



Recent Innovations in Reducing Home Energy Costs and Improving Resilience for Low- and Moderate-Income Renters and Homeowners

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Disclaimer

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Executive Summary

Community Development (CD) practitioners across the western U.S. are engaging in new efforts to reduce energy costs and improve resilience for low- and moderate-income (LMI) communities and other populations that face barriers to economic participation and household financial stability. Energy costs and resilience are factors in housing stability, which impacts economic participation. New federal and state funding sources, as well as growing involvement from philanthropy and CRA-motivated investors, have prompted growth in energy cost savings and resilience (ECSR) options for LMI households. To help scale this work, CD practitioners are experimenting with partnerships—between workforce development providers and employers, mission-driven lenders and nonprofits, state government and utilities, retrofit companies and the public sector, state government and municipalities, to name a few. These partnerships have led to innovations in lending (for homeowners, renters, and landlords), technical implementation of home retrofits, coordination across programs, consumer protection, workforce development, and technical assistance (TA) for CD practitioners. This brief provides descriptive findings from focus groups and interviews about ECSR-related work in the CD field.



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Introduction

Changing local average temperature ranges, extreme temperatures, and severe weather events create challenges for low- and moderate-income (LMI) populations that negatively impact their household financial stability and participation in the economy. LMI populations have less ability to prepare for and manage these factors than the general population, which can translate to greater impacts when they occur.ⁱ

As part of the Federal Reserve Bank of San Francisco’s community development work, we study underlying conditions that shape access to economic opportunity, particularly for LMI populations that face barriers to economic participation and household financial stability. In this brief, we first define “energy cost savings and resilience” (ECSR) and its importance for LMI households and describe our methods. We then profile ECSR-related programs and activities that focus on LMI populations in western U.S. geographies. Finally, we summarize the practices and lessons from these profiles that could be useful elsewhere in the U.S.

Energy cost savings are important because LMI households typically spend a greater share of their income on home energy costs than higher-income households do. Nationally, LMI households (0–80% of area median income [AMI]) spend an average of 7% of their annual income on energy (including electricity, gas, and other sources), while households above 80% of AMI spend an average of 2%.^{ii iii} In the nine western states that comprise the San Francisco Fed’s district, LMI households spend an average of 5% of their income on home energy costs (compared with 1% for households above 80% of AMI).^{iv v} Difficulty paying home energy costs can lead households to cut back on essential spending categories (such as food and medication), with negative consequences for health, including for children.^{vi} About 20% of Americans reduced or forewent spending on basic necessities in order to pay their home energy bill in 2015 and 2020.^{vii}

Compounding this issue, U.S. consumer electricity costs have risen steadily in recent decades, outpacing inflation.^{viii} These costs vary by geography and contribute to the high cost of living in western U.S. states.^{ix} For example, Alaska, California, and Hawai‘i have some of the highest electricity prices in the nation.^x Home energy costs depend on design, materials, and appliances used in new construction, as well as on retrofits




that have been made over the life of a home. Housing that is affordable to LMI households tends to be less energy efficient and have a greater backlog of repairs, retrofits, and weatherization upgrades that would contribute to energy efficiency.^{xi}

In a recent survey, eight in 10 respondents said that members of the LMI communities they serve were unprepared for potential shocks and stresses that could impact their personal and financial wellbeing, and they identified underlying issues of financial and housing instability as major contributors.^{xii} For example, low wages and a lack of savings can impact LMI households' ability to cope with unexpected expenses, such as costs arising from a sudden weather-related disaster or an increased need to heat or cool a home over time.^{xiii}

Previous survey results also indicated that a lack of access to resilient housing was a major challenge for LMI populations. *Resilience* is the ability of communities and individuals to adapt and thrive in the face of 1) *shocks* such as periods of extreme temperatures and extreme weather events, including declared disasters and 2) *stresses* such as ongoing temperature shifts, prolonged droughts, sea level rise, and increasing wildfire smoke exposure.^{xiv} *Adaptation* refers to taking steps to help communities and households withstand such shocks and stresses. At the community level, this might include infrastructure improvements and disaster planning.^{xv} At the level of an individual building, adaptation can include retrofits that make the structure more resilient to temperature shifts, extreme weather, and disasters. For example, regions of the western U.S. face a growing number of high heat days and heat waves; communities may adapt by taking steps to reduce urban heat island effects and designating public cooling centers, while households may insulate or install air conditioning (AC) for thermal safety.^{xvi}

Terminology

We refer collectively to measures that reduce home energy costs and help people adapt and thrive in the face of shifting average local temperatures and increasingly frequent and severe disasters as “energy cost savings and resilience” (ECSR). Potential resilience measures depend on the location and the risk factor(s) being addressed. In areas that experience wildfires, resilience measures might include air filters in response to increased wildfire smoke or fire-hardening measures (such as installing




roofing, siding, or gutters with higher fire ratings). Home batteries or generators are resilience options in places that experience increasingly frequent power outages.^{xvii} Installing AC is an option for increasing thermal safety in places with growing numbers of high heat days and severe heat waves.

