

THE MUNICIPAL UTILITY

Community Solar Workbook



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PREPARED BY

American Public Power Association, Arlington, VA
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The American Public Power Association's Demonstration of Energy & Efficiency Developments program funds research, pilot projects, and education to improve the operations and services of public power utilities.



The American Public Power Association is the voice of not-for-profit, community-owned utilities that power 2,000 towns and cities nationwide. We represent public power before the federal government to protect the interests of the more than 49 million people that public power utilities serve, and the 96,000 people they employ. Our association advocates and advises on electricity policy, technology, trends, training, and operations. Our members strengthen their communities by providing superior service, engaging citizens, and instilling pride in community-owned power.





APPB and the National Community Solar Partnership

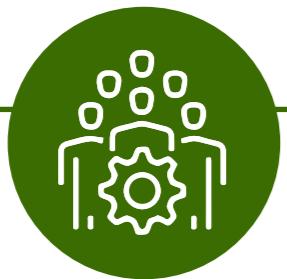
The American Public Power Association (APPB) is a partner in the National Community Solar Partnership (NCSP), an initiative led by the U.S. Department of Energy's (DOE) [Solar Energy Technologies Office](#). A leader of the NCSP Municipal Utility Collaborative, APPB works with public power stakeholders to identify and address common barriers to community-based solar.

Through this Collaborative, APPB coordinated a [Municipal Utility Community Solar Working Group](#). Seven public power utility organizations participated in this working group, and working sessions included monthly calls from April through December 2021 to learn how to develop a business case for an exploratory or site-specific community solar project. This workbook, published in July 2022, pulls resources and information from those calls as well as from the knowledge of the DOE, the National Renewable Energy Laboratory (NREL), and APPB staff. In it, you will find processes, materials, and considerations you can use to explore the possibility of community solar at your utility.

For more information on community solar or to join the National Community Solar Partnership, please visit www.energy.gov/community-solar.

Equity Considerations

This workbook regularly references how to prioritize equity in your community solar project. Community solar can be an effective tool to reduce **energy burdens** for customers living in **low- to moderate-income (LMI)** households by providing cost savings. It can also address other **environmental justice (EJ)** priorities, such as providing access to nonpolluting energy sources in **Black, Indigenous, and People of Color (BIPOC)** or other historically excluded and under-resourced communities. Many of the topics explored in this workbook intersect with and impact the goal of increasing equitable access to renewable resources.



In the Equity Callouts within each chapter of this workbook, you will find tools, resources, and information that you can use to create a community solar project that prioritizes equity and acknowledges the variety of backgrounds, needs, and preferences of LMI and BIPOC communities.

Relevant definitions include the following:

Low to Moderate Income: According to the **Community Reinvestment Act**, a low-income individual is someone whose total annual income is 50% or less of the area median income (AMI) of where they live. A median-income person is someone whose total annual income is above 50% but less than 80% of their metropolitan area's or state's AMI. Neighborhoods and geographic areas can also be defined as LMI according to the percentage of people living there who meet the low- or median-income definitions.

Environmental Justice (EJ): Environmental justice is the movement and practice of ensuring everyone has the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment. The **Department of Energy (DOE)** and the **Environmental Protection Agency (EPA)** both currently have EJ-focused programs. The DOE conducts regular stakeholder engagement with communities and integrates EJ considerations into its programs, and the EPA facilitates collaborative partnerships and awards EJ-focused grants.

Black, Indigenous, and People of Color (BIPOC)

Communities: BIPOC is an acronym that encompasses non-White, racially marginalized communities in the United States. Because Black and Indigenous people face unique hardships in the United States and Canada, this acronym specifically highlights those communities while encompassing communities of color in general.

Energy Burden: Customers living in LMI households have a higher **energy burden** than other customers, that is, they must spend a higher percentage of their income on energy costs. The Department of Energy's **Low-Income Energy Affordability Data (LEAD) Tool** allows users to explore which areas have the highest energy burden based on their income. Historically, **low-income, Black, Latinx, and Native American households** as well as **multifamily and renter households** have higher energy burdens than other households. These communities are also often disproportionately impacted by environmental pollution, and **energy equity work should prioritize EJ** for these communities.

