



The Residential Retrofits for Energy Equity Playbook

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What is the Playbook?

This resource is designed as a tool for program administrators at community-based organizations (CBO) and government offices seeking to establish, improve, or expand **building energy upgrade** programs for **low- and moderate-income housing** in their communities.^{1,2} The Playbook aims to help ensure that such programs are community led, easy to use, and able to accelerate equitable **decarbonization** across the country.³

How does the Playbook work?

The Playbook is organized in three sections: Planning an Equitable Engagement Process, Identifying Your Community and Upgrade Priorities, and Crafting a Well-Designed and Equitable Program.

Each of the three sections provides foundational information, followed by **actions** that program designers can take. The Playbook also follows each of the 12 actions with a set of **best practices** that can help administrators ensure that programs achieve lower energy bills and contribute to greenhouse gas (GHG) emission reductions, racial and social equity, improved health outcomes, and local economic development. For each of the best practices, we link to case studies, tools, and other resources.

Although we include many highly recommended actions and best practices in this list, Residential Retrofits for Energy Equity (R2E2) recognizes there is no one-size-fits-all solution to creating an equitable retrofit program. Programs succeed by responding thoughtfully and carefully to a given community's capacity, needs, and context. Generally, however, the more a program incorporates these best practices, the stronger that program will be.

For more information about R2E2, please visit our [website](#) to find out about events, new resources, and other opportunities.

¹ Building energy upgrades (used interchangeably in this resource with the term "retrofits") are improvements to existing buildings to improve energy efficiency (including through weatherization), reduce greenhouse gas emissions, and/or increase climate resilience.

² Generally, a low-income household is one for which household income is less than 50 percent of the area median income. A moderate-income household is one for which household income is at least 50 percent and less than 80 percent of the area median income. The area median income (AMI) is the midpoint income for a region.

³ Decarbonization encompasses strategies for reducing building-related carbon emissions. Key approaches include energy efficiency, beneficial electrification, distributed generation (e.g., solar), and/or use of carbon-free fuels. Beyond reduced greenhouse gas emissions, other benefits may include improved indoor air quality, reduced utility bills, and greater ease of maintenance.

Contents

The Residential Retrofits for Energy Equity Playbook.....	1
What is the Playbook?	2
How does the Playbook work?	2
Contents.....	3
The Opportunity.....	4
Checklist of Best Practices for Program Administrators	6
Section 1: Planning an Equitable Engagement Process	10
1.1 Community-driven planning.....	11
1.2 Community engagement tools	13
Section 1 Actions and Best Practices	27
Section 2: Identifying Your Community and Upgrade Priorities	31
2.1 Using data to identify program focus areas.....	32
2.2 Building upgrade and decarbonization strategies	33
2.3 Considerations for low- and moderate-income housing.....	40
Section 2 Actions and Best Practices	45
Section 3: Crafting a Well-Designed and Equitable Program.....	51
3.1 Program implementation and partnerships.....	52
3.2 Health and safety	54
3.3 Accessing funding sources	55
3.4 Workforce development and economic inclusion	60
Section 3 Actions and Best Practices	65
Conclusion.....	84
About Residential Retrofits for Energy Equity (R2E2)	85
Acknowledgements	85

The Opportunity

Households in disadvantaged and low-income communities across the United States are disproportionately affected by the damaging impacts of climate change, unsafe or unhealthy housing conditions, and unaffordable housing costs.^{4,5,6} Moreover, high energy costs are a key element of what makes housing unaffordable.

- Nationally, 67% percent of households with low incomes face a high energy burden because they spend more than 6% of their income on energy bills.
- Of households with high energy burdens, 60% face a severe energy burden because they spend more than 10% of their income on energy bills.
- These burdens are disproportionate: Black, Hispanic, Native American, older adult households, and families residing in low-income multifamily housing, manufactured housing, and older buildings experience higher energy burdens.⁷

Programs to address these challenges and improve the efficiency of low-income homes fall far short of the need.

- Roughly 27.5% of all U.S. households have low incomes, these households receive only about 13% of spending from efficiency programs administered by electric and gas utilities. While an estimated 36 million U.S households are eligible for the nation's largest efficiency program for households with low incomes—the federal Weatherization

⁴ American Council for an Energy-Efficient Economy. 2024. "Energy Burden Research." Accessed February. aceee.org/energy-burden.

⁵ R2E2 defines "disadvantaged communities" as communities that have historically been underserved by housing and clean energy investments. These communities include Black communities, Indigenous communities, people of color, low-income individuals, youth, older adults, recently arrived immigrants, people with limited English proficiency, and people with disabilities. See: American Council for an Energy-Efficient Economy. 2024. "Energy Burden Research." Accessed February. aceee.org/energy-burden.

⁶ Desmond, Matthew. 2023. *Poverty, By America*. New York: Crown Publishing.

⁷ Ariel Dreihobl, Lauren Ross, and Roxana Ayala. 2020. "How High Are Household Energy Burdens?" Washington, D.C.: American Council for an Energy-Efficient Economy. [Aceee.org/sites/default/files/pdfs/u2205.pdf](https://aceee.org/sites/default/files/pdfs/u2205.pdf).

Assistance Program—the program has served only seven million households over the past 40 years.^{8,9}

New approaches are needed, and community-driven planning can help reimagine how we design and implement solutions.

By leveraging federal funding from the Inflation Reduction Act (IRA), communities have a unique opportunity to stand up and redesign building energy upgrade programs that address persistent inequities and lead to healthier and more-affordable housing, reduced energy burdens, new economic opportunities for workers and small business owners, and reduced emissions across the country.

⁸ Diana Morales and Steven Nadel. 2022. "Meeting the Challenge: A Review of Energy Efficiency Program Offerings for Low-Income Households." Washington, DC: American Council for an Energy-Efficient Economy. [Aceee.org/sites/default/files/pdfs/u2205.pdf](https://aceee.org/sites/default/files/pdfs/u2205.pdf).

⁹ Ariel Dreihobl, Lauren Ross, and Roxana Ayala. 2020. "How High Are Household Energy Burdens?" Washington, DC: American Council for an Energy-Efficient Economy. [Aceee.org/sites/default/files/pdfs/u2205.pdf](https://aceee.org/sites/default/files/pdfs/u2205.pdf).

Checklist of Best Practices for Program Administrators

Section 1: Planning an Equitable Engagement Process

1. Begin with a landscape analysis.

- ☐ Analyze relevant existing policies, programs, and stakeholders; the existing building stock; community relationships; the workforce; and potential partners.

2. Design equitable engagement activities.

- ☐ Design engagement activities in partnership with CBOs and other stakeholders. Understand the difference between community and stakeholder engagement and undertake intentional and inclusive engagement that builds shared vision and capacity with the community.
- ☐ Center marginalized and underrepresented groups in all engagement and ensure that their perspectives are reflected in the leadership and decision-making structure of the planning process.
- ☐ Compensate community-based organizations and community members involved in the planning process. Identify and address barriers to participation by providing childcare, meals, and transportation to and from meetings. Choose accessible meeting times and locations.

Section 2: Identifying Your Community and Upgrade Priorities

3. Identify program focus areas.

- ☐ Using community data and community priorities, establish clear racial equity, housing, workforce development, health, and environmental justice goals for both engagement activities and program outcomes.
- ☐ Alongside other program goals, make greenhouse gas emission reductions a metric for program success.

4. Establish program upgrade offerings.

- ☐ Prioritize comprehensive efficiency upgrades and electrification in program offerings.
- ☐ Pair electrification of heating and cooling equipment and building envelope upgrades with onsite generation to help ensure that energy bills do not increase.
- ☐ Avoid installing new fossil fuel appliances.
- ☐ Include passive strategies for reducing energy costs, including shading, green roofs, and cool roofs.

5. Design program offerings to prevent increased household costs and displacement.

- ☐ Protect housing affordability for unsubsidized rental properties that are not subject to pre-existing affordability commitments.
- ☐ Minimize temporary disruptions and permanent displacement risks due to upgrades.
- ☐ Reduce energy bills and operations costs for rental property owners, homeowners, and renters.
- ☐ Get involved in or begin electricity rate-setting discussions with relevant stakeholders.
- ☐ Provide education to building owners and renters on how to control energy costs.

Section 3: Crafting a Well-Designed and Equitable Program

6. Create an easy-to-use program intake, participation, and support process.

- ☐ Employ a “one-stop shop” approach with a single point of contact for participants.
- ☐ Offer a single entry point to the program, and create a “no wrong door” approach.

7. Design program in coordination with partners.

- ☐ Ensure that program elements coordinate with existing programs provided by utilities, nonprofits, and local and state agencies.
- ☐ Establish robust partnerships with CBOs and a diverse range of stakeholders.

8. Prioritize the most energy insecure LMI households to receive upgrades.

- ☐ Target offerings to LMI households and ensure that multiple ownership structures and types of affordable housing (including both subsidized and unsubsidized) are eligible for program offerings, depending on community needs.

9. Build accountability into the program.

- ☐ Plan and budget for regular evaluation and adjustment to ensure the program is making enough progress toward goals.
- ☐ Establish processes for regularly reporting back to engaged communities for transparency and accountability.
- ☐ Establish community and/or workforce benefits agreements between the program and community members.
- ☐ Provide for quality assurance/quality control (QA/QC) inspection, project wrap-up, and ongoing monitoring of finished projects.

10. Ensure the program provides health and safety measures.

- ☐ Incorporate upgrade offerings, such as mold and asbestos remediation, that improve resident health, safety, and comfort. Ensure program provides or engages existing pre-weatherization offerings to lower barriers to participation.
- ☐ Require that service providers use healthier building materials that minimize harm to manufacturers, installers, and building occupants and use best practices for ventilation and promoting indoor air quality.

11. Ensure the program streamlines how users access funding.

- ☐ Leverage and layer a variety of funding sources.
- ☐ Provide a menu of available financing options and explain them transparently.
- ☐ Cover a large share (at least 75–80%), if not all of the total upfront cost of scopes of work.
- ☐ Maximize the use of non-debt funding over debt for the program's work. When using loans, make no-cost, low-cost, or forgivable loans available.
- ☐ Ensure financing options do not burden low-income households, include financing options for participants with low or no credit scores, and have proper consumer protections in place.
- ☐ Include supplemental funding sources to pay for needed structural, electrical, plumbing, and other health and safety repairs that pose barriers to participation.
- ☐ If possible, cover the full cost of replacing failing or unsafe appliances.

12. Ensure the program helps build out a local green workforce.

- ☐ Compile a list of workforce certifications and credentials for program service providers.
- ☐ Provide resources for potential job candidates in the community regarding existing training programs.
- ☐ Identify barriers to building a diverse workforce and deploy strategies to hire local under-represented groups into good paying local jobs.
- ☐ Identify product suppliers from diverse and under-represented groups and incorporate them into program offerings.
- ☐ Provide or link to opportunities for upskilling, credentialing, and certification for the existing workforce.
- ☐ Provide education to contractors in related trades on the benefits of adding efficiency and electrification work to their current services.
- ☐ Encourage program service providers to pay prevailing wages where not already required.
- ☐ Provide support and help contractors bring on apprentices to create long-term career pathways in building upgrades.
- ☐ Provide training to service providers on the impact of quality processes and practices on long-term building performance.



Section 1: Planning an Equitable Engagement Process

Section 1 provides an overview of methods and tools for community and stakeholder engagement. It also identifies strategies for program administrators to consider in the early stages of program planning.

1.1 Community-driven planning

"Marginalization [is] the status quo practice of current systems that have been historically designed to exclude certain populations, namely low-income communities, communities of color, women, youth, previously incarcerated people, and queer or gender non-conforming community members. This understanding is important because if concerted efforts are not made to break-down existing barriers to participation, then by default marginalization occurs [...] Whole governance and community ownership are needed to break the cycle of perpetual advocacy for basic needs that many communities find themselves in."

—Rosa González, Facilitating Power, The Spectrum of Community Engagement to Ownership¹⁰

Engaging community members is essential for designing programs that will meaningfully serve residents and bring high-priority benefits to participants and the community at large. When program administrators invest time in planning processes that center racial and social equity principles and seek broad collaboration with underserved communities, the result is more likely to be building upgrade programs that are more inviting, easier to use, better equipped to address community priorities, and capable of providing multiple benefits alongside emissions reductions. Strategies that seek to share decision making, foster collaboration, and center community priorities in programs or policies can help ensure more-equitable outcomes.¹¹

Community-driven planning is the process by which members of communities are empowered to define the complex challenges they face and the solutions most relevant to their unique assets and vulnerabilities.¹² According to the National Association of Climate Resilience Planners (NACRP), there are three essential capacities needed for this type of planning process:

- The capacity to assert a vision and articulate a set of community priorities related to that vision.
- The capacity to assess community vulnerabilities and assets and develop or select appropriate solutions based on a community's unique experience.

¹⁰ Rosa Gonzalez. 2019. "The Spectrum of Community Engagement to Ownership" movementstrategy.org/wp-content/uploads/2021/08/The-Spectrum-of-Community-Engagement-to-Ownership.pdf.

¹¹ For background on Energy Equity principles, please visit ACEEE's [Energy Equity](https://www.aceee.org/topic/energy-equity) page. ACEEE (American Council of an Energy-Efficient Economy). Accessed 2024. "Energy Equity." [aceee.org/topic/energy-equity](https://www.aceee.org/topic/energy-equity)

¹² Rosa Gonzalez. 2017. "Community-Driven Climate Resilience Planning: A Framework." National Association of Climate Resilience Planners. assets-global.website-files.com/65133224e95eca0de2235b3e/6572c1233211b5c31ed5ea8c_CDRP.pdf.

- The capacity to get those solutions implemented.

Different means of engagement serve different ends. Often, community engagement is conflated with stakeholder engagement or public outreach. However, these activities are distinct and are used for different purposes.¹³ R2E2 employs the following definitions:

- **Community engagement** is designed to reach the entire community and to particularly include people who have been historically marginalized from decision making or have experienced disproportionately high burdens and/or low benefits from policies and programs.
- **Stakeholder engagement** is more targeted, focusing on engaging with people or organizations that have historically been recognized as having a direct stake in a policy or program and its effects.

Program administrators will also likely need to coordinate with

- **Public outreach** is primarily meant to be informative and to broadly appeal to the public, typically without targeting specific populations. It is most often limited to one-way communication between a government and its residents and leads to minimal, if any, public input or involvement in decision making.¹⁴



¹³ For more resources on Community Engagement, please see the People's Climate Innovation Center's Resources for Community Engagement: People's Climate Innovation Center. Accessed February 22, 2024. "Resources for Community Engagement." docs.google.com/document/d/1r8aUZvUh6vl-p6YuLkEajaP0Xq4Ja7cMHCgDCHpz1Bw/edit?pli=1.

¹⁴ Public outreach is not discussed further as part of this resource.

1.2 Community engagement tools

Community engagement can help building upgrade programs incorporate valuable perspectives and leadership from groups that are traditionally excluded. These groups may include:

- Community members and leaders from **marginalized and frontline communities**.¹⁵
- Local business owners, faith leaders, organizers, volunteers, school officials, and nonprofit leaders.
- Homeowners and renters with **low incomes**.¹⁶

It is important for program administrators to emphasize accountability and transparency as part of their collaboration with communities. This can help to mitigate challenging power dynamics and repair existing mistrust. Emphasizing accountability and transparency means setting up structures to ensure:

- Clear communication about roles in partnerships among local government and community-based organizations and how community feedback will be meaningfully addressed.
- Transparent program progress reporting, no matter the degree of success.
- Fair compensation for an organization or individual's time and expertise.
- Fulfillment of commitments.

The following section highlights three tools that can help program administrators plan community engagement activities and incorporate accountability and transparency into their programs.

¹⁵ We define *marginalized* communities as those most impacted by community decision making while simultaneously being denied involvement in mainstream economic, political, cultural, and social activities and whose life outcomes are disproportionately negatively affected by social structures. Under-resourced communities have high proportions of low- and middle-income residents and generally receive a below-average quality and amount of services and financial resources from government and the private sector. *Frontline* communities include the populations most impacted by multiple, cumulative sources of pollution and climate impacts due to proximity to toxic factories, fossil fuel refineries, neighborhood oil drilling, freeways, and the like, often without access to clean drinking water or public investment.

¹⁶ In this resource, a household is considered "low-income" if it makes less than 80% of the Area Median Income.

Community Engagement Tool #1 – USDN Equity Framework

The Urban Sustainability Directors Network (USDN) provides a framework that helps define the role community engagement plays in creating equitable outcomes.¹⁷ This framework establishes four dimensions of equity, which include:¹⁸

Structural Equity – Decision makers recognize the historical, cultural, and institutional dynamics that have led to clean energy inequities.

Procedural Equity – Decision makers create inclusive and accessible processes for developing and implementing clean energy initiatives.

Distributional Equity – Clean energy initiatives fairly distribute the benefits and burdens across all segments of communities.

Transgenerational Equity – Decision makers consider the impact on future generations of the clean energy initiatives they develop.

¹⁷ Urban Sustainability Directors Network. Accessed 2024. "Equity and Buildings: A Practical Framework for Local Government Decision Makers." usdn.org/projects/equity-in-buildings-framework.html.

¹⁸ However, community engagement is only one part of the framework, which encompasses broader considerations. Focusing on one dimension of equity without intentionally bringing in the other three dimensions is likely to continue replicating inequitable outcomes.

How Can We Achieve an Equitable Energy System?

