A Guidebook on Equitable Clean Energy Program Design for Local Governments and Partners

USDN | urban sustainability directors network

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Introduction

Local governments and equity in clean energy

The growing wealth disparity between low- and moderate-income (LMI) households and other underserved groups and those with greater affluence is reflected through the disproportionate uptake of clean technologies by higher-income households in U.S. and Canadian municipalities. These households lack access to clean energy technologies because of a variety of barriers, including affordability, high up-front costs, access to credit, split incentives between landlords and tenants, outreach and awareness, and other programmatic barriers. These trends raise concerns of a growing "electrical divide" where differing abilities to adopt new clean energy technologies could further disadvantage communities.[1]

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1   Caperton, Richard W., and Mari Hernandez. The Electrical Divide: New Energy Technologies and Avoiding an Electric Service Gap. Center for American Progress. July 2013.

Inequity within communities is exacerbated by additional factors beyond income, including race, ethnicity, citizenship, ability, age, and fluency with the dominant language. This guide focuses primarily on economic inequity as a key limitation to household access to clean energy, while also underscoring that equitable program design must recognize and address social and racial inequities. Throughout North America, inequity and inequality have a direct relationship with race and indigenous communities.[2, 3] Persistent structural and institutional racism through government policies, the legal system, and formal and informal practices have posed barriers for communities of color, immigrant communities, and indigenous communities. These groups have historically faced limited access to resources and a disproportionate share of environmental and economic burdens.[4] Reversing both income and electrical divides will require local governments and their partners to examine the intersections of class and race within their contexts, and acknowledge and address structural and institutional racism and other barriers.[5]

To counteract these disparities, this guidebook introduces a process and principles that local governments and their partners can use to design equitable clean energy programs in their communities. When equity is approached intentionally, municipalities and their partners can create programs that prioritize making clean energy technologies accessible and beneficial to LMI households. Centering equity in clean energy program design and planning is critical to building a just transformation to a clean energy future.

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2   There are many different terms for tribal/indigenous communities in the U.S. and Canada, including, but not limited to Native Tribe, Native Nation, Native American, American Indian, Indigenous Peoples, First Nations, First Peoples, and Aboriginal Peoples. To be as inclusive and consistent as possible, this guide uses the term indigenous communities.

3   Park, Angela. Equity in Sustainability, p. 4. USDN. September 2014.

4   Yuen, Tina, et al. Guide to Equitable, Community-Driven Climate Preparedness Planning, pp. 14–16. USDN. May 2017.

5   For a more extensive discussion of structural and institutional racism and its intersection with climate and energy planning, please refer to pp. 14–20 of USDN's Guide to Equitable, Community-Driven Climate Preparedness Planning.
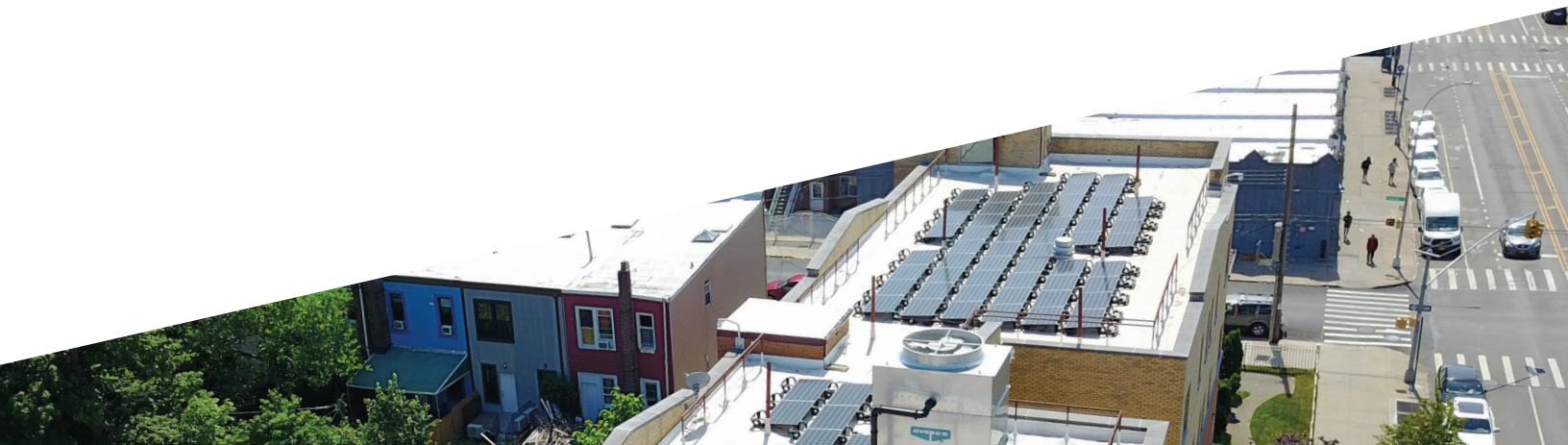
About USDN

The Urban Sustainability Directors Network (USDN) is "a peer-to-peer network of local government professionals from communities across the United States and Canada dedicated to creating a healthier environment, economic prosperity, and increased social equity." The network helps sustainability staff to collaborate and share best practices.[6]

About this guide

This guide supports local governments and their partners to intentionally design programs that enable current and emerging clean energy technologies to be accessed equitably. It begins with the understanding of a few limitations—municipalities cannot tackle inequality on their own, and often play a limited role in the planning and implementing of energy systems. However, they can orient their resources to help ensure that less wealthy households—both renters and homeowners—can access the benefits of clean energy technologies. The guide also posits that recognizing structural and institutional racism toward communities of color and indigenous communities as a root cause of inequity is critical to the design of equitable clean energy programs. Given the breadth of clean energy technologies and program models covered, this guide highlights and points to existing in-depth resources for further information on the key ideas introduced and discussed within. Local governments are described as the main actor throughout, but the information and steps within can also be guided by their partners. Additional information on the roles that local government can play in influencing and shaping their energy system is available in *Pathways to 100: An Energy Supply Transformation Primer for Cities.*[7]

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6   USDN homepage. 2018.
7   Meister Consultants Group on behalf of the Kresge, Energy, and Summit Foundations. Pathways to 100: An Energy Supply Transformation Primer for Cities. 2017.

Clean energy technologies

Many communities in the United States and Canada have declared their commitment to transition to clean energy by establishing ambitious greenhouse gas and clean energy targets.[8,9,10] Achieving the transition to carbon neutrality will require adoption of a suite of new technologies at the household level and at a community scale. This guide focuses on strategies to create equitable access for LMI households to a set of clean electrical, thermal, and vehicle technologies. These focal technologies were selected by a core group of seven USDN cities and are also aligned with the USDN's high impact practices in energy supply, transportation electrification, and energy demand in existing buildings.[11] The focal technologies are described in greater detail in Stage 2—Program Structure. They include rooftop solar photovoltaics (PV), solar+storage, air source heat pumps (ASHPs), and electric vehicles (EVs).[12]

Box 1: Four Dimensions of Equity

The guide uses the USDN definition of equity, which includes four components for sustainability planning, decision making, and program and policy design.[13] These four aspects of equity are often overlapping. Depending on the clean energy technology, program, and community context, different aspects of equity are emphasized. This guide focuses especially on procedural equity and distributional equity. The definition is:

- **Procedural (Inclusion):** inclusive, accessible, authentic engagement and representation in the process to develop or implement programs or policies.

- **Distributional (Access):** programs and policies result in fair distributions of benefits and burdens across all segments of a community, prioritizing those with highest need.

- **Structural:** decision-makers institutionalize accountability; decisions are made with a recognition of the historical, cultural, and institutional dynamics and structures that have routinely advantaged privileged groups in society and resulted in chronic, cumulative disadvantage for subordinated groups.

- **Transgenerational:** decisions consider generational impacts and do not result in unfair burdens on future generations.

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8   For communities in Canada, see the Community Energy Implementation Framework.
9   C40 and ARUP. Global Aggregation of City Climate Targets. NYC Climate Week. 2014.
10   For more recent commitments, see the "We Are Still in Campaign" which includes 261 U.S. municipalities and counties' commitment to the Paris Accords.
11   USDN. Catalyzing Sustainability Impact: A City-Led Process to Invest in High Impact Practices. 2018.
12   For the purposes of this guide, EVs are explored primarily from the perspective of personal vehicles, car-sharing servings, and in terms of charging infrastructure for personal vehicles, rather than for public transportation.
13   Park, Angela. An Equity Scan of Local Government Sustainability Programs, p.5. USDN. September 2014.

Box 2: Structural and Institutional Racism

Critical to designing equitable clean energy programs is recognizing that structural and institutional racism toward communities of color and indigenous communities are root causes of inequity. These terms are defined as:

- **Institutional racism** is discriminatory treatment, unfair policies, and inequitable opportunities and impacts based on race that are produced and maintained by institutions. Individuals, with their own personal assumptions about race, take on the power of the institution when they act in ways that advantage and disadvantage people based on race.

- **Structural racism** is defined as the system of institutions that interact with one another to generate and reinforce racial inequities. Structural racism normalizes and reinforces existing dynamics that routinely advantage white people, while producing cumulative and chronic adverse outcomes for people of color.[14]

This guide focuses primarily on economic inequity as a key limitation to household access to clean energy, while also underscoring that equitable program design must recognize and address social and racial inequities. Further information on social inequities and the role of government is available in USDN's *Guide to Equitable, Community-Driven Climate Preparedness Planning.*[15]

Guiding equity principles

This guide introduces 12 key principles of equitable clean energy program design for LMI households, both renters and homeowners.[16] These cross-cutting concepts should be front of mind for local governments and their partners throughout the program design process and implementation. There is not one pathway or a specific formula for making a clean energy program equitable, but adhering to these principles will support better outcomes for municipalities and the communities they serve.

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14   Definitions are drawn from the USDN's Guide to Equitable, Community-Driven Climate Preparedness Planning, p. 14.

15   Yuen, Tina, et al. Guide to Equitable, Community-Driven Climate Preparedness Planning, pp. 14–20. USDN. May 2017.

16   In the case of programs targeting renters, an important audience for these programs is also multifamily property owners and managers who can use well-designed programs to share clean energy benefits with tenants.

Box 3: Principles of Equitable Clean Energy Program Design

As local government staff and their partners pursue the design and implementation of equity-oriented clean energy programs for homeowners and renters, there are 12 cross-cutting principles to uphold throughout the process. At the outset, **local governments should review their internal capacity and understanding of equity and inclusion.** They should map available resources and work to fill gaps before pursuing program design work. The 12 principles are:

1. **Listen and respond**
   Local governments should first listen to the communities they seek to serve. Program design should be as responsive as possible to the needs expressed by community members, and local government staff should be transparent about their resources. Ideally, this would build from preexisting community connections and engagement, and help define program goals.

2. **Partner with trusted community organizations**
   Local governments should work with community organizations to design and deliver programs, and where applicable, help build the capacity of community organizations through the partnership.

3. **Recognize structural racism**
   Programs targeting LMI households will not necessarily serve all disadvantaged populations. Racial analysis and baseline data must be part of an inclusive program design process to understand and address structural barriers that exist beyond income.

4. **Efficiency first**
   Programs should ensure LMI households can access energy efficiency benefits as a key step to reducing energy burdens and increasing household health and comfort.

5. **Reduce financial burdens**
   Programs should not add financial burdens for LMI households and should aim to reduce financial and other burdens.

6. **Increase benefits**
   Programs should seek to deliver services beyond clean energy technologies and capitalize on co-benefits, such as job creation or community resilience for people of color, indigenous communities, and other historically underserved and underrepresented populations.

7. **Make it easy**
   Program participation should be as easy as possible for any household with effective, efficient, and culturally competent program design, outreach, and delivery.

8. **Integrate with other services**
Wherever possible, programs should align with other services for LMI households.

9. **Protect consumers and workers**
Programs should have carefully considered consumer and workforce protection elements and consumer education to avoid unintended consequences.

10. **Beyond carve-outs**
Programs should do more than set aside a small portion of benefits for LMI households, and where possible, center the needs of LMI households and other historically underserved communities in program design and delivery.

11. **Track progress**
Programs should establish and assess against baseline equity data —both quantitative and qualitative —to inform program design, establish metrics, and track progress.

12. **Long-term commitment**
Programs should provide support for LMI households beyond installing a clean energy technology, and include structures for helping with technology service, upkeep, and repair.

Using this guide

This guide serves as a road map for local governments and partners to design equitable clean energy programs, thereby furthering their local climate action and equity goals. The remainder of this guide walks through the core steps to designing and executing equitable clean energy programs. These steps fall into three main stages: (1) program design process, (2) program structure, and (3) program implementation and evaluation. Relevant resources and tools accompany each section. Key steps within each stage are highlighted, and although they are presented sequentially, local governments and partners should note that program design is an iterative process. They may find a different order for working on steps that better supports their context and needs. The sequence of these stages is illustrated following this list in Figure 1 and emphasizes the iterative nature of the process.

Stage 1—Program Design Process

☐ **Assemble the team** who will help organize and plan for the clean energy program

☐ Build internal **team alignment** and a shared understanding of equity

☐ Define **equity, goals, and desired outcomes** for engagement and program design from the local government perspective

☐ Gather and assess **baseline data** to inform community outreach and program design

☐ Listen to understand **community goals and existing initiatives**

☐ Partner with **experienced and trusted community organizations** for engagement

☐ Select and deploy **appropriate modes of engagement** and minimize the burden of participation

☐ Communicate about equity and clean energy with **tailored messages** that resonate

Stage 2—Program Structure

☐ Refine the **sustainability and equity goals** the program will seek to achieve

☐ Define **program eligibility** and who the program will serve

☐ Consider the **contextual factors** that need to be part of the program design

☐ Select the **clean energy technologies** that will be included in the program

☐ Recruit key **program partners** needed to make the program successful

☐ Choose an appropriate **financing mechanism**—or several combined—to use in the program

☐ Identify sustainable **sources for program funding**

☐ Determine the **program administrator**, which could be the local government or a partner

☐ Map out **customer interaction and access** to the program's resources

☐ Build equity into the supply chain via **workforce development and procurement**

☐ Establish **consumer protection measures** to protect LMI households from potential harms

Stage 3—Program Implementation and Evaluation

☐ Develop a **program implementation timeline**

☐ Determine **roles and responsibilities** for implementation

☐ Recruit **program participants** and administer the program

☐ Conduct **program monitoring and evaluation**

☐ Develop **long-term steps** for the program's continuation

Figure 1: Sample Timeline for Program Design

STAGE 1— Program Design Process

Prepare the team internally

Engage with the community

STAGE 2— Program Structure

Structure the program

STAGE 3— Program Implementation and Evaluation

Implement the program

Evaluate the program
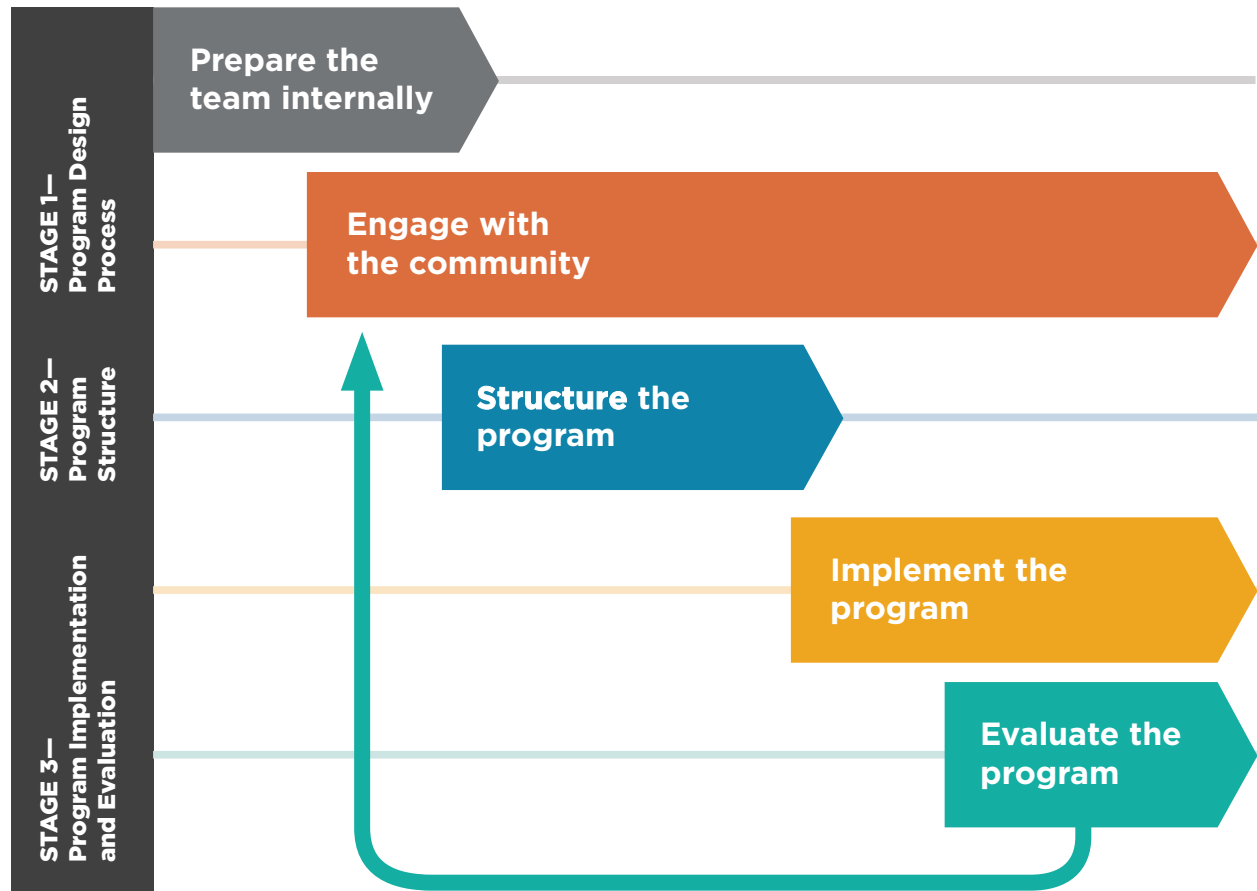
Stage 1—Program Design Process

Preparing for equitable clean energy programs

Local governments should begin by understanding and defining their equity goals internally to lay the groundwork for a successful program design process. These steps include assembling and training a program team, coalescing around the municipality's initial goals for the program, and assessing data to identify a baseline and potential metrics. Some municipalities may already have completed Stage 1 steps or may have other planning processes that can provide a foundation. For municipalities who have not had internal equity discussions, the following steps offer a pathway to begin.