There is overlap between measures that produce energy cost savings and resilience some, but not all, of the time. For example, generating electricity with home solar panels reduces energy costs and could also act as a backup source of power (when paired with home batteries) in a blackout. Weatherization measures, such as insulating buildings and weather-stripping doors and windows, reduce energy use and therefore costs. Installing AC (where none existed before) increases spending on energy; however, replacing a furnace with an air-source heat pump, which provides both heating and AC, can reduce energy use and therefore costs, while improving thermal safety from heat waves and high heat days.^{xviii} Metal gutters and air filters, on the other hand, do not provide direct cost savings, but they improve resilience in terms of reducing potential damage to the home from fire and reducing health impacts from smoke, respectively.^{xix}

Methods

Our research for this brief included a set of background focus groups, followed by in-depth interviews. We conducted focus groups with representatives of three subsectors of the CD field: housing, finance, and workforce development. Focus groups enable researchers to bring together people with specific knowledge of a topic to engage in a group conversation that spurs participants to share information that they might not otherwise think to share in individual interviews.^{xx} ^{xxi} Our focus groups elicited participants' views on the obstacles and opportunities surrounding ECSR for populations that face barriers to financial stability and economic participation, such as LMI communities, communities of color, people with lower educational attainment levels, and populations living in rural and Tribal geographies.^{xxii} We spoke to a total of 28 CD professionals during three separate focus group sessions conducted from fall 2021 to summer 2022: 12 participants from the affordable housing sector, eight from community development financial institutions (CDFIs), and eight focused on workforce development.



Our focus group participants raised different issues around the challenges and opportunities related to ECSR for LMI populations. Focus group participants from the affordable housing, CD finance, and workforce development fields reported challenges and opportunities addressing household energy costs and resilience issues. Affordable housing developers noted challenges with funding energy cost savings and resilience measures in new and existing homes. CD lenders also pointed to challenges with funding for ECSR, particularly the fragmented funding landscape, but noted emerging innovations in the field. Workforce training providers and employers both anticipate growth in the number of jobs related to ECSR, but wanted to see better data on what types of jobs this will include. They also pointed to pilot programs for training people who face barriers to workforce participation for high-quality ECSR-related jobs. For a full summary of our focus group discussions, see Appendix A.

To learn more about the themes that emerged from our focus groups, we interviewed additional representatives from the CD field about specific strategies to overcome obstacles and increase opportunities related to ECSR for LMI populations. We conducted 21 interviews with 28 individuals from public-, private-, and nonprofit-sector organizations in 2022. The following section shares our descriptive interview findings through profiles of ECSR work in specific western U.S. geographies.^{xxiii}

Profiles of Innovation in the Community Development Field to Reduce Energy Costs and Improve Resilience for LMI Residents

This section shares descriptive findings from our interviews on innovative ways that CD practitioners and policymakers are promoting access to ECSR measures for LMI households. We profile the work of small credit unions in Arizona, a state-run green bank in Hawai'i, a mission-driven company working in California, a state program implemented by local CD organizations in Oregon, and a state-run network of local governments in Washington State. The profiles feature experiments in lending, on-bill financing, retrofits, health and safety repairs, and capacity-building for ECSR. Although geographically specific, these profiles also provide potential models for other regions.




Mission-driven lenders in Arizona leverage partnerships to bring ECSR measures to LMI residents.

In Phoenix, AZ, the MariSol Federal Credit Union, which is also a CDFI, offers low-cost loans to LMI borrowers for measures that reduce their energy costs and improve resilience. The LMI credit union members it serves do not benefit from tax incentives as much as higher-income borrowers do, and they do not typically have the up-front cash to make improvements to their home that could increase resilience or lower their energy bills. For instance, installing AC can improve resilience by protecting residents from high heat days and multiday heatwaves.

Thermal safety for Arizona residents is becoming more of an issue with the increasing frequency and severity of heat waves and the increasing number of high heat days.^{xxiv} Yet many low-income residents still lack AC. According to Robin Romano of MariSol, AC loans have been part of its business for many years. More recently, MariSol has created new loan products for home energy-efficiency retrofits, energy-efficient appliances, and solar panels. Retrofits include efficient water heaters, windows, and insulation. After the federal Inflation Reduction Act (IRA) of 2022 introduced appliance rebates for LMI consumers, MariSol began offering low-cost loans for appliances such as refrigerators, where replacing decades-old models can substantially reduce electricity bills. The most popular uses of MariSol's home-improvement lending product have been to repair AC units and to purchase new heat pump heating/AC units.

Partnerships with nonprofits are helping MariSol expand its lending for solar panel arrays, which so far has primarily made sense for its moderate-income members. Romano noted that “these partners are what we need to make sure the installers are good, that they are licensed...[and] to look at their records to make sure you are dealing with somebody reputable doing work on your house.” Romano also noted the importance of finding vendors and salespeople who speak Spanish in order to reach and build trust with Spanish-speaking residents in the area.

Solar United Neighbors (SUN), a national nonprofit, has helped MariSol with vetting contractors, working with the local utility company, and marketing. SUN's model allows multiple homeowners with separate contracts to negotiate a single price for solar installation in their neighborhood. Bulk solar contract drives with a deadline can




be led by state or local government or a nonprofit and are sometimes called “solarize campaigns.”^{xxv} The MariSol credit union was a program partner for one such SUN campaign in Maricopa County in 2022 and offered the lending product to participants.

