



# Solar Pathways in Federal Energy Assistance Programs: Expanding the Low-Income Home Energy Assistance Program (LIHEAP) and the Weatherization Assistance Program (WAP)

Jeff Cook, Juliana Williams, Jenna Harmon, Kaifeng Xu, and Katie Nissen

*National Renewable Energy Laboratory*

**NREL is a national laboratory of the U.S. Department of Energy  
Office of Energy Efficiency & Renewable Energy  
Operated by the Alliance for Sustainable Energy, LLC**

This report is available at no cost from the National Renewable Energy Laboratory (NREL) at [www.nrel.gov/publications](http://www.nrel.gov/publications).

Contract No. DE-AC36-08GO28308

**Technical Report**  
NREL/TP-6A20-88519  
March 2024



# Solar Pathways in Federal Energy Assistance Programs: Expanding the Low-Income Home Energy Assistance Program (LIHEAP) and the Weatherization Assistance Program (WAP)

Jeff Cook, Juliana Williams, Jenna Harmon, Kaifeng Xu, and Katie Nissen

*National Renewable Energy Laboratory*

## **Suggested Citation**

Cook, Jeff, Juliana Williams, Jenna Harmon, Kaifeng Xu, and Katie Nissen. 2024. *Solar Pathways in Federal Energy Assistance Programs: Expanding the Low-Income Home Energy Assistance Program (LIHEAP) and the Weatherization Assistance Program (WAP)*. Golden, CO: National Renewable Energy Laboratory. NREL/TP-6A20-88519. <https://www.nrel.gov/docs/fy24osti/88519.pdf>.

**NREL is a national laboratory of the U.S. Department of Energy  
Office of Energy Efficiency & Renewable Energy  
Operated by the Alliance for Sustainable Energy, LLC**

This report is available at no cost from the National Renewable Energy Laboratory (NREL) at [www.nrel.gov/publications](http://www.nrel.gov/publications).

Contract No. DE-AC36-08GO28308

**Technical Report**  
NREL/TP-6A20-88519  
March 2024

National Renewable Energy Laboratory  
15013 Denver West Parkway  
Golden, CO 80401  
303-275-3000 • [www.nrel.gov](http://www.nrel.gov)

## NOTICE

This work was authored by the National Renewable Energy Laboratory, operated by Alliance for Sustainable Energy, LLC, for the U.S. Department of Energy (DOE) under Contract No. DE-AC36-08GO28308. Funding provided by the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy Solar Energy Technologies Office. The views expressed herein do not necessarily represent the views of the DOE or the U.S. Government.

This report is available at no cost from the National Renewable Energy Laboratory (NREL) at [www.nrel.gov/publications](http://www.nrel.gov/publications).

U.S. Department of Energy (DOE) reports produced after 1991 and a growing number of pre-1991 documents are available free via [www.OSTI.gov](http://www.OSTI.gov).

*Cover Photos by Dennis Schroeder: (clockwise, left to right) NREL 51934, NREL 45897, NREL 42160, NREL 45891, NREL 48097, NREL 46526.*

NREL prints on paper that contains recycled content.

## List of Acronyms

ACPU	average cost per unit
CEO	Colorado Energy Office
CESA	Clean Energy States Alliance
C.F.R.	Code of Federal Regulations
D.C.	District of Columbia
DOE	U.S. Department of Energy
E&I	Enhancement & Innovation
FPG	federal poverty guidelines
HHS	U.S. Department of Health and Human Services
ISSI	Inclusive Shared Solar Initiative
LIHEAP	Low Income Home Energy Assistance Program
NASCSP	National Association for State Community Services Programs
NASEO	National Association of State Energy Officials
NCAP	National Community Action Partnership
NCSP	National Community Solar Partnership
NEADA	National Energy Assistance Directors Association
NEPA	National Environmental Policy Act
NREL	National Renewable Energy Laboratory
PV	photovoltaics
PY	program year
REACH	Residential Energy Assistance Challenge Program
SERC	Sustainable Energy Resources for Consumers
SIR	savings-to-investment ratio
U.S.C.	United States Code
WAP	Weatherization Assistance Program
WPN	Weatherization Program Notice

## Executive Summary

The U.S. Department of Health and Human Services (HHS) Low Income Home Energy Assistance Program (LIHEAP) and the U.S. Department of Energy (DOE) Weatherization Assistance Program (WAP) are federal programs that help low-income households reduce their energy costs. LIHEAP provides direct assistance to help households cover energy costs and stay connected to utility services, as well as weatherization and minor energy-related repairs. WAP provides no-cost energy efficiency measures to reduce energy use and energy bills while ensuring health and safety for income-qualified households. Across the United States, program administrators are implementing or considering solar energy as an eligible measure for LIHEAP and/or WAP funding, but the successful implementation pathways were largely undocumented. This report details the National Renewable Energy Laboratory's efforts to fill that gap by analyzing LIHEAP and WAP annual plans, surveying LIHEAP grant recipients and WAP Grantees about their challenges or barriers to implementing solar, and conducting interviews and workshops with program administrators.

Through plan analyses, surveys, and discussions with state-level administrators of LIHEAP and WAP programs, we identified that 13 out of the 54 LIHEAP grant recipients and 12 out of the 57 WAP Grantees referenced solar in their 2022 or 2023 annual plans. These LIHEAP grant recipients and WAP Grantees represent 18 unique states or jurisdictions. In these locations, solar was noted either as a currently eligible program measure or under consideration to be an eligible measure in the future. We identified the following six pathways that administrators used to incorporate solar into LIHEAP and WAP:

1. Rooftop solar as an eligible weatherization measure in WAP
2. Rooftop solar as an eligible weatherization measure in LIHEAP
3. LIHEAP crisis funds to repair or replace existing rooftop solar systems
4. LIHEAP funds to pay for community solar subscriptions
5. LIHEAP funds for client solar bills
6. Use of LIHEAP or WAP infrastructure for external solar program intake.

For entities that have already incorporated solar into their WAP or LIHEAP programs, the top challenges cited were the need for funding to pay for solar installation and staff capacity, followed by installation timelines, utility coordination, client participation, and partner participation (i.e., utility or financial).

For entities considering incorporating solar into their programs, we conclude with several key insights from current programs:

1. Partnerships are important for funding and implementation.
2. Internal champions pave the way to success.
3. Developing solar capacity may build workforce skills.
4. Solar can introduce additional program management needs.
5. Successful programs may require building solar trust and education in low-income communities.

Finally, this research relies on data gathered from 2022 and 2023 and can provide interested parties with guidance. Further research is necessary to evaluate the rapid evolution of program designs in this area, especially as more states consider or implement solar in these programs.

# Table of Contents

<b>Executive Summary</b> .....	<b>v</b>
<b>1 Introduction</b> .....	<b>1</b>
<b>2 Federal Program Background</b> .....	<b>2</b>
2.1 LIHEAP Overview .....	2
2.1.1 LIHEAP Solar Guidance .....	2
2.2 WAP Overview .....	4
2.2.1 WAP Solar Guidance .....	4
<b>3 Literature Review</b> .....	<b>6</b>
<b>4 Methods</b> .....	<b>8</b>
4.1 LIHEAP and WAP Annual State Plan Analysis .....	8
4.2 Discovery Interviews, Webinars, and Workshops .....	8
4.3 Survey Data Collection .....	9
4.3.1 2023 Data Collection Changes .....	10
4.3.2 2022 and 2023 Survey Responses .....	11
<b>5 Results</b> .....	<b>12</b>
5.1 Jurisdictions That Have Solar Within Their LIHEAP and/or WAP Plans or Have Considered Doing So .....	12
5.1.1 Jurisdictions Implementing Solar in WAP .....	19
5.1.2 Jurisdictions Implementing Solar Within LIHEAP .....	19
5.1.3 Reported Challenges Associated With Incorporating Solar Into WAP or LIHEAP Plans .....	19
5.1.4 Jurisdictions That Have Considered Including Solar Within WAP .....	20
5.1.5 Jurisdictions That Have Considered Including Solar Within LIHEAP .....	21
5.1.6 Perceived Barriers and Challenges to Including Solar in LIHEAP and WAP .....	21
<b>6 Program Design Pathways and Implementation Lessons Learned</b> .....	<b>23</b>
6.1 Program Design .....	23
6.2 Implementation Considerations Lessons Learned .....	25
Partnerships Are Important for Funding and Implementation .....	25
Internal Champions Pave the Way to Success .....	25
Developing Solar Capacity May Build Workforce Skills .....	25
Solar Can Introduce Additional Program Management Needs .....	26
Successful Programs May Require Building Solar Trust and Education in Low-Income Communities .....	26
Areas for Future Research .....	27
<b>7 Conclusions</b> .....	<b>28</b>
<b>References</b> .....	<b>29</b>

## List of Figures

Figure 1. Percentage of LIHEAP funds allocated to weatherization in 2023. ....	3
Figure 2. 2022 and 2023 survey response status, grant recipient or Grantee.....	11
Figure 3. 2022 and 2023 reported challenges for organizations that have implemented solar in WAP and LIHEAP. ....	20
Figure 4. Factors respondents perceived as barriers to using WAP and LIHEAP funds for solar.....	22
Figure 5. Reasons respondent organizations decided not to include solar in WAP and LIHEAP.....	22

## List of Tables

Table 1. Summary of Solar Activity in WAP and LIHEAP Annual Plans, 2022–2023 .....	13
------------------------------------------------------------------------------------	----



# 1 Introduction

In the United States, 44% of households, or about 50 million, are defined as low-income (U.S. DOE n.d.a.). Whereas the average U.S. household spends about 2.3% of their annual income on energy bills, low-income households spend an average of 8.1% of their income on electric and heating expenses (Drehobl, Ross, and Ayala 2020). This reflects a proportionally higher energy burden, which is the percentage of income spent on energy costs. Energy bills above 6% of household income are considered a high energy burden, meaning that low-income households are generally well above the threshold for incurring a high energy burden (Drehobl, Ross, and Ayala 2020). Approximately 51% of households with an annual income of \$25,000 or less needed to cut back on basic necessities, such as food or medicine, to pay an energy bill at least once in the prior year (Frost 2022).

Federal, state, and local programs can help alleviate energy costs for low-income households. This report focuses on two of these federal programs: the U.S. Department of Health and Human Services (HHS) Low Income Home Energy Assistance Program (LIHEAP) and the U.S. Department of Energy (DOE) Weatherization Assistance Program (WAP). LIHEAP provides assistance to help households cover electric and/or heating fuel costs and avoid utility shut offs. WAP provides no-cost energy efficiency measures to reduce energy use and energy bills while also ensuring health and safety for income-qualified households (U.S. DOE n.d.f.). HHS estimates that 5.7 million households received LIHEAP assistance in FY 2022 (Office of Community Services n.d.). LIHEAP weatherization assisted 59,180 households in the same federal fiscal year. DOE estimates that roughly 64,000 households received weatherization services through WAP in 2021 (NASCSP 2021). Despite the volume of households served by LIHEAP and WAP, it is estimated that millions of additional households are eligible but have not received assistance yet (Castillo and Daniel 2022).

Recent activity around the country to incorporate rooftop and/or community solar into LIHEAP and/or WAP illustrates efforts to maximize low-income homeowners' energy bill savings. Until now, the various pathways by which states are implementing solar into these programs have not yet been comprehensively identified and analyzed.