Assemble the team who will help organize and plan the clean energy program

Municipalities should assemble an internal team with a shared understanding and commitment to equity, content knowledge around clean energy, and influence to execute. This team should start with government staff and could also extend to other key external stakeholders, such as utility and nonprofit partners, where early engagement is important. Mapping internal stakeholders into these three categories can illuminate who may compose an effective team. It is not necessary that every member of the team possess all three traits listed in the following; a successful team will collectively cover the areas identified, ideally with some members spanning multiple categories:

- **Commitment to equity:** Staff should look to build a cross-departmental team with a commitment to advancing equity. Offices of health, economic development, community engagement, or others may have staff with similar equity objectives, and it is possible that some equity-related initiatives are already underway in those departments. Collaborating where synergies exist streamlines the use of resources and demonstrates commitment to equity across multiple departments. It is also typically easier to start by gaining support from those already striving toward similar equity objectives rather than from those for whom equity is a new concept.[17]

- **Knowledge:** The team should also include those with expertise related to the program's content and goals, such as those with content-

Where to find partners?

While internal partners can come from many parts of government, departments related to any of the following topics are good places to begin:

- Public Health
- Economic Development
- Community Outreach
- Planning
- Affordable Housing
- Workforce and Economic Development
- Sustainability and Energy
- Administration and Finance

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17   Parzen, Julia. Interview by Julie Curti and Farrah Andersen. Personal Interview. May 10, 2018.

area knowledge in clean energy technologies, affordable housing, finance, workforce development, and community engagement.

- **Influence:** This category includes both those in official leadership capacities in the local government (e.g., a city manager or department heads), as well as others who have more informal influence (e.g., long tenure with the municipality, community connections, or leading other successful initiatives). Individuals who meet this criterion can help garner broader support for the program, open doors to funding sources, and share lessons learned from previous initiatives.

Build internal team alignment and a shared understanding of equity

Effective equity work requires local governments to discuss and develop a shared understanding of equity. This is an important step in any equity-oriented program design process and lays the foundation for how the local government team will build an understanding about equity in their community. This includes how past and present local government actions and other forces, such as structural and institutional racism, may have created or exacerbated inequities. Chapter 2 of USDN's *Guide to Equitable, Community-Driven Climate Preparedness Planning* offers an orientation on the government's role in social inequity and a framework for building equity within government organizations.[18] USDN also offers an "Equity Foundations" training with modules on communicating about, creating shared terminology around, building a team for, and leading organizational change to advance equity.[19] These resources center on racial equity and can help local governments learn about and recognize important intersections between economic and racial equity. Further resources are highlighted in Appendix A. The local government team should recognize that building internal alignment takes time and commitment, and invest in this step before moving forward.

As part of building alignment and understanding of equity within the team, the municipality can conduct an internal "readiness assessment," to begin to understand its level of readiness to work on equity and energy transformation issues. A full worksheet for this process, with questions on baselining and potential partners, is included in Appendix B. Several key internal readiness questions include:

- Who on your municipal staff is interested in working on equity and energy?

- Have you done any internal work on equity before (e.g., trainings, discussions, goal-setting)? Please describe.

- If not, what type of work do you think you need to do internally on equity?

- Who else will you need to get buy-in from internally?

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18   Yuen, Tina, et al. Guide to Equitable, Community-Driven Climate Preparedness Planning. USDN. May 2017.
19   USDN. Equity Foundations: A USDN Capacity Building Program. September 2015.

Using the readiness assessment with help the internal team understand its current assets and needs, and point towards next steps for building equitable clean energy programs.

Define equity goals and desired outcomes for engagement and program design from the local government perspective

The local government team should next define its high-level goals for equitable community engagement and clean energy program design. Drawing on the definition of equity outlined in Box 1, the local government team can begin to develop their vision for equitable program design and community engagement by working through questions that include:

- **Define equity:** What does the local government mean by equity? What should the role of the municipality be in addressing inequity?

- **Discuss program goals:** What are the main equity goals to pursue in a clean energy program? How do these align with other local government sustainability priorities?

- **Translate into action:** How does pursuing these goals translate into action steps for the municipality?

The local government team should expect the process of answering these questions to be iterative. Discussing these questions initially with local government staff can help consolidate internal objectives, create a shared language around equity, and provide an avenue to conduct internal education on the value of equity in clean energy programs (see the communications section on p. 26 for more details). However, the internal team should also recognize these conversations do not need to be conclusive before their municipality can take initial action. Instead, conversations on these topics should be viewed as steps to build a foundation for a broader listening and goal-setting process via community engagement. An equitable process should involve engaging with community members (see next section) and then aligning a program to respond to the needs that are surfaced, rather than local government staff arriving for community engagement with a pre-developed agenda.

The Greenlining Institute's "Four Ws Framework" (see Table 1) provides key questions that can support the local government team in conducting an internal education process. The framework was developed with a racial justice lens and can help municipalities understand connections between racial and economic equity. The full framework from the Greenlining Institute provides an in-depth resource for local governments on diversity, equity, and inclusion.

Table 1: The Greenlining Institute's Four Ws Framework[20]

Four Ws	Key Questions
Who	**Who am I advocating on behalf of?** Who are their allies/similarly affected communities? Who am I not including in this effort? Have I analyzed this issue from an intersectional lens?
What	**What am I advocating for?** Diversity, equity, and/or inclusion? What area do I want to impact?
Where	**Where does this take place?** Does it impact a workforce, supply chain, or another area? Will you engage individual entities on their internal practices or advance policies to impact an entire region or industry?
Why	**Why does diversity, equity, and/or inclusion matter?** Why should stakeholders prioritize this, and what are the consequences if no action is taken?

Several tools exist to support local governments in goal setting. One part of the Four Ws Framework discusses defining who specifically the municipality seeks to advocate for, serve, and engage as part of its clean energy program development, which is a crucial component of defining equity, goals, and outcomes.[21] One recommended approach for answering this question is to develop a two-by-two matrix. Figure 2 outlines this Power Analysis, a tool which is being developed by Desiree Williams-Rajee, an independent consultant focusing on equity leadership coaching and organizational development services, who also formerly served as Equity Program Manager for the City of Portland.[22] One axis of the tool maps the extent to which stakeholders may be impacted by a proposed program and the other axis maps the stakeholders' power to influence the proposed program.[23]

Using this approach, the local government team can identify the communities where they should prioritize engagement. In the case of clean energy, this could lead to mapping those stakeholders who are most impacted by energy poverty and environmental harms, and have low influence or power over the process. The stakeholders who fall into the other quadrants could also be included in engagement, but an equity-oriented approach will prioritize those in the lower-right quadrant. Additional suggested definitions for thinking about eligible households for programs is in the second section of the guide on p. 31.

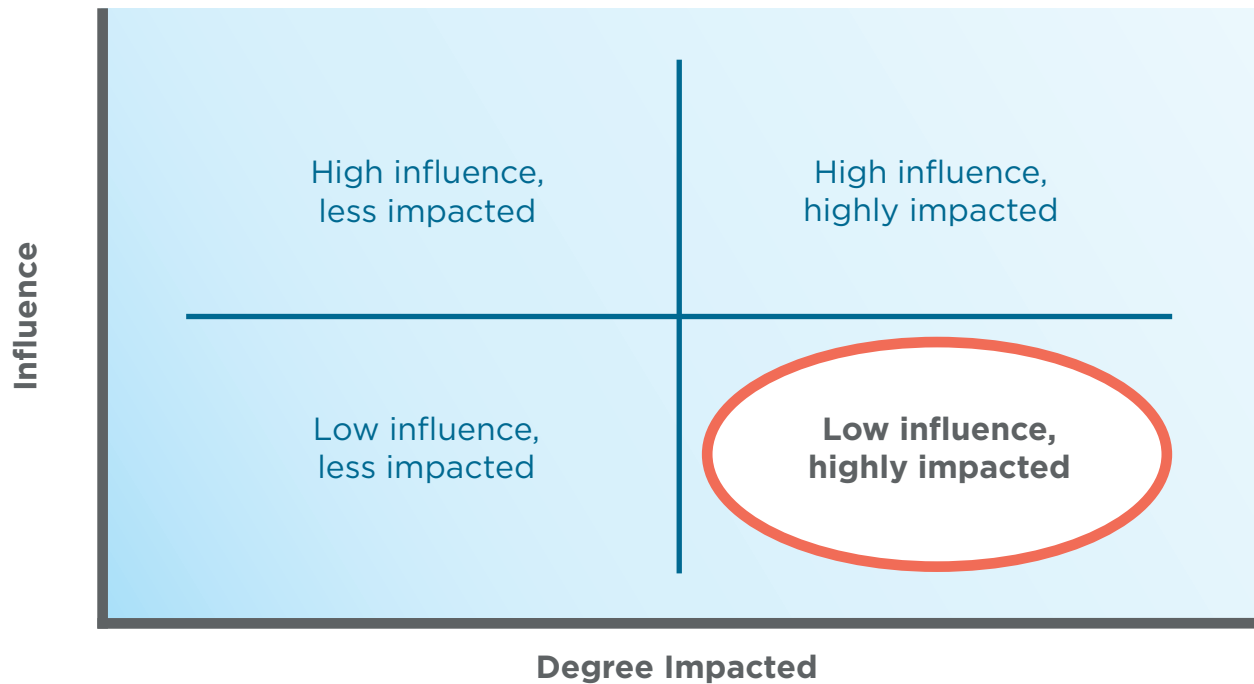20   Beavers, Danielle. Diversity, Equity and Inclusion Framework. The Greenlining Institute. May 2018.
21   Beavers, Danielle. Diversity, Equity and Inclusion Framework. The Greenlining Institute. May 2018.
22   Williams-Rajee, Desiree. Interview by Julie Curti and Farrah Andersen. Personal Interview. May 23, 2018.
23   The full Power Analysis tool is in development and is anticipated to soon be available to USDN members.

Figure 2: Power Analysis

Influence (vertical axis)

| High influence, less impacted | High influence, highly impacted |
| Low influence, less impacted | **Low influence, highly impacted** |

Degree Impacted

Gather and assess baseline data to inform community outreach and program design

The local government team can best set goals and more clearly measure progress by first understanding its current status ("baselining"). To effectively baseline, the internal team can use the following process:

- Determine what data is needed, both quantitative and qualitative;

- Seek out sources that may already have the information needed; and

- Evaluate how to fill any gaps to assess its baseline status.

Table 2 outlines key questions a municipality can use to assess its baseline. The first three rows highlight how to collect data on benefits, burdens, and inclusion within clean and fossil-fuel based energy, while the demographics category provides guidance on understanding differences within LMI communities based on race, ethnicity, and other demographic breakdowns. This further breakdown of demographic data can uncover how inequity impacts different groups in different ways, revealing structural inequities that can inform more tailored solutions in future program design. Local governments should use baselining as an opportunity to understand these intersections, particularly as they pertain to race and indigenous status. Doing so will lead to producing a more accurate and holistic understanding of an energy baseline and more inclusive, tailored, and effective program design.

Table 2: Baseline Data for Equitable Clean Energy Program Design

Data Category	Example Information Sought	Example Metrics	Example Sources
Benefits	What percentage of the LMI population utilizes current local government or utility clean energy or energy efficiency programs? What are the savings benefits associated with enrollment? How many LMI residents are employed in clean energy or energy efficiency jobs?	• Percent of households enrolled in selected programs, broken down by income, race, and other subcategories (see demographic suggestions below) • Typical range of savings associated with programs • Employment in clean energy jobs	• Local government program data • Utility program data, including Green Button data • Municipality or state/provincial workforce data
Burdens	What percentage of their income do LMI residents pay in energy bills?[24] Where are neighborhoods disproportionately affected by environmental harms and who lives in them? In what communities are occurrences of diseases linked to air pollution highest?	• Energy burden or poverty[25] • Percent of population residing within X miles of fossil fuel generation, hazardous sites, highways, or truck routes • Instances of asthma, respiratory conditions, cardiovascular disease, and other public health data	• Utility program data • American Community Survey • American Housing Survey • Census of Canada • Public Health Agency of Canada • EPA EJSCREEN Tool[26] • EPA Air Quality Index[27]
Inclusion	How many LMI households have access to existing municipal or utility clean energy programs? How does this compare with participation rates of households more broadly? How have clean energy programs been developed in the past? Who was engaged?	• Percent of LMI households enrolled in clean energy programs • Program eligibility criteria • Participation in past community meetings and locations of meetings	• Utility program data • Municipal assessor's data • Qualitative surveys/focus groups • Documentation from past community engagement
Demographics	What is the demographic breakdown of the municipality? How do the data points vary based on these factors? In particular, note the effect of racial, immigrant, and indigenous status on these data points.	Community segmentation: • Income • Age • Race • Gender • Immigrant or new-citizen status • Housing type • Employment	• U.S. Census and American Community Survey • Census of Canada • Community Foundations of Canada *Vital Signs*[28] • Canadian Council on Social Development's Community Data Program • LIHEAP program data • Other municipal or state data

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24 More information on energy burdens is available from the Energy Efficiency for All and ACEEE 2016 report, Lifting the High Energy Burden in America's Largest Cities.

25 For some starting points, see this Trinomics report for the European Commission, Selecting Indicators to Measure Energy Poverty.

26 EPA. EJSCREEN: Environmental Justice Screening and Mapping Tool.

27 EPA. EPA Air Quality Index.

28 Community Foundations of Canada. Vital Signs.

Some states will also have made tools available, such as California's CalEnviroScreen. The tool draws on environmental, health, and socioeconomic information to generate scores for each census tract in California that identify which communities are most vulnerable to the effects of pollution.[29] In addition to state-level resources, some local communities have developed their own tracking tools for equity data. For example, Sacramento developed a tool to track equity-oriented data locally, the Regional Opportunity Index. The initiative has since expanded through a partnership between the University of California Davis Center for Regional Change and Rabobank, and it integrates economic, infrastructure, environmental, and social indicators to provide data and mapping tools for understanding factors driving social and environmental opportunity.[30,31] Additionally, partner organizations, such as the Community Foundations of Canada, research and prepare regular reports on community status. The Community Foundations of Canada's *Vital Signs* reports provide social and economic data and indicators to understand quality of life in localities.[32]

It is unlikely that all data sought will be available. The internal team can strategize about how to collect data on the types of information that is needed, including methods for collecting qualitative data (e.g., interviews, focus groups, and surveys), and partnerships that can help with data collection, such as working with utilities or local universities.[33] The local government team can also prioritize among data needs and focus on those that will be most impactful for baselining and measuring a clean energy program's performance and impact.

Community engagement

Meaningful participation in decision making is a key element of equity.[34] Strong resources exist for engaging community members in energy planning. For example, the Rocky Mountain Institute's *Community Energy Resource Guide* outlines each step in a community's energy planning process, with a particular focus on community engagement.[35] This section of the guide discusses key principles of engagement for procedural equity in support of clean energy program development.

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29 California Environmental Protection Agency, Office of Environmental Health Hazard Assessment. CalEnviroScreen. 2018.
30 Jiang, Shelley. Interview by Farrah Andersen. Personal Interview. May 15, 2018.
31 UC Davis Center for Regional Change. Regional Opportunity Index. 2018.
32 Community Foundations of Canada. Vital Signs.
33 One method to facilitate data gathering is to encourage utilities that serve the local community to adopt the Green Button standard.
34 Curti, Julie and Kathryn Wright. Framework for an Equitable Energy Supply Transformation. Meister Consultants Group. 2017.
35 Rocky Mountain Institute. Community Energy Resource Guide. 2015.

Listen to understand community goals and existing initiatives

Experts in community engagement strongly recommend listening first before approaching community members with any objective. Simply put, understanding and responding to what matters to people in the communities the municipality seeks to serve is a foundational element. Ideally, experts recommend adding 3 to 6 months at the outset of any program plan for listening to community members. To be effective with time, this can occur in parallel with internal local government preparation to coalesce on goals and conduct internal equity training.[36, 37]

The local government team can seek out forums where community members already gather to discuss key local issues, which could include the regular meetings of local environmental justice organizations, community development corporations, tenant associations, faith-based groups, or other organizations deeply embedded in the communities they serve. There are several reasons that attending community meetings early on is beneficial for municipalities. Attending these meetings can:

- Help local government staff understand community concerns and priorities. For example, when a municipality eventually invites community participation in designing an energy program, time spent listening will build awareness of whether job opportunities, cost of living, clean air, or other issues are community priorities.

- Help municipalities understand who key community leaders are and what existing initiatives are already underway.

Cully Car Share:

Beginning in late 2015, the EV advocacy nonprofit, Forth, worked with an AmeriCorps member to better understand the needs of consumers in low-income areas in Portland, OR. Forth staff spent a year collaborating with community groups to hold focus groups and one-on-one interviews. The goal was to better understand people's mobility needs as well as their understanding of and interest in EVs. This outreach led to the peer-to-peer design of a car-sharing program for the Cully Neighborhood of Portland, a low-income neighborhood underserved by public transportation and car-sharing options. Forth searched for a community partner with capacity and community trust to support the program and partnered with the affordable housing nonprofit, Hacienda CDC. After connecting with various partners for funding support, three Honda Fit EVs and three level 2 charging stations were installed in the neighborhood, and the pilot program launched in March 2017. More information about this program is available in the companion case study to this guide.

36   Parzen, Julia. Interview by Julie Curti and Farrah Andersen. Personal Interview. May 10, 2018.
37   Williams-Rajee, Desiree. Interview by Julie Curti and Farrah Andersen. Personal Interview. May 23, 2018.

- Support trust and relationship building with the communities the local government seeks to serve. Where possible, the internal team should seek to meet with the community leaders active on economic and workforce development, affordable and healthy housing, environmental justice, and other areas most closely related to clean energy. Building these relationships will help to identify good partners for future outreach and program design.

When attending community meetings, it is critical that local government staff transparently share what they can and cannot achieve for communities. Many LMI communities as well as communities of color and indigenous communities may have experienced broken commitments with prior governmental organizations or representatives. The steps in this section can help rebuild those relationships and will be more effective if local governments transparently and clearly reflect what they can and cannot commit to and why they are listening.