MariSol is also exploring a partnership with Inclusive Prosperity Capital (IPC), a national nonprofit investment fund, which is helping lenders in Arizona and elsewhere develop and expand their ECSR lending. IPC’s Smart-E lending program helps lenders like MariSol by centralizing homeowner loan applications for solar panels and other energy-efficiency improvements, assisting with loan sourcing and underwriting, and connecting them with local contractors who have been vetted by IPC’s regional staff.^{xxvi} MariSol has also been working with IPC to develop a loan-loss reserve, possibly from philanthropic sources. Romano noted that this would help make MariSol’s unsecured lending in this area more sustainable and scalable.

In Tucson, AZ, the Tucson Old Pueblo Credit Union (TOPCU), also a CDFI, is working toward growing its lending for solar panels that can reduce home energy costs for LMI borrowers. TOPCU is a brick-and-mortar credit union with a majority Spanish-speaking staff that has been making solar loans to homeowners for about eight years. According to Joanna Jackson of TOPCU, the City of Tucson has created a loan-loss reserve of \$100,000 that TOCPU plans to apply to access for its solar panel lending once the city releases a request for proposals.

TOPCU hopes to make its solar panel lending more accessible to lower-income borrowers in the future through partnerships. TOPCU is partnering with Technicians for Sustainability (TFS), an employee-owned solar contracting company, on the Solar Empowerment Program, which is designed to put solar within reach of more low-income borrowers. TOPCU hopes to implement the Solar Empowerment program in the future. The Solar Empowerment Program was developed to combine grant funding with a loan for solar panels for single-family homes in order to help residents save on their energy costs over time, particularly on the cost of cooling. The program, co-designed by the nonprofit Sonora Environmental Research Institute (SERI), aims to serve low-income households—defined by HUD as below 80% of AMI—with a 30% grant for solar for borrowers at 50–80% of AMI and a 50% grant for borrowers below 50% of AMI.^{xxvii} The grant funding would be based on donations by TFS and the public.^{xxviii} The remaining portion of the cost of solar panels and installation would be



covered by a loan from a credit union. TOPCU is also working with Inclusive Prosperity Capital (IPC), the nonprofit investment fund mentioned previously working with MariSol, to become part of the Smart-E network, which will expand its customer pipeline and help with contractor vetting and marketing.

TOPCU is also working to reduce specific barriers in its existing solar lending for LMI borrowers related to assessing ability to pay and the upfront cost of any adjacent repairs. To address the first issue, TOPCU is exploring a program to consider whether potential borrowers have paid their electrical bill for the past 12 months as proof of ability to repay the solar loan. Additional vetting that TFS undertakes before TOPCU considers a solar loan is whether homeowners are current on their property taxes and whether their roof is in good condition. To reduce the barrier presented by adjacent repair costs, TOPCU will consider including 10% of the cost of roofing and related structural repairs in a solar loan, with the expectation that the solar contractor will either do the work itself if it is licensed or subcontract to a licensed roofer. TOPCU plans to begin offering small-dollar appliance loans when funding allows, possibly expanding to efficient heat pump heating/cooling. Jackson noted that in TOPCU's market, contractors are trending toward offering all-inclusive energy-efficiency services alongside their existing solar businesses, creating potential opportunities for incorporating energy-saving measures into a single loan that includes solar.

Jackson also noted the importance of education for lenders new to the ECSR lending space and pointed to a solar lender training program that she and four of her team members who work on sustainable lending had completed. Offered by a university-nonprofit partnership to help lenders grow their ECSR lending sustainably, this free, virtual Solar Lending Professional Training and Certificate Program is for staff at community-based lending institutions (CDFIs, credit unions, and community banks).^{xxix} The program helps lenders develop the skills needed to underwrite solar loans (with consumer and commercial tracks) and build their understanding of the tools they would need to create a solar lending program at their financial institution. The eight-week training is offered through a partnership between the Inclusiv Center for Resiliency and Clean Energy and the University of New Hampshire's Center for Impact Finance, with funding from the U.S. Department of Energy Solar Energy Technologies Office.




A state green bank uses on-bill repayment to bring energy savings to LMI residents in Hawai'i.

Many LMI households lack access to financing options for ECSR, even though they could benefit from cost savings and resilience improvements. According to CD professionals we spoke with, taking on additional debt through a traditional loan for ECSR measures may not make financial sense for many lower-income households. The Hawaii Green Infrastructure Authority (HGIA), which operates the state's green bank, has developed a program for LMI homeowners and renters to access cost savings through ECSR measures without a traditional loan and with no lien on their property. Hawai'i has high utility costs and a high share of renters, compared with other states.^{xxx xxxi} The program's approach avoids the pitfalls, notably potential foreclosure, created by on-bill repayment programs elsewhere in the U.S. that place a lien on a property.^{xxxii}


Hawai'i's Green Energy Money Saver (GEM\$) on-bill repayment program provides financing for ECSR measures for LMI homeowners, apartment building owners, nonprofits, and small businesses. Participants' household income must be below 140% of AMI to be eligible, and many participants are below 80% of AMI, according to Gwen Yamamoto Lau of HGIA.^{xxxiii} Participation must result in an estimated net utility bill savings, including the cost of repaying the ECSR measures.^{xxxiv} Yamamoto Lau noted that the current minimum 10% cost savings requirement can be a high threshold to meet (relative to the cost of the solar installation and the household's utility bill) and that a comparison of energy cost per kilowatt-hour could reduce the complexity of calculating savings, given such factors as changes in rates and tiered pricing. For single-family homes, the program covers solar or heat pump hot-water heaters and solar panels.^{xxxv} For multifamily rental properties and small businesses, GEM\$ will additionally cover efficiency upgrades to HVAC systems and building weatherization, thermal storage pumps (to extend the efficiency of heat pump heating/AC systems),^{xxxvi} and building-wide HVAC control systems.