Through the support of DOE's Solar Energy Technologies Office and WAP, the National Renewable Energy Laboratory (NREL) addressed this gap by (1) conducting a literature review of existing analyses of low-income solar programs focused on solar deployment in LIHEAP and WAP; (2) reviewing LIHEAP grant recipient and WAP Grantee plans for solar activity; (3) surveying LIHEAP grant recipients, WAP Grantees, and local program implementers; and (4) conducting discovery interviews and a virtual workshop with representation from state and local implementing organizations. This research was conducted from 2022–2023, allowing for a comparison of solar implementation in LIHEAP and WAP between the two years across all participating states and jurisdictions. This data collection identified real and perceived barriers to implementing solar in LIHEAP and WAP, along with widespread interest in solar among program implementers.

## 2 Federal Program Background

### 2.1 LIHEAP Overview

The Low Income Home Energy Assistance Act of 1981 established LIHEAP, a federal block grant program providing home energy bill assistance to income-qualified households that is administered by HHS. HHS allocates funding to 50 states, the District of Columbia (D.C.), all five U.S. territories, and 151 tribes (collectively referred to as “grant recipients”). The goal of LIHEAP is to assist low-income households in meeting their immediate home energy needs (Office of Community Services n.d.). Grant recipients determine income eligibility, with HHS requiring that eligible participants have an annual income at or below 150% of the federal poverty guidelines (FPG) or 60% of the state median income, whichever is greater. LIHEAP grant recipients may set lower income eligibility requirements, but no lower than 110% of FPG. As a program, LIHEAP provides financial assistance to households that have a high home energy burden and prioritizes providing support to the following target populations: older adults, household members with disabilities, households that include young children under the age of six. Additionally, LIHEAP funds may be used for weatherization and for crisis scenarios such as utility shut offs or disasters.

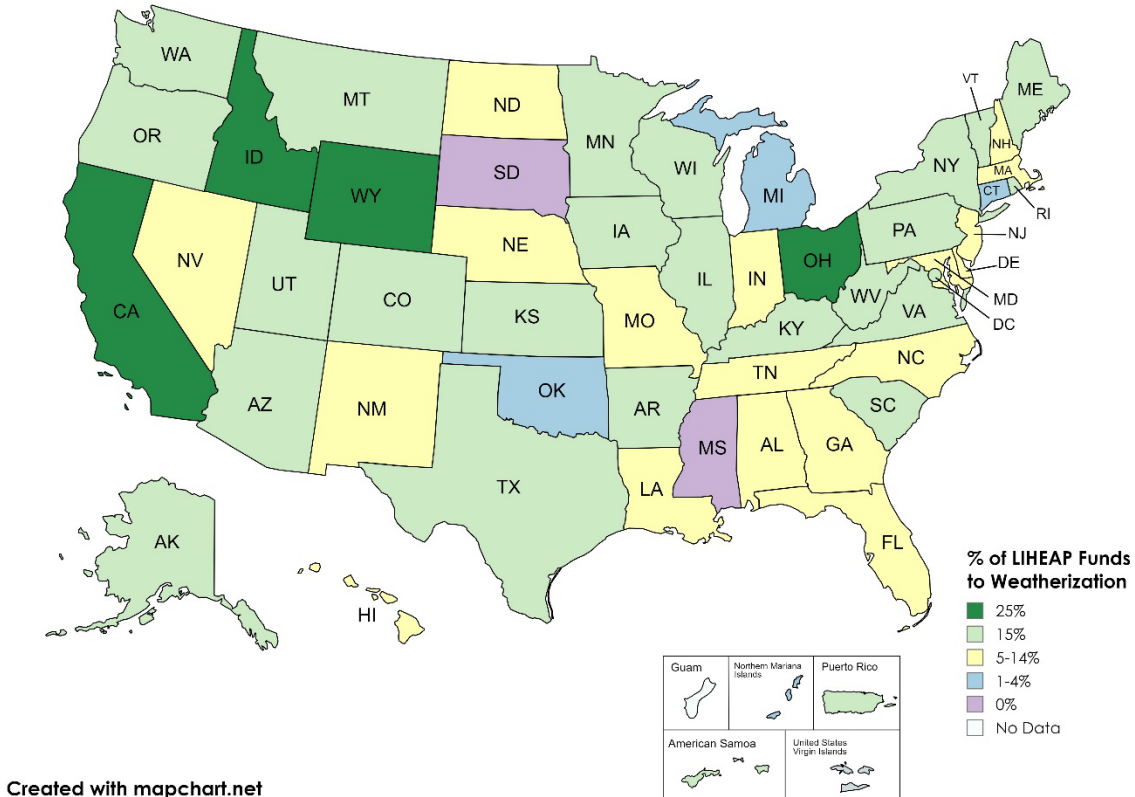
In federal fiscal year (FY) 2023, LIHEAP allocated \$4 billion in block grants to grant recipients, with an additional \$2 billion supplemental grant. The Infrastructure Investment and Jobs Act of 2021 (also called the Bipartisan Infrastructure Law) allocated an additional \$500 million to LIHEAP over each of the next five federal fiscal years (Office of Community Services n.d.). LIHEAP typically serves 5-6 million households annually (Office of Community Services n.d.).

#### 2.1.1 LIHEAP Solar Guidance

LIHEAP is a fuel source-neutral program, meaning that funds can be applied to household energy bills regardless of the energy source, according to grant recipient program rules. The Energy Policy Act of 2005 explicitly authorized LIHEAP to allow the use of funds to purchase renewable fuels. LIHEAP Assurance 16, in Section 2605 of the LIHEAP statute, allows grant recipients to set aside up to 5% of LIHEAP funds for energy education and guidance on reducing a household’s energy usage, including available solar options. Within LIHEAP, the Residential Energy Assistance Challenge Program (REACH) was authorized in 1996 and encourages grant recipients to be innovative with offering energy assistance, which could include solar. Although REACH is still authorized by law, no current funding is available (LIHEAP Clearinghouse n.d.a.). In June 2023, HHS published additional guidance on solar in LIHEAP, explaining how LIHEAP benefits may be used to pay for community solar subscription fees if they are a part of the household’s energy costs (Howard 2023).

Grant recipients may allocate up to 15% of their LIHEAP funds to weatherization services, or up to 25% with an approved waiver from HHS (42 U.S.C. § 8621-8630 (2008)). As shown in Figure 1, 48 states, three territories, and D.C. allocated 2%–25% of LIHEAP funds for weatherization in 2023. In total, 24 states, American Samoa, the Northern Mariana Islands, Puerto Rico, and D.C. allocated the full 15% of LIHEAP funds allowed without waiver. California, Idaho, Ohio, and Wyoming all received waivers to allocate 25% of LIHEAP funds to weatherization in 2023. The grant recipient must identify the agency that will oversee LIHEAP-funded weatherization activities and the rules that will apply to those funds, which may be LIHEAP rules, WAP rules,

or a hybrid between the LIHEAP and WAP rules. The request to allocate LIHEAP funds to weatherization must also include a list of specific approved weatherization measures, and grant recipients may include solar in that list (LIHEAP Clearinghouse n.d.b.).



**Figure 1. Percentage of LIHEAP funds allocated to weatherization in 2023.**

LIHEAP also allows funds to be allocated for energy crisis situations, defined as “weather-related and supply shortage emergencies and other household energy-related emergencies,” including bill payment assistance after receiving a shut-off or out-of-fuel notice and equipment repair or replacement (42 U.S.C. § 8621-8630 (2008)). Grant recipients determine the percentage of funds allocated to crisis situations and the funding rules, such as the definition of a crisis, eligibility priority, maximum benefit offered, time to resolve a crisis, and whether crisis funds can be used for equipment repair or replacement. If a grant recipient allows crisis funds to be used for equipment repair or replacement, they may choose to include solar panels as eligible equipment, as has been done in Florida, Missouri, South Carolina, and Washington (LIHEAP Clearinghouse, n.d.c).

The pending LIHEAP Fiscal Year 2025 Model Plan includes checkboxes for grant recipients to identify whether rooftop solar and/or community solar are eligible LIHEAP weatherization measures and whether rooftop solar is an eligible crisis fund measure (Meadows 2023).

## 2.2 WAP Overview

The Energy Conservation and Production Act of 1976 established WAP to reduce energy costs for low-income households by increasing the energy efficiency of homes while ensuring health and safety (Energy Conservation and Production Act of 1976). WAP is a formula grant program, and program funds are allocated by DOE based on population to 50 states, D.C., five U.S. territories, and one federally recognized tribe (collectively referred to as “Grantees”). In PY21, WAP served 64,024 households, and weatherization services were funded by over \$1.6 billion in allocations from DOE and HHS LIHEAP, with an additional \$335 million provided from the American Rescue Plan Act (NASCS 2021). The Bipartisan Infrastructure Law allocated an additional \$3.5 billion to WAP to be spent over multiple years (U.S. DOE 2022a). Each WAP-funded energy conservation measure and package of measures must be cost-effective. This is determined using the savings-to-investment ratio (SIR), where measures must save more money over the expected life of the measure than the cost of installation. Common measures include insulation, air sealing, heating and cooling system repairs or replacements, and efficient lighting.

### 2.2.1 WAP Solar Guidance

The Energy Policy Act of 2005 authorized renewable energy systems (including rooftop solar) to be eligible WAP measures, subject to DOE approval (Energy Policy Act of 2005). WAP statute sets the limit for the average cost per unit (ACPU), which is adjusted annually (42 U.S.C. § 6865(c)(1)). Within the ACPU, the total amount of program funds that can be spent on renewable energy improvements per project is also limited. For PY23, the ACPU for weatherized homes nationally was \$8,250, of which the renewable energy cost limit was \$4,047 (U.S. DOE 2022b).

Weatherization Program Notice (WPN) 23-6, issued March 3, 2023, updated and clarified the procedure for approval of rooftop solar as a WAP measure, originally outlined in WPN 19-4 (U.S. DOE 2023a). Standard materials that are approved to be installed using weatherization funds are identified in WAP regulations (10 Code of Federal Regulations (C.F.R.) § 440 Appendix A). To receive approval of rooftop solar photovoltaics (PV) as an eligible WAP measure, a WAP Grantee must follow the standard path for non-Appendix A technology approval by submitting a “Request for Special Approval of Energy Conservation Material” form (WPN 23-6 Attachment 6):

- Demonstrating the technology can achieve an SIR of 1.0 or greater,
- Including the technology in the Grantee’s annual plan, and
- Demonstrating that the Grantee can include the technology in the energy audit protocol for the specific housing type.