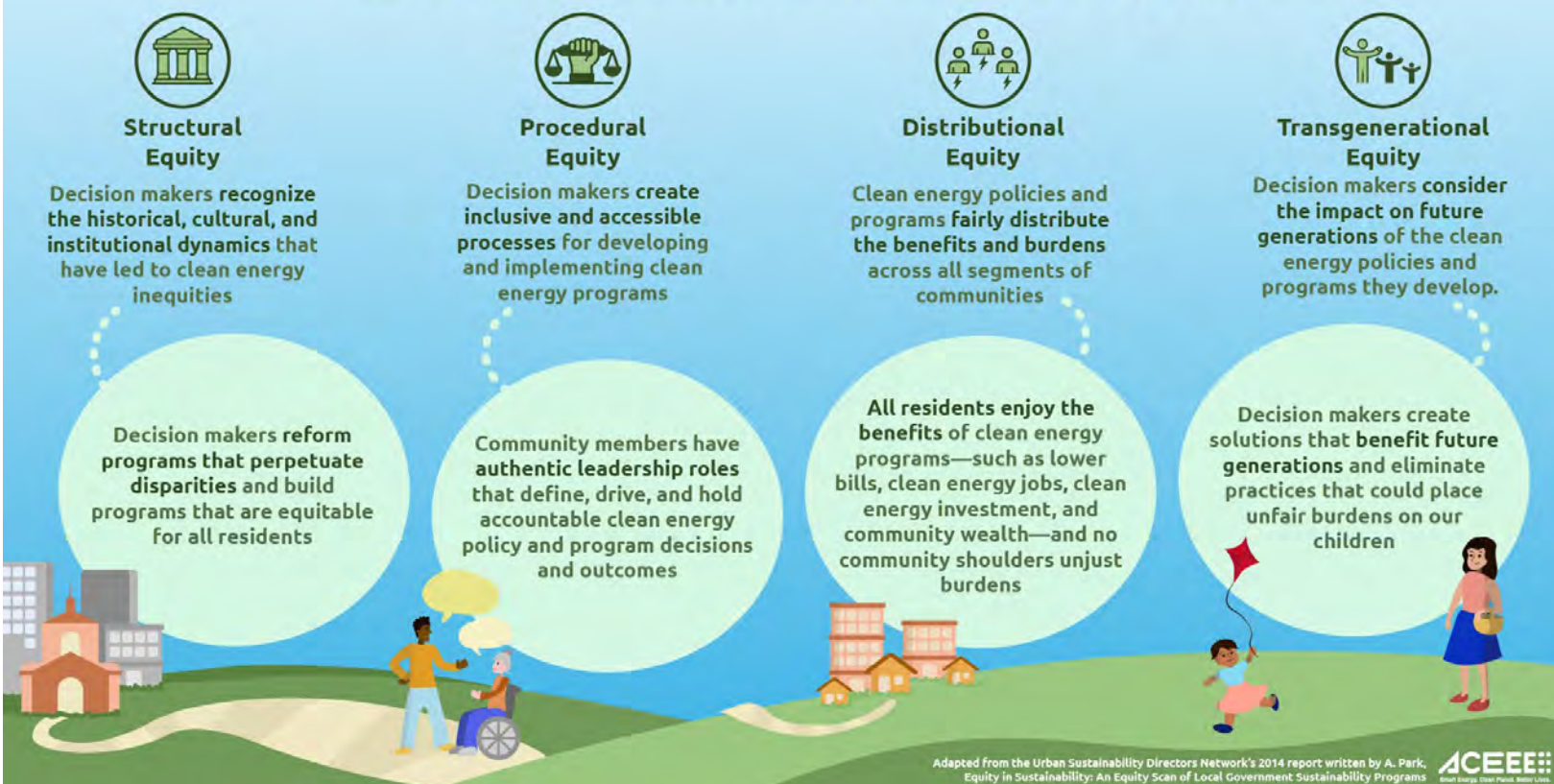


Figure 1: How Can We Achieve an Equitable Energy System?¹⁹

Community Engagement Tool #2: The Spectrum of Community Engagement to Ownership

Created by Facilitating Power, this self-assessment and planning tool demonstrates how more-impactful community engagement starts to happen toward the right side of the spectrum below.²⁰

¹⁹ ACEEE (American Council of an Energy-Efficient Economy). Accessed February 22, 2024. "Energy Equity." aceee.org/topic/energy-equity.

²⁰ Rosa Gonzalez. 2019. "The Spectrum of Community Engagement to Ownership." movementstrategy.org/wp-content/uploads/2021/08/The-Spectrum-of-Community-Engagement-to-Ownership.pdf.

THE SPECTRUM OF COMMUNITY ENGAGEMENT TO OWNERSHIP

▶▶▶▶▶ INCREASED EFFICIENCY IN DECISION-MAKING AND SOLUTIONS IMPLEMENTATION ▶▶▶▶▶ EQUITY



Figure 2: The Spectrum of Community Engagement to Ownership

While using these tools, it is important for program administrators to keep in mind that building the relationships and trust needed for authentic community engagement takes dedicated time, resources, and ongoing commitment.

Seeking input from community members should not only take place during planning processes or when specific decisions need to be made, but throughout the entirety of an initiative. During this ongoing process, program administrators should also work to identify short-term opportunities to deliver immediate impact in the community. Successful short-term initiatives

can establish a foundation of trust that can support further constructive action and long-term undertakings.

Community Engagement Tool #3: The Nexus Diagram

Relationship-building and equitable community engagement are ongoing, cyclical processes. USDN's Nexus diagram can help program administrators understand this aspect of community engagement.

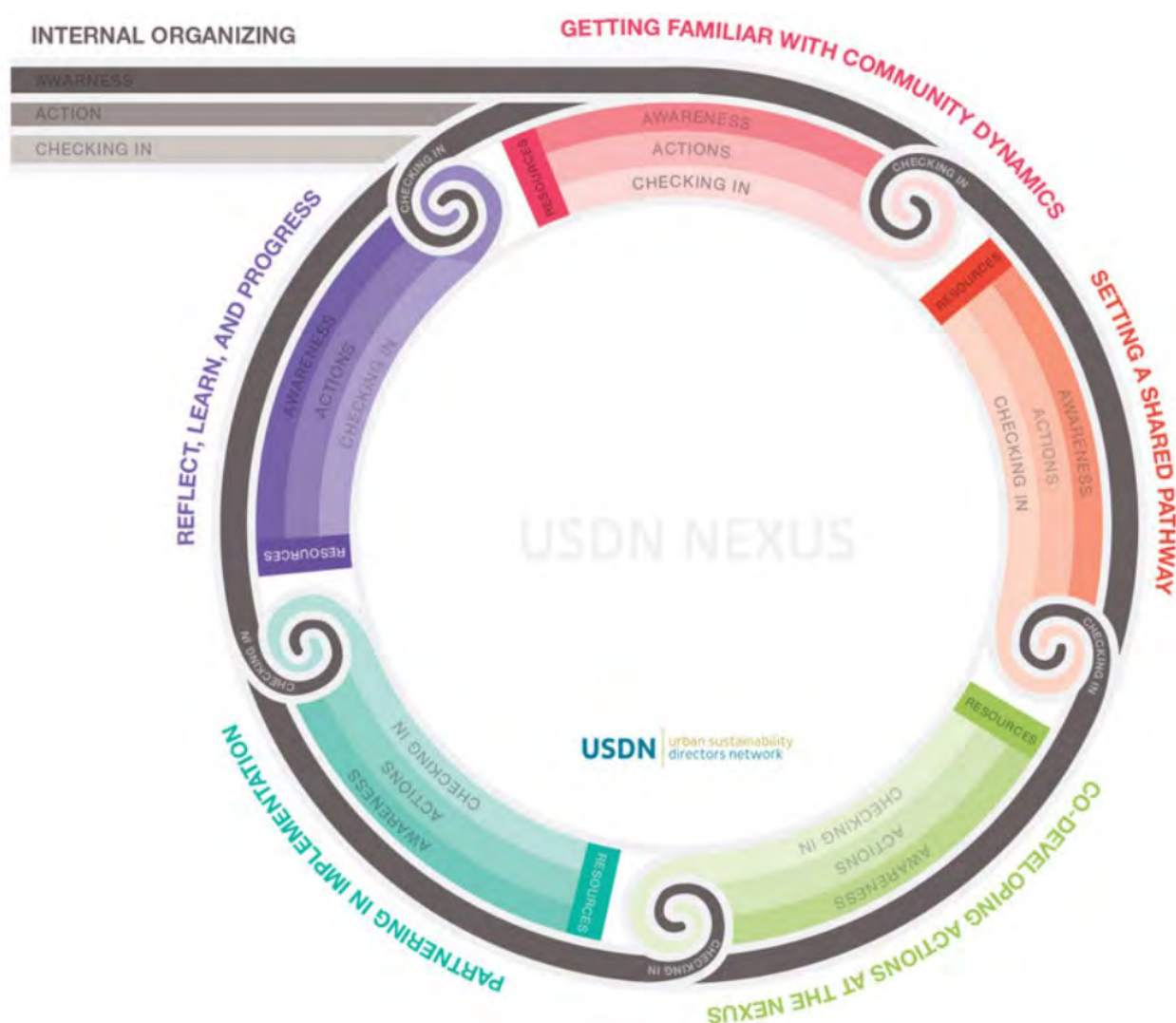


Figure 3: The Nexus Diagram²¹

²¹ Kristin Baja, Lindsay Ex, DeAngelo Bowden, Amy Leitch, Carmen Lopez, Jenna Witzleben, Victoria Benson, Vatic Kuumba, and Nancy Huizar. Accessed 2024. "The Nexus: Guidance for Local Governments Centering Racial Equity in Climate Planning and Practice." usdn.org/uploads/cms/documents/_usdn_nexus_document_draft_wm_3-26-21.pdf.

As the internal organizing stage suggests, there are numerous steps that program administrators can take to better prepare for authentic community engagement.²² These steps include:

- Identifying systemic issues and key factors (especially government policies or decisions) that have led to current racial and social disparities.
- Employing data and feedback from previous community engagement efforts to avoid engagement fatigue or burnout from frontline communities who are repeatedly engaged by different government departments or agencies.
- Building interdepartmental and intergovernmental collaborations to prepare to address multiple issues and advance multiple benefits through the work.
- Designating existing funds or procuring new funds to resource community engagement and community partners. This includes funding for translation and interpretation, participation stipends, food and childcare at meetings or engagement events, capacity-building for CBOs, etc.
- Using the “Questions to Guide Engagement” (see list below).

²² Jeremy Hays, Minna Toloui, Manisha Rattu, Kathryn Wright, Denise Fairchild, Avni Jamdar, Maria Stamas, and Steve Gelb. 2021. “Equity and Buildings: A Practical Framework for Local Government Decision Makers.” usdn.org/uploads/cms/documents/usdn_equity_and_buildings_framework_-_june_2021.pdf

GUIDING QUESTIONS

- 
- ❖ How will engagement change decisions and outcomes?
 - ❖ Which people, organizations, and neighborhoods are priorities for engagement? Who is closest to the problem? Who is experiencing the worst outcomes because of inequitable systems, both past and present?
 - ❖ Why would community leaders want to engage with the local government on this issue? What might they want to get out of it? Who can help answer these questions?
 - ❖ How will engagement shift power to correct disparities in influence and voice?
 - ❖ What information will help determine who might be affected by a policy, negatively or positively?
 - ❖ What power and authority does your organization have in the city's policy process for buildings? Has that information been disclosed and shared with community partners?
 - ❖ Are there key organizations or leaders who can help shape an engagement plan?
 - ❖ What is the earliest opportunity to begin discussing with people from impacted communities the policy or plans for engagement?
 - ❖ What is the budget for community engagement? Is it sufficient? What additional resources can be secured?
 - ❖ Who are the community engagement experts in the local government? How can they be brought into forming and executing an engagement plan? Who are the community engagement experts in the community? How can they be brought into forming and executing an engagement plan?
 - ❖ Are other city departments already engaging community members and CBOs? How can local governments coordinate the engagement of these groups or otherwise ensure that these groups are not overextended or in an extractive relationship with the city?

Figure 4: Questions to Guide Community Engagement²³

²³ Jeremy Hays, Minna Toloui, Manisha Rattu, Kathryn Wright, Denise Fairchild, Avni Jamdar, Maria Stamas, and Steve Gelb. 2021. "Equity and Buildings: A Practical Framework for Local Government Decision Makers." usdn.org/uploads/cms/documents/usdn_equity_and_buildings_framework_-_june_2021.pdf.

Section 1.3 Stakeholder engagement

Program administrators should involve six key stakeholder groups in addition to community members and community-based organizations when planning a building energy upgrade program. These groups can provide valuable insights and play leadership roles in the development of programs to upgrade low- and moderate-income (LMI) housing.

These stakeholder groups include government energy and sustainability offices, affordable housing stakeholders, energy efficiency program administrators, health entities, economic inclusion and workforce stakeholders, and building energy upgrade experts and funders.



1. Government energy and sustainability offices

Government energy and sustainability offices lead and help set a jurisdiction's clean energy and climate goals.^{24,25} These offices may carry out many functions, including:

- Launching or funding building energy upgrade programs.
- Referring participants to programs.
- Requiring upgrades, sometimes as a condition of receiving funding or participating in certain government programs.²⁶
- Funding or supporting community organizations doing adjacent work.



2. Affordable housing stakeholders

Housing finance agencies, public housing authorities, government housing offices, housing trust funds, syndicators, owners, renters, and funders

Publicly sponsored affordable housing activities take place across several levels of government. The federal government provides rules, regulations, and funding for major housing programs like the [Low-Income Housing Tax Credit \(LIHTC\)](#), [Section 8](#), [HOME](#),

²⁴ Roxana Ayala, Ariel Dreihobl, and Amanda Dewey. 2021. "Fostering Equity through Community-Led Clean Energy Strategies." Washington, DC: American Council for an Energy-Efficient Economy. [aceee.org/sites/default/files/pdfs/u2105.pdf](https://www.aceee.org/sites/default/files/pdfs/u2105.pdf).

²⁵ American Council for an Energy-Efficient Economy (ACEEE). 2023. "Energy Equity for Homeowners: Policy and Program Guide for Local Governments." [aceee.org/sites/default/files/pdfs/energy_equity_for_homeowners_guide_-_encrypt.pdf](https://www.aceee.org/sites/default/files/pdfs/energy_equity_for_homeowners_guide_-_encrypt.pdf).

²⁶ Building Energy Performance Standards (BEPS) are an example of a mandatory upgrade policy. Upgrade requirements can also be attached to voluntary programs that are already funding building rehabilitation; such programs are often run by a housing agency.

[Community Development Block Grants](#), [USDA Rural Housing](#), [public housing](#), COVID relief programs like [ARPA](#), and the Inflation Reduction Act's [Green and Resilient Retrofit Program](#) for Department of Housing and Urban Development (HUD)-assisted housing. State and local government offices also structure a wide variety of programs to fund affordable housing activities.

One critical group for program administrators to involve in stakeholder outreach is **housing finance agencies (HFA)**. Each state has an HFA that administers affordable housing policy at the state level and allocates federal LIHTC funding. In exchange for the financing or subsidies they provide, HFAs can incentivize or mandate energy efficiency upgrades.²⁷

Public housing authorities (PHA) are local government entities that own and operate public housing, funded by HUD. PHAs administer housing vouchers and utility allowances, which determine appropriate rent levels given the utility costs of residents.

Outside of HFAs and PHAs, **local governments** can also provide subsidies through agencies for building, preserving, or upgrading affordable housing. They also administer certain federal housing programs. More broadly, they implement zoning, issue permits, and enforce housing codes.

Tax credit syndicators, like the National Affordable Housing Trust (NAHT), are either for-profit or nonprofit entities that act as intermediaries between investors and developers that construct or preserve affordable housing. Syndicators enable investors to provide up-front cash to fund these projects in exchange for the ability to claim tax credits. These entities play several roles in building and preserving affordable housing and can also provide valuable insights for building upgrade programs.²⁸

Housing owners, whether for-profit or nonprofit, can also provide valuable insights to program administrators. Owners are uniquely positioned to understand the capital needs of their buildings (whether **subsidized** or **unsubsidized**), the associated costs of specific upgrades, and other opportunities and constraints.^{29,30} Owners may seek financing to develop or rehabilitate properties, coordinate with government agencies to receive government subsidies or accept

²⁷ Dana Bartolomei. 2021. "2020 Report Update: NHT finds more states incentivized energy and water efficiency in 9 percent LIHTC properties." energyefficiencyforall.org/updates/2020-report-update-nht-finds-more-states-incentivized-energy-and-water/.

²⁸ For more information on the role of syndicators, please see this [GAO resource](#).

²⁹ Subsidized, public, and deed-restricted housing receive federal, state, or local funding in exchange for a use restriction. These use restrictions may limit rents or purchase prices or require occupancy by low-income residents. Subsidized housing is generally privately owned, whether by a nonprofit or for-profit owner, whereas public housing is owned by the government.

³⁰ Unsubsidized housing refers to housing that is not subsidized by any federal or state program and has no regulations on rents.

vouchers, and leverage local government programs for building upgrades. Property managers and property owner associations can also help with outreach and facilitating participation in upgrade programs.

Renter groups, such as nonprofits, renter associations, and other community-based organizations focused on housing issues, can provide a valuable perspective on community upgrade opportunities, issues affecting tenants, and avenues for improving living conditions in rental housing.

Program administrators will also likely need to coordinate with **affordable housing funders**, which provide capital for the construction or rehabilitation of housing. Funders include [Community Development Financial Institutions](#) (CDFI), banks, and other lenders.³¹



3. Energy efficiency program administrators

The administrators of the Weatherization Assistance Program (WAP) and the Low-Income Home Energy Assistance Program (LIHEAP) are state agencies, though often not the same state agency. Weatherization reduces energy costs for households with low incomes by increasing the energy efficiency of homes.³² LIHEAP provides bill assistance to address energy bill shortfalls and emergencies. A LIHEAP administrator might be able to refer participants for upgrade program participation or offer insight into cost-burdened communities. Both WAP and LIHEAP are often implemented by community action agencies (CAA), which can provide helpful insights regarding on-the-ground upgrade needs and barriers to implementation.

Energy efficiency program administrators are typically utilities, using funds provided by ratepayers, but can also be a state agency or nonprofit organization using ratepayer or other funds. These entities are another valuable stakeholder group to include in engagement. In the case of WAP and utility programs, there may be an opportunity to achieve economies of scale by building on existing offerings.

³¹ [CDFIs](#) are mission-driven financial institutions that create economic opportunity for individuals and small businesses, high-quality affordable housing, and essential community services in the United States. Four types of institutions are included in the definition of a CDFI: CD banks, CD credit unions, CD loan funds (most of which are nonprofit), and CD venture capital funds. CDFIs may be certified by the CDFI Fund.

See: Office of Comptroller of the Currency. "Community Development Financial Institution (CDFI) and Community Development (CD) Bank Resource Directory." Accessed 2024. occ.gov/topics/consumers-and-communities/community-affairs/resource-directories/cdfi-and-cd-bank/index-cdfi-and-cd-bank-resource-directory.html.

³² The topic of weatherization is covered in more detail in Section 2.2.

These existing programs often have limitations on what upgrades they cover, which creates coverage or funding gaps that administrators may need to fill with their building upgrade programs. For example, WAP must spend its entire federal allocation (including a recent federal cash influx) on an annual timeline, but the program can serve only a fraction of eligible households each year.³³ Moreover, despite the recent boost in funding, federal rules mean that agencies can spend only \$8,000 per home.³⁴

This means that programs must still leverage outside funding for more-comprehensive upgrades. WAP also defers many homes from the program because they are not able to allocate sufficient funding to meet health and safety needs that must be addressed before weatherization can occur. Also, many community action agencies focus their efforts on one- to four-unit properties, even though properties of five or more units are also eligible.

These limitations or gaps—a program’s comprehensiveness, and whether it covers health and safety measures or multifamily buildings—may present opportunities for discussion and partnership with your state WAP administrator or local implementer.

Importantly, utility-administered energy efficiency programs may have constraints, such as cost-effectiveness tests, that create gaps in their programs. These might result in the inability to serve certain building types (e.g. only single-family homes, only master-metered multifamily buildings), offering only direct-install measures such as LED bulbs, or not offering electrification measures. Community stakeholders and intervenors in public utility commission proceedings (e.g., clean energy advocates, public utility commission staff) can be another helpful source for learning about utility program gaps and shortcomings.



4. Health entities

Marginalized communities are especially susceptible to in-home health and safety hazards, and homes with health hazards are often energy inefficient.^{35,36} Building upgrades can reduce exposure to mold, asbestos, and moisture,

³³ The IIJA included \$3.5 billion for WAP to be spent over several years. For more information, see ACEEE’s report [“Home Energy Upgrades Incentives: Programs in the Inflation Reduction Act and other recent federal laws.”](#)

³⁴ Weatherization Assistance Program: Office of State and Community Energy Programs. Accessed February 23, 2024. “Weatherization Assistance Program.” energy.gov/scep/weatherization-assistance-program.

³⁵ Hayes, S., M. MacPherson, C. Gerbode, and L. Ross. 2022. “Pathways to Healthy, Affordable, Decarbonized Housing: A State Scorecard.” Washington, DC: American Council for an Energy-Efficient Economy. www.aceee.org/research-report/h2201.

³⁶ ACEEE (American Council for an Energy-Efficient Economy). Accessed February 22, 2024. “Healthy Buildings.” aceee.org/topic/indoor-air-quality.

improve indoor air quality, and make indoor environments more comfortable for residents.³⁷

There are a variety of entities working to improve public health and reduce healthcare costs that may be interested in supporting programs to improve energy efficiency.