THE MUNICIPAL UTILITY Community Solar Workbook

This workbook provides an overview of the process for developing a community solar project or program for municipal utilities. The topics are organized into seven chapters that may be explored in order or by topic of interest. The chapters included in this workbook are:



To provide comments or feedback on this workbook or its content, please contact DEED@PublicPower.org.

Chapter 1 **DEFINING COMMUNITY SOLAR PROJECT GOALS & OBJECTIVES FOR YOUR UTILITY**

Using a set of starter questions, explore potential goals and objectives to serve as a framework for the design and implementation of your community solar project.

Chapter 2 **GAUGING MARKET POTENTIAL & CUSTOMER APPETITE**

Learn about methods and tools to use to better understand your customer base and their interest in and motivations for engaging in community solar.

Chapter 3 **CHOOSING A COMMUNITY SOLAR PROJECT SITE**

Evaluate potential sites for your community solar project by their physical characteristics, local regulations, and community preference.

Chapter 4 **INVESTIGATING PROGRAM DESIGNS & SUBSCRIPTION MODELS**

Explore different elements of community solar program and subscription design and understand how different design choices impact your project's goals.

Chapter 5 **EXPLORING PROJECT ECONOMICS & FINANCIALS**

Learn how to conduct an analysis of the technical solar potential of your project site and the economics of your chosen program design and goals.

Chapter 6 **DEVELOPING REQUESTS FOR PROPOSALS & PROJECT TIMELINES**

Learn how to develop a Request for Proposal (RFP) for your community solar project that prioritizes your program goals.

Chapter 7 **CONSIDERING MARKETING, CUSTOMER ACQUISITION, & PROGRAM IMPLEMENTATION**

Learn how to create a marketing plan for your community solar project to support subscriber acquisition in your service territory and how to set up billing and subscription management to support project financials and customer needs.

Appendix I **FACILITATOR QUESTIONS**

Use these questions as a foundation for community solar workshops to facilitate discussions about the potential of community solar projects with participants.

Appendix II **FURTHER RESOURCES**

Browse more resources, studies, websites, and toolkits sorted by chapter to help evaluate and design your community solar project.

CHAPTER 1

Defining Community Solar Project Goals & Objectives for Your Utility



Section I: Learning Objectives

In this chapter, you will:

- Learn about the status of community solar in the public power sector
- Build foundational knowledge of your utility's unique situation and service area
- Begin the process of identifying your project's key objectives, design, and regulatory and approval processes



Section II: Background on Community Solar

The U.S. Department of Energy's (DOE) September 2021 [Solar Futures Study](#) concluded that to fully eliminate emissions from the electric grid, solar will need to supply about [40% of U.S. electricity by 2035](#) and [45% of U.S. electricity by 2050](#). However, [49% of households and 48% of businesses cannot host a photovoltaic system on their property or do not](#)

[have sufficient demand to warrant constructing one off-site](#). These customers can still participate in solar through community solar projects. Community solar is defined by the DOE as any solar project or purchasing program within a geographic area in which the benefits flow to multiple customers. In most cases, customers are benefiting from energy generated by solar panels at an off-site array. These medium- to large-scale solar installations take advantage of economies of scale to deliver cost-effective solar to multiple customers who subscribe to the project.

In 2021, the DOE set a target to enable community solar to power the equivalent of 5 million households and generate \$1 billion in energy bill savings by 2025. The [National Community Solar Partnership \(NCSP\)](#) provides market data, resources, peer networking, and technical assistance to support reaching this target and to ensure that projects incorporate the core benefits of community solar, including energy burden reduction, low- to moderate-income (LMI) household access, resilience and grid benefits, community ownership, and equitable workforce development.

There are numerous ownership and management models that public power utilities may use to develop a community solar project. The utility may choose to finance, install, own, and maintain the solar system themselves, as well as manage the customer subscription and billing process. A third party can also be used for any of these elements. These management models influence how the benefits of the community solar program are communicated to subscribers. Customers may see the solar production on their utility bill or on a separate statement, depending on the entity that runs the administrative side of the program. Public power utilities, which [serve one in seven electricity customers in the United States](#), have the opportunity to provide customers with access to the core benefits of renewable energy through community solar. The first step for these utilities is to define their goals and objectives as they build the framework for later decisions regarding project siting and development, ownership and subscription models, and customer management.