WPN 23-6 further provided guidance on the National Environmental Policy Act (NEPA) categorical exclusion for WAP solar installations (U.S. DOE 2023a). To be eligible for the WAP NEPA categorical exclusion, solar PV systems must be installed in or on an existing structure, require no ground disturbance or tree removal, and be appropriately sized and not exceed 60 kW (U.S. DOE 2023). If the PV system does not meet these guidelines, the Grantee is required to complete an environmental questionnaire and receive DOE approval. To complete the WAP approval process, the Grantee plan must include:

- A request to include solar PV as an approved measure for specific housing types
- A special materials request, including maximum PV size and installation location
- Grantee policies on solar PV energy modeling, installation, inspections, and monitoring, including:
  - The process for including leveraged funds in the SIR calculations
  - Compliance with historical preservation requirements
  - Requirements for Grantee, Subgrantee, and/or contractor training, qualifications, or certification
- A sample analysis of a solar PV measure in energy modeling and cost-effectiveness calculations
- A declaration of eligibility for the NEPA categorical exclusion, or a written process for NEPA impact assessment if it is not eligible for the NEPA categorical exclusion (U.S. DOE 2023a).

WPN 24-5, issued November 28, 2023, further clarifies guidelines on solar warranties when rooftop solar is approved as a part of WAP. WAP previously established the maximum lifetime for PV analysis as 20 years, despite a longer expected life of some PV system components. WPN 24-5 specifies that DOE WAP funds may be used to purchase extended warranties on PV systems and components as long as the cost of the warranty is included in the total measure cost and the SIR is still 1.0 or higher (U.S. DOE 2023b).

Additionally, WAP is currently authorized to provide two innovation grant opportunities for implementing technologies and strategies that are outside the scope of standard WAP regulations (U.S. DOE n.d.c.). The Sustainable Energy Resources for Consumers (SERC) grants are available to WAP Grantees and Subgrantees for renewable energy systems and other new technologies that maximize energy burden reduction for WAP participants. At the Secretary of Energy's discretion, DOE may allocate up to 2% of WAP funds for SERC grants, provided WAP-appropriated funds exceed \$275 million. Projects funded by SERC awards are not subject to the ACPU and SIR requirements of the formula grants and may include previously weatherized homes.

The second competitive grant opportunity for WAP Grantees, WAP Subgrantees, and/or nonprofit organizations is the Enhancement & Innovation (E&I) grants. The Consolidated Appropriations Act of 2021 instructed DOE to provide financial assistance for E&I when the total DOE weatherization appropriation exceeds \$225 million per year during PY21 to PY25. The E&I grants are eligible for projects with the goals of increasing weatherization readiness, renewable energy deployment, health and safety measures, best practices, and workforce development (U.S. DOE n.d.c.). As with SERC, activities funded by E&I awards are not subject to the ACPU and SIR requirements of the formula grants. Renewable energy systems are allowable uses of both SERC and E&I funds.

### 3 Literature Review

NREL conducted a literature review related to low-income solar access aligned with LIHEAP and WAP. NREL used online databases and internet searches to identify relevant documents regarding rooftop solar, community solar, or both in relation to LIHEAP and WAP. The literature review identified 98 relevant sources, with 78 sources referencing rooftop solar, community solar, or both. Some sources did not reference solar but were deemed relevant, as they discussed LIHEAP and WAP policies, barrier assessments, and opportunity assessments. Relevant literature was coded into four categories. When more than one category was addressed in a report, it was coded for both, as summarized below:

- **Barrier assessments** (48 sources) reference literature that discusses difficulties in program design and implementation. Many perceived barriers exist toward increasing solar deployment for low-income households, including a lack of clear policies, low-income homeownership status, financial barriers, lack of information on available programs, lack of trust in program administrators, and low-income access not being a priority for solar developers (Phua 2020; Cook and Shah 2018).
- **Opportunity assessments** (46 sources) reference literature that discusses the potential low- and moderate-income solar market and associated business models to serve that market. For example, Ramasamy et al. (2022) note that rooftop solar installations now cost between \$2.55 and \$2.95 per watt and community solar installations cost between \$1.71 and \$1.94, making solar energy more cost-effective. While low-income households make up over 40% of all U.S. households, only 5% of solar installations serve the low-income population (McGregor 2016). DOE initiatives, such as the inactive Solar in Your Community Challenge and the Clean Energy Savings for All Americans Initiative, provided pathways to increase low-income solar capacity (McGregor 2016). Cook et al. (2019) identify 10 different business models that could be used to increase low-income solar adoption. This category also includes literature related to equity and affordability in energy efficiency and solar programs.
- **Case studies** (41 sources) are reports that include detailed summaries of solar projects or programs related to state-level LIHEAP and/or WAP implementation. For example, the Colorado Energy Office (CEO) released a case study on their 2015 Low-Income Community Solar Demonstration Project. CEO provided a \$1.2 million grant to GRID Alternatives to provide 300 low-income households with community solar subscriptions through eight utility partners (Dobos et al. 2017). Additionally, the Clean Energy States Alliance (CESA) and Minnesota Department of Commerce published a case study on Minnesota's pilot program to include rooftop solar PV as a WAP measure. Beginning in 2019, the state launched a 15-home pilot program with the end goal of full approval from DOE to include rooftop solar PV as a weatherization measure (State of Minnesota Department of Commerce Energy Equity Program n.d.).
- **Toolkits** (16 sources) provide a compilation of resources, template materials, case studies, and other documents to guide solar and/or LIHEAP and WAP program development and implementation. For example, the National Association of State Energy Officials (NASEO) published *Key Elements to Consider for a Low- and Moderate-*

*Income Community Solar Project*, which offers guidance for LIHEAP grant recipients interested in creating community solar programs for LIHEAP recipients (NASEO and NEADA 2022). Additionally, the DOE Clean Energy for Low-Income Communities Accelerator provides step-by-step instructions for determining how to implement renewable energy into weatherization, based on program requirements at the time (U.S. DOE 2019).

## 4 Methods

This section summarizes the stakeholder data collection methods NREL employed in this project to identify the current level of activity around solar in LIHEAP and WAP and understand stakeholder perspectives.

### 4.1 LIHEAP and WAP Annual State Plan Analysis

LIHEAP grant recipients and WAP Grantees are required to submit annual plans. LIHEAP currently issues grants to 50 states, five territories, D.C., and 151 tribes and tribal organizations.<sup>1,2</sup> WAP issues 57 grants to the same entities and one tribe. In total, NREL collected and reviewed 54 LIHEAP and 56 WAP plans for PY21 and 52 LIHEAP and 55 WAP plans for PY22.<sup>3</sup> NREL tracked mentions of solar within the LIHEAP and WAP plans and whether the entity had: (1) already developed a plan to implement solar as an eligible use of funds, (2) listed solar as an approved weatherization measure, and/or (3) completed or begun conducting a solar pilot, along with any relevant additional details. Changes in plans relative to solar were tracked between PY21 and PY22.

### 4.2 Discovery Interviews, Webinars, and Workshops

NREL conducted interviews with various program administrators, held four interactive webinars, and hosted a virtual workshop to gather feedback from stakeholders. In total, NREL interviewed five national stakeholder organizations, 11 WAP Grantees, two LIHEAP grant recipients, three state or local agencies implementing related low-income solar programs, and one WAP Subgrantee. In the interviews, we requested information on solar program implementation, program status, lessons learned, and open-ended feedback on solar in LIHEAP and WAP to increase our understanding of the barriers and opportunities to potentially expand solar in these programs.

The four stakeholder webinars were conducted between June 2022 and May 2023. The webinars were each attended by 44–163 registrants and were structured similarly: NREL and federal partners shared information on WAP and LIHEAP solar guidance and then solicited input from participants regarding program guidelines and their perspectives on incorporating solar into LIHEAP and WAP programs. In addition to DOE and HHS, national partners included CESA, the National Association for State Community Services Programs (NASCSPP), NASEO, the National Community Action Partnership (NCAP), and the National Energy Assistance Directors Association (NEADA).

---

<sup>1</sup> Upon HHS's recommendation, NREL did not include tribes or tribal organizations in its analysis of LIHEAP plans.

<sup>2</sup> NREL analyzed LIHEAP plans for PY22 (10/1/21–9/30/22) and PY23 (10/1/22–9/30/23) and WAP plans from PY21 (4/1/21–3/31/22 or 10/1/21–9/30/22) and PY22 (4/1/22–3/31/23 or 10/1/22–9/30/23). Despite covering the similar time periods, they are listed as different program years. WAP program years begin on 4/1 for roughly a third of Grantees and 10/1 for roughly two-thirds of Grantees.

<sup>3</sup> For PY21, NREL collected LIHEAP and WAP plans from all 50 U.S. states, D.C., American Samoa, Puerto Rico, and the Commonwealth of the Northern Mariana Islands. NREL collected PY21 plans from Guam and the U.S. Virgin Islands for WAP only. For PY22, plans were collected from all the same locations as PY21, with the exception of the U.S. Virgin Islands WAP plan, which NREL was unable to obtain.



Finally, NREL held a virtual workshop in November 2022, with attendance sought from the following stakeholder perspectives:

- DOE WAP staff
- WAP Grantees
- WAP Subgrantees
- WAP E&I or SERC awardees
- HHS LIHEAP staff
- LIHEAP grant recipients
- LIHEAP local implementers
- National stakeholder organizations
- DOE SETO representatives.

NREL extended 45 invitations to external stakeholders and ultimately had 48 attendees from the above stakeholder groups. HHS and DOE representatives shared policy guidance and updates to LIHEAP and WAP regarding solar implementation. NREL presented preliminary findings from the first year of data collection, including level of interest in solar around the country, models of implementation, lessons learned, and perceived barriers to implementing solar in LIHEAP and WAP. Following the presentations, attendees participated in a facilitated discussion about critical barriers to solar implementation and how to address them, along with resources that could help inform solar-related decision-making.

### 4.3 Survey Data Collection

NREL surveyed LIHEAP grant recipients and WAP Grantees in both 2022 and 2023 regarding implementation of solar in WAP and LIHEAP, perceived barriers, and reasons solar has not been adopted in WAP and LIHEAP, as applicable.<sup>4</sup> In some jurisdictions, one organization administers both WAP and LIHEAP, while other jurisdictions have the programs administered by different organizations. Across both programs, NREL aimed to obtain responses from 105 LIHEAP grant recipients and WAP Grantees, representing 56 states or territories in the United States (collectively referred to as jurisdictions). NREL distributed surveys via email to the individuals listed as contacts in the LIHEAP and WAP plans. NREL also distributed the surveys through partner organizations' e-newsletters, webinars, and workshops.

NREL collected responses to the survey between May 4, 2022, and September 1, 2022, and received 75 valid responses from 70 organizations in 43 jurisdictions (40 states, Puerto Rico, American Samoa, and D.C.). Of the 75 valid responses, 45 responses were received from Grantees and 30 from local Subgrantees or other state agencies.<sup>5</sup> Noting that organizations may overlap in their roles as administrators of both programs, we received 40 responses from WAP

---

<sup>4</sup> All survey questions can be found in a data file that can be accessed at the following link: <https://data.nrel.gov/submissions/232>.

<sup>5</sup> NREL considered a response to be valid if the respondent was an individual from the state entity or a local implementing organization within the state. Invalid responses included responses from entities that do not directly implement WAP or LIHEAP. When more than one response was provided within a jurisdiction and the responses were not consistent, we used the response from the state entity in the results section.

Grantees, 37 responses from LIHEAP grant recipients, 27 responses from WAP Subgrantees, and 24 responses from local-level LIHEAP grant recipients.