HGIA aims to make the GEM\$ program accessible to those who need it most by providing a long repayment period and a nontraditional screening method, in addition to avoiding liens and including renters. The GEM\$ loan is repaid through the utility over



20 years, which helps to keep the portion of the customer’s monthly utility bill going to repay the upgrades small and facilitates the net savings. If a tenant moves out, the on-bill obligation stays with the electric utility meter assigned to the unit. The payments are frozen until the lease and the utility payment is transferred to a new tenant—for a total of up to two years over the length of the repayment period—to allow for vacancies. For Department of Hawaiian Homelands homesteaders and other property owners, the on-bill obligation can also be transferred when the lease (or deed) is transferred (or sold), such as to another family member. Unlike most traditional financing, GEM\$ does not use credit scores to determine eligibility. Yamamoto Lau of HGIA noted that while program eligibility currently requires no prior disconnection notices over a 12-month “look-back” period, households who are disqualified based on having received a disconnection notice are often those who could benefit most from the savings. She noted that one possible solution for the future could be to require greater savings from the ECSR measures for applicants with prior disconnection notices. For example, a participant’s approval could require 15% net savings instead of the current 10% if they have a given number of disconnection notices. Such a program structure “would help LMI households catch up on delinquent utility bills, with a little extra savings that would have been paid to the electric utility to purchase food and other necessities,” said Yamamoto Lau.


To provide access to savings from solar power to residents of single- and multi-family buildings where it is not feasible to install solar panels, Hawai’i’s Public Utilities Commission and Hawaiian Electric (the utility) are providing subscription-based credits to customers on their utility bill for “community solar” generation, with a requirement that 40% of subscribers in the program be LMI. Community solar is one form of community-based renewable energy (CBRE), a model for providing cost savings to residents who are not able to locate a solar PV array on their roof, for example, because of upfront cost or ownership issues or because their roof is not well suited for solar.^{xxxvii} The energy production is located at a larger, nonresidential site, such as on commercial buildings, parking lots, brownfield sites, and other properties.^{xxxviii} Ownership can be public, private, or cooperative, as with a rural electric co-op.^{xxxix} Hawaiian Electric has selected bids from private developers for



community solar projects on all of the major islands, with the exception of Molokai, where a community co-op will own and operate the community solar and battery microgrid.^{xi} Molokai is more rural and remote than the other major islands, and over half of its population is Native Hawaiian. Due to Molokai's remoteness, residents pay a higher rate for electricity than the rest of the state, and some households are off the electrical grid.^{xii} Workforce training in solar and battery installation and maintenance is also offered on Molokai in anticipation of the community solar project on the island and potential job opportunities on other islands.^{xiii} High prices for electricity in Hawai'i and the program structure make community solar a cost-saving measure for residents. However, CBRE is not a cost-saving measure for residents in all electricity markets and, in some cases, is instead used as a hedge to insulate against potential future price increases.^{xiiii}


A mission-driven company brings lending, technical expertise, and partnerships to ECSR retrofits in California.

Many of the CD professionals we spoke with suggested that retrofitting existing buildings is the most challenging aspect of reducing home energy costs and improving resilience for LMI residents. For example, complexity arises when selecting the appropriate combination of ECSR measures for individual buildings (which may have different needs), engineering the system (e.g., sizing the capacity for a given building, and selecting the hardware), and installing the measures (e.g., planning for installation, hiring and managing contractors, and ensuring they did the work correctly). It is also challenging to find contractors who are willing and capable and who can do the retrofits at a reasonable cost. In addition to project management issues, CD professionals we spoke with raised the issue of misaligned or nonexistent funding/financing mechanisms for ECSR measures. Amélie Besson of MidPen Housing Corporation, an affordable housing developer and operator that works in the Bay Area in California, noted that finding upfront funding for retrofits is challenging, although the long-term costs are lower for its portfolio. In the affordable housing industry, existing building capital reserves are typically earmarked for other purposes and cannot be used for rehab work without investor approval. Additionally, Besson said, there is currently a lack of incentives from public-sector entities for this work—



such as the state’s Tax Credit Allocation Committee (the entity that administers the state and federal Low-Income Housing Tax Credit programs), state programs, and localities—to retrofit existing buildings in its portfolio. Despite these challenges, MidPen has found opportunities to do retrofits with local municipal partners; however, Besson noted that it takes resources to complete energy audits and staff capacity to focus on determining the exact solutions and execution for each building. Blanca de la Cruz of the California Housing Partnership Corporation, a state-chartered, nonprofit housing research organization, cited the California Low-Income Weatherization Program (LIWP) as a program that provides funding for energy retrofits of multifamily buildings but noted that, in most cases, the program incentives do not cover the full cost of retrofits. Although the LIWP was oversubscribed in 2022, it received an additional \$37.6 million in state funding that will extend the program through 2025.