Partner with experienced and trusted community organizations for engagement

To encourage community participation in the program design process, local governments should connect with community organizations that serve the demographics the municipality seeks to engage. These connections can build on existing relationships local government staff have developed from previous work and also build from relationships developed via the listening process described in the previous step. These organizations may be centers of worship, recreation, or community development, informal networks, or formal networks organized around other community issues. Generally, strong community partner organizations are those that have a significant history of work with the community served and thus strong trust, language accessibility, and channels of communication with the community. USDN's *Guide to Equitable, Community-Driven Climate Preparedness Planning* provides further guidance on selecting community partners that can support effective community engagement.[38]

Begin to engage other key partners

In addition to community engagement, the local government team should also begin—or continue—to connect with other potential partner organizations and other stakeholders who will be critical during the program structuring steps described in Stage 2 based on their expertise, resources, or relationships. These partners can include utilities, affordable housing providers, nonprofit partners, financial institutions, local foundations, renewable energy installers and project developers, state agencies, and more. More information on additional program partners to consider is on p. 42.

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38   Yuen, Tina, et al. Guide to Equitable, Community-Driven Climate Preparedness Planning, pp. 14–20. USDN. May 2017.

The local government should focus especially on engaging partners whose early buy-in, resources, and support will be critical for program success.

Select and deploy appropriate modes of engagement and minimize the burden of participation

There are many options for engaging communities. The *Community Planning Toolkit—Community Engagement* developed by Community Places describes the benefits and drawbacks of various forms of engagement including public meetings, workshops and focus groups, and standing forums.[39] Key literature in the community engagement arena suggests that over time, deepened levels of participation should arc toward greater community ownership over processes.[40] However, experience from previous equity-oriented planning processes emphasizes the need to slowly build relationships with community members and organizations if strong relationships do not already exist.[41, 42]

One example of strong community engagement comes from Energy Outreach Colorado (EOC). The nonprofit is dedicated to helping low-income families afford home energy. During a project in 2018 to reconstruct an aging section of a critical highway, EOC was selected to coordinate home assessments and the installation of measures to reduce residents' exposure to dust prior to construction. EOC prepared households for the challenges connected to the construction through individual conversations, working directly in the neighborhood, consistently talking with residents about their needs.[43] When planning the Cully Car Share program in Portland, Oregon, an EV car-sharing program for a low-income community underserved by public transportation, the nonprofit leading the effort spent a year engaging with community members and organizations to understand their needs and explore viable options for helping to bring EV access to the neighborhood.[44]

The **20/20 Catalysts Program** is a clean energy capacity building program for First Nations, Métis, and Inuit in Canada that began in 2016. Over an intensive three-months, the 20 selected 'catalysts,' who come from across the country, actively participate in training sessions with over 40 mentors or leaders in the clean energy field. The purpose of this program is to support the catalysts in partnering on clean energy projects in their communities. The program specifically focuses on skills learning in four categories: project financing, community engagement, employment creation and business planning, and encourages catalysts to bring what they learned back to their communities. The clean energy projects pursued span a breadth of areas including solar, hydro, wind and energy efficiency projects. There are now over 165 clean energy indigenous projects around Canada. All past and current catalysts are able to join the Indigenous Clean Energy Network to continue to learn, network, and support each other after they complete the program.

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39   Community Places. Community Planning Toolkit—Community Engagement. 2014.
40   Arnstein, Sherry. A Ladder of Citizen Participation. Pp.216-224. JAIP, Vol. 35, No. 4. July 1969.
41   Williams-Rajee, Desiree. Interview by Julie Curti and Farrah Andersen. Personal Interview. May 23, 2018.
42   Parzen, Julia. Interview by Julie Curti and Farrah Andersen. Personal Interview. May 10, 2018.
43   Interview with Jennifer Gremmert. Executive Director. Energy Outreach Colorado. May 11, 2018.
44   Henkin, Zach. Interview by Laura Simmons-Stern and Julie Curti. Personal Interview. May 8, 2018.

Minimize the burden of engagement: Stipends, realistic time expectations, and accessible logistics

Although engaging community members in the design process is a core facet of procedural equity, engagement can become a burden in the absence of careful process planning. Local government staff should seek to minimize the burden of engagement placed on LMI communities. One way to do this is to provide compensation for significant commitments of time, either monetary or via other in-kind value. This is particularly important for those who are asked to help lead or organize engagement as community members, rather than as representatives from organizations in which they work. For instance, a stipend may not be necessary to support the involvement of a nonprofit or utility partner staff member. On the other hand, it would be much more important to provide a stipend to support the participation of a resident leading a community initiative.

Another key point is setting manageable levels of time commitment to support greater engagement. In terms of logistics, meetings with community members should be at a location within the community and held in the evening or on a weekend to be widely accessible. Similarly, making accommodations for on-site childcare and providing meals can support broader participation.

Finally, offer frequent and transparent communication about how community input will be used, the program development timeline, and points for feedback and engagement in the process.[45] This ensures that community members can participate to the degree they wish to and at the stages they are most interested in. For instance, some community members may seek to be deeply involved throughout the process, while others may prefer to only provide input on a particular component of a program or issue. Providing clear communication and expectations about the process and points of engagement allows people to participate at the levels that suit their needs best, which also creates a smoother process for local government staff.

In addition to the guidelines that are particularly relevant for LMI community engagement, using general best practices for community meetings is advisable. These best practices include determining a realistic schedule for the meeting in advance, detailed logistical preparation, and coordination with speakers and attendees. Lack of adequate preparation for meetings and events can increase the time commitment burden on community members and undermine confidence in the organizer's process management ability.

Communicate about equity and clean energy with tailored messages that resonate

Effective communication about the link between equity and clean energy underpins the ability to secure strong buy-in and partnerships across municipal departments, with external organizations, and with community members. These messages should be tailored and connect to the priorities of different audiences and emphasize co-benefits of potential programs.

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45   Donnelson, Jimmy. Interview by Julie Curti and Farrah Andersen. Personal Interview. May 18, 2018.

Messaging: The moral and the business cases

Existing equity-oriented programs in clean energy and other sectors have relied on both value-based and economic approaches in their messaging and justifications. Values-based justifications are centered around the concepts of access, fairness, and the public good. This approach states that since clean energy has predominantly benefited higher-income households to the exclusion of lower-income households, encouraging greater participation from LMI and other underserved households is simply the right course of action. The moral case also tends to focus on fairness in clean energy access, energy savings, and co-benefits, such as family stability and improved health outcomes, as the main benefits. An example of a moral frame in an adjacent sector comes from the California Endowment's "Building Healthy Communities" initiative, which highlights the adverse odds stacked against low-income communities and communities of color and frames its vision as "healthy, fair, and just communities for all people."[46]

Values-based messaging can be effective for recruiting support across municipal departments, noting that the role of local government is to serve all of its residents. For example, the argument could connect to how the municipality promotes itself, perhaps as an affordable, welcoming place for residents of all types.[47] The moral argument can be connected to broader morality-based narratives of a municipality. This perspective can also be effective for engaging nonprofit partners and community groups who share similar missions. Finally, the value of fairness can resonate with utilities concerned about serving their entire customer base and that all ratepayers who pay into the system are receiving benefits from utility programs.[48]

Another frame that can resonate for community members and other program-implementation partners is the "business case" frame. The goal of an economic framing is to communicate how equitable clean energy programs contribute to building a strong local economy and community for everyone. An economic frame in communities can also focus on how clean energy can help with neighborhood development and reinvestment, thereby reducing the need for some public assistance programs, while increasing economic opportunity and security. It can highlight how clean energy can strengthen housing and economic security by stabilizing energy bills and helping people meet their basic needs, thus reducing the need to access ongoing or emergency public energy assistance.[49] Messages such as "putting money back in family's pockets" and "reducing costs for everyone" can resonate.[50] These arguments connect the dots for stakeholders on how equitable clean energy programs play a role in creating a stronger economy and healthier community. An economic frame can also resonate with a utility interested in customer engagement, supply chain, and human capital.[51] Utilities may also be interested in reducing energy poverty and bill arrears and improving cost recovery via clean energy programs.[52]

46   California Endowment. Building Healthy Communities.
47   Kantamneni, Abhilash. Interview by Julie Curti and Farrah Andersen. Personal Interview. May 23, 2018.
48   Walker, Eric. Interview by Julie Curti and Farrah Andersen. Personal Interview. May 24, 2018.
49   Abbott, Lisa. Interview by Julie Curti and Farrah Andersen. Personal Interview. May 22, 2018.
50   Kantamneni, Abhilash. Advisory Reviewer Input. July 2018.
51   Donnelson, Jimmy. Interview by Julie Curti and Farrah Andersen. Personal Interview. May 18, 2018.
52   Kantamneni, Abhilash. Advisory Reviewer Input. July 2018.

Moral and economic messages can be used together or distinctly as needed to communicate effectively with different audiences.

Key Resources for Stage 1—Program Design Process

Program Design Steps	Resource	Author; Organization	Key Content
• Define equity goals • Listen to understand • Appropriate modes of engagement • Communicate with tailored messages	Equity in Sustainability: A Scan of Local Government Sustainability Programs	Angela Park; USDN	Provides a definition of equity and why it matters, as well as suggested strategies and examples for framing and communication, data and analysis, and community engagement.
• Preparing for equitable clean energy programs	Framework for an Equitable Energy Supply Transformation	The Cadmus Group (formerly Meister Consultants Group)	Provides a framework for understanding equity in clean energy transformation Includes key questions for municipalities to consider as part of energy planning and program development.
• Define equity goals • Listen to understand • Appropriate modes of engagement • Partner with experienced and trusted community organizations	Guide to Equitable, Community-Driven Climate Preparedness Planning	Tina Yuen et. al.; Raimi + Associates for USDN	Resource for local governments to use in building an internal understanding of structural and institutional racism. Offers detailed guidance on equitable approaches to community engagement.
• Gather and assess baseline data	Low Income Energy Affordability Data Tool	OpenEI, U.S. Department of Energy	Provides data on communities across the United States along with an interactive tool to determine a community's relative energy affordability. Includes breakdowns by income level, homeowner versus renter status, fuel type, building type, building construction year, and average monthly energy expenditures and energy burden.
• Partner with experienced and trusted community organizations • Engage other key stakeholders • Appropriate modes of engagement	A Primer on Stakeholder Engagement in Community Energy Planning	Kirby Calvert and Abhilash Kantamneni; Community Energy Knowledge Action Partnership	A step-by-step guide for effective stakeholder engagement in community energy planning. Includes strategies for identifying the types of stakeholders to engage and protocols for effective engagement.
• Listen to understand • Appropriate modes of engagement • Communicate with tailored messages	Racial Equity: Getting to Results	Erika Bernabei; Racial Equity Alliance	Supports jurisdictions in using a racial equity lens to identify metrics and implement a community process. Uses a results-based accountability methodology.

Stage 2—
Program Structure

Local governments and partners with an interest in developing equitable clean energy programs must consider a series of decision points to structure their programs. These points are introduced in Box 4 as key program design questions to answer, and each point is developed in greater detail throughout Stage 2 of this guide. The order in which decisions about program structure occur can vary by municipality and program. As a result, this section is meant to be used as guidance on steps to take, as opposed to a prescriptive order to follow.

Box 4: Key Questions to Answer in Program Structure

Goals: What municipal sustainability and equity goals does the program seek to achieve?

Eligibility: What target population will the program serve, and how can targeted universalism be a key part of the design? Is the program for homeowners or renters, or both?

Context: What contextual factors should be part of the program design? These include the municipality's utility, geographic, and economic context.

Technology: Which clean energy technologies will be included in the program? This guide discusses household-level access to rooftop and community solar PV, solar+storage, ASHPs, and EVs.

Program partners: What partner organizations are needed to run the program? These organizations may include the utility, community development corporations, financial institutions, nonprofit partners, advocacy organizations, or others.

Financing: What financing mechanisms will the program use?

Funding: What level of funding is needed, and where will the program funding come from?

Administrator: Who will administer the program? Will the local government lead or be in a supporting role to a partner organization?

Customer interaction: How will people access the program? How many households will the program serve? How long will the program last? Will the program support long-term commitments to the community?

Supply chain: In what ways can this program advance equity in the supply chain via workforce development, procurement, or other measures?

Consumer protection: What program elements will be added to ensure protection for LMI households from potential harm or unintended consequences from the program?

Refine the sustainability and equity goals the program will seek to achieve

Building on the internal and community engagement processes pursued during Stage 1, program goals should be refined based upon these conversations and priorities. Program goals should serve as the guiding principles for subsequent steps undertaken to structure a program.

Define program eligibility and who the program will serve

Based on the goals for a program, a next step is to determine what types of households are the target audience for the program:

Targeted universalism: The audience for a program may be a broader population with a tailored component of the program for LMI households, or the program may be designed specifically for LMI households. Recognizing the importance of designing to address structural barriers impacting communities of color and indigenous communities, a targeted universalism approach is strongly recommended. Many government programs proceed with one of two main approaches, either "universal" or "targeted." Universal programs, such as Social Security, provide benefits to everyone by treating all groups equally. Such programs can fail to reduce group-based discrimination and may even exacerbate inequality. Targeted programs, such as food stamps, provide benefits to only select groups. These programs can be perceived as unfairly favoring groups over the public good by providing resources to marginalized groups who are often subjected to negative stereotypes.

John Powell of the University of California's Haas School of Business advocates a third approach, targeted universalism, which means setting universal goals that can be achieved through targeted approaches. This approach can be used in the program design process to understand that setting the same goal will likely require different strategies to reach diverse groups.[53] In using targeted universalism, experts recommend beginning with a program design approach that centers the needs of marginalized groups—"design at the margins"—and building a broader approach from that starting point.[54, 55] For example, a targeted universalism approach for clean energy program design would intentionally consider the barriers and needs uniquely faced by communities of color and indigenous communities and structure programs to intentionally overcome those barriers. An example of a targeted universalism approach in city planning can be found in the City of Portland and Multnomah

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53   Powell, John. Targeted Universalism. University of California, Berkeley. Haas Institute for a Fair and Inclusive Society. February 8, 2017.
54   Harris, Glenn. Interview by Julie Curti. Personal Interview. May 31, 2018.
55   Williams-Rajee, Desiree. Interview by Julie Curti and Farrah Andersen. Personal Interview. May 23, 2018.

Country's recent climate action planning process. As part of the process, an Equity Working Group representing diverse community organizations and government partners applied an equity lens to proposed strategies to prioritize the needs of low-income communities and communities of color.[56]

Energy burden: One important measure across equitable clean energy programs is "energy burden," or the percentage of household income spent on energy. The U.S. National Renewable Energy Laboratory (NREL) provides a scale for understanding a household's energy burden. For households spending 4–7 percent of their income, NREL defines as "energy stressed," 7–10 percent as "energy burdened," and more than 10 percent as "energy impoverished."[57] Similarly, in Canada "energy poverty" is defined as "households who spend a disproportionate amount of their income on household energy needs such as electricity, heating, and cooling,"[58] or more simply, households "struggling to pay their energy bills."[59] This is most often considered to be households that spend 6 percent or more of their income on energy bills.[60]

LMI definition: Many federal and state definitions for LMI households exist. If a municipality or partner does not already have a working definition they prefer, they should identify a definition that best fits their program goals and the residents they seek to serve. As an example, the U.S. Department of Housing and Urban Development (HUD) defines LMI individuals and families as those "whose household income does not exceed 115 percent of the median income for the area when adjusted for family size." HUD defines "very low income" households as those at 50 percent or less of the median area income and "low income" as those at 80 percent or less of the median area income, again adjusted for family size.[61,62] Another approach is to identify eligible households based on locations that correspond to economic or environmental disadvantage. In California, the CalEnviroScreen tool identifies California communities that are disproportionately burdened by multiple sources of pollution.[63] To eliminate qualification burdens, programs could also prioritize participants already enrolled in existing income support programs such as the Low Income Heating Assistance Program (LIHEAP), the Supplemental Nutritional Assistance Program (SNAP), or the Temporary Assistance for Needy Families Program (TANF) in the U.S. context.

After choosing definitions to use, municipalities should also determine if a program will offer differentiated services for LMI households, recognizing that the different

56   Wiliams-Rajee, Desiree and Taren Evans. Climate Action Through Equity. City of Portland and Multnomah County. July 12, 1016.
57   Cook, Jeffery, and Manisha Shah. National Renewable Energy Laboratory. Reducing Energy Burden with Solar: Colorado's Strategy and Roadmap for States. March 2018.
58   Community Power. Energy Poverty: The hidden technology gap. March 2018.
59   EmPower Me. Energy Poverty.
60   Rezaei, Maryam. How Canada Can End Energy Poverty and Winter Cut-offs. The Conversation. October 24, 2017.
61   HUD. How Is a Low- to Moderate-Income Individual or Family Defined? 2018.
62   Canada does not have an official federal poverty line. For a recent discussion on the topic, see this June 6, 218 article: Why Canada Needs and Official Poverty Line.
63   California Environmental Protection Agency, Office of Environmental Health Hazard Assessment. CalEnviroScreen. 2018.

income levels will mean that households have different opportunities and constraints that impact their program needs and potential participation. Experts recommend a programmatic approach of "ramping," meaning that benefits should be scaled for households based on income levels.[64] This approach recognizes that moderate-income households also struggle to pay energy bills and lack access to clean energy technologies, and programs should have a pathway tailored to participation based on their income levels and unique needs. Many of these priorities and needs can also be identified during the engagement process outlined in Section 1.

Homeowners and/or renters: Programs can be tailored to serve homeowners, renters, or sometimes, both populations. Depending on the location, homeownership within LMI communities can vary significantly. LMI homeowners have different constraints than wealthier homeowners, which could include needing basic home repairs and weatherization, having less access to credit, and less cash on hand to make any up-front investments in their homes. To overcome some of these constraints, local governments can consider strategies such as earmarking programmatic funds to cover basic home repairs and using other benchmarks to increase credit access, such as utility bill payment history.

If there is a significant population of renters in the community, these residents may have limited control over what types of energy investments take place at their residences. Landlords may also be reluctant to pursue energy investments at rental properties where tenants pay electricity bills because they cannot benefit from the savings. This challenge is often referred to as the split incentive.[65] Local governments should consider programmatic options that alleviate the split incentive or directly benefit renters. This often includes programs that target owners or managers of affordable multifamily housing and are structured to ensure a sharing of benefits between owners and renters. For example, California's Low-Income Weatherization Program helps overcome split incentives in a multifamily housing context by offering financial incentives to cover 30 to 100 percent of energy efficiency upgrades and 50 to 100 percent of solar installations to qualifying properties sharing the benefits between tenants and landlords.[66]

Additional information on rental housing and strategies for working with multifamily property owners and managers is covered on p. 53. Several detailed guides on designing clean and efficient energy programs that reach renters in affordable multifamily housing are also referenced in Appendix A.