In 2023, NREL administered two separate surveys, and the survey questions were largely identical to the survey released in 2022 (see Section 4.3.2 below for further discussion of the relevant differences). One survey targeted entities that were identified as implementing solar as part of their LIHEAP or WAP programs (“Implementation Survey”), and one targeted entities that were not yet implementing solar (“General Survey”). The Implementation Survey was sent directly to five LIHEAP grant recipients,<sup>6</sup> 10 WAP Grantees,<sup>7</sup> and one entity<sup>8</sup> that administers both, all of which had implemented solar based on the 2022 survey results. The General Survey was distributed via email directly to 89 contacts from remaining Grantees (see Figure 2).<sup>9</sup> Responses were collected between March 29, 2023, and June 30, 2023. In some cases, NREL staff manually entered survey responses based on interviews conducted with the Grantees in lieu of the Grantee completing the survey. In total, NREL received responses from 49 jurisdictions. In addition, 26 local organizations, 17 of which implement both WAP and LIHEAP and nine of which implement WAP only, from 20 states, provided survey answers.

#### **4.3.1 2023 Data Collection Changes**

Although the bulk of the questions in the 2022 and 2023 versions of the surveys remained the same, some changes were made in 2023 for clarity or ease of response. The 2023 General Survey asked respondents to report whether they had considered implementing solar in LIHEAP and/or WAP. For affirmative responses, respondents were then asked to identify the internal and external factors affecting their decision capacity, administrative systems, approvals, client participation, utility coordination.<sup>10</sup> These respondents were also asked to describe actions their organization had taken toward implementing solar in LIHEAP or WAP, perceived barriers to implementation, and interest moving forward. Respondents who indicated that their organization had not considered implementing solar in LIHEAP or WAP were asked a similar set of questions to understand perceived barriers to implementation and what would be necessary for them to consider including solar access through WAP and/or LIHEAP.

The Implementation Survey omitted questions about perceived barriers. Instead, respondents were asked to report on their experience implementing solar within LIHEAP or WAP, including program structure, funding sources, clients and client eligibility, program outcomes, and program challenges. Further, implementing respondents were asked to reflect on lessons learned from implementing solar and what could improve implementation moving forward.

---

<sup>6</sup> Colorado, D.C., Delaware, Minnesota, and New Mexico.

<sup>7</sup> Colorado, D.C., Delaware, Illinois, Minnesota, New Jersey, New Mexico, New York, Puerto Rico, and Wisconsin.

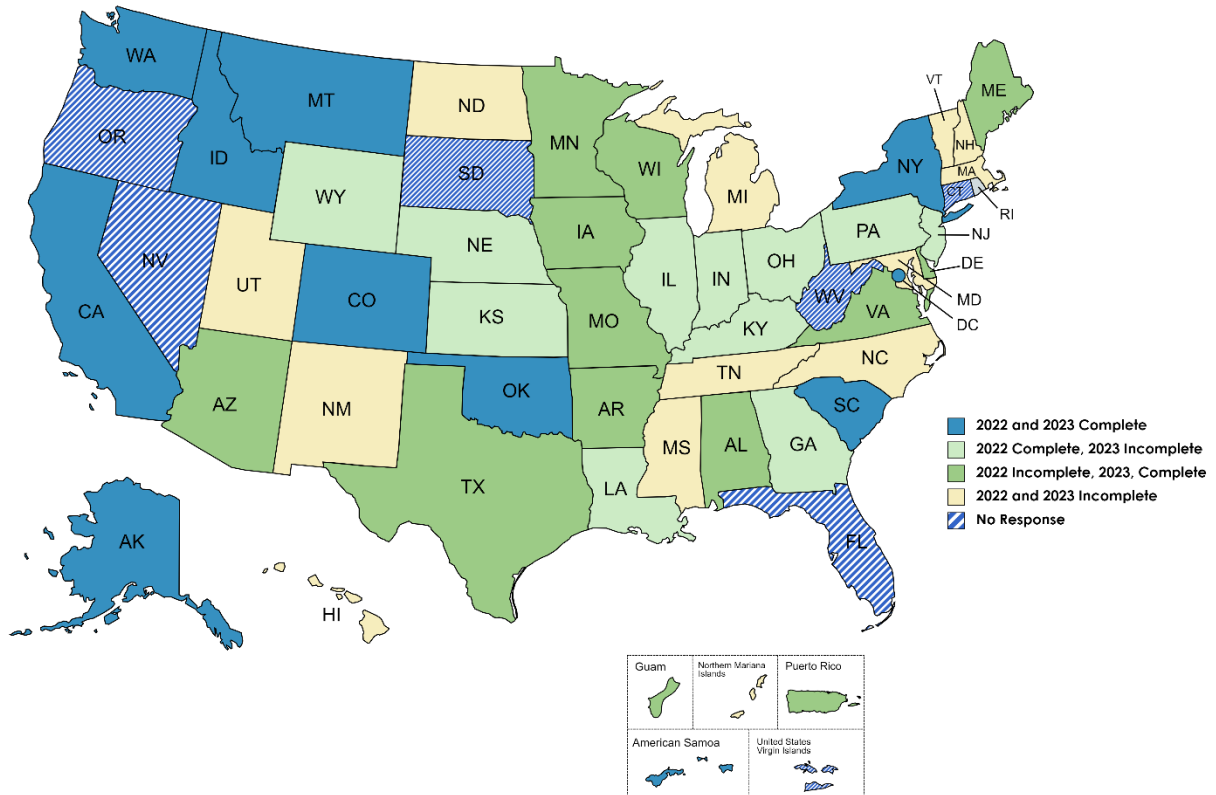
<sup>8</sup> American Samoa.

<sup>9</sup> Note that the Implementation and General surveys were sent to jurisdictions depending on whether one or both of the LIHEAP grant recipients and WAP Grantees had implemented solar.

<sup>10</sup> This refers to states working with the utility companies on securing additional funding and working on grid interconnection for when solar panels are installed.

### 4.3.2 2022 and 2023 Survey Responses

The map in Figure 2 compares the aggregated 2023 survey response results to the 2022 survey. This figure shows the response status of the WAP Grantees and LIHEAP grant recipients over the two years. Survey response completion varied across jurisdictions and program types: Respondents from some locations provided responses for both WAP and LIHEAP programs (“Complete”), respondents from other locations responded for *either* WAP or LIHEAP (“Incomplete”), and the remaining entities provided no responses at all (“No Response”).



**Figure 2. 2022 and 2023 survey response status, grant recipient or Grantee.**

As depicted in Figure 2, nine states and American Samoa completed both the 2022 and 2023 surveys for LIHEAP and WAP. Eleven states completed the survey in 2022 but not 2023. Twelve states, D.C., Guam, and Puerto Rico did not complete the survey in 2022, but did complete it in 2023. Twelve states and the Northern Mariana Islands did not provide complete responses in either year, and six states and the U.S. Virgin Islands provided no responses.

## 5 Results

### 5.1 Jurisdictions That Have Solar Within Their LIHEAP and/or WAP Plans or Have Considered Doing So

In total, 18 jurisdictions referenced solar in their WAP and/or LIHEAP plans across PY21 and PY22. Eleven jurisdictions reported solar in their WAP plans, and 14 jurisdictions reported solar in their LIHEAP plans, with seven jurisdictions reporting both. In addition, 36 jurisdictions have explored the idea of including solar in their WAP and/or LIHEAP plans to some degree over the same period (33 for WAP and 23 for LIHEAP, with 14 jurisdictions considering both). See Table 1 for the full summary of solar in WAP and LIHEAP plans.

**Table 1. Summary of Solar Activity in WAP and LIHEAP Annual Plans, 2022–2023**

		LIHEAP Solar Program Status		WAP Solar Program Status		
Location	Year of Existing Program Approval	Existing Program Description	If No Existing Program, Degree of Exploration	Year of Existing Program Approval	Existing Program Description	If No Existing Program, Degree of Exploration
Alabama			Have interest in exploring			Research and discussion
Alaska						Have interest in exploring
American Samoa			Minor efforts			Program development
Arizona			Have interest in exploring			Have interest in exploring
Arkansas			Research and discussion			Program development
California			Have interest in exploring			Program development
Colorado	2017	2. Rooftop solar approved as weatherization measure under LIHEAP rules. Solar costs are not allowed to be more than 25% of LIHEAP funds allocated to weatherization. Up to 10% of LIHEAP funds allocated to weatherization may be used for solar readiness work. 6. Piloting Low-Income Clean Energy Connector.		2017	1. Rooftop solar approved as weatherization measure.	
Connecticut						
Delaware	2023	2. Rooftop PV as an approved weatherization measure under LIHEAP rules.		2022	6. Use of WAP infrastructure for referrals to rooftop solar Green Energy Program.	

Location	LIHEAP Solar Program Status			WAP Solar Program Status		
	Year of Existing Program Approval	Existing Program Description	If No Existing Program, Degree of Exploration	Year of Existing Program Approval	Existing Program Description	If No Existing Program, Degree of Exploration
District of Columbia	2018, 2021, 2023	6. Use of LIHEAP infrastructure to enroll participants in D.C. Solar for All. Participant in Inclusive Shared Solar Initiative (ISSI). Piloting Low-Income Clean Energy Connector.		2017–2018	1. DOE WAP funding used to install solar on D.C. Housing Authority properties.	
Florida	2016	3. LIHEAP crisis funds may be used for rooftop solar panel repair or replacement.				Have interest in exploring
Georgia			Have interest in exploring			Minor efforts
Guam						Research and discussion
Hawaii				2023	1. Solar water heaters approved as weatherization measure.	
Idaho						
Illinois	2023	6. Use of LIHEAP infrastructure for Illinois Solar for All intake. Piloting Low-Income Clean Energy Connector.	Have interest in exploring	2019	6. Use of WAP infrastructure for Illinois Solar for All intake.	
Indiana			Research and discussion			Research and discussion
Iowa			Research and discussion			Research and discussion
Kansas						
Kentucky			Have interest in exploring			Program development

		LIHEAP Solar Program Status			WAP Solar Program Status		
Location	Year of Existing Program Approval	Existing Program Description	If No Existing Program, Degree of Exploration	Year of Existing Program Approval	Existing Program Description	If No Existing Program, Degree of Exploration	
Louisiana			Research and discussion				
Maine			Have interest in exploring			Research and discussion	
Maryland			Have interest in exploring			Program development	
Massachusetts						Have interest in exploring	
Michigan	2023	2. Solar screens and solar water heaters approved as weatherization measures (LIHEAP rules apply).	Have interest in exploring			Research and discussion	
Minnesota	2021	2. Rooftop PV approved as a weatherization measure under LIHEAP rules. 4. LIHEAP funds to pay for community solar subscriptions. 6. Participant in ISSI.		2019	1. Rooftop solar approved as weatherization measure.		
Mississippi							
Missouri	2023	3. LIHEAP crisis funds may be used for rooftop solar panel repair or replacement.				Program development	
Montana			Research and discussion	2009, 2023	1. Rooftop PV approved as weatherization measure in SERC grants.	Have interest in exploring	
Nebraska			Research and discussion			Research and discussion	