To address challenges with ECSR retrofits for existing buildings, BlocPower, a mission-driven, for-profit company, partners with the public sector and workforce development programs as part of its business model around energy-efficiency and weatherization retrofits for LMI single- and multi-family buildings. According to Keith Kinch of BlocPower, the company’s goal is to reduce home energy costs and improve home resilience, as well as thermal safety and comfort, for LMI renters and homeowners. Started on the East Coast, BlocPower is a “public benefit corporation,” a legal designation in several dozen states that allows it to focus on its public-service mission, as well as on profit, and involves reporting to a third party about performance on its stated public-service goals.^{xliv xlv xlvii} BlocPower has received private impact investment and public funding to grow the structured financing pool that it uses to finance projects. Customers enter a service contract for a fixed monthly fee that is lower than their expected energy bill savings, pay no upfront cost for weatherization measures and equipment, and do not have a lien placed on their property, noted Kinch. When the service contract expires in 15 or 20 years, customers can either purchase the equipment at a discount, or they can upgrade their equipment and continue having BlocPower be responsible for maintenance costs. This model allows landlords or homeowners to replace appliances and HVAC systems that are at the end of their service lifespan without having upfront capital, with the equipment owned by a holding company. In the future, BlocPower aspires to sell ownership



shares in the holding company to its customers (on the model of rural electricity co-ops) to help them build wealth.^{xlvii}

To overcome some of the engineering complexity of ECSR retrofits in buildings, BlocPower integrates multiple steps of the retrofit process into its approach. The company has developed in-house capacity to scope projects by calculating expected load and to design HVAC systems that are tailored to individual buildings. For example, it developed a partnership with a heat pump manufacturer to offer a mini-split heat pump that will fit in the wall opening left by removing a PTAC (packaged terminal air conditioner), or “hotel unit,” according to Kinch. The mini-split is more energy efficient and has the potential for a longer service life than the hotel unit, which is common in multifamily buildings.^{xlviii} By calculating the needed capacity, being familiar with hardware options, and designing a tailored system for each project, BlocPower reports being able to reduce some of the costs that typically arise from installation. It also manages the installation project, which is carried out by a contractor whom BlocPower has vetted in its local networks.

Partnerships with public-sector entities, workforce development providers, and local contractors help facilitate BlocPower’s ECSR retrofit work. On the San Francisco Peninsula in California, BlocPower is partnering with the city of Menlo Park to retrofit LMI housing, according to Roopak Kandasmy of BlocPower.^{xlix} Menlo Park, an affluent Silicon Valley town and job hub, is focused on including its LMI population in the implementation of its local climate action plan (CAP). State funding is supporting an initial round of 200 home retrofits for LMI residents in Belle Haven, a neighborhood with a larger LMI population than the rest of Menlo Park.^{li} BlocPower’s work in New York involves partnering with local workforce development providers, so BlocPower is exploring working with JobTrain, a San Francisco Bay Area workforce development provider that draws from underserved communities to help staff local contractors who are carrying out the retrofits.^{lii} Menlo Spark, a nonprofit, has committed to raising \$35 million from a mix of public and philanthropic sources to support BlocPower’s work in this community, such as its data mapping tool, contractor outreach and installation, and community engagement efforts.^{liv} In the East Bay, BlocPower retrofitted 12 homes as part of a pilot in Oakland and is expanding to other areas of Alameda County, including a second round of 60 home retrofits.^{lv} BlocPower




is partnering with East Bay Community Energy (EBCE), a public “community choice aggregator” that provides renewable energy to utility customers in Alameda County.^{lvi} EBCE is providing capital for the home retrofit loans and is interested in reducing costs and improving resilience for its LMI customers.

A state program in Oregon helps bridge the gap between health and safety repair costs and federal weatherization funding.

Weatherization funding can help LMI homeowners reduce their energy costs and improve their resilience to shifts in local average temperatures and extreme weather. Weatherization can include such retrofits as upgrading heating and cooling systems, installing insulation, and sealing leaks. The federal Infrastructure Investment and Jobs Act of 2022 expanded available funding for this work through the federal Weatherization Assistance Program (WAP).^{lvii} However, there are often significant barriers to accessing these and other funds in the form of basic and often expensive home improvements that need to be completed first. Many LMI homes face repair backlogs, with leaks, mold, and structural issues being the most common and the most expensive to address.^{lviii} Restrictions on federal weatherization funding sources can prevent homes with outstanding repairs from receiving funding. Several states have developed programs that aim to bridge this gap, including Oregon.

The Oregon State Department of Housing and Community Services (OHCS) is working to address the issue of adjacent repair costs disqualifying LMI households from federal and state weatherization funding sources. Federal weatherization funding sources allow states to set aside up to 15% of the total funding toward health- and safety-related repairs. OHCS uses a portion of the federal WAP funding it receives to pay for repair costs; According to Dan Elliot at OHCS, the state also takes this approach with its other federal and state low-income weatherization assistance dollars, including the federal Low Income Home Energy Assistance Program (LIHEAP) and the state’s utility ratepayer energy-efficiency funds.^{lix} By dedicating a portion of these funding sources to pay for repair costs, Oregon provides funding for home repairs that would otherwise prevent LMI households from being eligible for weatherization funding through its state WAP. OHCS partners with the state’s network of 17 regionally based community action agencies (CAAs) to deliver the services and funding to homeowners




and landlords across the state. The CAAs help homeowners and landlords with navigating both the necessary pre-weatherization repairs and the subsequent weatherization work. However, the portion of federal weatherization funds that can be used for necessary repairs still does not cover all of the LMI households who cannot afford repairs but would otherwise qualify for weatherization assistance.