These entities include:

- Healthcare providers and hospitals.
- Community health clinics.
- Managed care organizations (such as HMOs or PPOs).
- State and local public health departments.
- Locally administered health programs.

Some of these entities may already be running healthy home programs to remove asthma triggers, lead, and other hazards from homes. Specifically, healthcare providers, hospitals, and managed care organizations are motivated to reduce healthcare costs and may provide in-home health interventions to that end. For such programs, administrators may be municipal, nonprofit, or private entities.

Health initiatives and healthy homes programs may present opportunities to build on existing efforts to install home health upgrades or provide health services.³⁸

There are several locally administered health programs, such as the federal CHIP Health Services Initiative, that conduct in-home lead abatement, modify homes to remove asthma triggers, and work to reduce federal healthcare spending via clean energy upgrades. These programs can be administered through state or county health agencies and may also present partnership opportunities for building upgrade program administrators. For more information on health and safety stakeholders, see Section 3.2: Health and safety.



5. Economic inclusion and workforce stakeholders

Building energy upgrade programs can also create numerous economic benefits and **high-road**, equitable opportunities for local workers and

³⁷ For a more detailed discussion of the relationship between home health hazards and energy inefficiency, please see Section 3.2.

³⁸ ACEEE (American Council of an Energy-Efficient Economy). Accessed 2024. "Healthy Buildings." aceee.org/topic/indoor-air-quality.

businesses connected to disadvantaged communities.³⁹ Focusing on ***economic inclusion*** can help align upgrade work with a jurisdiction's other priorities, including driving economic recovery, increasing racial equity, delivering community benefits, and repairing harm from past government actions.⁴⁰

Key stakeholders for workforce development include:

- High schools, trade schools, community colleges, and universities, which can offer training for the workforce.
- City or county workforce development agencies, which may run programs for incumbent workers to upskill or provide services (e.g. career exploration, job placement) to ***opportunity youth***.⁴¹
- YouthBuild or JobCorps program administrators, which run programs for opportunity youth funded by the U.S. Department of Labor. YouthBuild programs are run by CBOs or others named above and primarily build homes for low-income households. JobCorps administrators run JobCorps centers.
- Employers and contractors, which hire new entrants and other job seekers, upskill the existing workforce, and provide training.

The business support ecosystem includes:

- Apprenticeship program administrators such as unions, labor-management organizations, business associations, and community colleges.
- Small Business Development Centers, which are locally administered centers funded by the Small Business Administration that provide technical assistance, coaching, and access to loans related to business planning.

³⁹ ***High-road*** employment is typically understood as workforce development and applies to individuals. The high-road approach focuses on workforce opportunities that increase access to jobs for people who need them most and others who have been historically excluded from career-track, family-sustaining employment, and improving the quality of jobs that allow workers to be economically self-sufficient, upwardly mobile, and safe and healthy while at work. A high-road job market also encourages competition based on the quality of work rather than exclusively the cost. See: Barr Foundation. "An Assessment of the Clean Energy Workforce in New England." Accessed 2024. barrfoundation.org/reports/building-new-england-clean-energy-workforce.

⁴⁰ Economic inclusion is a process that includes high-road employment and contracting opportunities and improved access to those opportunities for historically marginalized people and communities.

⁴¹ This term refers to low-income 16 to 24-year-olds who have left high school or are underemployed.

- Business associations and chambers of commerce, which include MBE/WBE (Minority Business Enterprise/Woman Business Enterprise) and specific ethnic business associations (e.g., Hispanic Chamber of Commerce).

Partnership with such entities might establish goals and accountability via community benefits agreements with the community. For example, agreements might set targets and require reporting on hiring workers from disadvantaged communities. They can also create opportunities for new workers or those who have been left out of the labor force to receive training (e.g., via apprenticeship programs or community colleges). For more information on economic inclusion and workforce stakeholders, see Section 3.4: Workforce development and economic inclusion.



6. Building energy upgrade experts and funders

Energy, decarbonization, and building stakeholders often help design and implement building energy upgrade programs. Technical experts can advise on building needs, appropriate technologies, costs, and benefits, including how to ensure that electrification results in stable or lower bills for low-income residents. Energy service companies (ESCO) operate performance-based programs and can manage and finance large upgrade projects. Clean energy advocacy organizations can provide valuable insight into the gaps and shortcomings of existing programs, emerging program models, and best practices. Green banks, where they exist, can combine public and private funds to speed up the adoption of commercially available technologies. Organizations that advise on building science can also provide valuable feedback on the structure of upgrade programs.⁴²

⁴² Some of these organizations, for example, are part of the [Relay Network](#) and the [Clean and Equitable Buildings Collaborative](#).

Section 1 Actions and Best Practices

1. Begin with a landscape analysis.

This analysis should cover relevant existing policies, programs, and stakeholders; the existing building stock in your locality; the relationship between communities and local governing entities; the current energy efficiency workforce; and the capacity limits of potential partners.⁴³

→ Case studies:

- [Greenlink Analytics](#), a nonprofit focused on energy data analytics, developed a data visualization tool (GEM) to explore the potential relationship between historical redlining and current energy-related issues facing residents of Atlanta.⁴⁴

→ Additional tools:

- [Ecosystem mapping](#) identifies potential anchor partner organizations with the expertise, track record, and capacity to provide support with assessing equity impacts, setting equity goals, and designing a process to codevelop comprehensive decarbonization policies. This content was developed for the [Equitable Home Electrification Toolkit](#) provided by the Rocky Mountain Institute (RMI) and Emerald Cities Collaborative and is intended for use by local governments and community groups tasked with developing a roadmap for electrifying their community's housing stock.
- For additional information on identifying and engaging stakeholders, see the U.S. Department of Energy's (DOE) Better Building Energy Data Accelerator's (BBEDA) [Stakeholder Engagement Strategy Guide](#) and the Initiative for Climate Action Transparency's [Stakeholder Participation Guide](#).
- For analyzing the building stock in your community, the National Renewable Energy Lab's (NREL) [ResStock](#) and [ComStock](#) tools combine large public and private data sources, statistical sampling, detailed sub-hourly building simulations, and high-performance computing to model the impacts of building technologies in different communities.

⁴³ A supplementary approach to landscape analysis may include "[ecosystem mapping](#)." An ecosystem map is a visual representation of a process, flow, or system that highlights relationships in a particular context. Ecosystem mapping can help identify the scope of the project and ensure feasibility of the chosen strategy. See link in Additional Tools for more information.

National Democratic Institute. Accessed February 20, 2024. "Module: Ecosystem Mapping." ndi.org/sites/default/files/3.%20Ecosystem%20Mapping.pdf

⁴⁴ NB: There is a cost for Greenlink Analytics' services.

- The U.S. Environmental Protection Agency (EPA) and DOE have established 16 [Environmental Justice Thriving Communities Technical Assistance Centers](#) (TCTAC). These can help program administrators build capacity for navigating federal grant application systems, developing strong grant proposals, and managing grant funding effectively, among other critical tasks.
- For additional information on getting started with residential energy upgrade program planning, see DOE's [Residential Program Guide](#) (a repository for lessons learned, resources, and knowledge from program administrators and industry experts across the country).
- This resource from the [Journal of Participatory Research Methods](#) discusses how landscape analysis can help reveal trends, opportunities, and resource gaps in communities.⁴⁵
- Maps that demonstrate the history of redlining are available through the University of Richmond's [Mapping Inequality](#) project.

2. Design equitable engagement activities.

Design engagement activities in partnership with community-based organizations (CBOs), affordable housing agencies, and other local experts and practitioners. Understand the difference between community and stakeholder engagement and undertake intentional and inclusive engagement that builds shared vision and capacity with the community.

→ Case studies:

- Philadelphia organized [Energy Burden Focus Groups](#) of residents and CBOs to understand energy burdens in the city and to confirm whether the quantitative data it had gathered accurately reflected energy impacts on communities. Using both types of data allowed the city to directly inform programs focused on energy burdens and energy poverty reduction. For more information on Philadelphia's community "co-creation" approach, please see [this case study](#), part of [guidelines](#) for creating community-driven building retrofit programs, assembled by the Building Electrification Institute (BEI), Elevate, and C40 Cities Climate Leadership Group.
- Orlando, FL, developed a partnership with the Institute for Market Transformation (IMT), Poder Latinx, and the National Association for the Advancement of Colored People (NAACP) to [co-develop community engagement efforts](#) focused on building performance standards (BPS) and addressing the energy burdens of residents.

⁴⁵ NB: This resource focuses more on landscape analysis as a participatory research method and is thus geared towards an academic audience.

→ Additional tools:

- The [Community-Driven Climate Resilience Planning Framework](#) is another helpful engagement planning tool. Co-launched by NACRP members and grassroots partners in the summer of 2017, this framework was created through convening community-driven planners across a wide array of organizations. It includes principles, practices, and key capacities for community-driven planning.
- The [Climate Equity & Community Engagement in Building Electrification Toolkit](#) developed by Emerald Cities Collaborative and PODER derived from the City of San Francisco's engagement with Urban Sustainability Directors Network's Zero Cities Project. The purpose of this initiative was to experiment with different forms of community engagement to highlight best practices, lessons learned and models for creating effective community engagement around equity and climate resiliency through anchor-community strategies.
- [This resource](#) from Emerald Cities Collaborative provides a list of resources on energy democracy, including webinars, flipbooks, facilitation guides, community reflection surveys, and an energy democracy scorecard.

Center marginalized and underrepresented groups in all engagement and ensure that their perspectives are reflected in the leadership and decision-making structure of the planning process.

→ Case studies:

- Minneapolis designated two [Green Zones](#), or areas where residents have experienced disproportionate pollution impacts and systemic marginalization. Each Green Zone has a task force consisting of individuals who live or work in the affected neighborhoods. The task forces are responsible for implementing work plans that address issues like public health, climate resilience, and environmental justice.
- Providence, RI, founded a [Racial and Environmental Justice Committee](#) (REJC) to integrate the concerns and needs of marginalized communities into the city's sustainability work and decision-making processes. The REJC surveyed frontline communities and co-developed the city's Climate Justice Plan.
- Seattle uses an [Equitable Development Framework](#) to guide its engagement. The city uses a combination of traditional tools to engage community members, such as hands-on workshops, smaller-scale interactive meetings with community-based organizations, and online updates and questionnaires. It also uses bicultural and/or bilingual Planning Outreach Liaisons (POL) to connect with underrepresented communities.
- San Jose, CA, initiated a process of "community co-creation" to produce the [Electrify San Jose Framework](#). This framework, prepared in collaboration with the Building

Electrification Institute, Upright Consulting Services, and the American Cities Climate Challenge, documents major priorities and concerns of key stakeholders, historically marginalized communities, and the broader community concerning the electrification of San Jose's existing buildings.

Compensate community-based organizations and community members involved in the planning process. Identify and address barriers to participation by providing childcare, meals, and transportation to and from meetings. Choose accessible meeting times and locations.

→ **Case studies:**

- [Vallejo, CA](#), implemented a participatory budgeting initiative to directly engage the community in deciding how a portion of the city's budget should be spent. The community engagement process involved compensating both CBOs and individual community members for their time and providing childcare and transportation services.



Section 2: Identifying Your Community and Upgrade Priorities

Section 2 provides an overview of important data sources to use while identifying program focus areas. It also explains elements of building upgrade scopes of work and specific considerations for affordable housing.

2.1 Using data to identify program focus areas

Along with undertaking effective community and stakeholder engagement, using data to understand how complex inequities shape the realities of communities is a powerful step for planning programs or policies that seek to address and repair previous harm. Developing an effective and equitable building energy upgrade program requires both quantitative and qualitative data.

There are numerous data sources that can be used to understand trends or conditions in a geographic area, such as the American Housing Survey (AHS), the U.S. Census, and existing local studies and planning documents. However, these data may fall short of fully reflecting the daily experiences of community members. Using datasets alongside community input to design and inform policies and programs is essential to ameliorating inequities in LMI communities.^{46,47}

There are many supplementary data tools available that focus specifically on data related to environmental justice metrics. These tools can help decision makers direct investments to underserved communities. For example, to help achieve the goals of Justice40, the federal government has created several tools, including:⁴⁸

- The Climate & Economic Justice Screening Tool ([CEJST](#)), which includes visual data layers in a map to highlight communities that face significant environmental and housing burdens.
- EPA's environmental justice screening and mapping tool, [EJScreen](#).
- DOE's [LEAD](#) tool, which helps users understand housing and energy characteristics for low- and moderate-income households.

Several state and local governments have also created similar tools using local data. However, it is important to note that these data sources do not always capture local realities, community priorities, fluid conditions, and other circumstances that could impact the success of a building upgrade initiative. For example, CEJST currently does not use race as an indicator in the tool to

⁴⁶ NB: In many instances, it is not possible to receive input from communities to complement existing data sources before building trust with communities that have experienced significant harms from decision makers. This often takes significant resources to accomplish and will be context dependent.

⁴⁷ Ford, TN and Goger, A. 2021. "The Value of Qualitative Data for Advancing Equity in Policy." The Brookings Institution Blog, August 14. [brookings.edu/articles/value-of-qualitative-data-for-advancing-equity-in-policy/](https://www.brookings.edu/articles/value-of-qualitative-data-for-advancing-equity-in-policy/).

⁴⁸ [The federal government](#) has made it a goal that 40% of the overall benefits of certain federal investments flow to disadvantaged communities that are marginalized, underserved, and overburdened by pollution. See: The White House. Accessed February 22, 2024. "Justice40: A Whole-of-Government Initiative." [whitehouse.gov/environmentaljustice/justice40/?utm_source=link](https://www.whitehouse.gov/environmentaljustice/justice40/?utm_source=link).

identify disadvantaged communities, despite race being clearly correlated with many of the indicators in the tool.^{49,50}

2.2 Building upgrade and decarbonization strategies

Building energy upgrades enhance energy efficiency in existing buildings. They can significantly reduce building energy use, playing a critical role in addressing climate change and improving the quality of homes and buildings. Scopes of work with **deep retrofits** can reduce a home's energy use by 58% to 79% and its emissions by 32% to 56%, depending on the home's age and the regional climate where the home is located.^{51,52}

A building energy upgrade scope of work may include:

- Adding new technology to an older **building system** (focusing on the improved energy performance of the building).⁵³
- Making the building more efficient through the tune up, repair, or replacement of an existing system or systems (including plumbing **HVAC** systems).⁵⁴

⁴⁹ Rajat Shrestha, Sujata Rajpurohit and Devashree Saha. 2023. World Resources Institute. *CEQ's Climate and Economic Justice Screening Tool Needs to Consider How Burdens Add Up*. Washington, D.C. wri.org/technical-perspectives/ceq-climate-and-economic-justice-screening-tool-cumulative-burdens#:~:text=Race%20is%20absent%20from%20CEJST,part%20of%20advancing%20environmental%20justice.

⁵⁰ Sadasivam, N and Aldern, C. 2022. Grist. *The White House excluded race from its environmental justice tool. We put it back in*. grist.org/equity/climate-and-economic-justice-screening-tool-race/.

⁵¹ Deep retrofits are whole-home projects that incorporate more-extensive envelope and equipment upgrades with the goal of achieving whole-home energy savings of 50% or more. Deep energy reduction projects expand on the range of measures targeted in retrofit projects to include behavioral measures and a more comprehensive set of end uses with the goal of achieving at least a 50% reduction in energy use. See: Jennifer Amann, Rohini Srivastava, and Nick Henner. 2021. "Pathways for Deep Energy Use Reductions and Decarbonizations in Homes." Washington, DC: American Council for an Energy-Efficient Economy. [Aceee.org/sites/default/files/pdfs/b2103.pdf](https://aceee.org/sites/default/files/pdfs/b2103.pdf).

⁵² Ben Somberg. 2021. "Report: Deep Retrofits Can Halve Homes' Energy Use and Emissions." aceee.org/press-release/2021/12/report-deep-retrofits-can-halve-homes-energy-use-and-emissions.

⁵³ [A building system](#) is a combination of equipment, operations, controls, accessories, and means of interconnection that use energy to perform a specific function. Examples include heating, ventilation, and air conditioning (HVAC), water heating, lighting, thermal envelope, and miscellaneous electrical load systems. See: Associated Cooling Services. 2020. "What is HVAC and How is it Different from Air Conditioning?" acsuk.org/what-is-hvac-and-how-is-it-different-from-air-conditioning/.

⁵⁴ [HVAC](#) is responsible for heating and cooling a building. It's also a source of proper ventilation, allowing for moisture to escape.

- Improvements to the **envelope** (including weatherization).⁵⁵

Weatherization typically involves efficiency improvements to a building's envelope through insulation, air sealing, or window upgrades. Weatherization can help address health issues like asthma, uncomfortable or dangerous indoor temperatures, and indoor air pollution.

Strengthening a building's envelope can block pollutants from entering a house and regulate indoor temperatures, thereby reducing exposure to outside air pollution and extreme heat and cold.⁵⁶ Energy upgrades that improve a building's ventilation and filtration systems can also mitigate asthma and other respiratory illnesses.

Comprehensive building energy upgrades are a whole-building approach to address deficiencies in the building envelope and complete necessary upgrades to major systems. These upgrades include a suite of measures that typically require engineers, contractors, or special tradespeople to install. Comprehensive upgrades are undertaken to improve building energy efficiency and achieve savings larger than those possible from the installation of isolated measures.

Decarbonization encompasses strategies for reducing building-related carbon emissions. Key approaches include energy efficiency upgrades, replacing fossil fuel equipment with efficient electric equipment (**electrification**) and **distributed generation** (e.g., solar).^{57,58} Beyond reduced greenhouse gas emissions, other benefits may include improved indoor air quality, reduced utility bills, and greater ease of maintenance.

Many techniques can be used to upgrade the envelope, heating and cooling systems, water heating system, lighting, and other aspects of a home's energy equipment.

- Building envelope upgrades
 - o These upgrades ensure that a building can retain heat in the winter and keep it out in the summer, reducing HVAC load. They include improvements to air sealing, duct sealing, and insulation in the walls, attic, and foundation. They can

Better Buildings, U.S. Department of Energy. Accessed February 23, 2024. "Building Envelope" betterbuildingsolutioncenter.energy.gov/building-envelope.

⁵⁵ The envelope, which includes the walls, windows, roof, and foundation, forms the primary thermal barrier between the interior and exterior environments.

⁵⁶ Sara Hayes and Christine Gerbode. "Session 1: Providing Health Services as Part of Residential Energy Saving Programs" aceee.org/sites/default/files/pdfs/Session%201%20Presentation%20Deck.pdf.

⁵⁷ Electrification refers to fully or partially switching from technologies that directly use fossil fuel to those that use electricity.

⁵⁸ Distributed generation refers to a [variety of technologies](#) that generate electricity at or near where it will be used, such as solar panels and combined heat and power. See: The Alliance to Save Energy. "Building Systems Efficiency." WBDG, December 7, 2018. <https://www.wbdg.org/resources/building-systems-efficiency>.

also include replacing windows, doors, installing secondary windows, and weatherization measures.⁵⁹

- *Heat pumps* for heating and cooling⁶⁰
 - o Instead of generating heat through **electric resistance** or combusting fossil fuels, these systems transfer heat from one place to another, much like refrigerators and air conditioners do.⁶¹ They can be used for both heating and cooling. These systems are more efficient than standard electric resistance, gas or oil heating systems. Installing geothermal heat pumps can reduce household energy use by as much as 80% and installing air-source heat pumps (ASHP) can reduce household energy use by as much as 65%.⁶²
- Heat pump water heaters (HPWH)

⁵⁹ HVAC and water heating are the most significant contributors to household energy consumption, and the most significant energy savings benefits come from making these systems more efficient, as well as strengthening a building's envelope.