		LIHEAP Solar Program Status			WAP Solar Program Status		
Location	Year of Existing Program Approval	Existing Program Description	If No Existing Program, Degree of Exploration	Year of Existing Program Approval	Existing Program Description	If No Existing Program, Degree of Exploration	
Nevada	2016, 2020	2. Solar screens approved as weatherization measure (WAP rules apply). 5. LIHEAP funds for client solar bills, with a minimum annual payment of \$240.					
New Hampshire			Program development	2023	1. Rooftop PV approved as weatherization measure in SERC grant	Program development	
New Jersey	2023	6. Piloting Low-Income Clean Energy Connector.				Research and discussion	
New Mexico	2023	6. Piloting Low-Income Clean Energy Connector.	Research and discussion	2022	1. Rooftop PV approved as weatherization measure in SERC grant.	Program development	
New York	2023	6. Piloting Low-Income Clean Energy Connector.	Program development	2022	1. Rooftop PV approved as weatherization measure in SERC grant.	Have interest in exploring	
North Carolina						Have interest in exploring	
North Dakota							
Northern Mariana Islands						Have interest in exploring	
Ohio			Research and discussion	2023	1. Rooftop PV approved as weatherization measure in SERC grant.	Program development	
Oklahoma			Minor efforts	2023	1. Solar water heaters approved as weatherization measure in SERC grant.	Research and discussion	
Oregon							



Location	LIHEAP Solar Program Status			WAP Solar Program Status		
	Year of Existing Program Approval	Existing Program Description	If No Existing Program, Degree of Exploration	Year of Existing Program Approval	Existing Program Description	If No Existing Program, Degree of Exploration
Pennsylvania			Have interest in exploring			Research and discussion
Puerto Rico	2019–2020 only—solar water heaters 2022—rooftop solar	2. Solar water heaters and rooftop solar approved as weatherization measures (WAP rules apply).	Program development	2018, 2023	1. 2018: Rooftop solar and storage approved as weatherization measures in pilot program. 2023: Solar water heaters approved as a weatherization measure.	
Rhode Island						Have interest in exploring
South Carolina	2017	3. LIHEAP crisis funds may be used for rooftop solar panel repair or replacement.				
South Dakota						
Tennessee			Have interest in exploring			Program development
Texas	2023	2. Rooftop solar and solar screens approved as weatherization measures (LIHEAP rules apply).				Program development
US Virgin Islands						
Utah						Research and discussion
Vermont						Program development

		LIHEAP Solar Program Status		WAP Solar Program Status		
Location	Year of Existing Program Approval	Existing Program Description	If No Existing Program, Degree of Exploration	Year of Existing Program Approval	Existing Program Description	If No Existing Program, Degree of Exploration
Virginia			Minor efforts			Minor efforts
Washington	2023	3. LIHEAP crisis funds may be used for rooftop solar panel repair or replacement.	Program development	2023	1. Solar water heaters approved as weatherization measure.	Program development
West Virginia						
Wisconsin	2021	6. Participant in ISSI.	Have interest in exploring			Research and discussion
Wyoming	2023	2. Solar water heaters approved as weatherization measure (WAP rules apply).	Research and discussion			Program development

Existing program descriptions align with the six identified pathways for implementing solar in LIHEAP and WAP: 1. Solar as an eligible weatherization measure in WAP, 2. Solar as an eligible weatherization measure in LIHEAP; 3. LIHEAP crisis funds to repair or replace existing rooftop solar; 4. LIHEAP funds to pay for community solar subscriptions; 5. LIHEAP funds for client solar bills; and 6. Use of LIHEAP or WAP infrastructure for external solar program intake, as explained further in Section 6.1. ISSI is the Inclusive Shared Solar Initiative, a multistate partnership lead by NASEO and NEADA to increase accessibility of community solar for low-income households. The Low-Income Clean Energy Connector is a digital tool to connect LIHEAP administrators with community solar subscription options for LIHEAP recipients, as a part of the National Community Solar Partnership (NCSP).

Additional information may be found here: <https://data.nrel.gov/submissions/232>.

### **5.1.1 Jurisdictions Implementing Solar in WAP**

Twelve WAP Grantees mentioned solar in their PY22 Grantee plans, which represents an increase of six states (California, Delaware, Hawaii, New York, Washington, and Wyoming) and two territories (Puerto Rico and American Samoa) over the PY21 Grantee plans. However, only Colorado, Minnesota, and Puerto Rico had installed rooftop solar through WAP formula funds through 2023. Four PY22 plans identified rooftop solar as an approved measure under WAP, four plans identified solar water heaters as an approved measure,<sup>11</sup> and the final four plans mentioned solar as a measure the Grantee is interested in implementing. Additionally, Montana, New Mexico, New York, New Hampshire, and Ohio have been awarded WAP SERC grants that allocate funds to rooftop solar projects, and Oklahoma received a SERC grant that includes solar hot water (U.S. DOE n.d.g.).

### **5.1.2 Jurisdictions Implementing Solar Within LIHEAP**

Thirteen LIHEAP grant recipients mentioned solar in their PY23 LIHEAP plans, which represents an increase of six states (Delaware, Michigan, Missouri, Texas, Washington, and Wyoming) plus D.C. compared to the PY22 LIHEAP plans. Four PY23 plans identified rooftop solar as an approved LIHEAP measure, two plans identified solar water heaters as an approved LIHEAP weatherization measure, four plans allowed LIHEAP crisis funding to apply to solar repair or replacement, one plan allowed LIHEAP funds to be used for community solar subscriptions, one plan allowed LIHEAP funds to cover rooftop solar bills (such as for a solar lease), and the final plan mentioned solar as a measure the grant recipient is interested in implementing. Additionally, Minnesota, Wisconsin, and D.C. are participating in the DOE-funded and NASEO- and NEADA-led Inclusive Shared Solar Initiative (ISSI) to improve low- and moderate-income access to community solar in coordination with LIHEAP (NASEO n.d.). Similarly, New Mexico, Illinois, and D.C. are piloting the DOE and HHS Low-Income Clean Energy Connector, a software platform to securely connect LIHEAP recipients to community solar subscriptions with verified savings and strong consumer protections (U.S. DOE n.d.d.).<sup>12</sup>

### **5.1.3 Reported Challenges Associated With Incorporating Solar Into WAP or LIHEAP Plans**

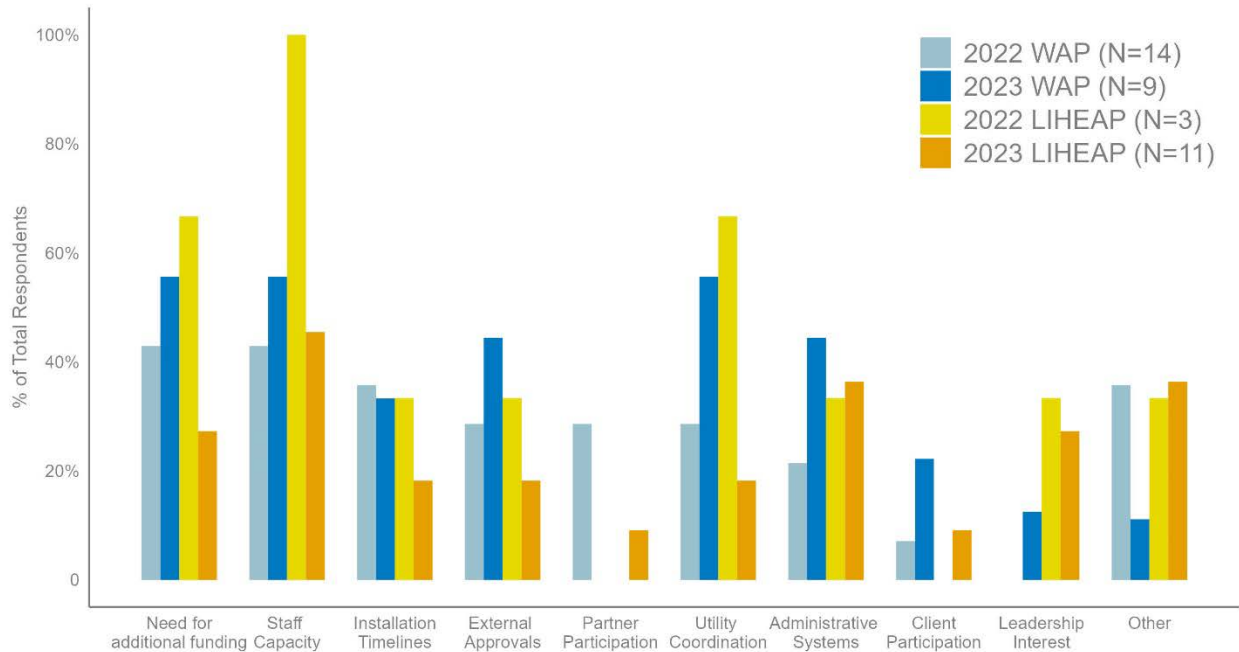
For jurisdictions that have implemented solar in their LIHEAP or WAP plan, the survey questions inquired about the challenges each organization faced during either the development or launch phases. Figure 3 shows the challenges reported by respondents in 2022 and 2023. For WAP organizations, the 2022 and 2023 surveys consistently highlighted the need for additional

---

<sup>11</sup> Upon request from DOE, NREL included solar water heaters in the analysis of WAP plans. Solar water heaters were not explicitly included in the surveys, though some respondents reported on their inclusion as an eligible WAP measure.

<sup>12</sup> DOE and HHS developed the Low-Income Clean Energy Connector, a digital platform that makes community solar accessible to households participating in government-run low-income programs (U.S. DOE n.d.d.). The Connector streamlines the process for LIHEAP implementers to connect clients with community solar subscriptions that have verified savings and strong consumer protections. LIHEAP funds do not directly pay for the subscription.

funding (55.6%, 2023 survey) and staff capacity (55.6%, 2023 survey) as primary challenges. Furthermore, the 2023 survey revealed an increased level of reported concern regarding utility coordination (55.6%) compared to 2022. In contrast, for LIHEAP organizations, the 2023 survey identified staff capacity (45.5%) and administrative systems (36.3%) as the primary challenges. This represents a shift from the 2022 survey for LIHEAP, which identified staff capacity (100%), need for augmented funding (66.7%), and utility coordination (66.7%) as major challenges.



**Figure 3. 2022 and 2023 reported challenges for organizations that have implemented solar in WAP and LIHEAP.**

#### 5.1.4 Jurisdictions That Have Considered Including Solar Within WAP

We asked the survey respondents if they had ever considered including solar within their WAP plans. In the 2022 survey, 32 organizations from 24 jurisdictions responded affirmatively. In the 2023 survey, 43 organizations from 27 responded affirmatively. Notably, the 2023 survey received responses from an additional 11 states and Guam.<sup>13</sup> Of the jurisdictions that had not implemented solar in their plans, as shown in Table 1, respondents from 25 states and American Samoa said that they had considered implementing solar measures through WAP. In addition, respondents from eight states and the Northern Mariana Islands expressed interest in pursuing solar within their WAP plans.

Beyond expressing interest, some jurisdictions had already investigated incorporating solar into their programs. Respondents reported undertaking a range of efforts to consider solar in their programs, including program development, research and discussion, and minor procedural efforts. Program development refers to comprehensive program assessments, the launch of pilot

<sup>13</sup> WAP Grantees with existing solar programs were assumed to have already taken all relevant actions to implement solar programs.

initiatives, and the formulation of detailed plans to integrate solar into WAP. Respondents from 10 states and American Samoa were identified as having program development activities. Preliminary research and discussion activities, mentioned by respondents from 11 states, include assessing the cost-effectiveness and prospective benefits of solar energy integration. Finally, minor efforts, identified by respondents from two states, refer to other activities to begin considering solar, with limited exploration.