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64 Gordesky, Ben. Advisory Reviewer Input. July 2018.
65 McKibbin, Anne. Engaging as Partners: Introducing Utilities to the Needs of Multifamily Buildings and Their Owners. ACEEE. March 2013.
66 For more information, see the California Low-Income Weatherization Program for Multifamily Properties case studies.

Consider the contextual factors that need to be part of the program design

The success of a clean energy program can be highly dependent on local context and the needs of a community. There are several additional factors that may influence what program delivery options are appropriate; these include:

Utility regulatory context: Clean energy program development often necessitates coordination and interaction with local utilities. Utilities can be investor-owned, cooperatively owned, or publicly owned municipal utilities. Investor-owned utilities' activities are usually subject to direct regulation and supervision from a public utilities commission. Municipal utilities and cooperatively owned utilities can have more discretion to develop their own programs. Similarly, communities may have more direct channels for influence with municipal or cooperatively owned utility partners because community members or local officials are decision-makers within their governance structures.

In contrast, major investor-owned utility decisions require approval by a public regulatory commission and are subject to its cost-effectiveness and programmatic requirements. Communities can establish strong working relationships with their investor-owned utility or submit public comments to commissions to encourage program development. For more details on utility regulation and municipal energy supply, please see *Pathways to 100: An Energy Supply Transformation Primer for Cities,* which further discusses the relationship between utility-type and energy transformation efforts.[67]

Geography: Some program models or technology options may operate more effectively in areas with different population density, building stock, and climate. Considerations include:

- **Density:** Population density can impact program models that involve sharing clean energy technologies, such as an EV car-sharing program, where residents need to reach the car-sharing site via walking or public transit. In contrast, rural or suburban locations can often take advantage of community solar projects because they have sufficient space to site the systems within their communities. In the case of solar+storage, some urban communities have utilized the density of their buildings to develop resilience hubs, in which a single solar+storage site can serve many individuals during an emergency. This hub concept relies on an ability to travel to the resilience hub or shelter site in a timely manner during a power outage and may not translate as well to more rural contexts.

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67 Meister Consultants group on behalf of the Kresge, Energy, and Summit Foundations. Pathways to 100: An Energy Supply Transformation Primer for Cities. 2017.

- **Building stock:** In all cases, improving the energy efficiency of a building via weatherization should be considered first priority. Pursuing these building improvements can improve occupant comfort and magnify the input of renewable generation investments, since on-site and community systems will be able to serve more of the reduced on-site load. This point is particularly salient for municipalities with an older building stock, where energy efficiency measures, as well as basic improvements, such as electricity system upgrades and roof improvements, should be pursued ahead of or alongside programs that install on-site or community clean energy technologies.

- **Climate:** The climate context of a municipality can impact which clean energy technologies and program models are the best fit for meeting equity and clean energy goals. Municipalities facing increasing climate threats from rising temperatures or sea level rise, may want to focus on clean energy programs that increase in-home or community resilience. Some clean energy technologies also have climate constraints. In the case of cold-climate ASHPs, with current technology, their performance declines when outdoor air temperatures drop below 5°F, meaning that a backup heating option will be needed in very cold climate locations.[68]

Regional connectivity: Municipalities that serve as regional economic hubs may have more flexibility and resources to deploy clean energy programs. In some cases, if a community is within a highly competitive region or close to other communities with less stringent development policies, clean energy programs may experience resistance or push back from members of industry and from residents concerned about affordability. Municipalities with weaker local economies may have a harder time funding programs using municipal revenue and prioritizing clean energy programs among many needed services. Additional information on anticipating and mitigating potential unintended consequences of clean energy programs is discussed in the consumer protection section on p. 58.

Select the clean energy technologies that will be included in the program

There are a variety of clean energy technologies, which have differentiated strengths and weaknesses. Local governments and their partners should pick clean energy technologies that best align the community's needs and programmatic goals with commercially available options. The next section introduces the clean energy technologies considered in this guide, including solar PV, solar+storage, ASHPs, and EVs. Beyond the discussion of these household-level clean energy technologies, additional information on the role of local governments in influencing
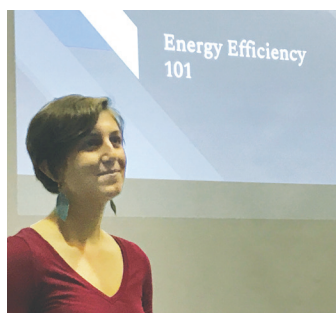
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68   U.S. Department of Energy. Heat Pump Systems. 2018.

and shaping clean energy supply policies, systems, and programs is available in *Pathways to 100: An Energy Supply Transformation Primer for Cities.*[69]

Energy efficiency first

A key principle of this guide is that supporting energy efficiency improvements for LMI households should be a first step. The easiest way to provide both environmental benefits and cost savings through clean energy is often to avoid using energy at all, rather than generating it from renewable resources. LMI customers often live in lower quality housing with greater opportunity for basic energy efficiency measures. These measures tend to be very cost-effective and can improve home comfort and health. The cost per-kWh-saved (kilowatt hour) of providing basic insulation and duct sealing, for example, is generally much lower than the cost per-kWh-generated of rooftop solar. More so, it can be practically helpful to first address a home's energy efficiency opportunities before considering renewable energy resources. For a home considering rooftop solar, for example, a thorough home energy retrofit can lower the household's overall energy consumption, and therefore reduce the size (and cost) of the rooftop solar project necessary to serve the home. Wherever possible, municipalities and their partners should seek to combine a clean energy program with existing or new energy efficiency incentives and upgrades.

As illustrated in the following, different clean energy technologies are well-suited to mitigate or alleviate specific burdens. During the program design process, local governments and their partners should carefully examine which technology options most closely align with community needs and desired outcomes.

Solar PV

Rooftop: Solar PV systems generate energy by converting sunrays into electricity. Solar PV systems are made up of a series of panels, which can be easily scaled to a variety of applications. Distributed or smaller-scale solar PV systems can be installed on rooftops of homes, businesses, or nonprofits; ground-mounted in yards or parking lots; or integrated directly into the structure of buildings. In these cases, the electricity generated by the solar PV system can directly offset a building's energy usage, which can reduce or eliminate a home's electricity bill payment. Net metering laws in many U.S. states and all Canadian provinces enable customers with rooftop solar to be credited for feeding excess electricity generated back to the grid.[70] The cost of solar hardware has declined dramatically in recent years and these trends have made solar PV systems more affordable and increased returns on investment.[71]

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69   Meister Consultants Group on behalf of the Kresge, Energy, and Summit Foundations. Pathways to 100: An Energy Supply Transformation Primer for Cities. 2017.

70   For a full list of enabling state policies, please visit the North Carolina Clean Energy Technology Center's Database of State Incentives for Renewables & Efficiency (DSIRE). In a few cases, some states have feed-in tariff policies for solar. At the time of publication, a form of net metering was approved in all Canadian provinces.

71   NREL. US Solar Photovoltaic System Cost Benchmark. August 2017.

Since distributed solar PV is inherently localized, states and provinces with strong solar markets have seen an increase in jobs for installation, maintenance, and technical assistance.[72] As a result, distributed solar PV can bring direct benefits to LMI households in terms of bill savings and workforce benefits to communities, particularly when solar job opportunities are accessible to LMI households and communities of color.[73] Because solar PV does not generate air or greenhouse gas emissions, solar, particularly when deployed at larger scales, can improve the environmental quality of regions where they are located and may be of interest to environmental justice communities. In some states, such as New York, significant efforts are underway to value these non-energy benefits to society through tariffs.[74]

For LMI households, common barriers to rooftop solar include up-front costs, credit score barriers that inhibit access to financing, and home readiness challenges including updated electric systems and roof readiness.[75,76] Rooftop solar typically benefits homeowners, though for multifamily housing, programs can be designed to incentivize sharing savings with tenants. One example of overcoming these barriers in a multifamily context is California's Solar on Multifamily Affordable Housing Program which uses up-front rebates to reduce the cost of installing solar and requires that customers receive the full economic benefit of solar credits.[77] Additional guidance on pursuing solar in affordable multifamily housing is available in a recently published report from The American Council for an Energy Efficiency Economy (ACEE).[78]

The **Rural Renewable Energy Alliance (RREAL)** is a nonprofit organization in Minnesota that provides solar energy systems to low-income communities through their **Solar Assistance Program**. RREAL leverages Low-Income Home Energy Assistance Program (LIHEAP) funds to install solar systems that reduce customer's electricity usage. The program has completed over 500 residential installations, including both solar air heat and photovoltaics, since 2005. The program expands access to solar benefits to residents who would otherwise be financially unable to participate and aims to address the root causes of energy poverty.

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72   The Solar Foundation. The National Solar Jobs Census 2017. 2018.
73   Ibid.
74   New York Public Service Commission. Value of Distributed Energy Resources (VDER) Docket. 2018.
75   NREL. Low- and Moderate- Income Solar Policy Basics. 2018.
76   For an example of an effective rooftop solar program, see this example from the Colorado Energy Office.
77   For a summary of California programs for solar on affordable housing, please see the Low-income Solar Policy Guide.
78   Samarripas, Stefen and Dan York. Our Powers Combined: Energy Efficiency and Solar in Affordable Multifamily Buildings. ACEEE. May 2018.

Community solar: In contrast to traditional rooftop solar PV installations, community or shared solar projects allow for the benefits of solar PV to be distributed to parties other than the host site. Typically, community solar projects are located in an area or rooftop with sufficient space to host a larger renewable energy installation (e.g., greater than the 3- to 7-kW systems that could serve a home or small business). Subscribers or participants in community solar projects can either pay up-front to own or lease a share of the production proportional to their energy needs or in some cases receive economic benefits month to month. In many cases, the output from the solar shares are distributed in the form of utility bill credits. Community solar subscribers receive energy from the system at an agreed upon rate, which can result in savings if the price is below the retail rate of electricity.

Community solar has been championed as a method to increase access to solar energy because subscribers do not have to install solar at their residences. A recent NREL study noted that only 51 percent of households within the United States meet the technical parameters for solar, and 37 percent of residential households are renters.[79] These figures do account for the subset of homeowners and renters prevented from pursuing rooftop solar by financial limitations. Rooftop solar PV can have significant up-front costs, and high credit scores are often necessary for no-money down loan or leasing models. As a result, community solar projects that offer flexible and accessible subscription models can diversify participation in the solar market. Although many states do not have enabling legislation for community solar, willing utilities have implemented programs in the absence of regulation in a few communities.[80, 81] In the Canadian context, community solar is more nascent, but with growing potential.[82]

In 2015, the Colorado Energy Office presented the nonprofit GRID Alternatives with a $1.2 million grant to launch the **Low-Income Community Solar Demonstration Project**. GRID worked with eight utilities to develop eight different demonstration projects in communities across the state, each providing different lessons learned and policy recommendations. As of October 2017, 380 households were participating in 1,485 kW of community solar. Average energy savings, provided via a bill credit, equate to $382 per subscriber per year. The bill credit is guaranteed for participants long-term. The program aims to decrease the disproportionate energy burden placed on low-income Colorado families by expanding clean energy opportunities to families who are typically unable to participate due to financial constraints.

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79   Feldman, David et. al. Shared Solar: Current Landscape, Market Potential, and the Impact of Federal Securities Regulation. NREL. April 2015.
80   Stanton, Tom and Kathryn Kline. The Ecology of Community Solar Gardening: A Companion Planting Guide. National Regulatory Research Institute. 2017.
81   Another case study for this model is UPSTART in L'Anse, Michigan.
82   The first community solar garden in Canada was reportedly launched in June 2017 in the City of Nelson, BC.
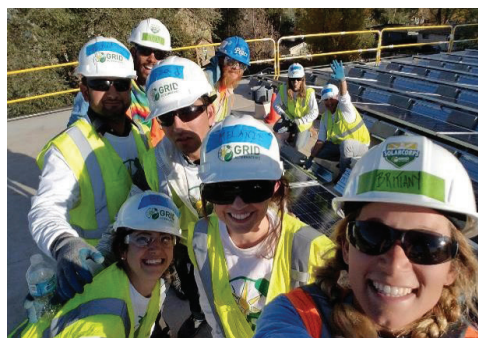
Solar+Storage

In the case of a power outage or an emergency, most grid-tied solar systems are designed to stop operation to prevent electricity from entering the grid. This is a built-in safety feature can protect line workers as they conduct repairs to restore power.[83] An emerging technology, which can provide many of the economic and environmental benefits of solar as well as resilience in emergency situations, is solar+storage. Energy storage, often in the form of a battery, allows for energy usage to be decoupled from when it is generated—in other words, solar electricity, which is produced during the day, could be stored in a battery and used at nighttime or under cloudy conditions to provide power.

Akin to solar PV prices, prices for lithium-ion batteries have rapidly fallen in recent years.[84] These trends have driven increased interest in using solar+storage on individual households, multifamily properties, public buildings, and community centers as an alternative form of backup power. Unlike traditional diesel generation, outside of an emergency solar+storage can still deliver clean energy and utility bill reductions.[85] In New York City and Baltimore, solar+storage is being used to augment and supplement shelter sites and emergency response centers in low-income and climate-vulnerable neighborhoods.[86, 87]

Current electricity prices often make solar+storage economically viable for multifamily housing complexes whose common areas or units (if not on sub-meters for each household) are subject to demand charges by their utilities.[88] Demand charges are used in some states and provinces to recover some cost of electricity generation, transmission, and distribution for larger users of electricity. They are a formulaic charge based on the highest energy usage during a defined time period in a billing cycle. Therefore, solar+storage can be used by multifamily housing to reduce on-site peak demand and reduce demand charges, and has the potential to dramatically lower electricity bills for residents.[89] Solar+storage is typically easier to plan for new construction as compared with retrofits in multifamily housing.[90] Though not yet economically viable, some utilities are beginning to pilot demonstration solar+storage projects on single-family homes.

83   Sustainable CUNY DG Hub. Storage 101—Hardware. 2018.
84   Curry, Claire. Lithium Ion Battery Costs and Market. Bloomberg New Energy Finance. July 2017.
85   Solar Outreach Partnership. Solar+Storage Applications for Local Governments. 2015.
86   Solar Market Pathways. Global Green Solar for Sandy Program. 2018.
87   Enright, Nicole et. al. Resilient Solar: Empowering and Repowering Communities. Institute for Sustainable Communities. 2018.
88   Solar Market Pathways. Global Green Solar for Sandy Program. 2018.
89   The recently released report, Closing the California Clean Energy Divide, discusses strategies for solar+storage in affordable multifamily rental housing.
90   Sustainable CUNY DG Hub. Storage 101—Hardware. 2018.

ASHPs

Heating and cooling accounts for the majority of greenhouse gas emissions from residential and commercial buildings.[91] Clean or renewable heating and cooling technologies can reduce emissions relative to fossil fuel heating while also providing energy savings to system owners. ASHPs are electric appliances that provide heating and cooling by moving heat in and out of a building. During the summer, ASHPs work as air conditioners, but during the winter, ASHPs run in reverse, extracting heat from the outdoor air and moving it indoors. Since ASHPs use electricity to transfer, rather than create, heat, they are more energy efficient and in many states and some provinces, can provide significant cost savings relative to electrical resistance heat, propane, or oil.[92]
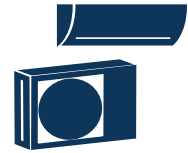
ACEEE indicated that heating and cooling costs for low-income households and households of color can be up to three times higher proportionally than those of higher income levels.[93] The adoption of ASHPs can lead to energy savings when replacing oil, propane, or electric resistance heating systems.[94] They also can improve indoor air quality and occupant comfort by providing efficient air conditioning, dehumidification, and air filtration.[95] Of note, ASHPs can have higher up-front installation costs than fossil fuel–based heating systems and central air conditioning systems, though energy savings and incentive programs can still make them cost effective in many markets.[96] Income-eligible programs across the country have supported retrofits of electric resistance heating with ASHPs in affordable housing units to reduce costs to homeowners while delivering grid benefits.

From August 2017 to February 2018, the City of Somerville, MA ran a community group purchasing and outreach program for ASHPs called **HeatSmart/CoolSmart (HSCS) Somerville**. The city-led program allowed residents to leverage reduced pricing for ASHP installations. As part of the program, HSCS Somerville offered an affordable pathway for income-eligible homeowners to receive zero-interest, deferred-payment loans for renewable heating and cooling installations. More information about this program is available in the companion case study to this guide

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91   EPA. Sources of Greenhouse Gas Emissions. 2016.
92   Massachusetts Clean Energy Center. Learn More About Air-Source Heat Pumps. 2018.
93   Drehobl, Ariel and Lauren Ross. Lifting the High Energy Burden in America's Largest Cities: How Energy Efficiency Can Improve Low-Income and Underserved Communities. ACEEE. 2016.
94   U.S. Department of Energy. Heat Pump Systems. 2018.
95   Massachusetts Clean Energy Center. Clean Heating and Cooling. 2018.
96   U.S. Department of Energy. Heat Pump Systems. 2018.