See: "U.S. Energy Information Administration - EIA - Independent Statistics and Analysis." Electricity use in homes - U.S. Energy Information Administration (EIA). Accessed March 25, 2024.
<https://www.eia.gov/energyexplained/use-of-energy/electricity-use-in-homes.php>.

⁶⁰ [Heat pumps](#) are systems that use electricity to transfer heat. During the heating season, heat pumps move heat from the cool outdoors into hotter indoor environments. During the cooling season, heat pumps move heat from the hotter indoor environment into the outdoors. There are many types of heat pumps connected by ducts (air-to-air, water source, and geothermal), as well as ductless heat pump systems. Geothermal heat pumps operate similarly to air-source heat pumps, but they move heat between the indoor environment and the ground. Geothermal heat pumps are able to take advantage of ground temperatures, which are more consistent than air temperatures.

U.S. Department of Energy. Accessed February 22, 2024. "Heat Pump Systems."
<https://www.energy.gov/energysaver/heat-pump-systems>

U.S. Department of Energy. Accessed April 12, 2024. "Heat Pump Hot Water Heaters."
<https://www.energy.gov/energysaver/heat-pump-water-heaters>.

⁶¹ [An electric resistance heater](#) converts the electrical energy a device consumes to the heat supplied to a space; [electric resistance heat](#) can be supplied by centralized forced-air electric furnaces or by heaters in each room. Room heaters can consist of electric baseboard heaters, electric wall heaters, electric radiant heat, or electric space heaters.

Ibrahim Dincer. 2018. "Comprehensive Energy Systems." sciencedirect.com/topics/engineering/electric-resistance-heater.

U.S. Department of Energy. Accessed February 22, 2024. "Electric Resistance Heating."
[energy.gov/energysaver/electric-resistance-heating](https://www.energy.gov/energysaver/electric-resistance-heating).

⁶² U.S. Department of Energy. Accessed February 22, 2024. "Heat Pump Systems."
[energy.gov/energysaver/heat-pump-systems](https://www.energy.gov/energysaver/heat-pump-systems).

- o Heat pumps can also be used to heat water. Importantly, HPWHs have some unique installation considerations, including location, required space, and planning for potential noise from the system.
- Lighting and appliances
 - o Lighting upgrades often involve converting a building to be fully lit by LED lighting. These upgrades can also include sensors and controls that regulate lighting and home appliances, including refrigerators, stoves, and heat pump/**hybrid dryers**.^{63,64} EPA's ENERGY STAR Program certifies energy-efficient lighting and appliances.

⁶³ Efficient stoves include **induction stoves**, a [special type of electric cooktop](#) that uses induction technology. This technology generates energy from an electromagnetic field below the glass cooktop surface, which transfers current directly to magnetic cookware. This causes the cookware to heat up. Currently, there is no specific ENERGY STAR certification or DOE standard for induction stoves, just for electric stoves generally. As of the writing of this report, available electric resistance and induction stoves have comparable performance.

U.S. Department of Energy. Accessed February 22, 2024 . "Gas and Electric Ovens, Stoves, and Ranges" energy.gov/energysaver/gas-and-electric-ovens-stoves-and-ranges.

⁶⁴ [A heat pump dryer](#) works as a closed loop system by heating the air used to remove moisture from the clothes and then reusing it once the moisture is removed. Rather than releasing warm, humid air through a dryer vent to the exterior of the home as a conventional dryer does, a heat pump dryer sends it through an evaporator to remove the moisture without losing too much heat.

- Electric infrastructure
 - o Electric infrastructure upgrades can include higher-capacity or **smarter electrical panels** and circuit splitters for **load shifting** and prioritization to limit simultaneous power draw.^{65,66} These changes can help facilitate increased **plug loads**.⁶⁷

⁶⁵ Smart electrical panels give users more control over the electrical circuits in their home.

See: New 'smart panels' give homeowners real-time control of their energy use - WSJ. Accessed April 11, 2024. <https://www.wsj.com/articles/smart-panels-home-improvement-energy-9544da4a>.

⁶⁶ [Load shifting](#) is the ability to move electricity consumption from one time period to another (e.g., from peak hours to off-peak hours).

Slipstream. 2020. Load shifting: The measures that can save energy and carbon together. slipstreaminc.org/research/load-shifting-measures.

⁶⁷ [Plug load](#) refers to energy used by equipment that is plugged into an outlet.

GSA. "Plug Load Nuggets." Accessed April 12, 2024. <https://www.gsa.gov/governmentwide-initiatives/federal-highperformance-green-buildings/resource-library/energy-water/plug-loads/plug-load-nuggets>.

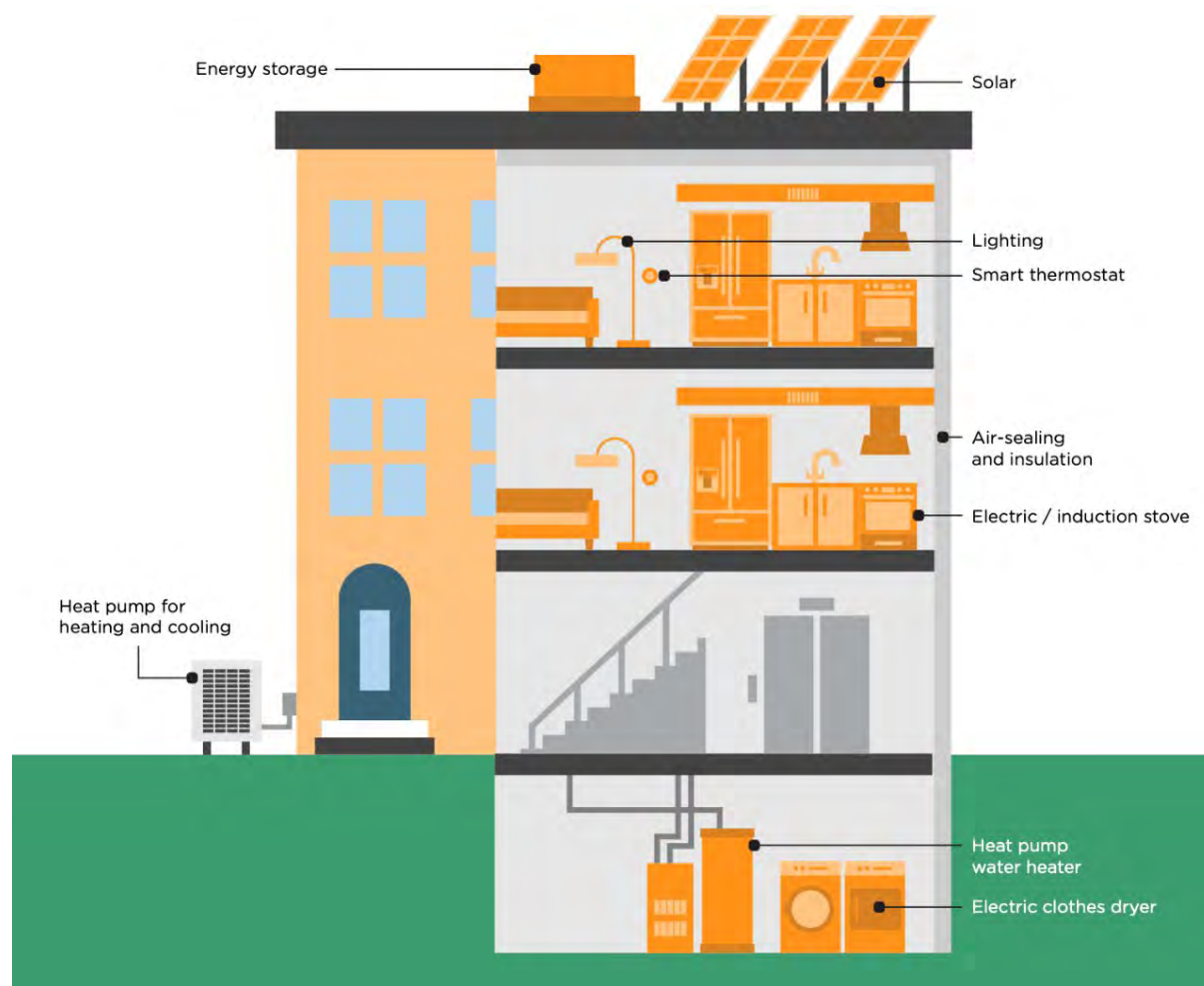


Figure 1: Examples of decarbonization measures in a multifamily building⁶⁸

Energy upgrades that reduce total building energy loads and costs are often the basis for **efficient electrification** upgrades made to support decarbonization.⁶⁹ While the sequencing of comprehensive upgrades may vary widely depending on the building's needs, three examples of typical sequencing are shown in the figure below.

⁶⁸ Elevate.

⁶⁹ [Efficient electrification](#) is a term for replacing direct fossil fuel use (e.g., propane, heating oil, gasoline) with electricity in a way that reduces energy use. For more information, See:

Steven Nadel, 2023. "The United States Can Electrify Most Fossil Fuel Use: Here Is What Needs to Happen to Make This Possible." Washington, DC: American Council for an Energy-Efficient Economy. https://www.aceee.org/sites/default/files/pdfs/the_united_states_can_electrify_most_fossil_fuel_use_encrypt.pdf.

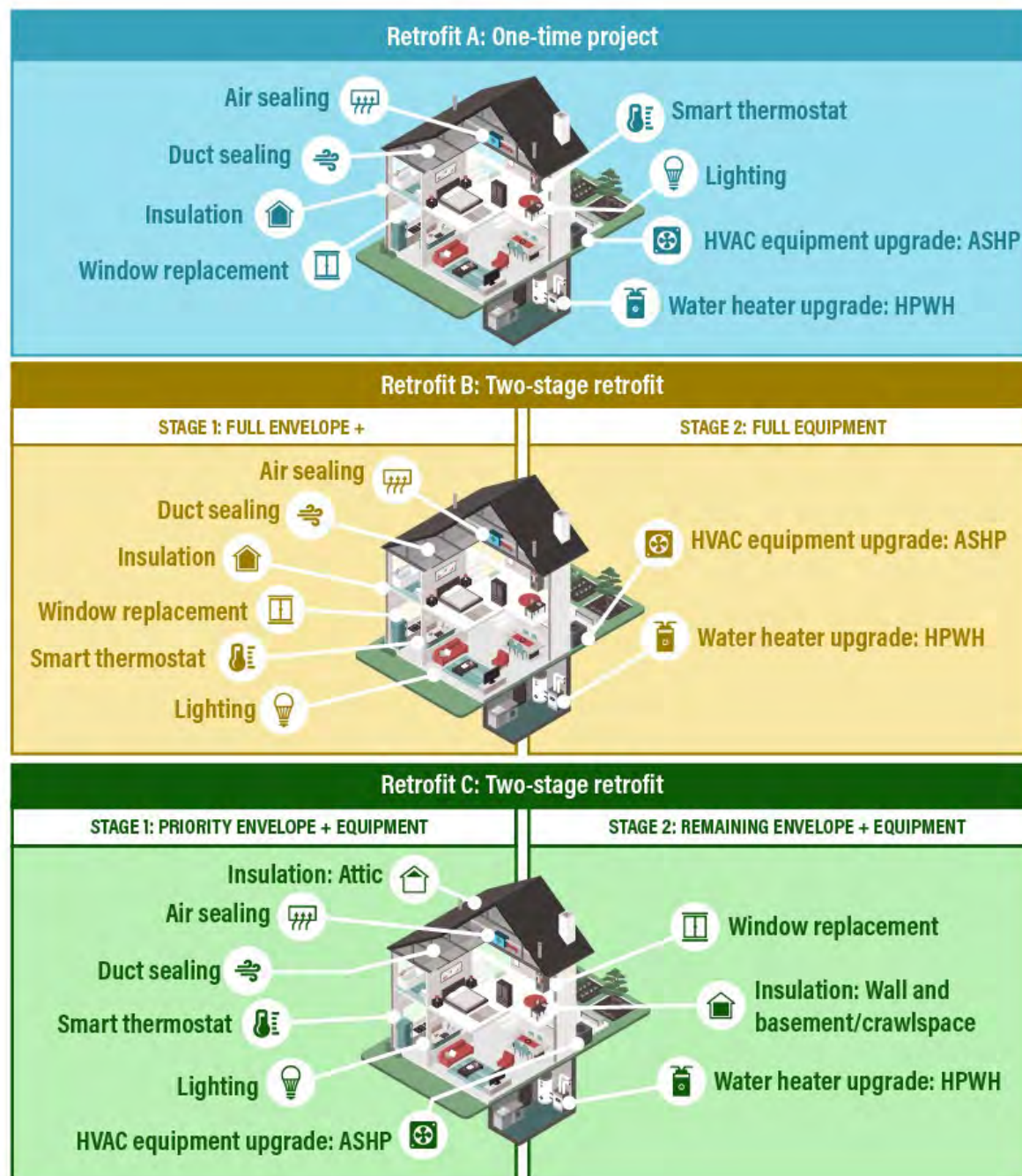


Figure 2: Examples of Retrofit Sequencing⁷⁰

⁷⁰ Amann, J., R. Srivastava, and N. Henner. 2021. *Pathways to Residential Deep Energy Reductions and Decarbonization*. Washington, DC: American Council for an Energy-Efficient Economy. Accessed April 2024. <https://www.aceee.org/research-report/b2103>.

2.3 Considerations for low- and moderate-income housing

Affordable housing serves a diverse range of low- and moderate-income residents. Building upgrades in affordable housing can improve the quality of life and costs of living for low-income renters, while benefiting homeowners and rental property owners through energy cost savings, lower operation and maintenance costs, and better renter retention. However, because affordable housing is typically older and more likely to be in areas prone to environmental hazards, it is often less energy efficient and more susceptible to high energy costs.^{71,72} This can make designing building upgrade programs to serve affordable housing a unique challenge.

Housing is generally considered **affordable** when housing costs, including utility costs, are less than 30% of a household's income. Households that pay more than 30% of income towards these costs are considered **cost-burdened**. For most subsidized or public affordable housing, households are considered eligible based on how their household income compares to the **Area Median Income** (AMI), the midpoint income for their region. A household is often considered "low-income" if it earns less than 80% of AMI. Cost-burdened low-income households have fewer resources for basic needs, such as healthcare, food, and childcare. These households are also more likely to experience housing instability, overcrowding, and eviction.⁷³

For most of the 20th century, government agencies and private financial institutions reinforced segregation and restricted people of color from building wealth through discriminatory housing and finance policies and exclusionary zoning laws. **Redlining** is a particularly relevant example of how racist policies led to divestment and reduced opportunity for wealth generation for communities of color. Redlining was a practice endorsed by the U.S. government to designate areas on maps as good or bad investments.^{74,75} Areas that had high concentrations of

⁷¹ Frederick J. Eggers. 2017. "Characteristics of HUD-Assisted Renters and Their Units in 2013." huduser.gov/portal/publications/Characteristics-HUD-Assisted.html.

⁷² Abigail Corso, Pat Coleman, John Viner, Claire Oleksiak. 2022. "Making Naturally Occurring Affordable Housing More Efficient: Outreach to Upgrade." elevatenp.org/wp-content/uploads/NOAH-Programs-Elevate-NEI-Summer-Study-Presentation.pdf.

⁷³ HUD Fair Market Rents and Income Limits. See: HUD's Office of Policy Development and Research. 2023. "Income Limits." [Huduser.gov/portal/datasets/il.html](https://huduser.gov/portal/datasets/il.html).

⁷⁴ Jake Blugmart. 2017. "How Redlining Segregated Philadelphia." Next City Blog, December 8. <https://nextcity.org/features/redlining-race-philadelphia-segregation>.

⁷⁵ Many sources on housing segregation and redlining point to the Homeowners' Loan Corporation (HOLC) as a driver of redlining and discriminatory housing practices. However, several scholars have pointed out the more significant role of federal agencies such as the Federal Housing Administration (FHA) in redlining. For more information on the research examining each entity's role, please see Blugmart (2017).

Jake Blugmart. 2017. "How Redlining Segregated Philadelphia." Next City Blog, December 8. <https://nextcity.org/features/redlining-race-philadelphia-segregation>.

communities of color were labeled as areas of bad investment, effectively leading to the continued disinvestment of entire neighborhoods.⁷⁶ Today, the amount, location, availability, and quality of housing stock, along with access to resources in underinvested communities, can often trace their roots back to these policies.

Affordable housing typologies

Only 34% of all housing units in the United States are considered affordable for low- and moderate-income households. Only 4% of all housing units (20% of the affordable units) are subsidized through affordable housing finance agencies, [public housing authorities](#), [deed restrictions](#), inclusionary zoning, and/or [rent control laws](#).⁷⁷

The other 30% (80% of the affordable units) are unsubsidized but still affordable to households making under 80% AMI.⁷⁸ Unsubsidized affordable housing often faces challenges related to building age, deferred maintenance, and high utility costs, and can be in areas at a high risk for natural disasters.⁷⁹

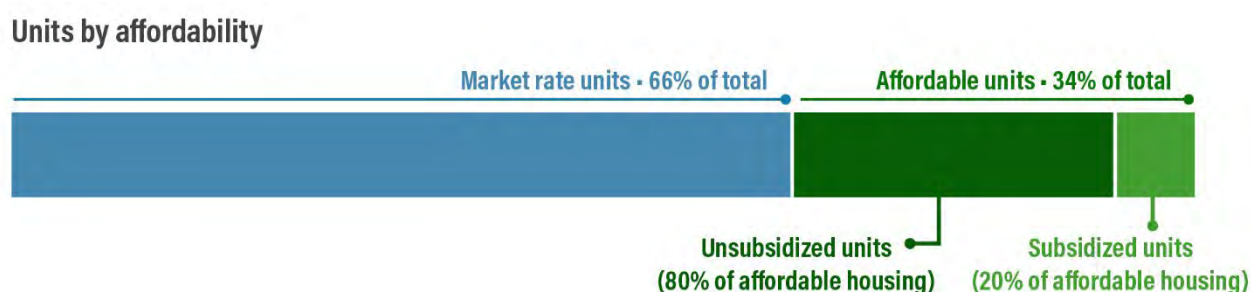


Figure 3: Housing units by affordability level and subsidy status in the United States⁸⁰

⁷⁶ Andre M. Perry and David Harshbarger. 2019. "America's Formerly Redlined Neighborhoods Have Changed, and So Must Solutions to Rectify Them" brookings.edu/articles/americas-formerly-redlines-areas-changed-so-must-solutions.

⁷⁷ Abigail Corso, Pat Coleman, Claire Oleksiak, and Dane John Viner. Accessed February 22, 2024. "Making Naturally Occurring Affordable Housing More Efficient: Outreach to Upgrade." elevatenp.org/wp-content/uploads/Making-Naturally-Occurring-Affordable-Housing-More-Efficient.pdf.

⁷⁸ This subset of the market is sometimes called **naturally occurring affordable housing (NOAH)** and may include owner-occupied housing or unsubsidized and non-restricted rental housing.

⁷⁹ Abigail Corso, Pat Coleman, Claire Oleksiak, and Dane John Viner. Accessed February 22, 2024. "Making Naturally Occurring Affordable Housing More Efficient: Outreach to Upgrade." elevatenp.org/wp-content/uploads/Making-Naturally-Occurring-Affordable-Housing-More-Efficient.pdf.