#### **5.1.5 Jurisdictions That Have Considered Including Solar Within LIHEAP**

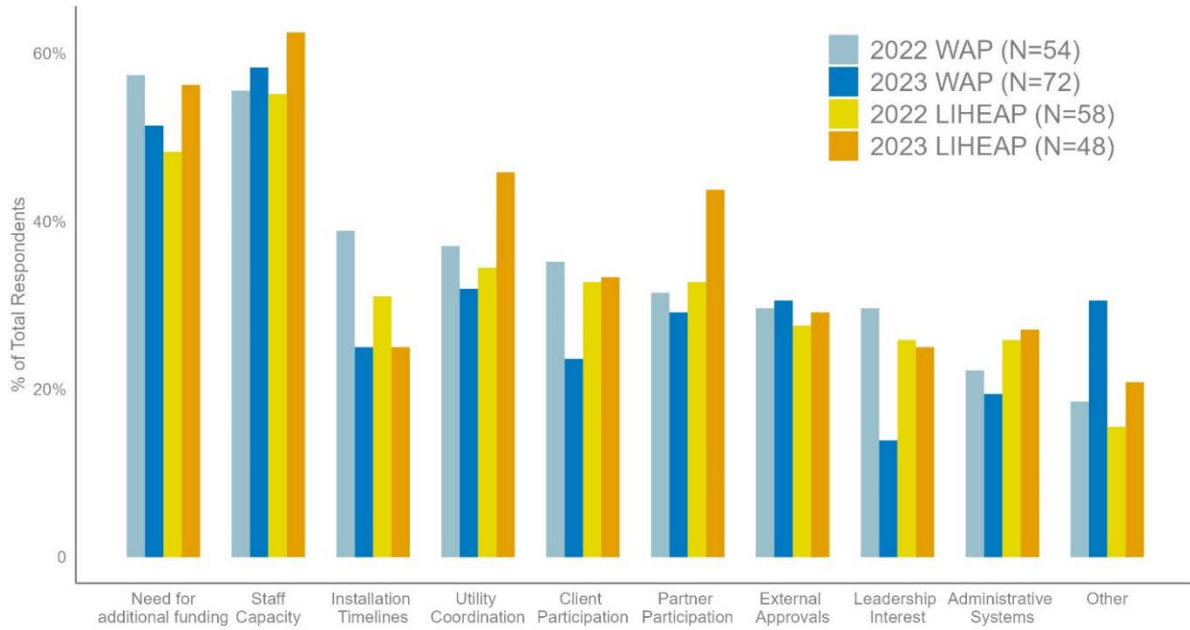
In the 2022 survey, 20 organizations from 19 jurisdictions responded that they had considered including solar within their LIHEAP plans. In the 2023 survey, 24 organizations representing 17 jurisdictions indicated interest in integrating solar into LIHEAP. Cumulatively, the 2023 survey received responses from an additional four jurisdictions.

Looking at the jurisdictions that had not implemented solar in their plans, respondents from 12 states and American Samoa reported considering implementing solar measures through LIHEAP. Meanwhile, respondents from 10 states expressed interest in pursuing solar within their LIHEAP plans.

For jurisdictions that had conducted some exploration, the activities were similarly varied to those for WAP. Respondents from New Hampshire and New York reported program development activity. Eight respondents reported conducting preliminary research and discussion for including solar in LIHEAP. Lastly, organizations from two states and American Samoa were either in the early stages of exploring solar inclusion in LIHEAP or identified the need for further studies (categorized as minor efforts).

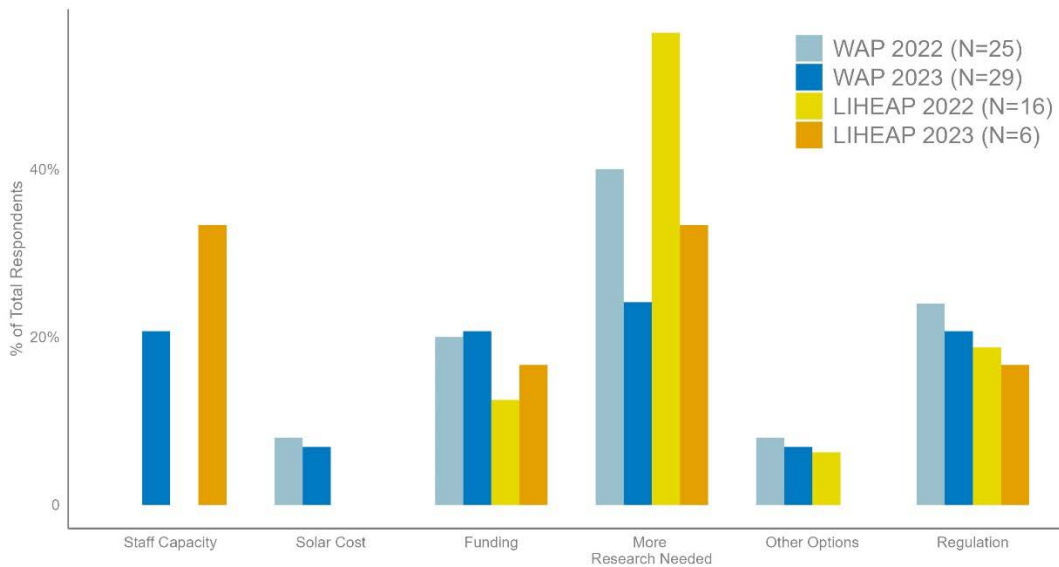
#### **5.1.6 Perceived Barriers and Challenges to Including Solar in LIHEAP and WAP**

NREL collected survey responses on the perceived barriers and challenges to implementing solar in WAP and LIHEAP from entities that had not already done so. As shown in Figure 4, over 50% of respondents representing both LIHEAP and WAP identified staff capacity and the need for additional funding as the top two barriers. WAP respondents' citation of barriers generally decreased from 2022 to 2023, while they generally increased for LIHEAP respondents.



**Figure 4. Factors respondents perceived as barriers to using WAP and LIHEAP funds for solar.**

Survey respondents whose organizations decided not to include solar in LIHEAP or WAP were asked about the reasons for that decision. As shown in Figure 5, key findings include a notable decrease in the number of respondents citing “more research needed” as a reason for not incorporating solar energy into both LIHEAP and WAP in 2023, compared to 2022. Meanwhile, lack of staff capacity emerged as a reason for not including solar in WAP and LIHEAP in 2023.



**Figure 5. Reasons respondent organizations decided not to include solar in WAP and LIHEAP.**

## 6 Program Design Pathways and Implementation Lessons Learned

### 6.1 Program Design

Through NREL’s review of LIHEAP and WAP plans, survey responses, workshop feedback, and interviews of program implementers with active solar programs, we identified six main pathways for solar implementation in LIHEAP or WAP.<sup>14</sup> The solar implementation pathways and examples are summarized below:

- 1. Solar as an eligible weatherization measure in WAP:** Upon DOE approval, WAP Grantees may list rooftop solar PV and/or solar water heaters as eligible WAP measures. WAP Grantees may also apply for SERC awards, allowing Grantees to design and pilot a solar program outside of the standard spending and cost-effectiveness requirements. For example, from 2019–2021, Minnesota conducted a WAP solar pilot and installed rooftop solar PV systems on 15 homes, costing a total of \$163,177, or an average of \$10,878 per home. Minnesota utilized \$56,097 of WAP retrofit funds to complete the pilot program and funded the remaining costs through state and utility funds (State of Minnesota Department of Commerce Energy Equity Program n.d.). Following the completion of the successful pilot, Minnesota received approval from DOE to list rooftop solar as a weatherization measure programwide. DOE no longer requires Grantees to complete a pilot program before submitting for approval to include solar as an eligible weatherization measure.
- 2. Solar as an eligible weatherization measure in LIHEAP:** LIHEAP grant recipients may allocate up to 15% of LIHEAP funds (or up to 25% with an HHS waiver) to support weatherization. Grant recipients may specify rooftop solar, solar water heaters, or solar screens as LIHEAP-funded weatherization measures. Colorado included rooftop solar in their annual LIHEAP plan as a weatherization measure. Colorado allocates 15% of LIHEAP funds to weatherization and allows up to 25% of those funds to be used for solar installations (Colorado Department of Human Services 2023).
- 3. LIHEAP crisis funds to repair or replace existing rooftop solar:** LIHEAP crisis funds may be used to repair or replace existing rooftop solar. In the annual LIHEAP plan, the grant recipient defines crisis situations, eligibility priorities, and benefit amounts. If a grant recipient decides that crisis funds may be used for equipment repair or replacement, solar panels can be listed as eligible equipment. Florida, Missouri, South Carolina, and Washington allow LIHEAP crisis funds to be used for existing solar repairs or replacement (Florida Department of Economic Opportunity 2023; State of Missouri

---

<sup>14</sup> NREL has developed implementation resources with additional details on pathway options and considerations. These resources are available at the following link: <https://www.energy.gov/scep/wap/solar-resources-wap-and-liheap>.

2023; South Carolina Office Of State Treasurer 2023; Washington State Department of Commerce 2023).<sup>15</sup>

4. **LIHEAP funds to pay for community solar subscriptions:** LIHEAP grant recipients may seek approval to allow community solar operators to be vendors for eligible client energy bills, which allows community solar subscriptions to be paid through LIHEAP funds. If a community solar project offers dual billing, a subscriber would receive two monthly bills—one from their electricity utility and one from their community solar operator. LIHEAP funds can be used to pay the community solar bill instead of the electric utility bill, if allowed by a grant recipient. If the community solar project and utility offer consolidated billing, in which the community solar and electric utility bill are consolidated into one bill sent from the utility company, LIHEAP payments would be used the same way as standard electric utility bill payments (Fazeli 2023). Currently, Minnesota explicitly allows community solar operators to be eligible vendors for households with existing community solar subscriptions (Department of Commerce Minnesota 2023).
5. **LIHEAP funds for client solar bills:** Similar to the previous pathway, LIHEAP grant recipients may allow funds to be used for bills from solar vendors if included in their annual plan. As of 2023, Nevada is the only state to utilize this pathway. The state allows a minimum annual payment of \$240 to the solar vendor for eligible households with existing rooftop solar (Nevada Division of Welfare and Supportive Services 2023).
6. **Use of LIHEAP or WAP infrastructure for external solar program intake:** LIHEAP and WAP implementers can help clients enroll in external low-income solar programs. This may include providing clients with information about and applications for community solar programs, providing eligible client lists, and/or providing low-income verification to a community solar subscription manager. This pathway does not require formal approval from HHS or DOE. For example, the D.C. Solar for All program aims to bring solar energy benefits to 100,000 low-income households through a mix of rooftop and community solar projects. The D.C. Department of Energy and Environment manages the Solar for All program, as well as LIHEAP and WAP. The LIHEAP team provides Solar for All applications to recipient households, and LIHEAP participation acts as an automatic income qualifier for Solar for All participation (D.C. DOE & Environment n.d.).

