The CEO granted monies for gap financing in conjunction with energy assistance dollars. Moving forward, to reach the state's 20 percent renewable goal by 2020, to better assist low-income families, and to better utilize energy assistance funding, the implementation of solar using energy assistance proves to be a valuable strategy to allow low-income customers see renewable benefits.

California

Historically, California has been at the forefront of innovative energy solutions and typically have enacted leading-edge energy policies that are more highly creative than the federal government. In California's pursuit to create low-income solar access, energy assistance dollars were used as a part of the initiative. The "Solar for All California" program was created in 2010 and used $14.7 million of LIHEAP dollars to invest in the installation of solar photovoltaic panels for low-income families. The pilot program wrapped up at the end of 2012 and greatly surpassed original goals, and estimates for the number of low-income households reached and the amount of renewable energy generated. The total number of households benefitting from the program nearly tripled the department's original goal set in 2010, which was to reach 500 low-income families.

The monies used for this initiative were LIHEAP dollars, which allowed for leveraging of private funds through the commitment of public funds which lessens the risk for the private sector. The goals for the solar for all were to develop partnerships to provide solar PV systems with no loans, liens, or out-of-pocket costs to low-income households; to prioritize energy efficiency to further reduce the energy

consumption of each low-income home before installing solar, with the added kicker of providing jobs to become solar installers.

The Department of Community Services and Development, the LIHEAP administering agency in California, leveraged an additional $5.3 million through other partnerships. California's Department of Community Services and Development partnered with a network of private, non-profit, and local government community action organizations dedicated to helping low-income families which allowed for effective leveraging of LIHEAP infrastructure to locate low-income communities and families.

Minnesota

RREAL knows that energy assistance is an important social service but also contends that it doesn't provide long-term solutions for energy burden. Over $150 million is spent every year in Minnesota paying energy bills, but it fails to address causes and doesn't empower low-income families by giving them a choice on where their energy comes from creating a renewable divide.

Recently, RREAL commissioned 200 kW of 100 percent low-income community solar with the energy production being distributed through the tribal LIHEAP service provider. Forging this path has taken a concentrated effort to engage community action agencies, local government agencies, utilities, and policy-makers. RREAL, through their current model, teams with community action agencies to build solar electrical systems on low-income homes and initiates fundraising efforts for these installations. Though they don't receive energy assistance dollars for installing solar electric systems, they partner with community action organizations that administer energy assistance dollars as a means of customer acquisition. RREAL recognized that community action associations are the perfect vehicle to scale low-income solar because of the institutional wisdom of them have identified over 93% of low-income families in over 43 districts across the United States. Additionally, RREAL has forged a public-private partnership with the energy assistance infrastructure and is delivering benefits to energy assistance recipient households dependent on delivered fuels. A tribal energy assistance service provider owns the 200 kW system installed by RREAL, and the energy assistance program is using their typical intake process to dedicate a certain percentage of the production to families that qualify.

More critically, RREAL's approach is rooted in the energy assistance statute. LIHEAP policy explains that every state can redirect 15 percent of its total LIHEAP allocation to efforts that reduce dependence on energy assistance. Typically, this 15 percent has been simple transfers from energy assistance to WAP. RREAL proposes taking a percentage of the 15 percent for solar development in LIHEAP. Taking this portion would be of no consequence to WAP and would extend its services to low-income communities.

RREAL's financing strategies, specifically for gap funding, pursued by RREAL are drawing on innovative public/private partnerships. Social Impact Bonds are promoted as a creative tool to address this need. These are market instruments used to bring public sector innovators with private sector players for advancing causes that are good for society. These bonds have proven their value in various areas such as recidivism, child care, and job training. If agreed metrics are met for a project, then the public sector is obligated to adopt the financing model from the industry. RREAL is betting that Social Impact Bonds could provide a critical element for gap funding to show state innovation resulting in the persuasion of energy assistance officers to expand solar developments while quickly resulting in a SIR of above 1.

Other Uses of Energy Assistance Funds

Although there are less than a handful of states using energy assistance dollars for solar photovoltaic installations to serve low-income communities, others are exploring the option. States such as Pennsylvania, Wisconsin, Florida, Oklahoma, and Arizona are using their weatherization agencies to examine feasibility and conduct pilot programs for solar assistance in the form of solar air heating systems and solar water heating systems. These systems are showing promise to reduce dependence on energy assistance dollars and providing savings to customers.

KEY TRENDS OBSERVED BETWEEN STATES

Despite the various paths of states using or attempting to use energy assistance funds, there are commonalities between them that other states should consider when approaching solar within their energy assistance programs.