EVs

EVs, which can include cars, buses, and trucks, are powered by a battery charged by the electric grid, instead of conventional liquid fuels like gasoline and diesel. While EV costs are still substantially more expensive than conventional vehicles, battery costs have declined significantly in recent years which has resulted in reductions in up-front costs for EVs.[97] EVs account for a very small share of vehicles on the road today, but analysts project that adoption will increase in the coming years because of falling costs, increasing range, and policy efforts by states, provinces, and communities.[98] Encouraging and enabling the electrification of the transportation sector has major implications for air pollution and greenhouse gas emissions, both of which are highly driven by the transportation sector.[99] The impact of the shift to EVs can be magnified in regions of the U.S. and Canada where the electricity grid is beginning to include more renewables. As a result of EVs having zero tailpipe emissions, their adoption is particularly important for reducing air pollution health impacts, which affects low-income and communities of color who tend to be disproportionally located near high traffic roadways.[100] Because these communities are also frequently disproportionately exposed to traffic from heavy duty diesel trucks and buses—which have a greater impact on local air quality per vehicle—vehicle electrification may be an important priority for low-income communities in many regions.
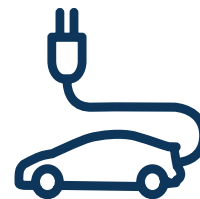
Despite the projections for accelerated EV adoption, further growth in EVs will likely require an expansion of charging infrastructure, as the perception of a lack of sufficient charging infrastructure is one of the largest barriers inhibiting further EV growth.[101] It is expected that about 85 percent of EV charging takes place at home, and while EV owners can charge with slow, "level 1" chargers that are typically included with an EV purchase, installing a higher capacity "level 2" charger at home can enable EV owners to take advantage of lower cost off-peak electricity rates.[102] However, installing a home charger can be expensive, which has prompted many areas to offer rebates or low cost financing. Additionally, many homeowners and tenants, particularly in urban areas, do not have access to a dedicated parking space where they could install a home charger, making access to public charging to reach daily destinations more critical. Some municipalities have required that a certain share of public and utility funds spent on public charging infrastructure be spent in low-income communities to try to ensure equitable access to public charging.[103]

97   Curry, Claire. Lithium Ion Battery Costs and Market. Bloomberg New Energy Finance. July 2017.
98   Bloomberg New Finance. Electric Vehicle Outlook 2018. 2018.
99   Center for Climate and Energy Solutions. Electrified Transportation for All: How Electrification Can Benefit Low-Income Communities. November 2017.
100 Rowangould, Gregory. A Census of the US Near-Roadway Population: Public Health and Environmental Justice Considerations. Transportation Research Part D: Transport and Environment. December 2013.
101 Merchant, Emma F. The Next Big Obstacle for Electric Vehicles? Charging Infrastructure. Green Tech Media. November 3, 2017.
102 U.S. Department of Energy. National Plug-In Electric Vehicle Infrastructure Analysis. September 2017.
103 California Public Utilities Commission. Summary of Proposed Decision on Transportation Electrification Program Proposals from the Investor -Owned Utilities. March 2018.

While the cost to purchase a new EV is still greater than a conventional vehicle, and out of reach for many LMI households, it is expected that EV owners will spend less money operating their vehicle. EV owners are likely to save on maintenance costs because EVs having less wear on brakes and fewer moving parts, and on fuel costs because of greater fuel economy for EVs than conventional vehicles.[104] Some communities have attempted to make EVs more affordable for LMI communities by increasing EV rebates for those below certain income levels, providing incentives for used EVs since new vehicles of any kind are often out of reach for LMI residents, and introducing electric car-sharing models for households who may not be able to afford a vehicle. Investing in EVs can also bring job growth to a region, with new workforce opportunities in vehicle parts manufacturing and charging infrastructure installation.[105, 106] In southern California, community organizers and unions have been able to secure community benefits agreements with electric bus manufacturers to ensure a certain number of jobs are filled by residents from underrepresented and undeserved communities.[107]

Recruit key program partners needed to make the program successful

Few clean energy programs are run by one entity alone. Building successful partnerships is a key to executing successful equity-oriented clean energy programs. Partners can administer programs or provide financial support, resources, technical assistance, or community outreach. Key partner organizations to consider for clean energy program administration or support include:

- Utilities

- Community groups, including neighborhood organizations, faith-based groups, and advocacy organizations

- Affordable housing providers, both nonprofit and private

- Nonprofit partners, including community development corporations and Community Action Agencies

- Financial institutions, including community development financial institutions (CDFIs), credit unions, and banks

- Impact investors

- Local and community foundations

- Installers and project developers

- State and provincial agencies

- Neighboring municipalities

104 Palmer, Kate et. al. Total cost of ownership and market share for hybrid and electric vehicles in the UK US and Japan. Science Direct. January 2018.
105 International Economic Development Council. Analysis of the Electric Vehicle Industry. 2013.
106 More information on the role local governments can play in developing EV markets and associated infrastructure is available in this recent guide from CleanTechnica.
107 Metro. BYD commits to hiring from communities facing significant barriers to employment. July 18, 2017.

Potential program partners, particularly community-based partners, will ideally be involved during Stage 1—Program Design Process to build common understanding and trust. Program partners should develop alignment around program goals and clarify the division of responsibilities and level of commitment each will bring to the program. In the case of community partners, it is important to ensure that organization's and individual's participation is fairly compensated to reflect their work.[108]

Choose an appropriate financing mechanism—or several combined—to use in the program

Communities have used a variety of financial and programmatic models to advance equitable access to clean technologies. This section outlines key financing models for building equitable programs around the clean energy technologies in this guide. Table 3 introduces a matrix comparing the clean energy technologies and financing programs, and identifies which programs can be adapted to serve homeowners and renters, as well as who owns the clean energy technology within each program model. Local governments and their partners can use this table to help guide how they structure the financing of their clean energy program. In picking appropriate financing models, municipalities should focus on approaches that make qualifying for a program easy, minimize—or ideally negate—any financial burden for LMI households, and provide financial and other benefits to households. Additional information on financing and policies by state for the United States is available from the Database of State Incentives for Renewables and Efficiency[109] and a list of funding, grants, and incentives for Canada is available from Natural Resources Canada.[110]

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108 Baker, Isaac. Interview by Julie Curti and Farrah Andersen. Personal Interview. May 28, 2018.
109 NC Clean Energy Technology Center. Database of State Incentives for Renewables and Efficiency (DSIRE).
110 Natural Resources Canada. Funding, Grants, and Incentives.

Table 3: Financing Structures for Clean Energy Access

Owner	Financing Mechanism	Eligibility — Renter (R) or Home-owner (H)	In-home — Rooftop Solar	Solar+ Storage	ASHPs	Personal EVs	In-community — Community Solar	EV Car Share	Public EV Infra-structure
Cooperative (city or community)	Municipality- or member-provided	R					X	X	X
		H					X	X	X
Third-party[i]	Third-party-provided	R				X	X	X	X
		H	X	X[ii]	X[ii]	X	X	X	X
Utility	Utility-owned asset	R					X		X[v]
		H	X	X[ii]	X[iii]		X		X[v]
Individual/Household	PAYS/ tariff-based financing[iv]	R	X[ii]	X[ii]	X				
		H	X[ii]	X[ii]	X				
	On-bill financing	H	X	X	X	X[vii]			
	PACE[v]	H	X	X	X	X[vii]			
	Rebate	R				X	X		
		H	X	X	X	X	X		
	Subsidized loan	R				X	X		
		H	X	X	X	X	X		
	Credit En-hancements[vi]	R				X	X		
		H	X	X	X	X	X		

i   Includes third-party models where municipality provides host site for clean energy technology.
ii   Does not exist yet; there is interest but making it cost-effective is challenging. In the case of solar+storage, changes in net metering could make this technology more cost-effective.
iii   Exists in a few locations but is difficult to implement.
iv   Utility technically owns the system until the cost of the improvements is recovered.
v   Depends on allowance under state or provincial regulations.
vi   Credit enhancements can also be used as part of PAYS in a model combining both financing mechanisms, in which case renters are also eligible.
vii   PACE and on-bill financing have been offered for residential charging infrastructure for EVs in some jurisdictions, but not for vehicle purchases.

Cooperative ownership

Cooperative ownership can increase access to energy programs for LMI households. In most cases, these programs are implemented as either municipality-owned or community-owned (cooperative) projects, and are available to both homeowners and renters. The cooperative or municipality provides the up-front financing and operating costs for the programs, and participants pay a participation or usage fee. For example, the New York City Housing Authority is offering access to its rooftops at low or no leasing costs to local businesses wishing to develop community solar projects to serve their residents.[111] Cooperative ownership does not include in-home programs, but can include the following in-community programs.

Community solar: Community solar programs are those in which a customer purchases a share of a solar installation in their community. Benefits from the solar installation are accrued by the customer, most commonly as monthly credits against their utility bill.[112] Community solar is often enabled by state and provincial virtual net metering policies, which enable the credits from solar production to be transferred from one installation to multiple off-site recipients.[113] Utilities can also choose to implement community solar programs independent of enabling legislation. Given this, some community solar projects are under development in jurisdictions without enabling legislation, such as South Carolina.[114,115] Community solar programs have used a variety of methods to increase LMI participation including credit enhancements to reduce investor perceptions of risk. These include offering

Cooperative Energy Futures (CEF) is an energy services cooperative in Minnesota that develops community solar gardens (CSGs). Their model prioritizes increasing access to solar for low-income residents and renters by offering pay-as-you-go subscriptions and utilizing backup subscribers to eliminate the need for credit scores during customer enrollment. Backup subscribers are large community organizations, such as local governments or houses of worship, that volunteer to receive credits from the garden in the event of a default. This model enables the system to be offered to a wider diversity of subscribers than comparable systems throughout the state. In addition, on-the-job installation training programs for low-income residents are focused on developing a workforce for CSG projects. To expand the model regionally and nationally, CEF has worked to define a set of equity goals through its role as a founding member of the Minnesota Just Solar Coalition, composed of developers, nonprofits, and advocacy organizations. More information about this program is available in the companion case study to this guide.

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111   New York City Housing Authority. ACCESS Solar: Community Solar Gardens at NYCHA. 2018.
112   Department of Energy. Community and Shared Solar.
113   At present, community solar is enabled in 16 U.S. states and Washington, DC. Shared Renewables HQ's "Shared Energy Map" provides more details.
114   South Carolina Gas and Electric. Compare Rooftop and Community Solar. 2018.
115   Also see SEIA's work on consumer protection.

month-to-month as opposed to up-front payment costs for community solar shares, eliminating fees for low-income subscribers, project-level hiring or training for local community members, or including considerations for low-income participants in the enabling legislation for community solar, as was the case in Colorado.[116, 117]

EV car share: Municipalities or other organizations can create community car-share programs, where some or all of the vehicles provided are EVs. These programs should ensure that parking stations or hubs are available in neighborhoods with LMI residents, particularly those underserved by other transportation options. In addition, community programs should establish a price point for entry into these programs that is accessible based on income constraints. Community car sharing can supplement access to public transit or replace the need for a personal vehicle, and can improve community connectivity and increase awareness about EVs.

Public EV infrastructure: Municipalities, utilities, or communities can install EV charging infrastructure. At present, one of the main concerns about EVs among drivers is access to charging infrastructure, and often the existing infrastructure is not evenly dispersed. To increase equity, EV infrastructure should be installed in neighborhoods with LMI residents. For example, Eversource Energy, an investor-owned utility in Massachusetts, recently proposed to increase the deployment of and equitable access to EV charging infrastructure, and its request was approved by the Massachusetts Department of Public Utilities. The utility will incentivize businesses to host charging stations and is requiring a proportion of stations be deployed in environmental justice communities.[118] Eversource indicates that fuel costs in Massachusetts are 50 percent lower for EVs than for traditional vehicles, and thus could create strong savings in LMI communities, assuming that the higher up-front cost of an EV may be addressed through rebate or other financing programs.[119]

Third-party ownership

Third-party entities can offer programs that can increase access to energy technologies or programs. In most cases, the third party is a technology manufacturer or installer that owns the system and then charges individuals a usage or participation fee. These programs fall into two primary categories.

In-home technologies: In-home technologies are generally only available to homeowners and are financed through individual fees or payments. The most common arrangement for this is on-site solar financed through a power purchase agreement (PPA). In this arrangement, the third party installs solar on a home, and the homeowner pays the installer for the energy produced by the system, typically

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116   Shared Renewables HQ. USA Shared Energy Map. 2018.
117   See this Colorado Energy Office rooftop solar pilot project.
118   Garcia, Noah. Massachusetts Approves Precedential Electric Vehicle Program. Natural Resources Defense Council. December 4, 2017.
119   Eversource. Electric Vehicles.

on either a per-kWh or per-month basis.[120] EVs are also available under leasing arrangements, like other automobiles. Third-party ownership structures have been developed for commercial solar+storage models, and there has been success deploying these models on affordable housing. However, wide-scale availability of third-party ownership models for ASHPs and solar+storage for single-family homes is more limited. In addition, not all jurisdictions allow for third-party ownership for energy generation.[121]

The largest benefit of third-party ownership is the elimination of initial up-front costs. For a program targeting LMI households, a contract agreement should ensure that a customer's savings would exceed lease or power purchase agreement payments. These models can require high credit scores, and much of the language utilized in third-party agreements can require significant effort to interpret. High escalator clauses or other contract terms may reduce the level of savings over the lifetime of the investment. The U.S. Department of Energy has funded an effort to compile consumer protection resources and develop plain-English educational resources, which can be used to help LMI residents advocate for their best interests.[122] Although these documents were developed for solar, many of the principles apply broadly to other energy technologies.

Our Community CarShare, administered by the Sacramento Metropolitan Air Quality Management District, aims to provide vehicle access to residents who struggle to pay for gas, might not own a car, and have poor public transit access. The program has placed eight electric vehicles in three affordable housing communities and a local train station. The first 300 qualifying residents to sign up received free membership. The program also installed EV charging infrastructure in areas where it does not currently exist to support usage and increase mobility. Our Community CarShare is supported by grant funds from the California Air Resources Board Greenhouse Gas Reduction fund.

In-community programs: Third-party entities can also offer a variety of community-based programs, including community solar, EV car sharing, or public EV infrastructure. These programs operate similarly to cooperative ownership models described on p. 45. As with third-party ownership for individual homes, financing arrangements for community models may also require high credit scores. Financing models should ideally include a credit enhancement or alternative qualification mechanisms to ensure accessibility for LMI households. In addition, the contracting terms for these agreements may be opaque to general consumers. To counter this, in the State of Minnesota requires a plain-English disclosure to accompany community

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120 Solar Energy Industry Association. Solar Power Purchase Agreements.
121 DSIRE. Third Party Solar PV Policies. NC Clean Energy Technology Center. March 2018.
122 Clean Energy States Alliance. Solar Consumer Protection Reflections and Resource Sections. 2016.

solar offers and has developed a suite of consumer protection resources to help protect individual interests.[123] Additional information on consumer protection is available on p. 58.

Utility ownership

Utilities can increase access to energy technologies and programs through a variety of methods. Utility programs fall into two primary categories.

In-home technologies: Utility-owned in-home programs are a relatively new program design method. Thus far, utilities have experimented with in-home solar installations, and in-home solar+storage and ASHPs are possibilities.[124] Investor-owned distribution utilities are often prohibited from owning generation assets in deregulated markets. Programs where utilities directly own rooftop solar generation assets tend to be approved on a case-by-case basis. Some of the utility-owned solar programs that do exist have been approved because they were focused on LMI populations or other communities underserved by the private sector.[125] Municipal utilities, such as the Los Angeles Department of Water and Power (LADWP), have used similar approaches to launch their "Solar Rooftops" program, which specifically targets areas of Los Angeles with the lowest solar penetration.[126] Municipal or cooperative utilities may have more flexibility in developing utility-ownership programs based on their regulatory structures.

Craft3 is a nonprofit community development financial institution that makes loans to increase the resilience of families, businesses, and communities. It offers a range of products that can compose up to 100 percent financing for energy efficiency projects, including ASHPs. Craft3's Home Energy Loan Program is specifically designed to be accessible to LMI homeowners and others with limited access to credit, but is not restricted to these households. Craft3 uses a combination of traditional (credit score) and nontraditional (utility bill repayment history) underwriting to increase access to credit and homeowners repay the loan through their heating utility bill. Between 2009 and Q1 2018, the program supported approximately 4,000 loans for energy upgrades. More information about this program is available in the companion case study to this guide.

In-community programs: The most frequently implemented utility-owned community-scale program is community solar. The arrangement for utility-owned community solar is similar for that described in the cooperative ownership structure on p. 45, except for that the utility operates the solar and delivers the on-bill credit. Depending on state regulations, utilities may also install and own public

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123 Clean Energy Resource Teams. Subscriber Resources. 2018.
124 Inskeep, Benjamin et. al. Utility Ownership of Rooftop Solar PV. NC Clean Technology Center and Meister Consultants Group on Behalf of the Solar Outreach Partnership. November 2015.
125 Ibid.
126 LADWP. Solar Rooftops. 2017.

EV infrastructure. As aforementioned, there are restrictions on utilities owning generation assets in some energy markets and utility-ownership programs may require approval by a public utilities commission or a legislative action. The participation of utilities in community programs is growing, and most of the utility-run programs are led by municipal and cooperatively owned utilities.[127]

Household ownership

Energy upgrades or programs that involve individual ownership of clean energy technologies have a variety of financing mechanisms that enable participation by LMI households. These mechanisms can be used to target different types of technologies or programs. Each of the financing mechanisms engages a unique set of stakeholders or financing partners, which could include financial institutions, local governments, utilities, and additional third-party actors. This section summarizes the main financing mechanisms that enable LMI individual participation in these programs.

On-bill financing

On-bill financing (OBF) or on-bill repayment is a financing structure in which individuals or households repay a loan for on-site energy upgrades via their utility bill. The original loan can be provided by either the utility or a third-party entity, but in either case, the utility bill serves as the vehicle for repayment. Generally, the customer saves money on their utility bill from the energy upgrade, which is subsequently used to repay the loan.[128]

OBF increases access to financing arrangements because the customer is not required to provide the up-front cost for an energy upgrade and can repay the loan with money saved from the efficiency upgrade, making it accessible to LMI households. The program is only available to homeowners, however, because the loan must be paid off prior to selling the asset, meaning the individual must plan to be a long-term resident (see tariff-based financing below for an alternative financing pathway for renters). In some cases, OBF program participants must also meet credit requirements.

OBF can be used by households to finance on-site energy technology upgrades such as solar, solar+storage, or ASHPs. It can also be used to finance energy efficiency projects that include technology upgrades. OBF cannot be used to finance offsite or community-based programs.[129] For multifamily housing, a promising model combining on-bill repayment with an energy service agreement has recently been tested in Santa Monica, CA.[130]

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127   Trabish, Herman. What Makes Utility-Led Community Solar Programs Successful? Utility Dive. June 8, 2017.
128   EPA. Clean Energy Financing Programs: A Decision Guide for States and Communities. July 2011.
129   An example of a successful OBF Program is Manitoba Hydro's Power Smart Residential Program.
130   Schwartz, Matt et. al. Financing Energy Savings through On-bill Repayment. California Housing Partnership. March 2017.

Pay As You Save or tariff-based financing

Pay As You Save (PAYS)© is a form of OBF, but is distinct as a tariff-based rather than loan-based offering. In a tariff-based program, a utility pays for the energy upgrade and then enrolls the customer in a special program that adds a tariff, or monthly bill charge, to the customer's bill to recover the cost of the upgrade. Because the upgrade is financed through a tariff instead of a loan, the repayment obligation is attached to the electric meter (i.e., the property), rather than the individual. This means that if the homeowner or renter moves, the repayment of the upgrade would be continued by the next occupant, negating a requirement that the program participant own their home or be a long-term tenant.