Each pathway has trade-offs, and a variety of pathways are needed to serve all eligible clients. For example, interviewees reported that only 10%–20% of interested WAP households were able to receive rooftop solar due to roofing characteristics, electrical issues, and rental status. Older roofs may need to be replaced before being able to support rooftop solar, and rooftop solar is most effective with large amounts of direct sunlight (U.S. DOE n.d.e.). On a limited basis a grant recipient may allow minor solar readiness repairs, however, roof replacements are not allowed under LIHEAP. LIHEAP has long held that roof replacements are considered construction and

---

<sup>15</sup> Use of LIHEAP crisis funds will require a grant recipient to intervene within 18 to 48 hours of eligibility determination, depending on the crisis.



therefore not an allowable expense. Similarly, community solar projects with available subscriptions are not evenly distributed nationwide, even in jurisdictions with an active community solar market and low-income carveouts (Chan et al. 2023).

## **6.2 Implementation Considerations Lessons Learned**

Drawing from stakeholder engagement and existing literature, the following themes and lessons learned by early implementers may be helpful for entities interested in incorporating solar into LIHEAP and WAP.

### ***Partnerships Are Important for Funding and Implementation***

Low-income households have difficulty taking advantage of solar tax credits, rendering rooftop solar more expensive without assistance than for higher-income households. In addition, the WAP ACPU limit effectively requires non-WAP funds to cover the remaining cost of rooftop solar installations. As demonstrated by Colorado and Minnesota, successfully incorporating solar into WAP or LIHEAP programs often requires some level of braiding multiple funding sources. These funds can come from partnerships with utilities, state and local government programs, community solar administrators, or other organizations.

Beyond funding, partnerships are also important for implementation. WAP and LIHEAP programs can be a source of referrals for eligible clients interested in the solar options offered by the other programs or by other parties.

### ***Internal Champions Pave the Way to Success***

The process for including solar in WAP and LIHEAP involves selecting the implementation pathway(s), securing adequate funding, building partner relationships, and applying for program approval. Early implementers typically had a leadership champion within the organization to spearhead the approval process and secure additional sources of funding. The champion may also recruit implementation partners. In multiple cases, a champion at the WAP Grantee identified a small number of Subgrantees to pilot rooftop solar installations and developed relationships with the LIHEAP grant recipient or utilities to contribute funding. Depending on jurisdictional leadership, availability of funding and partners, and internal staff capacity, the process for approval may take more than a year. Minnesota navigated staff turnover during its WAP solar pilot by ensuring that multiple staff members were involved (State of Minnesota Department of Commerce Energy Equity Program n.d.). The involvement of a leadership champion can help guide staff through the approval process and implementation.

### ***Developing Solar Capacity May Build Workforce Skills***

Establishing the framework for including solar in WAP and LIHEAP requires building staff capacity at the WAP Grantee or LIHEAP grant recipient level and at the local implementer level. Program offices seeking approval for rooftop solar will need to identify requirements for staff training, qualifications, or certification, as well as the monitoring framework to ensure work quality. Interviewees recommended identifying a solar lead or liaison to serve as the point of contact to support local implementers and solar contractors. Local implementers will need to decide whether rooftop solar will be installed by in-house weatherization crews or subcontractors and then obtain the necessary training. Despite the need for additional training and

administration for solar, interviewees reported that weatherization crews responded positively to the opportunity to expand their skill set to solar, thereby improving job retention and satisfaction.

### ***Solar Can Introduce Additional Program Management Needs***

WAP Grantees and LIHEAP grant recipients should identify funding to cover the staff time to develop their solar pathway, obtain DOE approval or include a narrative in their LIHEAP annual plan (if applicable), and train local implementers and monitoring staff. Similarly, local implementers will need to train intake staff on how to communicate solar options to clients and, if rooftop solar is the selected pathway, how to communicate with crews or contractors on program requirements. “Administrative and Training”, “Administrative and Planning” (LIHEAP) and “Technical Assistance” cost categories may be applicable program funding to cover administration of solar within WAP and LIHEAP. If LIHEAP funds are planned, a grant recipient must ensure that the administrative cost cap of 10% is not exceeded across all federal resources used for LIHEAP purposes. However, for the solar pathway of leveraging program infrastructure to connect clients with external solar programs, there may not be an obvious source of funding to cover administration. Where community solar programs have low-income requirements, WAP or LIHEAP implementers may be able to establish a referral or enrollment fee from the community solar entity.

Administration of rooftop solar also requires careful attention to solar and weatherization job closeout timelines. The solar permit, installation, and inspection timeline often takes longer to complete than weatherization. However, a weatherization job may not be able to be “closed” until the solar inspections are completed. This misalignment can cause challenges if the closure spans program years or grant periods. Colorado and Minnesota address timeline challenges by allowing rooftop solar to be added to homes that have been previously weatherized using non-WAP funds.

### ***Successful Programs May Require Building Solar Trust and Education in Low-Income Communities***

LIHEAP and WAP are generally viewed as trusted programs among low-income communities, and they take client interests into account during program design and implementation. This trust is especially important where access to solar is provided through third parties; some interviewees noted that low-income communities have experienced prior predatory solar vendor practices (Energy Resource Center, 2022; DC DOEE, 2022; IL Solar for All 2022). Ensuring that installation subcontractors or community solar entities are well-vetted and that clients have accurate information and program expectations is a critical role for WAP and LIHEAP implementers. Some program structures may also be confusing to clients, so client education is a critical component of solar success. For example, clients participating in community solar may receive multiple bills if consolidated billing is not available. Consolidated billing allows community solar subscription fees, community solar credits, and electric utility charges to be combined onto one bill (Fazeli 2023). In comparison, clients receiving rooftop solar may see a delay in receiving benefits from the installation because of long utility interconnection processes. Some interviewees recommended consulting with clients on program design to address their interests prior to program implementation.

### ***Areas for Future Research***

The pathways identified in this report provide a range of options for providing low-income households with access to solar, but they are not universally applicable to all housing types or jurisdictions. Although WAP and LIHEAP allow for multifamily solar installations, challenges still exist related to virtual net metering and ensuring rental clients receive solar benefits. Multifamily rooftops may not have sufficient space for solar scaled to serve all clients, and manufactured housing properties may not have the structural integrity to support a rooftop solar installation. Although community solar is well aligned to serve renters and manufactured housing, the uneven availability of community solar limits accessibility across the country. NREL recommends additional program research into multifamily and manufactured housing solar access where roof conditions are limiting and community solar is inaccessible.

## 7 Conclusions

Activity to include solar in LIHEAP and WAP has expanded in recent years. A total of 18 jurisdictions received approval for solar in LIHEAP and/or WAP as of 2023, an increase over eight jurisdictions in 2022. The six identified pathways for solar in LIHEAP or WAP are: (1) solar as an eligible weatherization measure in WAP, (2) solar as an eligible weatherization measure in LIHEAP, (3) LIHEAP crisis funds to repair or replace existing solar, (4) LIHEAP funds to pay for community solar subscriptions, (5) LIHEAP funds for client solar bills, and (6) use of LIHEAP or WAP infrastructure for external solar program intake. We highlight several key takeaways from this research to inform successful solar implementation in LIHEAP and WAP:

- 1. There is strong interest in solar among LIHEAP and WAP implementers.** This research identified real and perceived barriers to implementing solar in LIHEAP and WAP, the range of pathways available to address certain barriers, and the widespread interest in solar among program implementers.
- 2. Solar pathways in LIHEAP and WAP provide flexibility and involve trade-offs.** Each solar pathway expands low-income households' access to solar, but none of the pathways are available to all clients. Grant recipients and Grantees will need to weigh the jurisdiction policy landscape, funding sources, potential partners, and desired scale in selecting a solar pathway.
- 3. Staff capacity and funding needs are major perceived barriers to implementing solar.** Dedicated leadership to champion solar in LIHEAP or WAP and develop funding and implementation partnerships can alleviate these barriers. Early implementers reported that initial staff capacity impacts were outweighed by the workforce and client benefits.
- 4. Partnerships are important for successful implementation.** Strategic partnership with committed stakeholders, such as utilities, solar installers, community solar entities, other state agencies, and Subgrantees, allowed for iteration of program processes and in some cases brought complementary funding.

The research presented in this report relies on data gathered from 2022 and 2023, which represents a major improvement on the existing literature regarding solar in LIHEAP and WAP. Many survey respondents reported interest in adopting solar in LIHEAP or WAP in the future, which demonstrates the value in continuing to gather data on these programs as more locations around the United States implement—or choose not to implement—solar. Ongoing research into solar activity in these programs can further elucidate barriers and successful pathways for implementation, as well as options for improving access to solar among multifamily and manufactured housing residents and renters.

## References

- Castillo, Maria, and Joe Daniel. 2022. “By the Numbers: Low-Income Energy Assistance.” RMI. Accessed August 29, 2023. <https://rmi.org/by-the-numbers-low-income-energy-assistance/>.
- Chan, Gabriel, Kaifeng Xu, Matthew Grimley, Sudha Kannan, Mazen Hassan, and Jenny Sumner. 2023. “Sharing the Sun Community Solar Project Data (December 2022).” NREL Data Catalog. Golden, CO: National Renewable Energy Laboratory. Last updated: December 12, 2023. DOI: 10.7799/1994393.
- Colorado Department of Human Services. 2023. *Detailed Model Plan (LIHEAP) Revision # 1*. Denver, CO: State of Colorado. [https://liheapch.acf.hhs.gov/sites/default/files/webfiles/docs/2023/state-plans/CO\\_Plan\\_2023.pdf](https://liheapch.acf.hhs.gov/sites/default/files/webfiles/docs/2023/state-plans/CO_Plan_2023.pdf).
- Cook, Jeffrey, and Monisha Shah. 2018. *Reducing Energy Burden with Solar: Colorado’s Strategy and Roadmap for States*. Golden, CO: National Renewable Energy Laboratory. NREL/TP-6A20-70965. <https://www.nrel.gov/docs/fy18osti/70965.pdf>.
- Cook, Jeffrey, Sydney Forrester, Bryn Grunwald, Jenny Heeter, Clark Henry, and Monisha Shah. 2019. *Up to the Challenge: Communities Deploy Solar in Underserved Markets*. Golden, CO: National Renewable Energy Laboratory. NREL/TP-6A20-72575. <https://www.nrel.gov/docs/fy19osti/72575.pdf>.
- D.C. Department of Energy & Environment. n.d. “Solar for All.” Accessed August 29, 2023. <https://doee.dc.gov/solarforall>.
- D.C. Department of Energy & Environment. 2022. Personal Communication.
- Department of Commerce Minnesota. 2023. *Detailed Model Plan (LIHEAP) Revision # 1*. St. Paul, MN: State of Minnesota. [https://liheapch.acf.hhs.gov/sites/default/files/webfiles/docs/2023/state-plans/MN\\_Plan\\_2023.pdf](https://liheapch.acf.hhs.gov/sites/default/files/webfiles/docs/2023/state-plans/MN_Plan_2023.pdf).
- Dobos, Hillary, Emily Artale, Douglas Gagne, and Alexandra Anzar. 2017. *Insights from the Colorado Energy Office Low-Income Community Solar Demonstration Project*. Denver, CO: Lotus Engineering and Sustainability, LLC and the Colorado Energy Office. <https://lpdd.org/wp-content/uploads/2020/12/Insights-from-the-CEO-Low-Income-Community-Solar-Demonstration-Project.pdf>.
- Drehobl, A., L. Ross, and R. Ayala. 2020. *How High Are Household Energy Burdens?* Washington, DC: American Council for an Energy-Efficient Economy. <https://www.aceee.org/sites/default/files/pdfs/u2006.pdf>.
- Energy Conservation and Production Act of 1976, Public Law 94-385, U.S. Statues at Large 90 (1976). 1125–1169.