- **Policies for net metering -** Net metering and virtual net metering are the driving force behind solar. Without policies for net metering, it becomes difficult to extract monetary benefits from solar. Advocating for net metering policies that reimburse at the retail rate gives low-income solar the best chance to scale.
- **Partnering with utilities -** Partnering with utilities can prove difficult, but it is necessary. Utilities have the infrastructure to help construct demo projects, offer technical assistance during the construction process, and manage the solar system's connection after installation.
- **Community Action Organization Partnerships -** These partnerships are some of the most valuable ones needed to get low-income solar communities mobilized for solar. Community action organizations are deeply rooted low-income communities and typically provide services that low-income populations utilize such as housing security, education, and job training. Knowledge of how to access low-income communities, where they are could aid significantly in client acquisition. State officials engaging community stakeholders could allow for easier implementation of solar initiatives. These organizations could be difficult to locate but finding them would prove beneficial.
- **Public/Private Partnerships -** Financing for low-income solar initiatives have not yet fully matured. Because of this, finding developers, philanthropic organizations and funding entities will be needed. These partnerships help ultimately with gap funding for low-income solar projects. Energy assistance money doesn't cover the entire cost of a project so developing these partnerships for financing and deal structuring is necessary.
- **Relationships with energy officials -** Having relationships with energy officials in LIHEAP, WAP, HUD other governmental organizations will reap the rewards when attempting to maneuver policy roadblocks. Even with other state energy offices, building a line of communication will prove vital for getting started.
- **The need to demonstrate measurable savings in energy costs -** One of the most important tools in this process is the SIR calculator. Being able to produce a value of one or greater will significantly aid in getting energy officials to approve demo projects. Being persuasive with cost-effectiveness can show a remarkable proficiency at energy assistance.
- **Access to state utility renewable funds -** Increasingly, as states adopt energy renewable energy requirements, utilities are being directed to collect funds from ratepayers and create a fund to provide dollars for incremental costs between renewables and conventional fuels. Low-income customers are contributing to these funds but are not receiving benefits from them. Because of this, petitions and policies for set asides for low-income clients can be argued and won for low-

income specific projects with these monies. These funds can assist with gap funding for a variety of solar projects in low-income communities.

States have the authority to use energy assistant dollars with approval from federal regulatory bodies, particularity the Department of Energy (DOE). For state energy officers wanting to incorporate solar in their state energy plans, it is within the regulations to do so, but it will require demonstrating cost-effectiveness in order to move forward. The cost of solar has dropped over 60 percent in the last ten years and there is now greater infrastructure to support solar. More investment and financing structures are becoming available to support low-income solar thus making entry into solar industry more stable. Additionally, regulations and policies from the federal, state and local levels are increasingly being adopted for low-income communities.

Solar technologies, though in its infancy, has the potential to revolutionize society. Using existing policies, there is a great opportunity for communities who are have been historically marginalized to experience the benefits of solar technologies.

RECOMMENDATIONS FOR STATE ENERGY OFFICERS

1. **Leverage state and federal energy policy to support low-income solar deployment.** Plans currently exist in many states that support renewable energy. Tax incentives, net metering, state renewable portfolio standards (RPSs), and other financial incentives can all be adapted to support low-income solar deployment. The states mentioned in the examples above have used these programs to provide incentives for low-income solar.
2. **Develop a financial model that works for low-income solar.** When the retail solar sector grew, it was the leasing model (no money down and a leasing period of 20 years covering installation costs) and the Power Purchase Agreement (the company owns the panels, installs them and sells generated power to the homeowner) that allowed the sector to become affordable for middle-income families. Additionally, tax incentives for homeowners and developers made the industry more desirable for a critical mass. For low-income solar to develop, similar policies and financial models that take into account financial barriers for low-income families need to be created in conjunction with federal/state initiatives. Social impact bonds are becoming more popular in exploring economic models that work for this segment.
3. **Know federal energy assistance policies.** Being able to articulate and decipher energy assistance policy can go along way in implementing low-income solar with federal energy dollars. At the federal level, having a firm grasp of policy can compensate for changes in leadership within LIHEAP and WAP and provide a hedge if the administration has sentiments against using energy assistance for solar.
4. **Build relationships with state energy offices and community advocacy groups.** Having a network of energy experts, government officials, program administrators, state energy officers, especially those have used energy assistance for solar, and community allies that provide early stakeholder engagement can help both ensure enrollments how to troubleshoot potential issues in the process.

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