⁸⁰ HR&A advisors.

When planning or implementing building energy upgrade programs, it is helpful to keep these key distinctions and market segments in mind; different types of affordable housing may require different program approaches. In addition to differences between unsubsidized and subsidized affordable housing, single-family and multifamily housing often have very different needs and are best served by different program design features, timelines, and funding/financing options. Engaging local affordable housing stakeholders can help program administrators better understand specific program design components that will be attractive to different housing types and owners.

For unsubsidized rental housing, program administrators will need to navigate the risk that energy upgrades will spur property owners to increase rents, either to pay back the cost of the upgrades or to capitalize on their buildings' newly updated features. For subsidized housing, program administrators will need to design their programs around these properties' complex financing and regulatory constraints, which are generally overseen by the state housing finance agency.

The unique challenges of implementing energy upgrades in affordable housing

There are numerous challenges specific to implementing building upgrades in affordable housing.

- Due in part to a history of disinvestment and racial injustice, affordable housing stock tends to have more significant health, safety, and structural repair needs, which can make the cost of upgrade projects more expensive.⁸¹
- Owners and financiers may be concerned about high project costs and a lack of clarity about the return on investments through energy cost savings.
- Renters and advocates may be concerned about life disruption during building upgrades and resident displacement.

Anticipating the effect that building upgrades might have on renters' housing costs (including rent) requires a holistic understanding of the local housing market and demand for upgraded rental homes, the incentives building owners can use for each type of housing, and how low- to moderate-income renters in these housing types might experience cost shifts. In the case of electrification upgrades, for example, if a renter pays the electric bill and the building owner pays the gas bill, the cost of heating (or cooling) may shift to the renter. If the owner pays the

⁸¹ Jarrah, Alexander, Emily Garfunkel, and David Ribeiro. 2024. Nobody Left Behind: Preliminary Review of Strategies to Support Affordable Housing Compliance with Building Performance Standards. Washington, DC: ACEEE. www.aceee.org/research-report/b2401.

electric bill, the cost of building upgrades may be passed on to the renter in the form of rent increases.

In fact, one of the greatest challenges to making the case for upgrades in all rental housing (both affordable and market rate) is the diffusion of decision making among different stakeholders. For instance, if a renter pays for their utilities, an owner does not have an incentive to invest in efficiency (also known as ***the split incentive***). Conversely, if an owner pays for utility costs, a renter may not have an incentive to keep energy costs down.

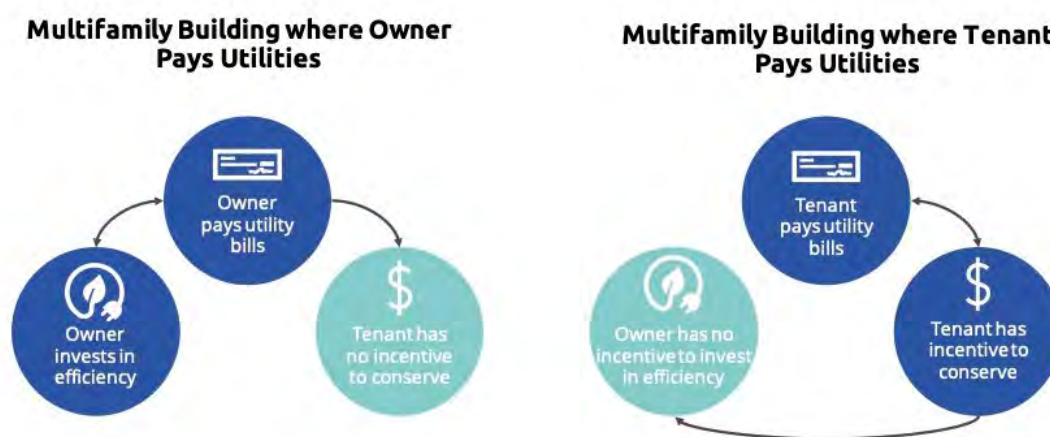


Figure 4: The split incentive⁸²

Interventions must be designed to overcome these challenges. For instance, a program can seek to cover as much of the upgrade cost as possible, so that the rental property owner does not experience pressure to raise rents to recoup their investment. Alternatively, a program that provides conditional capital funding support for building upgrades to reduce energy consumption can also incentivize owners to improve renter quality of life and agree to certain rent or energy cost restrictions. Examples of such interventions are included in the list of actions for this section. Preventing increased household energy costs due to electrification should be a primary focus of program administrators.

It is important to note that, in most situations, efficient building electrification will reduce overall bills for households.⁸³ While pairing electrification scopes with weatherization and distributed generation can help prevent increased household costs, program administrators should also get involved in conversations with local utilities, ratepayer advocates, and other stakeholders related

⁸² HR&A Advisors.

⁸³ Yim, E., and S. Subramanian. 2023. *Equity and Electrification-Driven Rate Policy Options*. Washington, DC: ACEEE. [aceee.org/white-paper/2023/09/equity-and-electrification-driven-rate-policy-options](https://www.aceee.org/white-paper/2023/09/equity-and-electrification-driven-rate-policy-options).

to rate-setting for low-income households, or more cutting-edge approaches to neighborhood-level energy savings, such as neighborhood-scale building decarbonization.^{84,85} While weighing these challenges, administrators should seek to maximize positive outcomes identified as priorities during community engagement.⁸⁶

⁸⁴ Mark Kresowik. 2024. "Heat Pump Programs Can't Keep Leaving Low-Income Households Behind." ACEEE Blog, February 12. [aceee.org/blog-post/2024/02/heat-pump-programs-cant-keep-leaving-low-income-households-behind](https://www.aceee.org/blog-post/2024/02/heat-pump-programs-cant-keep-leaving-low-income-households-behind).

⁸⁵ Kristin George Bagdanov, Claire Halbrook, and Amy Rider. 2023 "Neighborhood Scale: The Future of Building Decarbonization." [buildingdecarb.org/ resource/neighborhoodscale](https://buildingdecarb.org/resource/neighborhoodscale).

⁸⁶ For additional information about the benefits of efficient building electrification, please see the findings from a recent study in *Joule*: "News Release: Benefits of Heat Pumps Detailed in New NREL Report." NREL. Accessed April 5, 2024. <https://www.nrel.gov/news/press/2024/benefits-of-heat-pumps-detailed-in-new-nrel-report.html>.

Section 2 Actions and Best Practices

3. Identify program focus areas.

Using community data and community priorities, establish clear racial equity, housing, workforce development, health, and environmental justice goals for both engagement activities and program outcomes.

→ Additional tools:

- As mentioned above, to help identify program focus areas, administrators can use EPA's [EJScreen](#), the federal government's Climate and Economic Justice Screen Tool ([CEJST](#)) to identify disadvantaged census tracts, and DOE's [LEAD](#) tool.
- This guide, from [IREC](#), provides recommendations on how to direct workforce program resources.
- This [guide](#), from ECC, provides city staff, elected officials, and advocates with a strategic framework for folding workforce development into climate-related planning processes.
- As mentioned above in Section 1, the National Renewable Energy Lab's (NREL) [ResStock](#) and [ComStock](#) tools combine large public and private data sources, statistical sampling, detailed sub-hourly building simulations, and high-performance computing to model the impacts of building technologies in different communities.
- DOE's [Building Efficiency Targeting Tool for Energy Retrofits](#) (BETTER) software toolkit enables building operators to identify the most cost-saving energy efficiency measures in buildings and portfolios using readily available building and energy data.

Alongside other program goals, make greenhouse gas emission reductions a metric for program success.⁸⁷

→ Case studies:

- At the building level, the Los Angeles Department of Water and Power (LADWP) provides incentives for energy efficiency measures if whole building energy savings are above 10%. Through the [Comprehensive Affordable Multifamily Retrofits Program](#), LADWP offers different incentives based on the size of property, the location of efficiency upgrades, and the metric tons of carbon dioxide equivalent (MTCO2e) reduced. For

⁸⁷ Other program goals and metrics may be related to affordability, health and safety, workforce development, racial and social equity, and energy cost reduction. In R2E2's opinion, program goals should also specifically include emission reduction goals to ensure that this priority of building upgrade programs is pursued. For more information on this consideration, please see [ACEEE's Climate-Forward Efficiency Initiative](#).

multifamily buildings with fewer than 65 units, LADWP provides \$5,400 per MTCO₂e reduced in common areas and \$6,750 per MTCO₂e in renter units. Larger multifamily buildings earn up to \$6,200 and \$7,750 per MTCO₂e, respectively.

- California's [Low Income Weatherization Program](#) (LIWP), administered by the Association for Energy Affordability, was the first low-income program in the state to focus on decarbonization specifically, as reflected in the incentives, which are provided based on total avoided GHG emissions instead of a per-measure basis.

→ **Additional tools:**

- EPA provides [numerous tools](#) that can help develop GHG emissions inventories at the state and local level.

4. Establish program upgrade offerings.

Prioritize comprehensive efficiency upgrades and electrification in program offerings.

→ **Case studies:**

- California's [Low-Income Weatherization Program](#) provides comprehensive energy efficiency and solar PV upgrades exclusively for low-income households (both single and multifamily). This program is notable for its flexible incentive methodology; while it encourages comprehensive retrofits (providing free whole-building energy audits and a simple one-stop shop framework to ease the burden of seeking technical assistance), the program also provides incentives for incremental energy savings. This flexible incentive structure helps to overcome split incentives and reduce upfront costs for homeowners, renters, and property owners, while still rewarding comprehensive upgrades.
- Massachusetts' [Low-Income Energy Affordability Network \(LEAN\)](#) Deep Energy Retrofit Pathway provides an incentive for buildings that meet a 40% energy use reduction compared to existing conditions. These projects include higher-than-standard weatherization and may include electrification of space heating and water heating.

→ **Additional tools:**

- [This paper](#) from ACEEE reports the results of a home-by-home analysis of several thousand homes across the United States, looking at gas vs. electric decarbonization and deep retrofits options for space and water heating and their lifecycle costs.

Pair electrification of heating and cooling equipment and building envelope upgrades with onsite generation to help ensure that energy bills do not increase.⁸⁸

→ Case Studies:

- [Illinois Solar for All](#), an initiative of the Illinois Power Agency, enables households that otherwise could not afford solar to take advantage of the benefits it provides, including offsetting any cost increases that may result from electrification. The initiative also controls the cost the property owner pays for the solar system by ensuring ongoing costs of the solar photovoltaic system do not exceed 50% of the value of power it generates.

Avoid installing new fossil fuel appliances.

→ Case studies:

- Policies to end the use of fossil fuel appliances are being adopted around the country in both states and smaller localities. For example, Washington, New York, New Jersey, Colorado, and California have all either ended or set a timeline for ending gas appliance incentives.^{89,90}

Include passive strategies for reducing energy costs, including shading, green roofs, and cool roofs.⁹¹

→ Case studies:

- Cleveland participates in the Northeast Ohio Regional Sewer District's [Green Infrastructure Grant Program](#) which has provided grants for incorporating low impact development techniques in site design.
- New York City installs cool roofs at no cost to qualifying building owners through the [NYC CoolRoofs](#) Program.

⁸⁸ Where onsite generation is not possible, R2E2 recommends that both owners and renters consider community solar where it is available. For more information on community solar, see DOE's [primer on community solar](#).

⁸⁹ Mark Kresowik. 2023. "Leading States Embracing Climate-Forward Efficiency." ACEEE Blog, July 26. [aceee.org/blog-post/2023/07/leading-states-embracing-climate-forward-efficiency](https://www.aceee.org/blog-post/2023/07/leading-states-embracing-climate-forward-efficiency).

⁹⁰ Kiki Velez. 2023. "Progress Report: How States Are Kicking Gas." NRDC Blog, December 12. [nrdc.org/bio/kiki-velez/state-progress-report-kicking-gas](https://www.nrdc.org/bio/kiki-velez/state-progress-report-kicking-gas).

⁹¹ American Council for an Energy-Efficient Economy (ACEEE). 2021. "Community-Wide Summary" database. [aceee.org/city/mitigation-urban-heat-islands](https://www.aceee.org/city/mitigation-urban-heat-islands).

5. Design program offerings to prevent increased household costs and displacement.

Protect housing affordability for unsubsidized rental properties that are not subject to pre-existing affordability commitments.^{92,93}

→ Case Studies:

- The Philadelphia Housing Development Corporation's [Rental Improvement Fund](#) gives rental property owners who own fewer than 15 units the opportunity to carry out necessary repairs on aging units while also preventing rent spikes. The program seeks to ensure stable rents by requiring current rents to be affordable to households earning no more than 60% of AMI and by capping annual rent increases at 3%. Additionally, the current renters must have three-year **good cause eviction** protection.⁹⁴
- California's [Low Income Weatherization Program](#) requires owners to abide by a 10-year low-income eligibility requirement from the date of receiving incentives.
- The California Energy Commission's [Equitable Building Decarbonization Program](#) offers the following methods of renter protection: rent increase limitations, eviction protections, information for renters and property owners on rights and responsibilities under the program, and requirements related to project work and temporary displacement.
- The [Efficiency Navigator](#) in Middleton and Madison, WI, requires owners of unsubsidized housing to sign a contract stipulating that the units using the program are occupied by households at or below 80% AMI, and requires the owner to use reasonable efforts to maintain the unit as housing for LMI households for a period of three years after the completion of the upgrade work. For more information on this program, please see [this case study](#), part of [guidelines](#) for creating community-driven building retrofit programs,

⁹² WAP also offers a potential path for protecting housing affordability for unsubsidized rental properties. WAP allows states to set their own affordability restrictions (DOE Regulation 10 CFR 440.22b3) for unsubsidized units that make use of WAP funding. Program administrators should check with the WAP implementor in their locality to see what affordability restrictions apply for unsubsidized properties. See this [DOE FAQ](#) for more details.

⁹³ For additional program examples, see [ACEEE's Energy Equity for Renters](#) initiative. The policy tracker lists several more programs that provide rental efficiency loans and grants in exchange for affordability covenants.

⁹⁴ **Good cause eviction** broadly refers to policies that require owners of rental housing to stipulate a "good cause" for terminating or not renewing leases. In Philadelphia, examples of [good cause reasons](#) include habitual non-payment or late payment of rent, breach of or non-compliance with lease terms, nuisance activity, and more.

assembled by the Building Electrification Institute (BEI), Elevate, and C40 Cities Climate Leadership Group.

- In Seattle, the [Multifamily Weatherization Program](#) provides project management services at no cost, but to be eligible, building owners must commit to keeping rents affordable for at least three years and at least half of tenants must meet income qualifications.

→ **Additional Tools:**

- [This report](#) from ACEEE describes the benefits, barriers, and strategies for decarbonizing buildings in the affordable housing sector. It identifies and describes selected decarbonization and deep retrofit programs serving affordable housing markets.

Minimize temporary disruptions and permanent displacement risks due to upgrades.

→ **Case studies:**

- Los Angeles's [Tenant Habitability Program](#) requires owners to disclose the disruptions they will need to make during a building renovation. This applies to most residential properties protected under the city's Rent Stabilization Ordinance. The Tenant Habitability Plan describes the scope of the work and the methods that the owner, contractor, and workers will use to mitigate potential impact to the tenants and the tenants' personal property during the period that renovation work occurs in a tenant's unit or the building and premises.

→ **Additional tools:**

- [This report](#) from Strategic Actions for a Just Economy (SAJE) offers a strategic approach to incorporate renter protections into California's residential decarbonization policies to prevent aggravating the housing crisis. Aimed at policymakers and advocates, it discusses the current challenges for renters, describes existing legal protections, and proposes strategies to avoid negative impacts from new energy standards and programs, specifically focusing on the private rental market.

Reduce energy bills and operations costs for rental property owners, homeowners, and renters.

→ **Additional tools:**

- [The New York State Energy Research and Development Authority](#) (NYSERDA) has compiled a list of energy-saving measures that residential building owners and occupants can use. These include appliances, electronic use, heating and cooling practices, and window/door treatments.

Get involved in or begin electricity rate-setting discussions with relevant stakeholders.

→ Case studies:

- Nevada's [Energy Assistance Program](#) provides income-eligible households with a Fixed Annual Credit (FAC) benefit that is calculated for each program participant. The FAC is enough to reduce the energy burden of participating households to the statewide median household energy burden.⁹⁵
- In 2012, all investor-owned electric and gas utilities in Colorado started offering a [Percentage of Income Payment Plan \(PIPP\)](#) to income-eligible households. The state caps electricity costs at 6% of income for homes that are heated only with electricity. If the heating source is gas, then costs are capped at 3% each for gas and electricity bills. This ensures that bills are always capped at 6% of income for households, regardless of the heating source.

→ Additional tools:

- For more information about emerging approaches to improving energy affordability for households, please see ACEEE's white paper "[Equity and Electrification-Driven Rate Policy Options](#)."⁹⁶

Provide education to building owners and renters on how to control energy costs.

→ Additional tools:

- Northeast Energy Efficiency Partnerships (NEEP) has prepared a [guidebook](#) for renters that provides questions to ask landlords and building owners regarding the energy efficiency of their building's envelope and appliances. The guide also provides tips for ongoing practices renters can use to keep energy costs down.

⁹⁵ Yim, E., and S. Subramanian. 2023. Equity and Electrification-Driven Rate Policy Options. Washington, DC: ACEEE. [aceee.org/white-paper/2023/09/equity-and-electrification-driven-rate-policy-options](https://www.aceee.org/white-paper/2023/09/equity-and-electrification-driven-rate-policy-options). For Fiscal Year 2023, the household energy burden for a median-income Nevada household (\$85,150) was 2.29%.

⁹⁶ Yim, E., and S. Subramanian. 2023. Equity and Electrification-Driven Rate Policy Options. Washington, DC: ACEEE. [aceee.org/white-paper/2023/09/equity-and-electrification-driven-rate-policy-options](https://www.aceee.org/white-paper/2023/09/equity-and-electrification-driven-rate-policy-options).



Section 3: Crafting a Well-Designed and Equitable Program

Section 3 focuses on the initial steps required to implement an upgrade program, key partnerships, accessing various funding sources, and incorporating health and safety measures and workforce development opportunities into building energy upgrade programs.

3.1 Program implementation and partnerships

Offering an easy point of entry and individualized guidance for building decision makers through every step of the process can help program administrators reach residents who have historically been underserved by energy efficiency offerings.

Building upgrades can reduce high energy burdens and improve living conditions for low-income households, but they can also negatively impact residents if not designed well. As discussed elsewhere in this Playbook, program strategies to mitigate displacement and unaffordable costs are necessary to ensure residents can stay in their homes and benefit from greater affordability, improved health, and other potential benefits. Ensuring high-quality upgrades is necessary for residents' satisfaction, and evaluating a program's progress toward its goals is beneficial for continuous improvement and accountability to the community.