- Energy Policy Act of 2005, Public Law 109-58, U.S. Statutes at Large 119 (2005): 594–1143.
- Energy Resource Center. 2022. Personal Communication.
- Fazeli, Sandy. 2023. “Community Solar Consolidated Billing: Review of State Requirements, Policies, and Key Considerations.” National Association of State Energy Officials. <https://www.naseo.org/data/sites/1/documents/publications/Community%20Solar%20Consolidated%20Billing%20Final%5b85%5d.pdf>.
- Florida Department of Economic Opportunity. 2023. *Detailed Model Plan (LIHEAP) Revision # 2*. Tallahassee, FL: State of Florida. [https://liheapch.acf.hhs.gov/sites/default/files/webfiles/docs/2023/state-plans/FL\\_Plan\\_2023.pdf](https://liheapch.acf.hhs.gov/sites/default/files/webfiles/docs/2023/state-plans/FL_Plan_2023.pdf).
- Frost, Riordan. 2022. “Energy Insecurity Threatens to Destabilize Household This Winter.” Joint Center for Housing Studies of Harvard University. Accessed August 29, 2023. <https://www.jchs.harvard.edu/blog/energy-insecurity-threatens-destabilize-households-winter>.
- Howard, Dr. Lanikue. 2023. “LIHEAP IM 2023-04 Community Solar and LIHEAP Considerations.” U.S. Department of Health and Human Services. June 15, 2023. <https://www.acf.hhs.gov/ocs/policy-guidance/liheap-im-2023-04-community-solar-and-liheap-considerations>.
- Illinois Solar for All. 2022. Personal Communication.
- Low Income Home Energy Assistance Program [LIHEAP] Clearinghouse. n.d.a. “Assurance 16.” Accessed August 29, 2023. <https://liheapch.acf.hhs.gov/delivery/sufficiency.htm>.
- Low Income Home Energy Assistance Program [LIHEAP] Clearinghouse. n.d.b. “LIHEAP Funds by Program Component.” Accessed August 29, 2023. <https://liheapch.acf.hhs.gov/tables/components.htm>.
- Low Income Home Energy Assistance Program [LIHEAP] Clearinghouse. n.d.c. “LIHEAP State and Territory Plans, Manuals and Delegation Letters.” Accessed August 29, 2023. <https://liheapch.acf.hhs.gov/stateplans.htm>.
- McGregor, Caroline. 2016. “New Analysis Shows National Potential for Solar Power in Low-Income Communities.” U.S. Department of Energy. Accessed August 29, 2023. <https://www.energy.gov/eere/articles/new-analysis-shows-national-potential-solar-power-low-income-communities>.
- Meadows, Megan. 2023. “LIHEAP DCL 2024-01 Proposed Changes to the LIHEAP Model Plan Application for FY 25.” Office of Community Services. October 11, 2023. <https://www.acf.hhs.gov/ocs/policy-guidance/liheap-dcl-2024-02-proposed-changes-liheap-model-plan-application-fy-25>.

- National Association for State Community Service Programs [NASCSP]. 2021. “Weatherization Assistance Program Funding Report Program Year 2021.” Accessed August 29, 2023. [https://nascsp.org/wp-content/uploads/2022/12/PY21-WAP-Funding-Report\\_Final-1.pdf](https://nascsp.org/wp-content/uploads/2022/12/PY21-WAP-Funding-Report_Final-1.pdf).
- National Association of State Energy Officials [NASEO] and National Energy Assistance Directors Association [NEADA]. 2022. “Keys Elements to Consider for a Low- and Moderate-Income Community Solar Project.” National Association of State Energy Officials. <https://www.naseo.org/data/sites/1/documents/publications/issi-equity-checklist-final.pdf>.
- National Association of State Energy Officials [NASEO]. n.d. “Inclusive Shared Solar Initiative: ISSI.” Accessed August 29, 2023. <https://www.naseo.org/issues/solar/issi>.
- Nevada Division of Welfare and Supportive Services. 2023. *Detailed Model Plan (LIHEAP)*. Carson City, NV: State of Nevada. [https://liheapch.acf.hhs.gov/sites/default/files/webfiles/docs/2023/state-plans/NV\\_Plan\\_2023.pdf](https://liheapch.acf.hhs.gov/sites/default/files/webfiles/docs/2023/state-plans/NV_Plan_2023.pdf).
- Office of Community Services. n.d. “LIHEAP Fact Sheet.” U.S. Department of Health and Human Services Office of the Administration for Children and Families. <https://www.acf.hhs.gov/ocs/fact-sheet/liheap-fact-sheet>.
- Phua, Peiyu. 2020. “The Case for Low-Income Solar: Exploring the Obstacles to Solar for LMI Households and Potential Opportunities to Advance Access.” University of Minnesota Digital Conservancy. <https://hdl.handle.net/11299/216528>.
- Ramasamy, Vignesh, Jarett Zuboy, Eric O'Shaughnessy, David Feldman, Jal Desai, Michael Woodhouse, Paul Basore, and Robert Margolis. 2022. *U.S. Solar Photovoltaic System and Energy Storage Cost Benchmarks, With Minimum Sustainable Price Analysis: Q1 2022*. Golden, CO: National Renewable Energy Laboratory. NREL/TP-7A40-83586. <https://www.nrel.gov/docs/fy22osti/83586.pdf>.
- South Carolina Office Of State Treasurer. 2023. *Detailed Model Plan (LIHEAP)*. Columbia, SC: State of South Carolina. [https://liheapch.acf.hhs.gov/sites/default/files/webfiles/docs/2023/state-plans/SC\\_Plan\\_2023.pdf](https://liheapch.acf.hhs.gov/sites/default/files/webfiles/docs/2023/state-plans/SC_Plan_2023.pdf).
- State of Minnesota Department of Commerce Energy Equity Program. n.d. “Solar into WAP Pilot Program Lessons Learned - Patience is a Virtue: Incorporating Solar as a Measure of Weatherization.” Accessed August 29, 2023. <https://www.cesa.org/wp-content/uploads/Incorporating-Solar-as-a-Measure-of-Weatherization.pdf>.
- State of Missouri. 2023. *Detailed Model Plan (LIHEAP) Revision # 2*. Jefferson City, MO: State of Missouri. [https://liheapch.acf.hhs.gov/sites/default/files/webfiles/docs/2023/state-plans/MO\\_Plan\\_2023.pdf](https://liheapch.acf.hhs.gov/sites/default/files/webfiles/docs/2023/state-plans/MO_Plan_2023.pdf).
- U.S. Department of Energy. 2019. “CELICA: Preliminary Assessment Guide for Integrating Renewable Energy into Weatherization.”

<https://www.energy.gov/scep/slsc/articles/preliminary-assessment-guide-integrating-renewable-energy-weatherization>

- U.S. Department of Energy. 2022a. Energy Efficiency and Renewable Energy. Weatherization Program Notice BIL 22-2, by AnnaMaria Garcia. Washington D.C.  
<https://www.energy.gov/sites/default/files/2023-07/WPN-BIL-22-2-v2.pdf>.
- U.S. Department of Energy. 2022b. Energy Efficiency and Renewable Energy. Weatherization Program Notice 23-1, by AnnaMaria Garcia. Washington D.C.  
[https://www.energy.gov/sites/default/files/2022-12/WPN\\_23-1.pdf](https://www.energy.gov/sites/default/files/2022-12/WPN_23-1.pdf).
- U.S. Department of Energy. 2023. NEPA Determination [Online]. Accessed January 16, 2023.  
<https://www.energy.gov/sites/default/files/2023-05/CX-027925.pdf>.
- U.S. Department of Energy. 2023a. Energy Efficiency and Renewable Energy. Weatherization Program Notice 23-6, by AnnaMaria Garcia. Washington D.C.  
<https://www.energy.gov/scep/wap/articles/weatherization-program-notice-23-6-revised-energy-audit-approval-procedures>.
- U.S. Department of Energy. 2023b. Energy Efficiency and Renewable Energy. Weatherization Program Notice 24-5, by Derek Schroeder. Washington D.C.  
<https://www.energy.gov/scep/wap/articles/weatherization-program-notice-24-5-solar-photovoltaic-pv-system-warranties>
- U.S. Department of Energy. 2023c. Weatherization Readiness Funds - Expansion of Scope. Weatherization Program Notice 23-4, by Jenah Zweig. Washington D.C.  
[https://www.energy.gov/sites/default/files/2023-01/WPN\\_23-4\\_Weatherization\\_Readiness\\_Funds\\_Expansion\\_of\\_Scope.pdf](https://www.energy.gov/sites/default/files/2023-01/WPN_23-4_Weatherization_Readiness_Funds_Expansion_of_Scope.pdf).
- U.S. Department of Energy. n.d.a. “Low-Income Community Energy Solutions.” Accessed August 29, 2023. <https://www.energy.gov/scep/slsc/low-income-community-energy-solutions>.
- U.S. Department of Energy. n.d.c. “About the Innovation Grants.” Accessed August 29, 2023. <https://www.energy.gov/scep/wap/about-innovation-grants#serc>.
- U.S. Department of Energy. n.d.d. “Low-Income Clean Energy Connector.” Accessed August 29, 2023. <https://www.energy.gov/communitysolar/low-income-clean-energy-connector>.
- U.S. Department of Energy. n.d.e. “Homeowner’s Guide to Going Solar.” Accessed January 16, 2023. .
- U.S. Department of Energy. n.d.f. “Weatherization Assistance Program.” Accessed January 16, 2023. <https://www.energy.gov/scep/wap/weatherization-assistance-program>.
- U.S. Department of Energy. n.d.g. “Weatherization Assistance Program Enhancement and Innovation Selections.” Accessed January 16, 2023.



<https://www.energy.gov/scep/wap/weatherization-assistance-program-enhancement-and-innovation-selections>.

United States Code. 2008. “Appendix A to Part 440, Title 10.” U.S. Code Online. Accessed August 29, 2023. <https://www.acf.hhs.gov/ocs/law-regulation/liheap-statute-and-regulations>.

United States Code. 2008. “Title 42, Sections 8621-8630.” U.S. Code Online. Accessed August 29, 2023. <https://www.acf.hhs.gov/ocs/law-regulation/liheap-statute-and-regulations>.

Washington State Department of Commerce. 2023. *Detailed Model Plan (LIHEAP) Revision # 2*. Olympia, WA: State of Washington.  
[https://liheapch.acf.hhs.gov/sites/default/files/webfiles/docs/2023/state-plans/WA\\_Plan\\_2023.pdf](https://liheapch.acf.hhs.gov/sites/default/files/webfiles/docs/2023/state-plans/WA_Plan_2023.pdf).