Section III: Recommended Process

Use the following action items to begin building your plan to implement community solar. The starter questions in step 1 will help you determine your organization's goals and objectives for a community solar project. Your answers are the foundation on which you will build the project design, financing, and development plan.

Action Items:

 **Answer the starter questions** to the best of your ability. Later chapters cover these topics in detail, so you can continue to refine your answers as you progress through this workbook.

 **Summarize the foundational knowledge** that you compiled while answering these questions. You may use this foundational knowledge to develop formal or informal statements of your goals and objectives for your community solar project.

 **Refer to the foundational knowledge** throughout the planning process. Keeping your goals and objectives in mind, move to the next chapters to begin planning the details of your community solar project.

Starter Questions:

1. What are the **key objectives** for your community solar project? Potential objectives include:
 - Advance **equity and inclusion**
 - Generate local, low-cost energy
 - Create customer cost savings
 - Address customer demand for shared solar
 - Provide backup power to community buildings
 - Show environmental benefits or leadership
 - Encourage community participation in clean energy
 - Increase local generation to reduce utility peak demand charges
 - Support renewable portfolio standard (RPS) goals
 - Other (e.g., provide shading, demonstrate dual land use, etc.)
2. Which **customer types** will be invited to subscribe to the project?
 - Residential
 - Low- to moderate-income (LMI) households (see Equity Callouts in each chapter for specific strategies to prioritize LMI household inclusion)
 - Commercial
 - Industrial
 - Nonprofit entities
3. Will there be **multiple customer classes** served by the same project (e.g., commercial and residential customers in the same program, customers on different utility rates)?
4. Would a new **rate design** be required for your customers to participate in community solar?

5. Do you aim to have an **anchor tenant**? (Anchor tenants are often commercial, nonprofit, or other large, reliable subscribers that reduce the risk of the community solar project.)
6. Are you considering adding **battery storage** to the community solar project?
7. What are the **regulatory restrictions or approval processes** that need to be considered in developing a community solar project?
 - Does the utility have authority to implement a community solar program?
 - What are the timing considerations or restrictions? Are there important dates to consider? (For example, consider budget cycles and dates of committee or city council approval processes.)
 - What documents will approving managers and/or city council need?

Section IV: Additional Resources

Community Solar Overview

Download this PowerPoint presentation (Municipal Utility Community Solar Working Group Session #1, April 28, 2021) to learn about the status of community solar across the United States and better understand how to define your utility's community solar project goals and objectives.

[Download the presentation.](#)

Organizational Solar Readiness Assessment

A self-assessment will help you determine where your utility is in the process of developing a solar project. This assessment is designed for Multifamily Affordable Housing projects, but it is relevant to multiple solar program designs.

[Take the readiness assessment.](#)

Municipal Utility Community Solar Case Studies

In Lessons Learned: Community Solar for Municipal Utilities, the National Renewable Energy Laboratory presents real-life experiences of three municipal utilities that developed community solar programs and how they dealt with the challenges they faced.

[Read the case studies.](#)

The Sacramento Municipal Utility District shares best practices learned from the community solar program they created, the Solar Value Project, Community Solar Value Project: The Process.

[View the webinars.](#)



Find more resources in Appendix II: Further Resources

CHAPTER 2

Gauging Market Potential & Customer Appetite



Section I: Learning Objectives

In this chapter, you will:

- Become familiar with the different ways your customers can access solar energy and historic levels of participation among your customers in different types of voluntary programs
- Gauge the market potential for community solar in your service area; consider the following:
 - Potential number of subscribers
 - Types of subscribers/customer classes
 - Existing programs (can be used as benchmarks)
- Learn how to gauge interest and solicit feedback on potential community solar programs via customer surveys (sample survey on next page)

Big Sun Community Solar — Survey																																						
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FIGURE 2.1.

Example survey. (Courtesy of the Texas Energy Poverty Research Institute (TEPRI) and Big Sun Solar.)