R2E2 recommends that the process of standing up an easy-to-use program begins by developing a **program framework**. A program framework involves creating a strategy that outlines community-specific details that will inform program design and implementation, including goals and outcomes for the program, the audience served, and services needed for your target audience. The steps to developing a framework include:

1. **Convene an initial meeting of the program design team.** This team can consist of stakeholders, community representatives, and other early partners. This meeting can be used to discuss the results of your initial landscape analysis and community engagement, with the goal of developing a program framework.
 - a. Identify a timeline and next steps. For each major step in the process, all necessary assumptions, external factors, intended inputs and outputs or impacts should be defined.
 - b. Identify gaps in knowledge. If gaps in knowledge or experience are revealed during the meeting, the team should review the landscape analysis and other sources to see what resources exist to fill the gap. These resources may be individuals, best practice guides, case studies, etc.
2. **Make the framework accessible.** Once the initial draft of the framework is complete, it should be translated into a representation that community members can easily engage with. Just as in the initial community engagement, events should be scheduled to share the framework and solicit community members' input.⁹⁷ The community input should then be discussed among the design team and where feasible, adjustments should be

⁹⁷ For more information on how to approach equitable community engagement, see Section 1.1.

made to the framework to integrate the feedback. This process may need to be repeated until consensus is achieved.

3. **Assign teams to refine the framework.** The responsibility for further researching and designing components of the framework (e.g., outreach, intake, assessment, funding/financing) should be assigned to team members or sub-groups with regular check-ins scheduled to ensure that the early work of standing up a program stays aligned.
4. **Create a program manual.** The framework should be memorialized in a program manual that will be the resource for implementing and administering the program. How long this process takes before a program is launched depends on the size and scope of the program, the capacity of team members, and any external forces at play, such as funding deadlines. It is important to remember that the work of program design does not end when the program is launched; the team should be ready to change and continually improve the program to best fit community needs, and to compensate community ambassadors, advisors, and liaisons for their continued feedback and participation during this process.

Program administrators can base their program's offerings on the goals identified in the program manual. These offerings should also be responsive to local regulations, such as **Building Energy Performance Standards** (BPS), existing programs (such as those offered by utilities, nonprofits, and government entities), and broader community needs identified during community and stakeholder engagement.⁹⁸ For more information about designing successful residential energy upgrade programs, please see the ACEEE report "[Retrofitting America's Homes: Designing Home Energy Programs that Leverage Federal Climate Investments with Other Funding.](#)"

⁹⁸ BPS policies require existing commercial and residential buildings to reduce their energy use intensity or their GHG emissions intensity over a schedule that typically aims for buildings to achieve near- or net-zero energy use or GHG emissions by the middle of the century. See: Jarrah, Alexander, Emily Garfunkel, and David Ribeiro. 2024. Nobody Left Behind: Preliminary Review of Strategies to Support Affordable Housing Compliance with Building Performance Standards. Washington, DC: ACEEE. www.aceee.org/research-report/b2401. For more information on building policies and codes, please see ACEEE's [Building Policies and Codes](#) page.

3.2 Health and safety

Buildings can have a large impact on occupant health, especially considering that Americans on average spend about 90% of their time indoors.⁹⁹ The presence of mold, pests, and bacterial agents inside a home can result in various respiratory illnesses, and these effects often disproportionately impact marginalized communities. Asthma, for instance, is a common respiratory illness that disproportionately affects Black Americans, American Indians, Alaska Natives, and people living below the federal poverty threshold.¹⁰⁰

While most households can benefit from upgrades that simultaneously improve a building's energy performance and address health hazards, communities of color and low-income households could reap the most benefits from healthy housing energy upgrades. Compared to white, higher-income households, these households are more likely to live in inefficient, inadequate housing that leads to high energy bills and poor health.¹⁰¹

Many homes—often those that are least efficient—may need significant health and safety repairs before weatherization and other energy efficiency upgrades can happen.^{102,103} Often, if these repairs are not made, households may not be able to access critical funds, such as those provided by the Weatherization Assistance Program (WAP).¹⁰⁴ WAP deferrals highlight the necessity of prioritizing health and safety repairs in building upgrade programs.¹⁰⁵

Once homes are ready for weatherization, they can receive upgrades that can mitigate indoor air quality hazards and remove harmful pollutants or unhealthy building materials. Residents can then enjoy lower energy bills, more comfortable living conditions, and better respiratory health.

⁹⁹ Christopher Bloom. 2023. "June Is National Healthy Homes Month" NCHS Blog, May 31. nchh.org/2023/05/june-is-national-healthy-homes-month-2023/.

¹⁰⁰ Centers for Disease Control and Prevention (CDC). 2023. "Most Recent National Asthma Data" cdc.gov/asthma/most_recent_national_asthma_data.htm.

¹⁰¹ Hayes, S., M. MacPherson, C. Gerbode, and L. Ross. 2022. Pathways to Healthy, Affordable, Decarbonized Housing: A State Scorecard. Washington, DC: American Council for an Energy-Efficient Economy. aceee.org/research-report/h2201.

¹⁰² Jonathan Wilson and Ellen Tohn. 2010–2011. "Healthy Housing Opportunities During Weatherization Work." Golden, Colorado: National Renewable Energy Laboratory. [Nrel.gov/docs/fy11osti/49947.pdf](https://nrel.gov/docs/fy11osti/49947.pdf).

¹⁰³ Bratburd, Jennifer. 2021 "Increasing Access to Energy Efficiency: Options for Improving Weatherization Assistance." MOST Policy Initiative. mostpolicyinitiative.org/wp-content/uploads/2021/10/MOST_WX_report_2021.pdf.

¹⁰⁴ E4TheFuture. 2022. "Weatherization Barriers Toolkit" e4thefuture.org/wp-content/uploads/2022/04/E4-EFG_Weatherization-Barriers-Toolkit-4-7-2022.pdf.

¹⁰⁵ WAP deferral is a widespread problem. A study from [National Public Radio](https://www.npr.org) (NPR) found that in some jurisdictions, up to 60% of properties that are financially eligible for WAP are deferred from the program due to significant repair needs.

However, program administrators should take care that upgrades do not introduce toxic building materials into homes; insulation and sealants are common sources of toxins that can be harmful to the health of building occupants, installers, and manufacturing workers, but healthier options are available.^{106, 107}

As discussed in Section 1, health-oriented programs offer additional opportunities for braiding and blending funding. Health funding can come from the Center for Disease Control (CDC), the Children’s Health Insurance Program (CHIP), and various environmental health grants.¹⁰⁸ For more information on healthy buildings, please see ACEEE’s [Healthy Buildings](#) page.

3.3 Accessing funding sources

Finding and properly leveraging and braiding funding sources for building energy upgrade programs for low- and moderate-income housing is a prerequisite for successful implementation.

There are many sources of funding available, ranging from federal, state, and local government sources to philanthropies, nonprofits, utilities, and private entities. Drawing on multiple sources can help program administrators scale up building retrofits by offering additional measures, covering more of the upgrade costs, or reaching more homes. Providing substantial financial incentives for homeowners and rental property owners—or even covering the entire upgrade cost—can lead to higher program enrollment.

When considering various funding sources for a program, it is important to define and distinguish between the methods of braiding and blending funds. While **braiding** preserves the individual identities and requirements associated with the various funding sources, **blending** combines sources into one pot. Braiding is the dominant strategy because, although it can involve more-complex reporting, it is often easier to implement because of statutory requirements on funding sources. Using braiding and blending funding techniques, program administrators can effectively combine multiple sources to fund upgrade initiatives.

The process of braiding funds can be described in a few simple steps (although there is no one-size-fits-all model):

1. Identify available funding streams.

¹⁰⁶ Veena Singla et. al. 2018. "Making Affordable Multifamily Housing More Energy Efficient: A Guide to Healthier Upgrade Materials" energyefficiencyforall.org/resources/making-affordable-multifamily-housing-more-energy-efficient-guide-healthier-upgrade/.

¹⁰⁷ For more information on healthy building materials, see resources from [Habitat](#), including resources on [insulation product guidance](#) and [sealant product guidance](#).

¹⁰⁸ See Hayes and Christine Gerbode. 2020. "Braiding Energy and Health Funding for In-Home Programs: Federal Funding Opportunities" Washington, DC: ACEEE. aceee.org/research-report/h2002.

2. Identify eligible populations and compare requirements.
3. Align requirements of funding streams.
4. Develop shared goals and a plan for collaboration.
5. Develop governance structures to support collaboration.
6. Identify and address gaps and barriers to participation in program implementation.

Funding for upgrade programs—for the measures themselves and the administrative costs—can come in many forms: incentives, discounts, rebates, loans, grants, prizes, and in-kind services. For each of these funding sources, there are numerous considerations to keep in mind, including the following:

- Incentives, discounts, and rebates can help offset project implementation costs but do not cover full costs.
- While loans often require repayment, grants and prizes do not need to be paid back.
- Grants may have strict requirements for eligibility and reporting.
- In-kind services are similar to technical assistance services that can be used to help run and implement a program.

The federal government is an important source of funding for efficiency upgrades. Programs that support energy efficiency upgrades are typically administered by several key federal agencies: DOE, EPA, HUD, the U.S. Department of Agriculture (USDA), and the Internal Revenue Service (IRS), among others.

Funding from these agencies can take various forms. For example, the IRS provides tax credits or other tax incentives for certain energy efficiency projects.¹⁰⁹ Other agencies typically provide grants or low-cost financing to states, local governments, businesses, or directly to households, depending on the program.

Grants can be discretionary (also known as **competitive funding**) or based on a formula (also known as **formula funding**).¹¹⁰ Discretionary grants are issued competitively, meaning eligible entities will compete to win funding for a specific project or program. Formula grants are

¹⁰⁹ One problem with tax credits, however, is that unless they are refundable they are less likely to be helpful to low-income families; a household must have a tax liability in order for it to be reduced.

¹¹⁰ [Formula grants](#) are funding programs that an applicant does not compete for, though they must submit an application and meet other specified requirements. They ensure that designated recipients will receive funds and are usually administered and managed by state administering agencies.

National Institute of Food and Agriculture. Accessed February 22, 2024. "Types of Federal Assistance" nifa.usda.gov/about-nifa/what-we-do/types-federal-assistance#Competitive.

allocated to state or local governments by way of a predetermined eligibility formula, so they are effectively guaranteed should the state or local government choose to pursue the funding.

Recent federal legislation, including the Inflation Reduction Act of 2022 (IRA) and the 2021 Infrastructure Investment and Jobs Act (IIJA) (also known as the Bipartisan Infrastructure Law), has made billions of dollars available for climate investments, including funding for building energy efficiency upgrades.¹¹¹

One very large source of funding for building upgrades will originate from EPA's Greenhouse Gas Reduction Fund (GGRF). In April 2024, the agency [announced](#) three awardees for the National Clean Investment Fund (\$14 billion) and five awardees of the Clean Communities Investment Accelerator (\$6 billion). These awardees will establish a national clean financing network that will finance climate and clean energy projects, including building upgrades.

Energy efficiency funding is available across a variety of federal programs, as highlighted in the table below.

For more information on various federal programs, please visit R2E2's [Resources](#) page, which includes an FAQ on federal funding, a resource on [federal efficiency and electrification rebate programs](#), and a resource on [HUD's Green and Resilient Retrofit Program](#).

¹¹¹ For more information on the IRA, please see [ACEEE's policy brief on Home Energy Upgrade Incentives](#). Ungar, L., and S. Nadel. 2022. *Home Energy Upgrade Incentives: Programs in the Inflation Reduction Act and Other Recent Federal Laws*. Washington, DC: American Council for an Energy-Efficient Economy. aceee.org/policy-brief/2022/09/home-energy-upgrade-incentives-programs-inflation-reduction-act-and-other.

Federal program and program lead	Available funding
Home Energy Rebate Programs (Home Efficiency Rebates (HER) and Home Electrification and Appliance Rebates (HEAR)) (DOE)	\$4.3B (HOMES) and \$4.5 (HEAR)
Weatherization Assistance Program (WAP) (DOE)	\$3.5B infusion (plus appropriations, e.g., \$366M in FY23)
Climate Pollution Reduction Grants (CPRG) (EPA)	\$5B
National Clean Investment Fund (NCIF) (Greenhouse Gas Reduction Fund (GHGRF)) (EPA)	\$14B
Clean Communities Investment Accelerator (CCIA) (GHGRF) (EPA)	\$6B
Green and Resilient Retrofit Program (GRRP) (HUD)	Up to \$1B in grants or \$4B in loans, or combination thereof
Tax incentives (25C, 179D, 45L, 48, 25D) (IRS)	Uncapped
Environmental and Climate Justice Community Change Grants Program (EPA)	\$3B
Energy Efficiency and Conservation Block Grant Programs (EECBG) (DOE)	\$300M to local governments and tribes; \$120M to states

Figure 1: Federal funding for energy efficiency

State and local government funding opportunities are also available for various building types, including affordable housing. These opportunities vary more by geography, so it is incumbent on program administrators to explore funding opportunities specific to their state or locality. The state housing finance agency can be a good place to start exploring these opportunities.

There are also numerous non-governmental funding sources. Utility programs, for instance, can be useful for reducing upfront costs through rebates, although these program offerings vary widely from state to state, and they sometimes have restrictions on incentivizing fuel switching from gas to electricity. Within the nonprofit sector, community development financial institutions (CDFI) and energy efficiency-oriented nonprofits serve as the two primary funding

sources for energy efficiency work.¹¹² Financing from banks to fill funding gaps may be available for qualified borrowers, but this form of funding can pose higher interest costs and sometimes sets high qualification standards.

Braiding various funding sources (both governmental and non-governmental) helps maximize the benefits and minimize the drawbacks of each individual source. In general, because low-income households may have limited resources to pay monthly debt payments, program administrators should endeavor to maximize the use of non-debt funding (grants and rebates) over debt (loans) for the program's work.

When loans are incorporated into building energy upgrade programs, no-cost, low-cost, or forgivable loans are preferable, especially for low-income households that may not be able to budget for loan repayments.¹¹³ Another potential mechanism is "**on-bill**" **financing**, which employs a customer's utility bill as a vehicle for repayment.¹¹⁴ For more information about assembling the capital stack for residential retrofit programs, please see the ACEEE report "[Retrofitting America's Homes: Designing Home Energy Programs that Leverage Federal Climate Investments with Other Funding](#)."

¹¹² For more information on the role of CDFIs in climate change mitigation, see the [Practitioners' Guide to Community Lending for a Just and Equitable Energy Transition](#), authored in partnership by New York City Energy Efficiency Corporation (NYCEEC) and the Center for Impact Finance at the University of New Hampshire (UNH).

¹¹³ For more information on federal energy efficiency funding, please visit ACEEE's "[Putting New Energy Efficiency Incentives to Work](#)." American Council for an Energy-Efficient Economy (ACEEE). Accessed February 22, 2024. "Putting New Federal Energy Efficiency Incentives to Work." aceee.org/putting-new-federal-energy-efficiency-incentives-work#buildings.

¹¹⁴ For more information on this mechanism, please see [ACEEE's On-Bill Energy Efficiency Toolkit](#).

3.4 Workforce development and economic inclusion

A skilled clean energy workforce is instrumental to scaling up building energy upgrade programs. Recruiting contractors and training workers from diverse backgrounds can also improve economic growth in underserved communities.



Figure 2: Participants in Emerald Cities Collaborative's contractor academies.¹¹⁵

Building upgrade projects and programs are tangible ways to improve equitable access to opportunity, workforce diversity, and economic inclusion. As discussed elsewhere in this Playbook, R2E2 defines “economic inclusion” as a process that includes high-road employment and contracting opportunities and improved access to those opportunities for historically marginalized people and communities.

There is a growing demand for workers who can carry out building retrofit upgrades, driven by both private investment and new sources of federal and local funding. As additional funding becomes available, there will be increased demand for building upgrades, which require a skilled workforce to implement. Program administrators should anticipate needing access to a wide

¹¹⁵ Emerald Cities Collaborative.

variety of professionals to carry out the building upgrades they hope to spur in their communities.

As demonstrated in the chart below, DOE offers four primary types of federal energy efficiency workforce development programs:

- DOE's State-Based Home Energy Efficiency Contractor Training Grants reduce the cost of training contractor employees and provide testing and certification support.
- DOE's Energy Auditor training grant programs train individuals to conduct energy audits or survey of commercial and residential buildings.
- DOE's [building training and assessment centers](#), and other career skills training programs, such as [the Career Skills Training Program](#), establish training and assessment centers to identify opportunities for optimizing energy efficiency and environmental performance in buildings.

BIL and IRA Energy Efficiency Workforce Development Programs

	Statute	Total Appropriations & Availability	Allocation of Funds	Building Segment Served
 State-Based Home Energy Efficiency Contractor Training Grants	IRA Sec. 50123	\$200,000,000 Until September 30, 2031	State Agencies	Residential
 Energy Auditor Training Program	BIL Sec. 40503	\$40,000,000 Until Fiscal Year 2026	State Agencies	Residential, Commercial
 Building Training and Assessment Centers Program	BIL Sec. 40512	\$10,000,000 Until expended	Institutions of higher education	Commercial, Institutional
 Career Skills Training Program	BIL Sec. 40513	\$10,000,000 Until expended	Nonprofit-industry-labor partnerships	All buildings

Figure 3: Federal funding for energy efficiency workforce development¹¹⁶

¹¹⁶ Mary MacPherson. 2023. "State and Community Energy Program Workforce Development Programs." energy.gov/scep/articles/state-and-community-energy-programs-workforce-development-programs-webinar-slides.

Workforce development opportunities can be approached with three main **segments**¹¹⁷ of the workforce in mind: **new entrants**, **incumbent workers**, and **diverse suppliers**. Engaging a diverse workforce requires project developers and implementers to understand each of these segments if they want to successfully retain workers.

Labor market supply segment	Definition	Opportunities	Supports
New entrants	• High school students • College students (including community college) • Students in technical schools • Returning citizens • Youth with little experience	• Career awareness • Short-term credentialing opportunities • Work-based learning	• Mentoring • Cohort engagement in teams or groups • Transportation • Stipends
Incumbent workers	• Experienced workers changing careers	• Low-cost/ no-cost training opportunities • Networking • Increases in pay commensurate with skills development	• Access to work with benefits (e.g., healthcare) • Access to employers who need workers
Suppliers	• Minority business enterprises/disadvantaged business enterprises	• Training connecting directly to project opportunities • Networking	• Access to capital • Prompt payment • Supports with bonding insurance • Orientation to procurement processes

Figure 4: Workforce opportunities

¹¹⁷ [Refers](#) to the division of the labor market into separate sub-markets or segments, distinguished by different characteristics and behavioral rules. See: International Labour Organization. Accessed February 22, 2024. "Labour Market Segmentation" ilo.org/global/topics/employment-security/labour-market-segmentation/lang--en/index.htm.

Amid an increasing demand for workers, the greater lack of diversity in the labor market will require explicitly attracting, hiring, and retaining workers from marginalized groups. Some approaches to developing a diverse workforce are:

- Placing new entrants and incumbent workers into **good-paying**, high-quality jobs.¹¹⁸
- Investing in activities such as **upskilling**, credentials and certifications, work and learn opportunities, [pre-apprenticeships programs](#), and partnerships with community organizations such as community colleges, [YouthBuild/Job Corps](#), unions, and community-based training organizations that are calibrated to the market's demand for jobs in energy efficiency.^{119,120,121}
- Weaving in both local and national programs to enhance proficiencies in specific areas, including Interstate Renewable Energy Council (IREC) training centers.¹²²
- Requiring or incentivizing nationally recognized credentials from accredited organizations such as the Department of Labor's Workforce Innovation and Opportunity Act On-the-Job Training, Building Performance Institute (BPI Energy auditor), OSHA-10 and OSHA-30 Occupational Safety and Health Administration (OSHA) worker safety training, and the Consortium for Energy Efficiency (CEE) program for heat pump installation.

Program administrators can also take specific approaches to fostering economic inclusion in the workforce components of their building energy upgrade programs, including:

- Targeting programs to specific marginalized populations.