To address some of the remaining shortage of funding for pre-weatherization home repairs, the Oregon State Legislature passed the Healthy Homes Act of 2021, which created a Healthy Home Repair Fund. The \$10 million fund provides grants to homeowners below 80% of AMI and eligible landlords to address home repair and safety issues that often present a barrier to accessing weatherization funding.^{lx} OHCS is currently working with stakeholders to align this new funding source with Oregon's existing low-income WAP. Oregon also uses federal and state funding to support technical assistance (TA) and workforce training for weatherization-related jobs.^{lxi}

Other states have also taken the step of directly dedicating state funding to address the repair gap in federal weatherization funds. A notable example is Pennsylvania's Whole-Home Repairs Program, which uses dedicated state funding to address the gap between health and safety repair costs and weatherization assistance. Created in 2022, the \$125 million program provides grants of up to \$50,000 to low-income homeowners (up to 80% of AMI) and forgivable loans in the same amount to small landlords for habitability repairs and energy-efficiency and accessibility upgrades.^{lxii} The Whole-Home Repairs program funds will flow through Pennsylvania's Department of Community and Economic Development and will be administered by county governments or their designated nonprofit organization. In addition to providing direct funding to homeowners and landlords, the program allocates funding for additional county or nonprofit staff to provide TA to homeowners, landlords, and renters and for related workforce development.^{lxiii}

A state public health agency helps accelerate capacity for local adaptation and resilience through a cross-jurisdictional learning community in Washington State.


Local climate action plan (CAP) implementation is an emerging venue for efforts to reduce energy costs and improve resilience for LMI households. Initially developed by cities and counties in order to quantify and manage local sources of greenhouse gas



emissions, CAPs often include goals around serving LMI and other disadvantaged communities, and they increasingly include adaptation goals, such as improving community and household resilience to extreme weather events and changing local average temperatures. ECSR measures, including those that target LMI populations, are at the nexus of the adaptation goals in CAPs and their implementation. However, these local plans are often challenging to implement due to difficulties coordinating across jurisdictions and sectors and due to a lack of funding.

As municipalities seek to implement and fund the social equity- and adaptation-related components of their CAPs, there are new opportunities to provide TA and capacity-building to the local stakeholders leading these efforts. The Washington State Department of Health (DOH) is spearheading one such effort, known as the Climate and Health Adaptation Initiative (CHAI). CHAI is a partnership among state, federal, and academic partners that seeks to support local leaders in advancing adaptation strategies that promote positive public health outcomes, including for economically disadvantaged communities. These partners selected an initial three regions to work with based on a climate and social vulnerability index, whether cities and counties had existing CAPs, and whether regions that could benefit the most from support in kickstarting their CAPs had expressed interest in participating.

CHAI is led by staff at DOH, in collaboration with partners from federal agencies, including the U.S. Environmental Protection Agency (EPA), the Federal Emergency Management Agency (FEMA), and the Department of Health and Human Services (HHS), along with academic partners at Gonzaga University and the University of Washington (the Federal Reserve Bank of San Francisco helped convene partners). According to Rad Cunningham at the Washington State DOH, the aim of the initiative is to “support communities and let them lead their climate adaptation work” by providing expertise on public health and the impacts of climate change, TA, and connections to resources and data through collaboration across jurisdictions, sectors, and scales of government. According to Cunningham, the initiative is community driven: “The communities have let us know what their priorities are” and they have set the timeline. CHAI regions meet biweekly and come together regularly to share resources, challenges, and lessons learned. One of the biggest needs the group




identified is support in coordinating among different city and county CAPs within a given region.

Cunningham noted that CHAI is a deliberate investment by Washington State in building capacity around adaptation work that is already happening on the ground: “It’s slower and more challenging than doing a top-down grant program for writing a CAP. We’ve thought about how we’re mostly accelerating existing plans instead of writing new plans.” DOH and its partners at other state agencies are hoping to secure additional funding to expand the number of regions that participate in the initiative and the financial support they can provide.

Considerations for Policy and Practice


Several themes arose from our research for policymakers and practitioners considering energy cost savings and resilience (ECSR) strategies, including the importance of:

- **Partnerships:** Interviewees called for collaboration among nontraditional partners to address issues of energy costs and resilience for LMI populations. CD lenders and public-sector entities are working with nonprofit, private-sector, and philanthropic organizations to scale their ECSR work. Areas where collaboration has helped these partnerships—such as those we profiled in Arizona and California—include improving program marketing and building trust in the community, contractor vetting, accessing capital and loan-loss reserves, grantmaking, and project management. State-local partnerships, including those in Washington State and Oregon, have shown promise as a way to share strategies around funding and implementation of ECSR measures across different municipalities and CD practitioners.
- **Nontraditional borrower vetting:** CD lenders and state programs—like those operating in Arizona and Hawai‘i—have used criteria other than credit scores to assess LMI homeowners’ and renters’ ability to repay loans, such as prior utility bill and property tax payment. They have also considered that lending for efficient appliances, solar panel arrays, and weatherization may improve borrowers’



financial health by reducing their energy bills, rather than focusing solely on borrowers' finances at the point of making a loan. Long repayment terms help make ECSR loans and on-bill repayment programs feasible for LMI households.