Additionally, the PAYS model encourages the use of alternative creditworthiness standards that permit participation from households with low credit scores. LMI households can participate because the utility covers the up-front costs of the upgrade and repayment fees are less than the energy savings from the upgrade. PAYS can help alleviate some of the split incentive challenges in residential properties, which are not owner-occupied. The availability of this financing mechanism varies by the utility, as some utilities do not have the billing structures or capabilities required to make a new tariff program.[131] Currently, PAYS programs have been implemented by cooperatives, and in several cases, these programs did have to go through regulatory approval; no IOUs are known to have used PAYS as a financing model.

PAYS increases financing accessibility because the tariff structure is intended to enable participation from LMI homeowners and, most notably, renters, who often face financing barriers. Renters can participate because there is no homeownership requirement, and the repayment stays with the utility meter. PAYS is primarily used

In April of 2016, **Ouachita Electric Cooperative Corporation (OECC)** and its program operator, EEtility, launched **HELP PAYS**®, an opt-in, tariffed on-bill investment program utilizing the Pay as You Save system. In the PAYS model, the utility invests directly in energy efficiency upgrades on behalf of the customer. The utility's costs are recovered over time through a small monthly charge, or tariff, on the customer's utility bill, which is set to be less than the value of the energy savings experienced by the customer. The utility is therefore guaranteed repayment as long as the customer pays their bill. Even if the customer who originally signed up for the program is replaced by another tenant, the new tenant retains a portion of the value of the energy savings as a net reduction in utility costs. HELP PAYS opens participation to customers in multifamily rental housing who would be ineligible for traditional home energy loans. The program has tripled customer participation in OECC's energy efficiency initiative.

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131   EPA. Clean Energy Financing Programs: A Decision Guide for States and Communities. July 2011.

for energy efficiency upgrades or ASHPs. There is interest in using PAYS for rooftop solar or solar+storage projects, but cost-effectiveness or policy barriers have limited examples of implementation. PAYS is assumed to be limited to on-site technologies.

Property Assessed Clean Energy

Property Assessed Clean Energy (PACE) financing is a structure in which the participant voluntarily places a special assessment on their property tax in exchange for up-front financing for an energy improvement. The special assessment is called a "lien," which is a legal claim that grants the lender the right to repossess the property (i.e., the house) if debts are not paid. Importantly, in PACE financing, the lien does not have to be repaid before the asset is sold, meaning a PACE participant can transfer the lien and the energy savings to subsequent property owners.[132] PACE financing must be enabled through state or provincial legislation and authorized at the local government level to be available for residents in a jurisdiction.[133,134]

PACE financing can make energy programs more equitable by improving access to financing for LMI individuals or households. Although the individuals must be homeowners to benefit from PACE financing, it increases the ability of homeowners with lower credit scores or less capital to undertake energy improvements on their households. PACE programs can be administered centrally by a state or quasi-state agency or by a network of third-party providers. Programs may have varying interest rates and terms.

When using PACE in an LMI community, efforts must be made to ensure that the terms and structure of the PACE loans are clear and understandable to community members. California, which has a booming residential PACE market, has recently enacted additional consumer protections for property owners through the legislature regarding plain-English consumer disclosures and repayment terms.[135] These principles could serve as a model to other communities and are exceptionally important for LMI communities, which have seen higher percentages of predatory lending.[136]

PACE is commonly used to finance large-scale on-site technology upgrades such as solar systems and less commonly solar+storage systems or ASHPs. PACE is also frequently used to finance home energy efficiency improvements and could be used to finance multiple improvements as one larger project (e.g., solar and efficiency). PACE is generally not used to finance smaller projects or expenses and is not used to finance projects that are offsite. There have been efforts through the U.S. Department of Energy to develop PACE models for nonprofits, public agencies, such as housing

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132 EPA. Clean Energy Financing Programs: A Decision Guide for States and Communities. July 2011.
133 Department of Energy. Property Assessed Clean Energy Programs.
134 In Canada, as of publication, PACE is currently enabled in Ontario, with bills under consideration in Alberta, Nova Scotia, and Quebec.
135 California State Legislature. Assembly Bill 2693. 2016.
136 Leventis, Greg et. al. Energy Efficiency Financing for Low- and Moderate Income Households: Current State of the Market, Issues, and Opportunities. State and Local Energy Efficiency Action Network. August 2017.

authorities, and other buildings, which serve public interest.[137] In addition, some privately owned multifamily properties have used PACE to finance energy upgrades, which can have energy savings and home health and comfort benefits for renters.

Subsidized loan

In this arrangement, a household's bank loan is subsidized by a third-party entity to reduce financing costs. The loan is funded and serviced by a financial institution (e.g., a bank or a credit union), but offered with better terms, such as lower interest rates or more flexible underwriting standards, than standard loan products. The third-party actor (typically a government entity) provides funding to the loaning financial institution as compensation for the additional risk or lower return created by the loan terms.[138]

Subsidized loans increase financing access by enabling individuals or households with low credit scores or limited up-front capital to receive favorable financing terms. Program design can also include eligibility requirements tailored to LMI households. These loans can be used for a variety of on-site technology upgrades for homeowners, along with energy efficiency improvements. Subsidized loans are technically available to renters, but split incentives make installation of large technology upgrades in-household infeasible. However, subsidized loans can be used to support household participation for renters and homeowners in community-based programs such as community solar.

Rebates

Rebates are direct transfers of money with no repayment required that effectively lower the up-front cost of an energy upgrade. Rebates can be structured in a variety of ways, including price reductions, credits, or refunds, and can be claimed at the point of sale, at project completion, or after project completion (e.g., mail-in rebates). Rebates can be provided by a variety of entities, including a government agency, utility, or a third party (e.g., technology manufacturer or business).[139]

Rebates increase the accessibility of energy improvements by lowering up-front costs, particularly at the point of sale, thereby making the technology more affordable for LMI individuals or households. Rebate program design can include recipient eligibility criteria to ensure that rebate funds are directed toward LMI households. While rebates can be given to both homeowners or renters, split incentive barriers make on-site technology rebates infeasible for renters. Rebates can be applied to a variety of energy programs and technologies. For example, the rebate can be for an on-site technology (e.g., solar or ASHPS) or for community programs such as community solar.

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137 U.S. Department of Energy Solar Market Pathways. Civic PACE. 2017.
138 Mass Solar Loan. Mass Solar Loan Makes It Easy. Massachusetts Clean Energy Center and the Massachusetts Department of Energy Resources.
139 EPA. Clean Energy Financing Programs: A Decision Guide for States and Communities. July 2011.

Credit enhancements

In a credit-enhanced loan, a third party assumes a portion of the loan risk that ordinarily would be assumed by the lender. One common form of this arrangement is one in which the third party creates a loan loss reserve that can be used to cover potential losses incurred by a lender from riskier loans. If the lender's loans are not repaid, they can draw on the loan loss reserve pool to ensure they are made whole.[140] Credit-enhanced loans increase financing access by encouraging lenders to both reduce their underwriting criteria for loans and to offer improved interest rates for individuals with lower credit scores. Program design can include requirements that individuals meeting certain criteria be targeted for credit enhancement.

Credit-enhanced loans can be used for on-site technology upgrades for homeowners, such as solar, solar+storage, and ASHPs, along with energy efficiency improvements. Credit enhancements can also be used to support individual participation in community solar programs.[141]

Split incentives and multifamily housing

Of note, many of the financing program models described in this section could be pursued by owners of multifamily housing. However, the split incentive challenge, described previously in the guide on p. 33, makes it difficult for LMI renters to realize benefits from clean energy technologies installed at the building level. Owners of multifamily housing often face additional barriers to making upgrades including limited budgets for capital investments, challenges aligning project financing with available incentive programs, aging building infrastructure and systems that are not current to the building code, and complicated utility account structures, among others.[142,143] If targeting multifamily affordable housing with a program, local governments and partners should take steps in the design process to think through how to encourage or require benefit sharing between property owners and tenants.

The **Marcus Garvey Affordable Housing Complex**, composed of 32 buildings and 625 units, is located in Brownsville, Brooklyn. Grid constraints cause the area to be prone to extended power outages. To address this issue, the complex installed a microgrid that includes a battery system that can store energy from solar panels and off-peak power purchased from the utility. The microgrid can 'island' from the central grid and provide emergency power for up to 12 hours in certain common areas. In addition to resilience, the program improves grid reliability. The project was part of a larger rehabilitation and energy improvement project for the housing site.

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140 Department of Energy. Credit Enhancements.
141 For an example of a credit enhancement program for solar for homeowners, see the Massachusetts Residential Solar Loan Program.
142 California Delivers. Journalist Guide to Energy Efficiency Investments in Low-Income Multifamily Housing. April 2017.
143 CUNY Smart DG Hub. Marcus Garvey Case Study. Prepared for Solar Market Pathways program. 2017.

In California, the Public Utilities Commission recently approved a Solar on Multifamily Affordable Housing (SOMAH) incentive program, which requires that at least 51 percent of virtual net metering credits from a solar system financed with program incentives go to tenants.[144] Property owners and third-party system providers must also sign a contract to ensure that no additional costs for the solar system will be passed to tenants. In some cases, mission-oriented affordable housing providers have also pursued models of pooling savings from on-site renewable energy projects and investing them into other on-site benefits for residents. Leading nonprofit organizations in this space, such as the California Housing Partnership, focus on providing technical assistance to multifamily property owners to help them pursue clean and efficient energy upgrades for their housing properties while also sharing benefits with their tenants. This intermediary role is important in helping owners of multifamily properties to pursue equitable clean energy improvements.[145]

In addition, communities also have so-called "naturally-occurring affordable housing," which is defined as affordable housing units developed through market forces and operating without public subsidies. If major energy upgrades and improvements are installed in this housing type without legal or leasing mechanisms for benefits-sharing or rent control provisions, the affordability of the housing could be impacted. Policy models, such as California's SOMAH program, which include provisions preventing passing rent increases to tenants, can help mitigate these risks. One particular caution noted by several experts was to ensure that programs that share the economic benefits of clean energy with U.S. renters in HUD-owned housing or using Section 8 vouchers not impact the individual or household income limits that impact their qualification or the amount of rent they are required to pay.[146,147]

Ownership

The financing models outlined in Table 3 are organized based on who owns the clean energy technology: community or cooperative ownership, utilities, third-party, or individual ownership. One ownership model is not inherently more equitable than others; rather, it depends heavily on the financing and program structure around the clean energy technology and the resulting benefits and potential burdens it brings in the short and long run.

Direct ownership of a clean energy technology provides a household or community with the greatest control of the asset and the greatest access to clean energy benefits. In this model, all energy benefits accrue to community members as

144 Adroit Energy. SOMAH Program Resurrects Solar Electric Incentives in California. January 2018.
145 Wang, Stephanie. Interview by Julie Curti and Farrah Andersen. Personal Interview. May 14, 2018.
146 Mullendore, Seth. Interview by Julie Curti and Farrah Andersen. Personal Interview. May 25, 2018.
147 Santiago-Mosier, Melanie. Interview by Julie Curti. Personal Interview. May 31, 2018.

opposed to being split with a third party. This can often translate to deeper savings opportunities and increased energy affordability. Furthermore, if renewable energy development is paired with job training and placement opportunities, project development can benefit the wider community beyond the community owners of energy projects. As a result, some communities view owning their energy generation as a form of energy democracy and wealth building that LMI households, particularly low-income people of color, often do not have access to.[148] In practice, the up-front costs and operations and maintenance expenses may limit pursuit of direct ownership.

Another alternative suggested by the Clean Energy Group is to give highest value to a program structure that will allow communities or households to best "own the benefits" of a clean energy technology.[149] They note that utility and third-party ownership can allow greater access to financing. In the case of third-party ownership, it also opens the door to certain incentives that help drive down the cost of technologies, like the federal solar investor tax credit, which are not directly available to nonprofits who do not pay taxes or to households with too small of a tax burden.[150] If undertaking a nondirect ownership model for financing a program, local governments and partners should carefully evaluate the terms of any agreements, including benefits promised, conditions of those benefits, and any potential short- and long-term risks and obligations to the program participants and administrators. More information on consumer projection is available on p. 58.

Identify sustainable sources for program funding

Apart from the financing mechanism the program will use, municipalities and their partners also need to identify funding for program administration. This may include funding for staff time, outreach and marketing, technical assistance for households, and other elements of the program. Key sources of funding can include:

- **Municipal budget:** Municipalities can choose to fund programs through their municipal budget, either via the general fund or a specific fund within the municipal budget. Particularly where municipalities administer or have a strong role in a program, dedicated municipal funding is an important way to demonstrate commitment to a program and help ensure its stability.

- **Utilities:** Utilities can also be an important source of program funding, particularly where they have a dedicated role in a program and an interest in building their customer engagement with LMI communities.

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148 Center for Social Inclusion. Energy Democracy.
149 Sanders, Robert and Lewis Milford. Owning the Benefits of Solar + Storage. Clean Energy Group. February 2018.
150 Ibid.

- **Third party:** If a program uses third-party organizations for clean energy technology installations, an arrangement could be negotiated where those companies provide funding for general program administration to the local government or partner.

- **State/provincial and federal government:** Program funding can also come from other government entities, either via new or existing programs created at the state/provincial, or federal government, or via one-time grant funding from these entities.

- **Philanthropy:** Local, regional, and national foundations are increasingly interested in supporting municipalities in reaching their sustainability and equity goals. They can provide grant or seed funding to pilot new program ideas.

Equity-oriented clean energy programs are often grant-funded, which can provide a strong launching point for programs, but ultimately more stable and permanent sources of funding are needed to help programs scale and endure.

Determine the program administrator, which could be the local government or a partner

Equity-oriented clean energy programs can be administered by a municipality directly, or the municipality can play a supporting role as a partner. In determining what role to play, local governments can assess their capacity to administer the program and if the program model is one where the municipality would be the best administrator based on the program goals and anticipated structure. Local governments with municipal utilities, for example, are often in a better position to run programs directly than those who need to negotiate partnerships with their investor-owned utilities. Municipalities are also in a strong position to administer programs that draw on their credibility and trust with citizens.[151] An example of this is municipalities administering group purchasing or procurement programs, which have been used in many municipalities for rooftop solar and more recently for ASHPs.[152]

If not administering a program directly, there are many important supporting roles for local governments to play. Depending on the program model, they can provide roof or land space for clean energy installations, particularly on government-owned buildings or government-controlled affordable housing. They can also offer financial support in terms of direct or in-kind funding. Municipalities can play an important role

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151   Sellers-Garcia, Oliver. Interview by Julie Curti. Personal Interview. May 10, 2018.
152   For rooftop solar group purchasing campaigns, see Solarize and for ASHPS, WePowr campaigns.

by helping with program outreach and validation and serve as a convener to bring together different partners.[153] They can also help "connect the dots" on workforce development aspects of clean energy programs and leverage their own supply chain.[154] In all of these supporting roles, local governments can provide input and data to ensure that programs are designed with equity at the fore. The internal and external engagement processes described in Stage 1—Program Design Process can provide the basis for bringing these perspectives to the program design. Additional roles for municipalities in providing support for clean energy can be found in *Pathways to 100: An Energy Supply Transformation Primer for Cities*, which outlines municipal roles in energy supply transformation, including local policy.[155]

Map out customer interaction and access to the program's resources

With key elements decided about how to structure the program, a next step is to map out the full customer interaction process. Key guiding principles related to this step are to make it easy for households to participate, ensure that their participation will minimize any burden—financial or otherwise—on the household, and where possible, offer integration with other support services. Several organizations running clean energy access programs have shared that investing in helping customers through the full program process of bringing a clean energy technology to a household—including outreach, recruitment, application, inspection, installation, and maintenance—has been important to their programs' success.[156, 157]

Mapping out the full interaction process can help municipalities and their partners to anticipate unintended consequences and help ensure a smoother program launch. In this step, the program administrator should determine how many households the program can serve and the timelines for their participation in the program. Program administrators should consider starting small at the outset of the program and consider scaling as the program is tested and piloted.

The **T'Sou-Ke Nation** solar project is a 75 kW solar project that helped the British Columbian First Nation community gain energy autonomy. The project installed approximately 25 solar hot water systems on private residences, three solar PV electricity systems, and included a job training component for members of the community. The project, which was supported by multiple governmental agencies and nonprofits, also incorporated strong community participation throughout.

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153 Baker, Isaac. Interview by Julie Curti and Farrah Andersen. Personal Interview. May 28, 2018.
154 Moore, Michelle. Interview by Julie Curti. Personal Interview. May 29, 2018.
155 Meister Consultants group on behalf of the Kresge, Energy, and Summit Foundations. Pathways to 100: An Energy Supply Transformation Primer for Cities. 2017.
156 Wang, Stephanie. Interview by Julie Curti and Farrah Andersen. Personal Interview. May 14, 2018.
157 Baker, Isaac Interview by Julie Curti and Farrah Andersen. Personal Interview. May 28, 2018.

Build equity into the supply chain via workforce development and procurement

Equity-oriented clean energy programs should bring benefits directly to the households being served by the technologies, but a strong program design should aim to improve equity via workforce and procurement requirements or incentives. Energy project development should support and encourage local job training, economic development, and community skill building in LMI communities, communities of color, and indigenous communities. For example, the Just Transition Collaborative's recent vision report for Boulder included a recommendation that the city track the creation and distribution of green jobs created by its climate action policies, incentivize minority-owned green businesses, and incubate green jobs training programs to foster wealth building within all of Boulder's communities.[158] In the case of Groundswell, a Washington, DC–based nonprofit developing community solar projects, the organization ties solar installer selection to workforce commitment by that installer, which can include hiring and apprenticeship commitments from underserved communities within the municipalities where they work. Groundswell also looks for partnership opportunities with existing workforce programs from area schools.[159, 160]

Establish consumer protection measures to protect LMI households from potential harms

Often clean energy technologies and their associated financing agreements and contracting vehicles are new to consumers. Contracting terms, energy jargon, and economic metrics may be opaque or unfamiliar to community members, which can create unintended consequences for LMI communities.

When the technical content of clean technology programs is difficult to comprehend, program participants lose their ability to effectively negotiate or advocate for themselves and may end up victims of predatory practices. For example, many energy contracts contain escalator clauses, which raise the price of energy generated by renewable energy over time. If the percentage of increase is higher than the expected rate of increase of utility bill prices, LMI consumers could lose money in

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158 Just Transition Collaborative. A Just Transition for Boulder's Climate and Energy Future. University of Colorado-Boulder. December 2016.