¹¹⁸ We define "good-paying" jobs as jobs that exceed the local prevailing wage for an industry in the region, include basic benefits (e.g., paid leave, health insurance, retirement/savings plan) and/or are unionized, and help the employee develop the skills and experiences necessary to advance along a career path.

¹¹⁹ Short-term targeted training typically provided following initial education or training, and aimed at supplementing, improving or updating knowledge, skills, and competences.

¹²⁰ A pre-apprenticeship is a program or set of services designed to prepare individuals to enter and succeed in a Registered Apprenticeship program.

¹²¹ YouthBuild is a competitive grant program that provides work experience, skills training, and educational services to eligible youth, with a focus on the construction trades. Job Corps supports a network of residential centers that provide intensive services for participants. Centers provide occupational training in a trade as well as appropriate academic and social supports. Jobs Corps has the highest funding of the three youth-targeted programs in WIOA.

¹²² [IREC](#) offers clean energy training for professionals in a variety of sectors, including firefighters, apartment maintenance technicians, and code officials.

- Designing programs to ensure that the supply of new workers adequately matches the local workforce demand.
- Conducting **disparity studies** to provide a legal basis for creating local policies that promote economic inclusion or set metrics for economic inclusion.¹²³
- Creating **project labor agreements**, workforce/community benefit agreements, and supplier diversity plans.¹²⁴
 - o For example, [Community Benefits Plans](#) are legal agreements that are typically negotiated with the project developer, who agrees to fund specific benefits for local communities, which can include workforce training and metrics on economic inclusion. These have been used and promoted by DOE, among many other entities.
- Right-size contracts to help labor organizations or businesses develop their capacity.
 - o Unbundling projects to create right-size contracts can make projects accessible to contractors with different capacities. This can enable Minority, Women, and Disadvantaged Business Enterprises (MWDBE) to compete with contractors of similar size and capacity rather than competing against larger contractors.
- Pursue a “supplier diversity” strategy. This is a business strategy that focuses on creating a more-inclusive base of minority business enterprises.
 - o There are several resources that can help identify these businesses, such as labor management organizations, state or jurisdiction supplier diversity listings, minority or ethnic business contractor business associations or chambers of commerce, and community action agency weatherization assistance program administrators.

¹²³ A disparity study assesses whether a government entity engages in exclusionary practices toward minority, women-owned, and disadvantaged business enterprises (MWDBE).

¹²⁴ [PLAs](#) are pre-hire collective bargaining agreements negotiated between construction unions and construction contractors that establish the terms and conditions of employment for construction projects. U.S. Department of Labor. Accessed February 22, 2024. “Project Labor Agreement Resource Guide.” dol.gov/general/good-jobs/project-labor-agreement-resource-guide.

Section 3 Actions and Best Practices

6. Create an easy-to-use program intake, participation, and support process.

Employ a one-stop shop approach that provides centralized outreach and communication, educational resources for both renters and owners, technical assistance and customer support, project management, and access to incentives and financing through a single entity. Structure the program so participants have a single, dedicated point of contact to guide them through the process. Ensure that the point of contact is sufficiently trained and has cultural competency.

→ Case studies:

- The Massachusetts [Low-Income Energy Affordability Network \(LEAN\)](#) multifamily program is notable as an integrated and well-coordinated one-stop shop program to serve owners and operators of low-income and affordable housing. The LEAN network includes CAAs, utilities, state agencies, and nonprofits. The program requires for-profit affordable housing owners to abide by an affordability period based on the level of incentives received. LEAN has served more than 220,000 residential dwelling units and delivered more than \$100 million in energy savings since its inception.
- In Wilmington, DE, [New Ecology](#) runs [Climate Smart Homes](#), which supports collaboration with development and community-based partners in the unsubsidized affordable housing sector to develop sustainable, high-performance housing for LMI households. The program also provides job training to develop the local workforce and organizes community-building activities. In coordination with existing efforts led by community groups and the city, Climate Smart Homes aims to take a comprehensive approach to building efficient homes in underserved communities.

→ Additional tools:

- For more information and additional case studies of energy efficiency programs that are scalable, replicable, and sustainable, please see the program profiles in EPA's "[Bringing the Benefits of Energy Efficiency and Renewable Energy to Low-Income Communities.](#)"
- For additional materials specifically covering outreach and engagement for multifamily buildings, please see [ACEEE's Multifamily Energy Savings Project](#), which has numerous resources that specifically cover [low-income and affordable multifamily programs](#).
- [This guide](#) from Innovate provides a step-by-step process for setting up a one-stop shop. While this organization is based in the United Kingdom, the information in the resource is still applicable for program administrators in the United States.

Provide a single, consolidated application that serves as an entry point to the program. Create a no wrong door approach with categorical eligibility based on a household or property's participation in other programs (e.g. the Supplemental Nutrition Assistance Program (SNAP), WAP, LIHTC, Section 8) and referrals provided to and from rental assistance programs, housing counseling, legal support, and utility incentive programs.¹²⁵ Avoid eligibility processes that are overly restrictive or onerous for applicants.

→ **Case studies:**

- The Philadelphia Energy Authority's [Built to Last](#) program is a one-stop shop that coordinates multiple agencies to provide services for low-income homeowners, including home repair, energy efficiency and solar upgrades, housing and health counseling, and legal services. The Built to Last program provides a single application, no wrong door approach to coordinating services and program eligibility across multiple agencies. Built to Last layers multiple funding sources including public, philanthropic, and microfinancing funds to provide comprehensive services to stabilize low-income homeowners in their homes, preventing displacement and preserving housing options for the future. For more information on this program, please see [this case study](#), part of [guidelines](#) for creating community-driven building retrofit programs assembled by the Building Electrification Institute (BEI), Elevate, and C40 Cities Climate Leadership Group.
- The [EnergySmart Program](#) in Boulder County, Colorado, offers energy efficiency and electrification upgrades for residents. The program pairs participants with energy advisors (a single point of contact) who can help identify the best upgrades and recommend contractors. The program also offers rebates, tax credits, and other financial incentives to make upgrades more affordable for participants.
- The [NYC Accelerator](#) program in New York City is structured so that, after attending an in-person event or contacting the program through its website, building owners and representatives are paired with an account manager, a single dedicated point of contact who helps the program user determine what local laws they must comply with, what local incentives and programs they are eligible for, and which efficiency and retrofit work may be good options for their building. For more information on this program, please see [this case study](#), part of [guidelines](#) for creating community-driven building retrofit programs assembled by the Building Electrification Institute (BEI), Elevate, and C40 Cities Climate Leadership Group.

¹²⁵ By "no wrong door," we mean that participants use one single application to enter the program and are referred by their point of contact in the program to services for which they are eligible.

7. Design program in coordination with partners.

Ensure that program elements coordinate with existing programs provided by utilities, nonprofits, and local and state agencies.

→ Case studies:

- Washington, DC, hired a local affordable housing nonprofit to engage a [roundtable of affordable housing owners](#) for recommendations on how to design BPS rules to make compliance feasible for affordable housing.
- [EmPOWER Maryland](#), the state's energy efficiency program, provides funds through different initiatives that reduce energy usage and promote the adoption of renewable energy. The program coordinates multiple utilities to offer financial incentives for residential and commercial customers. The Maryland Department of Housing and Community Development, the state's housing finance agency, runs the state's Limited Income Energy Efficiency Program under the EmPOWER umbrella, which provides energy efficiency services at no cost to low-income households.
- [LISC Massachusetts](#) and [New Ecology](#) provide a series of case studies for integrating energy efficiency work into the existing affordable housing sector's requirements and timeline. One example is [Atwood Acres](#), a 50-unit senior housing facility partially funded by HUD's Section 8 Program. This project exemplifies the seamless integration of green retrofitting into existing affordable housing timelines. After a quarter century, the building faced failing hot water and heating systems. To tackle these issues, the owners took advantage of the Massachusetts Green Retrofit Initiative (MAGRI), which offers comprehensive energy management services, ensuring the facility's upgrade aligns with efforts to enhance living conditions while maintaining affordability. Other related case studies include [Treehouse at Easthampton Meadow](#), [Nonantum Village Place Apartments](#).

Establish robust partnerships with CBOs, government agencies (including state and local housing finance agencies), utilities, renters' associations and renters' rights groups, finance and lending institutions, affordable housing experts, and other interested entities so program offerings are well coordinated.

→ Case studies:

- Minneapolis collaborated across the city's economic development and sustainability agencies on the [4d Program](#), a program to preserve housing and provide energy incentives. This program is administered jointly by the health and housing departments.
- The Boston Housing Authority worked with Ameresco, an energy savings performance contractor, on the [largest public housing energy efficiency retrofit project in U.S. history](#).

It reduced gas and water use by more than 30% and saved more than \$4.8 million in annual utility costs.

- King County, WA, formed a [Vulnerable Populations Action Team](#) to coordinate preventive public health work with CBOs.
- The [Weatherization Plus Health Program](#) in Washington State is a \$15 million initiative funded by the state legislature to weatherize low-income homes and enhance the residents' health with healthy-home interventions. This program, eligible for homes under WAP and LIHEAP, is designed to merge social services and health programs with existing weatherization efforts. The impact of this integration is twofold: It allows for the use of funds beyond the constraints of DOE regulations and fosters stronger community ties through partnerships with local healthcare providers and nonprofits, ultimately aiming to reduce health burdens.
- [Efficiency Works](#), an initiative operating in northern Colorado, sought to boost participation of its home retrofit initiative through targeted outreach and addressing one of the biggest barriers to initiative participation: consumer trust in contractors and contractor transparency. It is a partnership between a local utility provider and Fort Collins.

→ Additional Tools:

- [The Better Buildings Residential Network website](#) from DOE provides strategies developed to maintain strong strategic partnerships with trusted local companies and organizations as part of the Healthy Homes Incentive Program's goal to complete 100 home energy upgrade projects. There are additional useful case studies available in DOE's [partnership toolkit](#).

8. Prioritize the most energy insecure and disadvantaged LMI households to receive upgrades.¹²⁶

Target offerings to LMI households and ensure that multiple ownership structures and types of affordable housing (including both subsidized and unsubsidized) are eligible for program offerings, depending on community needs. Seek alignment with the affordable housing

¹²⁶ "Energy insecurity" is characterized by households falling behind on their energy bills, forgoing payment of other bills and necessities like food or medicine to keep the lights or heat on, or using risky strategies such as heating their homes with an oven or taking out a high-interest payday loan to pay for their energy needs. See: Stefen Samarripas and Andrea Lee. 2022. "One-Third of Tenants Behind on Utility Bills, Highlighting Need for Energy Upgrades." ACEEE Blog, August 17. [aceee.org/blog-post/2022/08/one-third-tenants-behind-utility-bills-highlighting-need-energy-upgrades](https://www.aceee.org/blog-post/2022/08/one-third-tenants-behind-utility-bills-highlighting-need-energy-upgrades).

sector's regulations and potential complementary funding sources (e.g. Low-Income Housing Tax Credit).

→ Case studies:

- [Efficiency Vermont](#), a statewide regulated energy efficiency utility, offers various programs, incentives, and rebates to encourage its customers to retrofit homes and buildings. The organization's Targeted High Use (THU) program incentivizes direct install of efficiency and electrification measures such as appliances, heat pumps, and heat pump water heaters to qualifying houses with high electricity use. This program is promoted to customers who are deemed likely to be income eligible, use 5,000 kWh per year or more, and have an energy burden greater than 6%.
- Washington, DC's [Housing Production Trust Fund](#) (HPTF) was launched in 1988 with the goal of producing affordable housing. The fund, which requires construction of buildings at or near net zero, has been structured to align with the District's LIHTCs, Housing Equity Report, Clean Energy Omnibus Act, and the Tenant Opportunity to Purchase Act. The [D.C. Sustainable Energy Utility](#) (DCSEU), in partnership with the District Department of Energy & Environment (DOEE) and the DC Green Bank, offers enhanced technical and financial assistance to owners and managers of qualifying affordable multifamily buildings that do not meet the District's BPS through the Affordable Housing Retrofit Accelerator.
- [Minneapolis](#) offers a robust package of incentives for rental property owners through the 4d Program to reduce property tax liability, improve energy efficiency and, if applicable, address needed repairs in aging buildings. The primary goal of the program is to preserve affordability, reduce energy use, and enhance healthy homes to support renters and strengthen the bottom line for property owners.

→ Additional tools:

- [This ACEEE](#) report focuses on policy approaches that yield equitable energy efficiency programs. It advises on how to effectively engage and serve residential customer populations that untargeted programs do not serve well.
- RMI's [Multifamily Affordable Housing Decarbonization Toolkit](#) explains various challenges facing multifamily affordable housing and includes useful programmatic recommendations. This is a toolkit that is being developed on an ongoing basis with input from workshops scheduled in the Spring and Summer of 2024.

9. Build accountability into the program.

Plan and budget for regular evaluation and adjustment to ensure the program is making enough progress toward goals.

→ Case studies:

- Rhode Island's [Energy Efficiency Working Group](#) is an example of how equitable community engagement can improve program evaluation. One of the group's initial meetings in 2021 focused on metrics and data collection. Members proposed benchmarking participant data by demographic categories and household energy characteristics, tracking late payments and shutoffs, and aligning energy efficiency program goals with public health goals. National Grid incorporated some of these recommendations into its 2022 Annual Plan.

→ Additional tools:

- This [DOE Handbook](#) provides information on program evaluation and data collection.

Establish processes for regularly reporting back to engaged communities for transparency and accountability.

→ Case studies:

- PUSH Buffalo's Green Development Zone emerged from a [Community Congress model of community-driven neighborhood planning](#). After winning a campaign targeting a New York State housing agency that was using its control of vacant houses and lots in Buffalo for financial speculation, residents won millions of dollars and laid the groundwork for a new local economy in Buffalo's Westside. PUSH and a range of partners grew these efforts into a 25-square block Green Development Zone that links green infrastructure, affordable housing, local food systems, and energy efficiency. In this example, resident leadership and capacity-building were key to building solutions that addressed the root causes of poverty and blight.
- Milwaukee developed a [Rental Rehabilitation Loan Program](#) in consultation with CBOs, small neighborhood developers, and lenders. It holds quarterly meetings with residents, neighborhood groups, community development corporations, churches, and local businesses to get feedback, listen to housing concerns, and address code compliance.

Establish community and/or workforce benefits agreements between the program and community members.

→ Case studies

- The Sabin Center at Columbia University has established a national [database](#) of Community Benefits Agreements (CBA), which are legally enforceable contracts between

developers and local communities or municipalities, aimed at balancing the impacts of significant infrastructure projects with benefits tailored to the community's needs. This resource accompanies a guide on best practices for CBAs, providing both monetary and non-monetary benefits to communities, while offering developers increased support and certainty in project approvals.

- In partnership with Emerald Cities San Francisco, [the Mission Housing Development Corporation](#) (MHDC) and its general contractor/construction manager committed to a Community Workforce Agreement for a deep energy efficiency project for affordable housing units owned by MHDC. Among their commitments, they agreed on a goal to hire residents from the buildings and ZIP codes in which the work was being performed, as well as disadvantaged residents from San Francisco, to perform at least one-third of the work hours on each project.
- Somerville, MA's Union Square [Community Benefits Agreement](#) pledges to prioritize local hiring for construction jobs, bolstering the economy and providing practical training opportunities through a local career and technical education program at the regional high school. Additionally, it offers relocation benefits to existing businesses, opportunities for new spaces in redevelopment, and a robust funding commitment to affordable housing, underlining a commitment to sustainable and inclusive growth.

→ Additional tools:

- DOE's [CBA Toolkit](#) includes a comprehensive guide, FAQs, and presentation slides to educate stakeholders on the value and process of CBAs. These agreements are strategic partnerships that provide communities with direct benefits like local hiring and economic contributions in return for supporting development projects, fostering mutual gains for developers, governments, and communities. This approach aligns the interests of all parties, ensuring that government officials and developers support community needs while also achieving their own objectives.
- The Department of Labor's Good Jobs Initiative offers a [Resource Guide](#) that introduces and compares Project Labor, Community Workforce, and Community Benefits Agreements.
- Emerald Cities Collaborative's "[Anatomy of an Effective Community Workforce Agreement](#)" provides a framework to bring innovation to the traditional Project Labor Agreement and to give life and meaning to a new social compact among a city, labor, and the community.

Provide for quality assurance/quality control (QA/QC) inspection, project wrap-up, and ongoing monitoring of finished projects.¹²⁷

→ Case studies:

- [Energy Outreach Colorado \(EOC\)](#) was created by the State of Colorado as an independent nonprofit one-stop shop for low-income energy services. All projects in the multifamily weatherization and nonprofit energy efficiency programs undergo oversight and onsite inspections. EOC also provides contractor training on requirements and standards and monitors bill savings to ensure programs are performing as expected and that benefits are reaching low-income households.

10. Ensure the program provides health and safety measures.

Incorporate upgrade offerings, such as mold and asbestos remediation, that improve resident health, safety, and comfort. Ensure program provides or engages existing pre-weatherization offerings to lower barriers to participation.

→ Case studies:

- Michigan's lead health services initiative with in-home environmental assessment was a [six-year initiative](#) to mitigate in-home health risks for [Children's Health Insurance Program](#)-eligible children. The initiative removed lead hazards from paint, dust, plumbing fixtures, and soil.
- In Florida, the [St. John's Housing Partnership](#) offers repair services for single-family homeowners. By covering the upfront costs and easing the burden of underlying repairs, the partnership increases participation in its energy efficiency program (including comprehensive upgrades and direct installation).
- The Connecticut Department of Energy & Environmental Protection (DEEP) runs the [Weatherization Barrier Remediation Program](#) to assist households that are deferred from WAP. Using funding from multiple sources, including the American Rescue Plan Act and the State Energy Program, the program aims to address health issues like mold and asbestos to prepare income-eligible households for weatherization.
- In Denver, the [Energy Outreach Colorado's](#) Healthy Homes Program provides free energy efficiency improvements to improve indoor air quality for income-qualified Denver residents living with breathing conditions. For more information on this program, please see [this case study](#), part of [guidelines](#) for creating community-driven building retrofit

¹²⁷ This practice encourages building upgrade work that is high in quality rather than just low in price.

programs assembled by the Building Electrification Institute (BEI), Elevate, and C40 Cities Climate Leadership Group.

- [Rhode Island Progreso Latino](#) seeks to improve health and socioeconomic progress for Latino and immigrant communities in Rhode Island. The organization has used funding from a Preventive Health and Health Services block grant to operate a [wellness clinic for underserved residents](#).

→ Additional Tools:

- [This manual](#) from the CDC is a comprehensive guide to understanding multiple aspects of a healthy home. It also discusses the history of affordable housing in the United States.

Require that service providers use healthier building materials that minimize harm to manufacturers, installers, and building occupants and use best practices for ventilation and promoting indoor air quality.

→ Case studies:

- New York City requires developers of affordable housing to comply with the [Enterprise Green Communities Criteria](#). Under these guidelines, developers must avoid formaldehyde-based insulation and are incentivized to avoid two-part spray polyurethane foam and board insulation with halogenated flame retardants.
- The [Association for Energy Affordability](#) (AEA), the implementer of California's Low Income Weatherization Multi-Family component (LIWP-MF) has technical specifications that require formaldehyde-free blown insulation and fiberglass batt insulation, unfaced fiberglass batts for several applications instead of faced batts (which may contain unhealthy chemicals), and low volatile organic compounds (VOC) water-based duct mastic for duct sealing.
- [Efficiency Vermont](#) worked with Vermont's WAP to improve healthy housing for low-income residents. Interventions included whole-home weatherization, advanced ventilation, and appliance replacements. These "energy-plus-health" upgrades aimed to improve indoor air quality while reducing residents' energy burdens.
- The City of Fort Collins, CO, runs a [Healthy Homes Program](#) that aims to improve indoor air quality for Fort Collins residents. The program offers free home assessments to help residents address hazards like radon, particulate matter, and asbestos.