- **Weatherization-adjacent home repair costs:** ECSR loans and the federal WAP require that underlying issues be addressed before LMI households receive funds. These adjacent repair costs can be expensive and do not typically reduce homeowner energy costs, despite being a prerequisite for receiving financing or grant funding for appliances, HVAC systems, and weatherization measures that do reduce homeowner costs. Lender and state programs, such as in Arizona and Oregon, are helping to fund these repairs so that LMI residents can access state and federal weatherization funds.
- **Reaching renters and landlords:** Tenants have less control over building upgrades than homeowners, and landlords' maintenance budgets may not allow for retrofits. Community solar programs (e.g., in Hawai'i) allow residents to access cost savings even if it is not possible to install solar panels on their homes. Loans and on-bill repayment programs can enable retrofits to rental units without upfront costs or maintenance costs for landlords.
- **Reducing unintended consequences:** The programs we profiled (e.g., in Hawai'i and California) do not include liens on property that could put LMI homeowners at risk of foreclosure. They emphasize designing interventions to avoid any unintended consequences, such as increased risk of foreclosure from property liens or increased debt more generally. Furthermore, many of the efforts we profiled had a direct or indirect emphasis on *improving* the financial stability of LMI households through ECSR measures.
- **Workforce training:** As the ECSR ecosystem expands, workforce development practitioners we spoke with called for corresponding growth in workforce development programs to increase the number of ECSR contractors and fill the need for more workers among existing businesses. Pilot programs in California are



emphasizing outreach to disadvantaged communities as part of their efforts to grow these pools.

- **CD lender and practitioner training:** Lenders we spoke with said that they will need additional training in order to grow their ECSR lending sustainably; one example is the solar lending training noted previously.^{lxiv} Additionally, the new federal Clean Communities Investment Accelerator will include funding for capacity building for CDFIs and community lenders working in LMI communities.^{lxv} Finally, cross-jurisdictional learning communities, such as the one we profiled in Washington State, can also help provide TA to CD practitioners engaging in local implementation of ECSR efforts.

CD practitioners in the western U.S. are experimenting with a range of strategies to reduce home energy costs and improve resilience for LMI households who are facing rising energy costs, shocks such as severe storms and wildfires, and stresses such as high heat days and prolonged smoke exposure. However, challenges remain with funding and implementation. Future research in this area could explore the impact of new funding sources and regional differences in ECSR implementation.



Appendix A: Detailed Summary of Focus Group Discussions


Focus Group 1: Affordable Housing

Affordable housing developers and operators pointed to the complexity of addressing energy costs and resilience, particularly in the existing housing stock.

Focus group participants pointed to the challenges involved in incorporating resilience measures in both new construction and in existing housing stock, although they also highlighted potential opportunities to help address those challenges.

For instance, focus group participants noted that the upfront costs of equipment/materials and installation of such measures as insulation and efficient heating, ventilation, and air conditioning (HVAC) are often a barrier to incorporating measures that would reduce energy costs for future affordable housing residents in new buildings. Heat pump heating/AC units currently cost more and often have higher installation costs than conventional alternatives, although they cost residents less to operate. Including these equipment and installation costs in affordable housing plans can make the projects less competitive for funding sources that prioritize construction costs per unit, such as the Low-Income Housing Tax Credit (LIHTC). Focus group participants suggested that dedicated financing sources could help bridge the gap between baseline construction costs and energy-efficiency measures for new construction.

Funding retrofits to the existing stock of subsidized affordable housing is more difficult than doing it for new construction. For example, participants noted that they had found it challenging to install solar panels on an existing LIHTC-funded affordable housing project using solar tax credits. They also noted that not all residential resilience measures provide direct cost savings to residents through ongoing reduced energy use, although they may provide indirect cost savings in an emergency. For example, home batteries or generators can reduce or prevent the costs associated with power interruption, such as loss of food and medication when a refrigerator loses power. Grants and low-cost financing could help with retrofits, depending on the resilience goal(s) and the income level of the household, according to participants.




Placing a lien on a property is a common way for lenders to ensure repayment. A type of financing called property-assessed clean energy (PACE), instituted by local governments in states including California and Florida, enables people to pay for home energy efficiency improvements and solar photovoltaic (PV) arrays through their local tax bill. However, because it puts a lien on the property it created a risk of foreclosure and raised consumer protection concerns, leading several municipalities to discontinue the program.^{lxvi} One affordable housing developer who participated in our focus group noted that their funders were not comfortable with financing for home solar panels if they placed a lien on a property, as is the case with PACE financing. Focus group participants expressed interest in potential new sources of upfront funding or financing for solar PV arrays in new developments and in retrofits that would not create a risk of foreclosure.

Focus Group 2: CDFIs

Mission-driven lenders see a sparse and fragmented ECSR funding landscape that makes it challenging to address needs in hard-to-serve communities, but they also see opportunities for their sector to play a bigger role in bridging these gaps.