159 Moore, Michelle. Interview by Julie Curti. Personal Interview. May 29, 2018.

160 Another Washington, D.C.-based example of a community solar program with a workforce development component is Solar Works DC.

later years of the project. LMI communities have been disproportionately affected by predatory practices, and because of this may be sensitive or hesitant to engage with new actors.[161]

Consumer protection is also important in the case of affordable multifamily properties. If projected savings from an energy project do not materialize, higher operational costs could cut into funds for maintaining the property. Programs can address this issues by requiring performance guarantees for energy improvements and incentivizing the costs of monitoring services for energy improvements.[162]

Like many other businesses, both clean energy technologies and project developers are regulated by a suite of national and state/provincial agencies. Initiatives such as the Sustainable Solar Education Initiative, are focused on helping consumers understand modes of recourse and protection. In addition, U.S. federal law, via the Truth in Lending Act, is designed to increase transparency and accessibility for traditional loan products, but some newer products, such as PACE are not clearly legally obligated to comply with these protections.[163]

Table 4: Available Consumer Protection Avenues in the United States[164]

Finance	Construction/Electrical	Technology	Manufacturing
• **Consumer Financial Protection Bureau** • **Federal Trade Commission** • **Attorney General Offices**	• State Contractor Licensing Boards • Occupational Health and Safety Administration • Local Government Safety and Permitting Protocols	• Federal Trade Commission • Federal Communications Commission • Attorney General Offices	• Federal Trade Commission • National Electric Code • Underwriters Laboratory • Attorney General Offices

Outside of federal action, states and provinces, nonprofits, and the renewable energy industry have taken action through policies and developing consumer-friendly resources in response to consumer protection concerns. For example, the states of California and Minnesota have required consumer-friendly disclosures of contracting terms and developed resources for PACE and community solar, respectively.[165, 166] The Solar Energy Industries Association (SEIA) and the Coalition for Community Solar Access have also prepared consumer negotiating checklists for solar that translate well to other technologies.[167] In parallel, SEIA has set up a dispute resolution process

161   Leventis, Greg et. al. Energy Efficiency Financing for Low- and Moderate Income Households: Current State of the Market, Issues, and Opportunities, p. 27. State and Local Energy Efficiency Action Network. August 2017.
162   Stephanie Wang. Personal Communication. June 27, 2018.
163   National Consumer Law Center. "PACE Energy Loans: Good Intentions, Big Risks for Consumers." 2016.
164   SEIA. Solar Consumer Protection. Presentation on behalf of the U.S. Department of Energy Sustainable Solar Education Initiative. December 2016.
165   California Legislature. Assembly Bill 2693. 2016.
166   Minnesota Public Utilities Commission. Docket E-002/M-13-867. April 2014.
167   SEIA and CCSSA. Residential Consumer Guide to Community Solar. July 2016.

for any installer that is part of its membership and an associated code of conduct, which provide guidance on unacceptable marketing practices and acceptable terms for escalators.[168] This supplements the existing network of protections, since pathways to address consumer disputes for clean energy are not clear in all states jurisdictions.

Municipalities and their partners should carefully consider what type of resources they want to share or develop with residents to support informed program participation in parallel to the selection of program's technology and design. Minimally, programs should make participants aware of the protections available to them under relevant laws and share this information via accessible resources. Programs can also include establishing minimum savings requirements/energy burden reduction goals. Consumer protection and awareness of potential risks can reduce unintended consequences from clean energy programs.

Key Resources for Stage 2—Program Structure

Themes	Resource	Organization	Key Content
• Define program eligibility • Choose financing mechanism • Recruit key program partners	Clean Energy Financing Programs	United States Environmental Protection Agency (EPA)	Provides descriptions and applications for differing program financing mechanisms, as well as a decision tool to help determine effectiveness.
• Refine goals • Define program eligibility • Recruit key program partners	Equity and Energy Efficiency Toolkit	Southeast Energy Efficiency Alliance (SEEA) and the Partnership for Southern Equity	Reviews resources on understanding equity (e.g., equity terms and concepts, measurement, communication), best practices on key topics (e.g., innovative finance, job training, multifamily), and expertise and partners (e.g., corporate, utility, NGO, and others).
• Consider contextual factors • Choose financing mechanism • Recruit key program partners	Community-Scale Energy: Models, Strategies, and Racial Equity	Anthony Giancatarino and Madeleine Adamson; Center for Social Inclusion	Scans a variety of cases of community-driven clean energy programs and associated financing mechanisms. Describes models of community energy financing.
• Define program eligibility • Choose financing mechanism • Map out customer interaction	Program Design Guide: Energy Efficiency Programs in Multifamily Affordable Housing	Philip Henderson; Energy Efficiency for All	A guide for designing energy efficiency programs in multifamily affordable housing contexts. Useful for determining financing strategies and program structure for programs targeting this housing type.

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168 SEIA. Solar Business Code of Conduct. 2015.

Stage 3—Program Implementation and Evaluation

After developing the program structure, the next step for local government and its partners will be to develop a detailed program implementation plan. This section builds on the groundwork laid in the previous two sections, focusing on the key steps that should be undertaken to apply an equity lens for robust implementation planning, program execution, and evaluation. Of note, this guide can be used as a starting point for program implementation and evaluation, but it is not intended to be a holistic resource for these steps. Additional implementation resources related to equitable energy policy are included at the end of Stage 3.

Implementation

Initial program implementation has been divided into three stages: (1) establishing a program implementation timeline, (2) determining roles and responsibilities among implementation partners, and (3) recruiting program participants and beginning to administer the program.

Develop a program implementation timeline

As highlighted in the discussion of Stage 1, allowing adequate time to gather input is critical to building community support for equitable clean energy programs. A similar principle of "going slow" applies for program implementation. Local governments and their partners should anticipate a longer program implementation timeline than expected and map out an implementation process that will work over an extended timeline.[169] This mapping process should consider the implications of a longer timeline, including ways to address the challenges of maintaining support and progress over an extended period (e.g., maintaining stakeholder engagement, allocation of staff and other resources to manage the process, etc.). While extended timelines can create challenges, they also enable more robust program engagement and can help reduce the risk of unintended consequences by increasing opportunities for potential problems or pitfalls to be identified and addressed.

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169 Sellers-Garcia, Oliver. Interview by Julie Curti. Personal Interview. May 10, 2018.

Pilot Programs:

As with many new initiatives, piloting a program can allow the community, municipality, and partner organizations to test the concept and incorporate feedback without expending the full resources required for full-scale implementation. Moreover, implementing an equitable clean energy program may reach historically underserved groups such as LMI communities, indigenous communities, and communities of color with whom the local government has less experience working. A pilot phase may help surface unanticipated needs and provide an opportunity for program adjustments and improvements. Building in time for iterative review and improvement throughout the pilot phase can ultimately support roll-out of a more effective and resource-efficient program.

One framework that can be useful for pilot phase program development is developmental evaluation. Developmental evaluation "supports innovation by collecting and analyzing real-time data in ways that lead to informed and ongoing decision making as part of the design, development, and implementation process."[1] In other words, conducting ongoing data collection and analysis early and continuously allows for program improvements during, rather than after, implementation. Utilizing such a process can produce insights and positive changes as part of the program's real-time development.

1   Parkhurst, Marcie et. al. The Case for Developmental Evaluation. FSG. March 2016.

Determine roles and responsibilities for implementation

Building on the roles established during the program design process and structures stages, the implementation stage also requires a division of responsibilities. Program delivery and efficiency can be improved when team members understand their roles and are empowered and comfortable with advancing specific segments of the work.[170] Specifically, the implementation plan should clearly delineate roles and key tasks for each party in a written format shared with the whole team to ensure clarity and provide accountability.

Figure 3 outlines different roles and considerations for dividing roles based on people's capacities and assets. These roles may be filled by the local government and/or their implementation partners, such as utilities, nonprofits, and community groups. Roles in the program will vary based on the focal technology and program design but it is important that each is led by those internal and/or external partners best suited to the task. Typical divisions of responsibility include: outreach, marketing, finance delivery, home visits and installations, technical assistance, program evaluation, and overall program management. Qualities that position an individual or

170 Erickson, Tammy. The Biggest Mistake You (Probably) Make with Teams. Harvard Business Review. April 5, 2012.

organization to serve in these roles include knowledge, specialized skills, influence, community trust, capacity, and resources. Finally, it is also critical that there is a designated leader (e.g., a nonprofit administrator or city sustainability director) who oversees or directs the entire program.

Figure 3: Sample Implementation Roles and Responsibilites

Potential Roles	Related Capacities and Assets
• Outreach • Marketing • Finance delivery • Home visits and installations • Technical assistance • Program evaluation • Overall program management	• Knowledge • Specialized skills • Influence • Community trust • Capacity • Resources

Recruit program participants and administer the program

Four conditions are critical to ensuring program participation:

1. Residents and/or housing providers are aware of the program;

2. Residents and/or housing providers can envision themselves as part of the program;

3. Residents and/or housing providers believe the program's benefits to be worthwhile; and [171, 172]

4. Cost, time, and other barriers to participation are minimal.

These four conditions hold true in general for a wide range of community-focused programs. However, reaching LMI residents in both multifamily and single family affordable housing may require consideration of additional variables and inclusion of program implementation components that address unique contexts and constraints.[173]

For programs that target residents of multifamily affordable housing, housing providers (either property owners or managers) play a key role. Thus, it is critical to partner with housing associations or other organizations that serve or represent housing providers. Participating in housing association conferences and otherwise collaborating with housing associations can bolster the ability to ultimately reach multifamily residents. [174]

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171   Fish, Ingrid. Interview by Julie Curti and Farrah Andersen. Personal Interview. May 29, 2018.
172   Donnelson, Jimmy. Interview by Julie Curti and Farrah Andersen. Personal Interview. May 18, 2018.
173   Parzen, Julia. Interview by Julie Curti and Farrah Andersen. Personal Interview. May 10, 2018.
174   Wang, Stephanie. Interview by Julie Curti and Farrah Andersen. Personal Interview. May 14, 2018.

The **EmpowerMe** program is an energy conservation and efficiency program that began in 2012, sponsored by the City of Surrey, Canada and its natural gas utility. The program aims to reach homeowners by using an in-language mentor from the community. EmpowerMe uses a peer-to-peer learning model by going to peoples' homes and communities directly. The mentors speak multiple languages

including Farsi, Korean, English, and three Chinese dialects. Through this system, the mentors provide energy efficiency upgrade recommendations, education on water usage and recycling, as well as a free energy saving kit. This unique cultural approach provides coaching on best energy efficiency practices, while also measuring behavior change. Surrey has seen a rise in new Canadians and created the EmpowerMe program to better serve these communities.

Reaching LMI residents directly also poses unique challenges. For example, development of outreach materials should give careful consideration to language and imagery, particularly when addressing communities of color, and indigenous and immigrant communities. Outreach to these communities should also consider the message and messenger. In particular, community mistrust of government programs may prove to be an underlying barrier meaning that municipal staff are not the best choice for presenting material or leading meetings. Some high-level guidance on outreach for reaching residents is provided in Table 5. These strategies can partially address some of these barriers and help build trust by demonstrating commitment to serving these communities.

Table 5: Resident Recruitment Considerations

Condition Required for Success	Component of Outreach	Select Guidance
Residents are aware of the program	Time of day for meetings	• Evenings and weekends are the best time for reaching the widest groups of people.
Residents are aware of the program	Location of meetings	• Near public transportation. • In LMI neighborhoods. • In centers where the community already tends to gather.
Residents can envision themselves as part of the program	Images used in materials and presentations	• Use images of people that reflect the local setting, and the race, gender, and age demographics of the community.
Residents believe the program's benefits to be worthwhile	Message and messenger	• Language—share the message in the language(s) spoken by the community. • Choice of words—select words that align with community organizations' guidance. For example, some organizations have encountered more receptivity to words like "income-qualified" rather than "low-income," or "no-cost" rather than "free." • Accessible—describe the program in clear, simple terms, omitting technical jargon. • Relevance—Frame with reference to the community's priorities identified in Stage 1.[175] Moreover, the program should emphasize opportunities it may create for community members to gain skills. • Trusted source—Build legitimacy by cobranding with agencies or organizations that are trusted by the community. To do so, ask the community which organizations they trust and collaborate with those entities. • Word of mouth—Utilize a referral program or emphasize word-of-mouth in outreach.
Cost, time, and other barriers to initiating participation are minimal	Flexibility of registration	• Offer multiple modes of contact. This includes modes of communication preferred by and accessible to the target demographic, recognizing social media and computer access may be limited for some households. • Provide quick responses to inquiries. • Minimal costs for program initiation. • Minimal documentation required to sign-up. Ideally use qualification requirements aligned with pre-existing programs potential participants are likely to already be enrolled in.

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175 Donnelson, Jimmy. Interview by Julie Curti and Farrah Andersen. Personal Interview. May 18, 2018.

Report back on early wins and tangible impacts

In planning a program's implementation, it can be beneficial for local governments to identify ways to report back on different kinds of "early wins," potentially adopting and tracking progress against interim targets. Demonstrating and publicly communicating initial success can support trust-building in communities, particularly where initial skepticism or low levels of confidence in government agencies may be barriers.

Evaluation and Institutionalization

Once implementation has begun, the program team should begin monitoring and evaluation. Conducting a strong monitoring and evaluation process will ensure that the program team can make course adjustments and program improvements to best meet the community's energy needs in ways that are also efficient for the local government and its partners.

Conduct program monitoring and evaluation

Program staff should first identify a set of quantitative and qualitative metrics and means of collecting data points to measure program success (see Table 2). If the local government team and program partners conducted a strong baselining process in Stage 1, it is likely that those metrics can be applied to ongoing program evaluation with minimal additions or adjustments. Key data points should ideally be gathered on an ongoing basis and analyzed at regular intervals to monitor the program's progress and help the program team identify emerging challenges and make mid-course adjustments. Additionally, the same process—likely with additional metrics and reflection on key lessons learned—should be conducted at the end of the program (or at regular intervals if an ongoing program) as part of a full program evaluation.

Best practices and additional options for designing an effective monitoring and evaluation process include:

- **Leverage and add to the set of metrics used in the program baselining:** While the metrics used during baselining provide a starting point for monitoring and evaluation, program staff may identify additional metrics during program implementation that are important to measuring its success. These additional metrics may be identified through in-depth interviews with program partners, surveys or focus groups with participants, and other feedback mechanisms. For example, LADWP identified 50 additional potential equity metrics to use in its programs after the launch of its Equity Data Initiative in 2016.[176] Some of LADWP's data insights occurred after attempting to measure the impact of existing programs.

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176   LADWP. Equity Metrics Data Initiatives. 2018.

- **Develop or apply a "logic model" to evaluate each component of the program:** Program leadership teams can also consider developing a logic model to thoroughly evaluate all of a program's structure and potential impacts. The diagram in Figure 4 is developed based from a framework provided by the W.K. Kellogg Foundation which describes the differences between program inputs, activities, outputs, outcomes, and impact through an illustrative logic model. Evaluating the program against each component of the logic model can produce a broad-based understanding of whether the program is receiving sufficient support and is delivering on its intended goals.[177] As the whole evaluation system drives toward creating impact, it is worth noting that impacts are often interrelated.
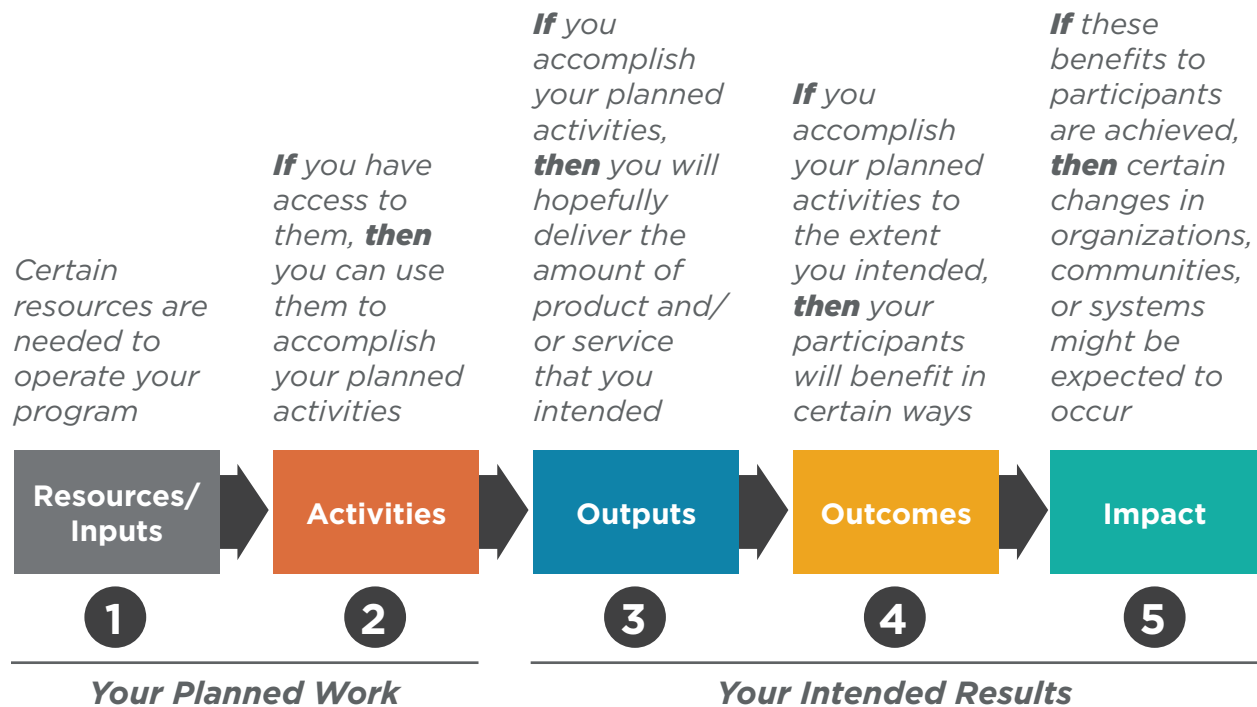
- **Consider models that integrate community members in the monitoring and evaluation process:** For example, participatory action research is an alternative model to traditional evaluation in which community members lead the research and data evaluation process. This approach can be empowering for community members, provide important program feedback and insights, and help build trust among the community, local government, and implementing partners.[178,179]

- **The evaluation process should address the perspectives of both program users or residents, and local governments and their partners:** As discussed in the baselining section of Stage 1, incorporating intersectional equity and demographic breakdowns of data can improve the resulting analyses' usefulness in addressing community challenges regarding equity in the energy transition. Highlighting race, immigrant, and indigenous status in the evaluation steps can further elucidate how the program can be refined to meet the needs of all community members.