11. Ensure the program streamlines how users access funding.

To fill funding gaps, leverage and layer a variety of funding sources in addition to the primary program funding source (e.g. government, philanthropic, utility, private, tax credits).

→ Case studies:

- Montgomery County, MD, and Washington, DC, both created green banks to finance clean energy projects. The State of Massachusetts [recently launched a green bank](#) based within its state housing finance agency.
- The [Efficiency Navigator](#) in Middleton and Madison, WI, focuses on small- and medium-sized multifamily housing, seeking to promote affordability, equity, resilience, and efficiency. This program provides a strong example of an equity- and climate-focused fund braiding strategy for affordable multifamily housing. The program's success is a function of its effective fund-braiding strategy; it used a combination of philanthropic, federal, state, nonprofit, and utility funding (a total of nine discrete funding sources) to cover research, administrative, and improvement costs. By leveraging an array of funding sources, program designers were able to maximize reach and effectiveness, funding more than \$195,000 in building improvements and saving an average of \$300–500 in energy costs per building annually. For more information on this program, please see [this case study](#), part of [guidelines](#) for creating community-driven building retrofit programs assembled by the Building Electrification Institute (BEI), Elevate, and C40 Cities Climate Leadership Group.
- The Rhode Island [Green and Healthy Homes Initiative](#) uses Lead Hazard Control grant funding to provide a range of healthy housing services. Funds have helped repair homes to reduce weatherization deferrals.
- In Philadelphia, the [Built to Last](#) program uses a partnership between the Philadelphia Energy Authority (PEA) and Philadelphia Green Capital Corp (PGCC) to help identify and close funding gaps through layering and streamlining existing fundings sources and services. For more information on this program, please see [this case study](#), part of [guidelines](#) for creating community-driven building retrofit programs assembled by the Building Electrification Institute (BEI), Elevate, and C40 Cities Climate Leadership Group.

→ Additional tools:

- [This guidebook](#) from C40 was developed to help mayors and their staff understand the climate provisions included in the IRA and opportunities for local governments. The guidebook details the major programs that fund local government directly, those available to CBOs, programs administered through states, and the consumer and business tax credits. For each, it describes what the funding can be used for, how it will flow, and the process and timeline for accessing resources.

Provide a menu of available financing options and explain them transparently to program users.

→ Additional tools:

- The [EPA Clean Energy Financing Toolkit](#) is intended to help decision makers understand the basics of a range of financing programs across multiple sectors, view examples from state and local jurisdictions, and access additional resources to learn more.
- To determine financing options and answer funding-related questions, program administrators can use or direct program users to consult various available tools, including the [AFFORD](#) tool (for finding a comprehensive listing of available funding sources), [EWG Funding Opportunities](#), ENERGY STAR's [Home Improvement Savings finder](#), and R2E2's [guides to funding sources and federal funding FAQs](#), which includes resources on federal efficiency and electrification rebates, HUD's Green and Resilient Retrofit Program (GRRP), and answers to frequently asked questions about various federal funding sources. Program administrators may also use RMI's [Green Upgrade Calculator](#) to help program users understand the potential impacts of different decarbonization approaches.

Cover a large share (at least 75–80%), if not all of the total upfront cost of scopes of work.

→ Case studies:

- In Seattle, the [Multifamily Weatherization Program](#) provides energy grants that can cover up to 90% of project costs. Seattle's Office of Housing provides project management services at no cost, but to be eligible, building owners must commit to keeping rents affordable for at least three years and at least half of tenants must meet income qualifications.
- Participants of [Energize Connecticut's Multifamily Initiative](#) earn incentives if they upgrade at least two measures from different end uses. Market-rate properties are eligible for incentives that cover up to 75% of the project cost, while income-eligible properties can receive up to 90% of costs in incentives.

Maximize the use of non-debt funding over debt for the program's work. When using loans, make no-cost, low-cost, or forgivable loans available.

→ Case studies:

- The [Multifamily Energy Efficiency and Housing Affordability](#) (MEEHA) program is administered by Maryland's Department of Housing and Community Development (DHCD). One of the keys to MEEHA's success is its flexibility to structure project funding as loans or grants. Many participants must receive the funding as a loan or as a grant based on their tax liability (nonprofit versus for-profit) or existing outstanding project

debt. Without this flexibility in financing structure, many properties would not be able to participate in the program. This flexibility makes more properties eligible and allows the inclusion of MEEHA funding in more complex financing structures, as typically seen in LIHTC projects that DHCD finances.

Ensure financing options do not burden low-income households, include financing options for participants with low or no credit scores, and have proper consumer protections in place.

→ **Case studies:**

- The [Philadelphia Housing Development Corporation's Rental Improvement Fund](#) in Philadelphia gives rental property owners who own fewer than 15 units the opportunity to carry out necessary repairs on aging units while also preventing rent spikes. The fund offers two different forgivable loan options to eligible landlords: a 10-year loan worth \$10,000–24,999 per property and a 15-year 0% interest loan worth \$25,000–50,000 per property. The maximum loan amount for a single rental property owner is \$100,000. The loan can be used for essential home repairs that address habitability, health, and safety concerns and energy or water efficiency upgrades.
- California's [LIWP](#) offers a flexible incentive structure to help overcome split incentives and reduce upfront costs for homeowners, renters, and property owners while still rewarding comprehensive upgrades. LIWP also requires owners to abide by a 10-year low-income eligibility requirement from the date of receiving incentives.

Include supplemental funding sources to pay for needed structural, electrical, plumbing, and other health and safety repairs that pose barriers to participation.

→ **Case studies:**

- Pennsylvania's [Whole-Home Repair Program](#) provides grants up to \$50,000 per home or unit to fund work that addresses habitability concerns, improves energy or water efficiency, or makes units accessible for individuals with disabilities.
- [Energy Outreach Colorado](#) (EOC) implements Xcel Energy's low-income programs. EOC leverages funds from utility rebates, government funding, and donor funds to address health and safety and other needed repairs and measures. Xcel Energy provides \$275,000 in utility funds per year to address health and safety threats tied to energy savings, such as boiler and furnace tune-ups, replacements, and water heater replacements.
- Austin Energy, the municipal electric utility in Austin, TX, works in collaboration with the City of Austin Neighborhood Housing Program, the Green and Healthy Home Initiative, and local housing repair coalition nonprofits in a referral network. This network provides structural and roofing repairs to low-income customers, and Austin Energy's [WAP](#) provides the weatherization components.

- [LEAN](#) in Massachusetts is a network of community action agencies, public and private housing owners, government organizations and public utilities that work together to provide low-income efficiency solutions in the state. These agencies work alongside utilities to administer energy efficiency programs. CAP agencies leverage additional funding from DOE and DHCD for heating systems and health and safety repairs. Community action programs (CAP) leverage utility funds and WAP funds for repairs of health and safety measures such as knob and tube removal, asbestos removal, combustion safety, mold and moisture remediation, roof repair, pest remediation and others.
- In Denver, [the Building Electrification Incentive Program and Healthy Homes Pilot](#) both help building owners connect with additional local, utility, and federal funding sources to cover the costs of building upgrades. This case study is part of [guidelines](#) for creating community-driven building retrofit programs assembled by the Building Electrification Institute (BEI), Elevate, and C40 Cities Climate Leadership Group.

→ Additional tools:

- DOE's [Financing Program Implementation Primer](#) provides an overview of key considerations for state and local policymakers, utility energy efficiency program administrators, and program partners such as financial institutions and contractors in designing and implementing successful energy efficiency financing programs for existing buildings in the residential and commercial sectors.

If possible, cover the full cost of replacing failing or unsafe appliances.

→ Case studies:

- Massachusetts' [LEAN](#) has recently expanded its criteria to include electrification upgrades, such as space heating and hot water system replacements, insulation and air sealing, lighting and appliance retrofits, water efficiency measures, appliance replacement, and other energy-saving measures that meet the cost-effectiveness criteria.
- Boston's [Healthy and Green Retrofit pilot program](#) creates a custom green retrofit plan for participants' buildings, which includes replacing appliances. To do this work, building owners may receive up to \$50,000 per unit, assistance accessing energy efficiency financial incentives, construction management services including bidding and hiring a general contractor, and construction oversight and inspections throughout the process.

12. Ensure the program helps build out a local green workforce.

Compile a list of workforce certifications and credentials (e.g., OSHA-30, BPI Energy Auditor) that program service providers must have.

→ Case studies:

- The [NYSERDA Andromeda Community Initiative](#) in New York trains and certifies workers from underserved communities to become entry-level construction workers with a focus on skills in energy-efficient building operations and maintenance, weatherization, and carbon emissions reduction. The seven-week training program includes classroom work and hands-on projects that allow students to gain experience and earn certifications that prepare them for a wide range of green jobs upon graduation from the program.
- [The California Advanced Lighting Controls Training Program](#) (CALCTP) is a partnership among the California utilities, the International Brotherhood of Electrical Workers (IBEW), and industry partners. Licensed electricians are eligible to participate in CALCTP, which certifies workers to install and conduct inspections on advanced lighting control systems. Several thousand workers statewide have attained the certification, which is required for state building code inspections and for utility-administered, ratepayer-funded commercial lighting projects.¹²⁸

→ Additional tools:

- To support the development of a robust building systems workforce, DOE recognizes [training and certification programs](#) that are aligned with DOE goals. Programs recognized as Energy Skilled cover key occupations and knowledge areas relevant to DOE's mission.

Provide resources for potential job candidates in the community regarding existing training programs.

→ Case studies:

- DCSEU's [workforce development program](#) in Washington, DC, connects District residents to five-month paid green job externships with local organizations. Participants work with mentors, access energy efficiency training and credentials, gain job and soft skill development, and receive job placement support.

¹²⁸ Stackable credentials are an interlocking series of credentials that demonstrate a worker has accomplished a greater specificity of skills within a particular trade. They are often designed to be achieved sequentially and "stack" on top of broad occupation-wide credentials or licenses, such as an electrician's license. Training current workers to receive stackable credentials equips them with demonstrable skills needed to advance in their career and provides employers with skills necessary to construct, install, and maintain clean energy and energy efficiency technologies.

- [Building Futures](#), a workforce partnership program in Providence, RI, helps people with low incomes attain careers in the commercial construction industry through a registered apprenticeship system.

→ **Additional Tools:**

- This [Career Map](#) from the Building Innovation Hub is designed for a broad audience, including educators, career advisors, job seekers, employers, policymakers, and workforce professionals, with the goal of inspiring the next generation to enter the building performance industry. The map demonstrates the breadth of the green buildings industry, some of its critical occupations, and the multitude of advancement routes between jobs and sectors.

Through program offerings and partnerships, identify barriers to building a diverse workforce and deploy strategies to hire local underrepresented groups into good-paying local jobs. Track the creation of these jobs.

→ **Case studies:**

- [Red Cloud Renewables](#) is an Oglala Lakota-led organization on the Pine Ridge Reservation that provides free, place-based workforce development opportunities for Native Americans. It is a pre-apprenticeship readiness program that includes training on how to perform energy assessments and complete retrofit projects, while focusing on home safety and occupant health measures. It has successfully worked with more than 70 tribes since 2002 and has created more than 600 jobs in weatherization, solar installation, and sustainable home building.
- [NYSERDA Pay for Success Clean Energy Training](#) is an energy efficiency job training program targeted toward low-wage workers, youth, and unemployed individuals. Funding came from the Social Impact Partnerships to Pay for Results Act.
- In 2018, the Mayor's Office of Nashville, TN, announced the launch of the [NES Home Energy Uplift \(HEU\) Program](#), a weatherization program for limited-income homeowners in Davidson County. The program was created through a collaboration with Nashville Electric Service (NES) and the Tennessee Valley Authority (TVA) and receives funding from the TVA and the Federal Home Loan Bank of Cincinnati. The City of Nashville was awarded a \$300,000 grant from the Southeast Sustainable Communities Fund (SSCF) to create an energy efficiency workforce training program at the Nashville Career Advancement Center (NCAC). The program addressed the need for retrofit technicians for the Home Energy Uplift Program, while providing low-income or unemployed/underemployed Nashville residents with training, industry-recognized certification, and career pathways in the energy efficiency sector.

- [LISC Boston](#) offers Financial Opportunity Centers that provide employment, career counseling, and one-on-one financial coaching, and help participants learn about building credit, savings, and assets. LISC Boston's workforce development offerings also include the Bridges to Career Opportunities program, which helps students fill critical education gaps related to math and literacy, and the Bridges to Green Jobs program, a two-week training program designed to prepare residents of Greater Roxbury for entry-level weatherization technician positions.

→ **Additional tools:**

- [This report](#) from the National Association of State Energy Officials (NASEO) provides useful data and background for building diversity into the U.S. energy workforce.
- The American Council on Renewable Energy's (ACORE) [Accelerate Membership Program](#) is a cohort-based program that supports women and minority-led renewable energy companies by connecting them to resources, including complimentary access to events, exclusive briefings, tools, and advocacy.

Identify product suppliers from underrepresented groups and incorporate them into program offerings.

→ **Case studies:**

- [The RENEW program](#), led by Emerald Cities Collaborative, brought together the community, representatives from organized labor, and the City of San Francisco to implement building upgrades. These stakeholders crafted a community workforce agreement that included requirements for apprenticeship utilization and the employment of minority- and women-owned business enterprises. The program also provided energy savings to residents of affordable housing units and good-paying union jobs. This project demonstrated several actionable ways to engage residents, such as having representatives of the community at the negotiating table, using a facilitator to effectively communicate the needs of a community, and increasing supplier diversity, achieved through a partnership.

→ **Additional tools:**

- Emerald Cities Collaborative and PolicyLink created a [comprehensive guide](#) to procurement and contracting called "Inclusive Procurement and Contracting: Building a Field of Policy and Practice." This guide details specific strategies to increase participation of small MWBEs.
- ACEEE has identified local governments that have inclusive contracting policies and/or energy workforce development programs, several of them equity focused. [This brief](#) provides a review of current city efforts, an overview of policy options, and case studies

of programs from Orlando, FL, and Chattanooga, TN, that can serve as examples for other cities to adopt.

Provide or link to opportunities for upskilling, credentialing, and certification for the existing workforce.

→ **Case studies:**

- The [DC Sustainability Energy Utility](#) in Washington, DC, offers DC residents 5-month paid externships working in green industries. More than 85% of participants in the program move on to full-time positions, creating a larger workforce to help with future energy efficiency activities.

Provide education to contractors in related trades on the benefits of adding efficiency and electrification work to their current services.

→ **Case studies:**

- In California, the Technology and Equipment for Clean Heating Program (known as [TECH Clean California](#)) included training for contractors on integrating electrification into their services, as well as ongoing business model support to help contractors re-tool their businesses to integrate electrification.

Encourage program service providers to pay prevailing wages where not already required.¹²⁹

→ **Case studies:**

- NYSERDA's [Green Careers and Training](#) resource highlights case studies from New York's clean energy transition, which is creating thousands of new jobs across a range of sectors in the clean energy economy.
- The Midwest Economic Policy Institute's [analysis of peer-reviewed research and its study on Minnesota's prevailing wage law](#) demonstrates that construction cost is not impacted by prevailing wage standards.
- The Portland Clean Energy Community Benefits Fund ([PCEF](#)) in Portland, OR, upholds workforce and contractor equity standards for projects receiving funding. By law, payments for work funded by PCEF must be at least 180% of the relevant state minimum wage. PCEF's wage requirement applies to workers paid by the grantee and by contractors and subcontractors of the project, including office staff. For projects with construction budgets (hard and soft costs) that include PCEF funds of at least \$350,000

¹²⁹ The prevailing wage rate is defined as the average wage paid to similarly employed workers in a specific occupation. For more information on prevailing wages, see the Department of Labor's (DOL) [Prevailing Wage Resources](#) page.

at a single site there is an additional requirement of prevailing wage payment to workers in trades for which a prevailing wage is defined, excluding projects with privately owned, predominantly affordable residential housing construction.

Provide support and help contractors bring on apprentices to create long-term career pathways in building upgrades.

→ Case studies:

- The Boston Housing Authority (BHA) facilitated a [PLA](#) that created approximately 600 jobs for local union workers and public housing and low-income city residents and helped establish the Building Pathways Program, a free, six-week pre-apprenticeship program aimed at connecting those underrepresented in the construction industry with opportunities in the building trades.
- The San Francisco Public Utility Commission in San Francisco established the [Contractor's Assistance Center](#), where contractors can gain access to information about projects and the technical and financial resources needed to compete for subcontracts.

Provide training to service providers on the impact of quality processes and practices on long-term building performance.

→ Case studies:

- Emerald Cities Collaborative's [E-Contractor Academy](#) is a seven-week training program where women- and minority-owned business enterprise contractors learn to perform energy efficiency and renewable energy retrofit projects. The program typically involves a collaboration between a local or regional government entity and a local financial institution. Participating contractors learn about the regulatory and technical demands of green infrastructure projects. They also learn to bid and manage large-scale projects that include labor and community workforce standards typical of government, schools, hospitals and other institutions. Training is tailored to specific projects and is also applicable to large-scale green infrastructure projects. The E-Contractor Academy includes a strategic, comprehensive business support program to ensure that small and minority firms are in the forefront of the emerging green building/construction industry.
- The Center for Energy and Environment (CEE) [offers paid training](#) to join the clean energy and energy efficiency sector. The program prioritizes training people of color and women from communities across the Twin Cities that have been underrepresented in the industry. Past graduates have gone on to work as energy auditors, insulation installers, line workers, and contractors.

→ Additional tools:

- [Zero Energy Now](#) program contractors are certified by the Building Performance Institute (BPI), National Home Performance with ENERGY STAR Partners, and members of the Building Performance Professionals Association of Vermont (BPPA-VT).
- DOE has [collected resources, case studies, and other materials](#) to help identify solutions to address workforce needs. They are organized according to the focus areas identified for the Better Buildings Workforce Accelerator.



Conclusion

While building energy upgrade programs look very different around the country—based on the local geography, building typologies, available funding resources, and administrative structures—there are many examples of existing programs that are already employing best-practice strategies to accelerate equitable building decarbonization.

As discussed throughout this Playbook, with new funding available for building decarbonization, equitable building energy upgrade programs can address persistent inequities and lead to healthier and more affordable housing, reduced energy burdens, opportunities for local economic development, and reduced emissions across the country.

R2E2 will update this resource as new and innovative approaches develop across the country. Our work aims to spur a national movement that prioritizes energy efficiency investments for those most in need. By doing so, we hope to help transform the housing sector and energy efficiency building upgrade markets.

If you would like additional information about any of the strategies discussed in this resource, have questions related to the Playbook, or would otherwise like to get in touch, please contact our initiative at our [“Stay Informed”](#) page.

About Residential Retrofits for Energy Equity (R2E2)

R2E2 is a partnership of the American Council for an Energy-Efficient Economy (ACEEE), Elevate, Emerald Cities Collaborative, and HR&A Advisors. R2E2 provides technical assistance to state and local governments, community-based organizations, and other entities to jumpstart energy retrofit programs for both single-family and multifamily low- to moderate-income housing (“LMI” housing), especially in disadvantaged and frontline communities.

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