Focus group participants noted that the funding landscape for ECSR is sparse and fragmented and that funding this work is challenging in cases where interventions may increase resilience but do not provide direct cost savings. They pointed to a lack of long-term, committed capital, as well as a dearth of startup capital to build their staff and lending capacity in ECSR. Funding sources do exist, but they tend to be small and short-term, with varying requirements that are challenging to navigate. Measures that reduce risk and improve resilience for LMI households but do not result in cost savings are particularly hard to fund. For example, participants noted that there is a great need in the western U.S. for fire-hardening measures to reduce risks to property and health from wildfire damage and wildfire smoke for households and small businesses, but there is no clear source of funding or financing that specifically targets LMI populations.

Participants noted that there are additional challenges for funding ECSR in rural areas and in tribal communities, and that ECSR is particularly hard to fund retrofits for very low-income households. Many communities in rural Alaska, for example, are



accessible only by airplane, which increases the cost of materials and labor. Tribal governments face barriers to accessing traditional financing mechanisms. In rural and tribal areas with small populations, fewer projects are financially feasible for nonprofit lenders because of the smaller scale and/or smaller customer base across which to spread costs. Participants noted growth in partnerships between Native-led organizations and CDFIs on developing strategies to attract funding from financial institutions and foundations for ECSR. Participants also cautioned that loans may not be the right solution for some very low-income households to access ECSR retrofits because of challenges associated with increasing their overall debt burden. However, mission-driven lenders suggested that connecting with other sectors and programs could help them make resilience measures that do not provide cost savings, or building repairs that are needed before completing ECSR work, more accessible to lower income borrowers.

Mission-driven lenders see an opportunity for their sector to start to address what they see as the need for turnkey ECSR loans where complexity and out-of-pocket costs currently present barriers for LMI borrowers. Focus group participants noted that part of their role is to help clarify where cost savings exist for borrowers, especially for ECSR-related loans (e.g., for heat pumps, appliances, and home weatherization). Additionally, there is interest in the field in bundling ECSR measures into a single loan in a way that would reduce overall risk and insurance costs for households. However, lending for ECSR measures for households and small businesses does not always require developing a new, standalone product, and could be incorporated into existing CDFI products in some cases, according to participants.^{lxvii}

Participants indicated that a dedicated pot of long-term, low-cost, flexible funding, such as through the Treasury Department's CDFI Fund, would enable CDFIs to experiment with adaptation and resilience work that is not directly subsidized. Mission-driven lenders also said that they could benefit from education and TA as they scale their lending for ECSR. For example, participants noted that a tool for determining what measures would reduce energy costs and improve resilience the most for a particular home or residential building would be helpful.




Focus Group 3: Workforce

Workforce training providers and employers see opportunities for job growth in ECSR-related sectors and a need for partnerships and funding to target disinvested communities.

Focus group participants from the workforce development sector identified opportunities for job growth in key sectors related to ECSR. In particular, participants anticipate opportunities for growth in living-wage jobs and small businesses that help reduce energy costs for households, businesses, and nonprofits. They expect growth in trades such as electrical, plumbing, mechanical, and HVAC, which are critical to new construction and retrofits. They pointed to drought, extreme heat, and cost of living as drivers of demand for buildings that use less energy and water and produce energy with solar power.

However, participants noted that they would like to have a more specific understanding of where the growth opportunities will be in their respective geographic areas. Workforce development representatives from different sectors believe that they could better prepare to meet training needs if they had a clearer understanding of the number, type, and geography of ECSR-related jobs. One participant noted that “if we start looking across sectors...at the issues that come up with flooding, access to drinkable water, sewer...or even the need to have a greening of certain spaces where you have excess heat...we do not have a very good understanding at the local level of what that translates into in terms of jobs.”

Focus group participants called for partnerships, funding, and policy to support high-quality ECSR jobs. Participants suggested that partnerships between employers, trade unions, worker centers, workforce development providers, workforce boards, community colleges, and community-based organizations could help promote high standards for jobs in ECSR. For example, ongoing communication between employers and workforce training programs can help clarify employer needs for specific skills and reduce unnecessary job requirements. Participants also underscored the importance of including members of historically disinvested communities in the development of ECSR business models, financing strategies, and training curricula that target those communities.




One training program that participants raised as an example of creating inclusive, equitable pathways to high-quality jobs in ECSR is the Energy Career Pathways Training Program currently being piloted in the Sacramento, CA, region.^{lxviii} The Sacramento Municipal Utility District (SMUD) coordinates closely with the training program to ensure that curricula line up with current job openings at the utility and other employers. Another example participants raised is the state of California’s pilot program to promote cross-sector partnerships for workforce development in growth professions related to ECSR. The High Road Training Partnership spurred eight new partnerships between employers and worker-led organizations to develop training curricula and set standards for career-path jobs.^{lxix} Participants also noted examples of public-sector wage and hiring practices that help set high standards for ECSR jobs, such as community benefits agreements (CBAs) in conjunction with large-scale, publicly funded development and infrastructure investments. They also suggested that flexible funding for partnerships and training could help promote equity and career paths in growth sectors related to ECSR, and that policy could also help support innovation in these areas.



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