- **Communicate program evaluation results transparently:** Transparency plays a key role in maintaining support for community programs. Once the results of monitoring or evaluation have been collected and analyzed, the program team should communicate with the community about the results. Similar to program outreach, communicating results is most effective if shared in straightforward, clear messaging.

177 WK Kellogg Foundation. Logic Model Development Guide. January 2004.
178 MacDonald, Cathy. Understanding Participatory Action Research: A Qualitative Research Methodology Option. Dalhousie University. Canadian Journal of Action Research. 2012.
179 Forbes, Rachel. Advisory Reviewer Input. July 2018.

Figure 4: Program Evaluation Logic Mode

Certain resources are needed to operate your program

If you have access to them, then you can use them to accomplish your planned activities

If you accomplish your planned activities, then you will hopefully deliver the amount of product and/or service that you intended

If you accomplish your planned activities to the extent you intended, then your participants will benefit in certain ways

If these benefits to participants are achieved, then certain changes in organizations, communities, or systems might be expected to occur

Resources/ Inputs	Activities	Outputs	Outcomes	Impact
1	**2**	**3**	**4**	**5**

Your Planned Work | *Your Intended Results*

Logic Model Section: *Example evaluation metrics*

Resources/ Inputs	Activities	Outputs	Outcomes	Impact
• Funding • Financing • Staff time • Partnerships	• Outreach events • Home evaluations • Hotline for residents to request program information	• Renewable energy installations • Improved access to clean transit options	• Savings for LMI households • Reductions in local fossil fuel energy use	• Greater economic prosperity • Improved community health

Upper image adapted from W.K. Kellogg Foundation[180]

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180 WK Kellogg Foundation. Logic Model Development Guide. January 2004.

Develop long-term steps for the program's continuation

If a program has a successful process and outcomes, the program leadership team can consider how best to situate it for long-term sustainability. Institutionalizing the program within at least one organization provides stability for participants moving into proximate years and can help secure the program's longevity. The organization that hosts the institutionalized program may be a city department, nonprofit, utility, or other community partner. The main substeps for institutionalizing the program include:

1. Determine revised program growth goals

- Revisit the original program goals to determine how the program may adjust course or expand its impact moving forward (e.g., seek to reach more participants, improve savings, or accelerate other co-benefits such as job creation). This step should include community engagement for deeper program feedback and evaluation.

2. Select a hosting organization

- The program team can consider where to institutionalize the program based on the long-term goals. Ideally, the program should be housed where there are sufficient institutional resources to support its continued growth. In this case, institutional support is distinct from personal support from individual staff members, which may change with staff turnover or changes in city administration. An emerging option is to sign a community benefits agreement for the program between the local government and a new or existing nonprofit.[181]

- Staff capacity at a hosting organization should ideally support some ongoing program implementation or add such capacity.

- Funding may be a consideration for selecting a hosting organization as well, although both staff capacity and funding may be supplemented from other sources.

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181   Kantamneni, Abhilash. Advisory Reviewer Input. July 2018.

3. Institutionalize funding and surrounding partnerships

- Given that partnerships between several entities underlie many equity-oriented clean energy programs, institutionalizing these partnerships is beneficial. This could be done through simple agreements between the organizations or other avenues.

- Establishing dedicated funding for the program also supports institutionalization. This can be at a larger program level or for each of the partner organizations that contribute to the program. Longer-term funding could be the result of a multi-year grant from a foundation or earmarked funds from local or state government sources.

4. Leave room for flexibility and feedback

- Programs can be more successful and relevant during the long term if feedback loops and flexibility are built into the institutional structure. Shifts may be necessary to address changing community needs, incorporate community feedback, and adapt to changing availability of funds among other potential changes.[182]

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182 A resource for developing flexibility in program implementation is the Collective Impact Framework.

Key Resources for Stage 3—Program Implementation and Evaluation

Themes	Resource	Organization	Key Content
• Recruit program participants • Conduct program evaluation	Electric Vehicles for All: An Equity Toolkit	Greenlining Institute	Provides a comprehensive toolkit for an equitable transition to EVs at the community-scale.
• Implementation • Conduct program evaluation	Low Income Solar Policy Guide	GRID Alternatives, Vote Solar, and the Center for Social Inclusion	Includes resources for implementing a program and evaluating it based on core equity principles.
• Recruit program participants • Conduct program evaluation	Renewable Energy Toolkit for Affordable Housing	HUD Community Planning and Development	Describes a variety of implementation methods, tools, and best practices for developing renewable energy projects in affordable housing contexts.
• Conduct program evaluation	Connecting Low-Income People to Opportunity with Shared Mobility	Michael Kodransky and Gabriel Lewenstein; Institute for Transportation and Development Policy and Living Cities	Provides an overview of shared mobility programs and design/implementation strategies. Of particular interest is best practices on EV program implementation.
• Recruit program participants • Conduct program evaluation • Develop long-term steps	Financing Energy Savings through On-Bill Repayment	Matt Schwartz et al.; California Housing Partnership Corporation	Test for a pilot OBF program for five Santa Monica affordable multifamily properties. Contains recommendations for implementation of the full pilot, which are applicable to a variety of OBF contexts.

Program Design Checklist

The following is a procedural checklist for local governments and their partners to use as a guide through the process of designing and implementing equity-oriented clean energy programs. In addition to completing the steps described, the checklist is designed to correspond to the cross-cutting principles of equitable clean energy program design introduced in this guide. Although no checklist can guarantee equity, following these steps and adhering to the guiding principles can lead to a more equitable process and outcomes for local governments and the communities they serve.

Program Design Steps	Guiding Equity Principles
Stage 1—Program Design Process ☐ **Assemble the team** who will help organize and plan for the clean energy program ☐ Build internal **team alignment** and a shared understanding of equity ☐ Define **equity, goals, and desired outcomes** for engagement and program design from the local government perspective ☐ Gather and assess **baseline data** to inform community outreach and program design ☐ Listen to understand **community goals and existing initiatives** ☐ Partner with **experienced and trusted community organizations** for engagement ☐ Select and deploy **appropriate modes of engagement** and minimize the burden of participation ☐ Communicate about equity and clean energy with **tailored messages** that resonate	1. **Listen and respond** Local governments should first listen to the communities they seek to serve. Program design should be as responsive as possible to the needs expressed by community members, and local government staff should be transparent about their resources. Ideally, this would build from preexisting community connections and engagement, and help define program goals. 2. **Partner with trusted community organizations** Local governments should work with community organizations to design and deliver programs, and where applicable, help build the capacity of community organizations through the partnership. 3. **Recognize structural racism** Programs targeting LMI households will not necessarily serve all disadvantaged populations. Racial analysis and baseline data must be part of an inclusive program design process to understand and address structural barriers that exist beyond income.

Program Design Steps	Guiding Equity Principles
Stage 2—Program Structure ☐ Refine the **sustainability and equity goals** the program will seek to achieve ☐ Define **program eligibility** and who the program will serve ☐ Consider the **contextual factors** that need to be part of the program design ☐ Select the **clean energy technologies** that will be included in the program ☐ Recruit key **program partners** needed to make the program successful ☐ Choose an appropriate **financing mechanism**—or several combined—to use in the program ☐ Identify sustainable **sources for program funding** ☐ Determine the **program administrator,** which could be the local government or a partner ☐ Map out **customer interaction and access** to the program's resources ☐ Build equity into the supply chain via **workforce development and procurement** ☐ Establish **consumer protection measures** to protect LMI households from potential harms	4. **Efficiency first** Programs should ensure LMI households can access energy efficiency benefits as a key step to reducing energy burdens and increasing household health and comfort. 5. **Reduce financial burdens** Programs should not add financial burdens for LMI households and should aim to reduce financial and other burdens. the program design and delivery. 6. **Increase benefits** Programs should seek to deliver services beyond clean energy technologies and capitalize on co-benefits, such as job creation or community resilience for people of color, indigenous communities, and other historically underserved and underrepresented populations. 7. **Make it easy** Program participation should be as easy as possible for any household with effective, efficient, and culturally competent program design, outreach, and delivery. 8. **Integrate with other services** Wherever possible, programs should align with other services for LMI households. 9. **Protect consumers and workers** Programs should have carefully considered consumer and workforce protection elements and consumer education to avoid unintended consequences. 10. **Beyond carve-outs** Programs should do more than set aside a small portion of benefits for LMI households, and where possible, center the needs of LMI households and other historically underserved communities in program design and delivery.

Program Design Steps	Guiding Equity Principles
Stage 3—Program Implementation and Evaluation ☐ Develop a **program implementation timeline** ☐ Determine **roles and responsibilities** for implementation ☐ Recruit **program participants** and administer the program ☐ Conduct **program monitoring and evaluation** ☐ Develop **long-term steps** for the program's continuation	11. **Track progress** Programs should establish and assess against baseline equity data—both quantitative and qualitative—to inform program design, establish metrics, and track progress. 12. **Long-term commitment** Programs should provide support for LMI households beyond installing a clean energy technology, and include structures for helping with technology service, upkeep, and repair.

Appendices

Appendix A: Additional Equitable Clean Energy Program Design Resources

The tables below highlight additional in-depth resources related to topics introduced in this guidebook. The first table outlines resources that apply across multiple stages of program design, while the following two tables reference further resources for Stages 1 and 2 (note that key resources highlighted at the ends of each chapter of the guide are not repeated in this appendix).

Resources Relevant to Multiple Stages of Program Design

Stage	Resource	Organization	Key Content
• Stage 1 • Stage 3	Guide to Equitable, Community-Driven Climate Preparedness Planning	USDN	Provides a detailed overview of strategies and methods for climate preparedness planning, including a racial equity evaluation tool that can be used for internal and community workshops.
• Stage 1 • Stage 2 • Stage 3	Advancing Equity and Inclusion: A Guide for Municipalities	City for All Women Initiative	Resource and guide to incorporating equity and inclusion into municipal operations. Relevant to Stage 1 is chapter 4, "Getting Ready for Change," and chapter 5, "Engage Communities." Relevant to Stages 2 and 3 is chapter 7, "Delivering Inclusive Services," which includes an array of case studies of equitable local government initiatives.
• Stage 1 • Stage 3	Community Energy Resource Guide	Rocky Mountain Institute	Toolkit with strategies for community-based renewable energy planning and implementation. Offers specific resources such as an example community workshop agenda. Particularly relevant to Stage 1.
• Stage 1 • Stage 2 • Stage 3	Equity and Energy Efficiency Toolkit	USDN	Provides a variety of resources for framing, designing, and running energy efficiency programs with an equity focus.

Stage	Resource	Organization	Key Content
• Stage 1 • Stage 2 • Stage 3	Equity in Sustainability: A Scan of Local Government Sustainability Programs	USDN	Includes a high-level overview of equity and sustainability as they pertain to local government sustainability programs and initiatives. Gives a definition of equity. Provides a variety of case studies of successful practices, as well as future recommendations for programs.
• Stage 1 • Stage 2 • Stage 3	Guide to Community Energy Strategic Planning	U.S. Department of Energy	Step-by-step guide for developing a community energy plan, with key roles laid out for local government staff. Includes how to incorporate community energy plans into broader municipal planning and budgeting efforts.
• Stage 1 • Stage 2 • Stage 3	Racial Equity Strategy Guide	Portland City and Bureau Leadership	Based on Portland's work advancing racial equity in sustainability, this document provides strategies for integrating equity into program design and implementation.

Stage 1—Additional Program Design Process Resources

Themes	Resource	Organization	Key Content
• Built internal local government team alignment • Listen to understand • Communicate with tailored messages	Equity Foundations Program	USDN	Five-part series to support training for sustainability managers on incorporating racial equity into sustainability planning and practice.
• Gather and assess baseline data • Listen to understand	Focus On: A Proportional Approach to Priority Populations	Public Health Ontario	Guide to identifying priority populations using a "proportionate universalism" approach.
• Gather and assess baseline data	Housing and Transportation (H+T) Affordability Index	Center for Neighborhood Technology	Provides an expanded view of affordability in U.S. neighborhoods nationwide based on housing and transportation costs at the neighborhood level.
• Gather and assess baseline data • Listen to understand • Appropriate modes of engagement	Racial Equity Framework	Greenlining Institute	Provides definitions of diversity, equity, and inclusion for the implementation and practice of racial equity. Includes a set of four Ws for goal setting in diversity, equity, and inclusion advocacy in a racial equity context.
• Gather and assess baseline data	Selecting Indicators to Measure Energy Poverty	Trinomics	Overview of energy poverty as a concept and how it can be measured.
• Listen to understand • Appropriate modes of engagement • Communicate with tailored messages	San'Yas Indigenous Cultural Safety Training	Provincial Health Services Authority	Training in core competencies for public health professionals working with indigenous communities. Has broad applicability to engaging with indigenous communities in the Canadian context.
• Gather and assess baseline data	U.S. EPA Air Quality Index	EPA	Tool to determine U.S. communities' relative air quality.
• Gather and assess baseline data	Vital Signs and Associated Common Data Portal	Community Foundations of Canada	Annual report of community-level social and demographic trends in Canadian communities.

Stage 2—Additional Program Structure Resources

Themes	Resource	Organization	Key Content
• Choose financing mechanism • Build equity via workforce development	Climate Solutions That Work	Toronto Environmental Alliance	Report on best practices for leveraging investments in climate actions to generate community benefits. Contains case studies of effective program design for community benefits and workforce development.
• Recruit program participants • Select technologies	Electric Vehicles for All: An Equity Toolkit	Greenlining Institute	Comprehensive toolkit for an equitable transition to EVs at the community-scale.
• Define program eligibility • Consider contextual factors • Choose financing mechanism	On-Bill Energy Efficiency	ACEEE	Discusses different OBF mechanisms and strategies to overcome split incentives for energy efficiency programs.
• Choose financing mechanism • Select technologies • Recruit key program partners	Our Powers Combined: Energy Efficiency and Solar in Affordable Multifamily Buildings	ACEEE	Includes several case studies of affordable multifamily building owners using investments in solar projects to leverage energy efficiency upgrades.
• Select technologies	Resilient Solar Powering and Empowering Communities	Institute for Sustainable Communities	Provides a series of case studies in resilient solar programs, emphasizing aspects community partnerships.
• Choose an appropriate financing mechanism	Report: Inclusive Financing for Efficiency and Renewable Energy	Institute for Loan Self Reliance	Overview of tariff-based financing for energy efficiency and renewables; includes cases of tariff-based financing in action.
• Choose financing mechanism	Review of Renewable Energy Investments in Social and Affordable Housing	Toronto Sustainable Technologies Evaluation Program	An evaluation of renewable energy investments in affordable housing in Ontario, including lessons learned from implementation.

Appendix B: Local Government Readiness Assessment

The goal of this exercise is to begin assessing your municipality's readiness to work on equity and energy transformation. The questions below are suggestions for guiding group discussion within your department or municipality to understand internal readiness, an equity baseline, program partners, and past community engagement.

Internal readiness: Is your municipality ready?

- Who on your municipal staff is interested in working on equity and energy?

- Have you done any internal work on equity before (e.g., e.g. staff trainings, discussions, goal-setting)?

- If not, what type of work do you think you need to do internally on equity?

- Who else will you need to get buy-in from internally?

Baseline: What are your local government's goals for energy equity?

- What do you perceive as your community's greatest equity needs related to energy?

- What data do you have to help you understand who is benefiting and who is burdened by the status quo? What data do you need?

- Who in your community do you want to serve via your work on energy equity?

- What are some preliminary goals you are thinking about for advancing energy equity in your municipality?

- Are there specific clean energy technologies of interest?

Partners and community engagement: Who do you need to collaborate with?

- What partners do you need to do this work?

- What previous engagement efforts could you build on? Or, what new engagements and relationships will you need to build?

- What challenges have you experienced with community engagement in the past? What has worked well?

- Do you think your local government will host clean energy programs or partner with organizations to implement clean energy programs?

Photo Credits

FRONT COVER: GRID Alternatives. *GRID Alternatives solar energy installation on Sankofa House.*

p. 2: Jennifer Green, *Burlington Kids Day.*

p. 6: Kertis Creative, *Empower Kentucky Plan 2016 2-day summit workshop.*

p. 7: Resonant Energy, *Solar on a multi-family affordable housing building in Boston.*

p. 15: Kertis Creative, *Empower Kentucky Plan 2016 2-day summit table talk.*

p. 23: Forth, *Hacienda CDC Cully Car Share ribbon cutting ceremony.*

p. 24: Kertis Creative, *Empower Kentucky Plan 2016 speaker.*

p. 29: GRID Alternatives. *GRID Alternatives solar energy installation on Sankofa House.*

p. 33: Kentuckians For The Commonwealth, *"Power House Workshop" energy efficiency kits.*

p. 36: Kentuckians for the Commonwealth*, A member of Kentuckians For The Commonwealth shares energy efficiency tips during a workshop in eastern Kentucky.*

p. 37: City of Fort Collins, *Colorado Energy Office and GRID Alternatives Solar-A-Thon rooftop solar panel installation.*

p. 39: City of Fort Collins, *Colorado Energy Office and GRID Alternatives Solar-A-Thon event participants.*

p. 40: Jeremy Koo, *HeatSmart CoolSmart Somerville, workshop speaker.*

p. 43: GRID Alternatives, *A family helping to install community solar.*

P. 49: Groundswell, *Human Centered Design session feedback interview.*

p. 54: Sally Barros, *Bay Area Home Upgrade program workshop.*

p. 56: Jeremy Koo, *HeatSmart CoolSmart, Somerville table presentation.*

p. 61: Forth, *A mother and child at the Hacienda CDC Cully Car Share event.*

p. 62: Laura Armstrong, *City of Aspen EV test drive event.*

p. 65: Empower Me, *Empower Me® Energy Mentor visits families at home.*

p. 65: Fotolia, *Heat pump condenser - summer.*

p. 68: Sally Barros, *Bay Area Home Upgrade program workshop.*

BACK COVER: Forth (photo). *A Honda Fit EV for the Cully Car Share program parked in front of electric vehicle supply equipment.*