Section II: Recommended Process

The following action items will guide you through the process of deciding if community solar is right for your service territory. In addition, you can use these steps to better understand your customers' thoughts on the features to include in a community solar project.

Action Items:

 **Assemble your team.** Reach out to your marketing or customer service program representatives and involve them in the process of collecting background information and gauging customer interest and market potential.

 **Answer the starter questions** to better understand your customer base and learn more details about any previous community solar research your utility has conducted or existing projects in which your utility is involved.

Starter Questions:

1. How many solar customers do you already have?
2. What are your existing solar programs?
3. Where are there gaps in the current programs for specific customer groups (low- to moderate-income [LMI] households, renters, etc.)?

4. What are the demographics in your service area?
5. Do your stated goals for community solar align with your customer base?
6. What are the unique characteristics in your service area that may impact subscriber interest in community solar?
 - For example, language barriers and lack of background knowledge of community solar may impact customer engagement, interest, and response. Consider these characteristics when designing your outreach — you may need to include additional information and infographics (in multiple languages) as part of your customer outreach. Tailor your outreach to your community.

7. Do you have any results from previous customer surveys or market research?
 - Use these previous surveys or research as a starting point. What worked to engage customers? What did they respond positively to? What kind of outreach garnered the most response? Use previous lessons learned as a baseline when starting to create outreach.

 **Design market research approach.** Using the background knowledge you collected about your utility, its service area, and your customer base, design a plan of action for evaluating customer interest and needs.

SURVEY DESIGN TIPS

Use the [Market Research and Market Segmentation for Community Solar Program Success](#) brief created by the [Community Solar Value Project](#) to help you design your approach. Consider the following suggested methods for evaluating customer interest and needs:

1. **Create surveys** (see pages 19–20 in the Market Research and Segmentation brief):
 - Draft questions and prepare the vehicle (Facebook poll, online survey, town hall, event booth, focus groups, etc.) you will use to gauge interest in your service area. View a sample survey in Figure 2.1.
 - Speak with actual customers to understand their needs and barriers. Listen to and speak with them from a place of respect, authenticity, and relevance.
 - Partner with community organizations that have established relationships and are trusted by target customers. Draw on their experience and expertise to validate the approach and to execute the strategy. Collaborate with these partners to educate and generate interest in the program.
2. **Collect existing statistics** (see pages 6–17 in the Market Research and Segmentation brief):
 - Improve your understanding of the daily circumstances facing people living in low-income households across the geographic area. See [TEPRI's 2017 Energy Poverty Research Landscape Analysis](#) for an example.
3. **Employ primary market research**, such as focus groups, to ensure that the program design fulfills specific community needs. See pages 18–21 in the Market Research and Segmentation brief.
4. **Collect qualitative feedback from your community** by engaging with customers where they already gather (e.g., community centers, faith-based institutions, community organization meetings). Find information on stakeholder engagement strategies at [SolSmart's Stakeholder Engagement](#) site.

Implement your market research approach.

When distributing the vehicle to your customer base, active outreach that prompts your customers to respond may be necessary. Part of this active outreach could include attending existing community meetings or events as well as partnering with local organizations (see [Equity Callout](#)).

- Consider leveraging your anchor tenants in outreach about the project (i.e., nonprofits and businesses).
- Target current commercial customers of green power purchase programs.
- Engage local clean energy, climate action, or equity advocacy groups.
- Work with community hubs such as poverty assistance organizations, faith-based centers, and other community groups.

Engage your community.

Identify local organizations that can help you communicate with and engage the community. Build new partnerships with established stakeholder groups that have a mission of environmental stewardship or with specific stakeholder groups.

 **Explore your data.** Analyze the data you receive through this process to gain an understanding of your customer base's needs and market potential for community solar.

- Use a combination of survey results, census data, and other relevant information from local partners to identify income-eligible households to target.
- Spatially identify distribution of the target households in the community by income, demographics, energy burden, and risk profile to target marketing efforts.
- Use the insights and customer data for existing programs, such as low-income weatherization programs, in which customers have already expressed interest along with the data and results from your outreach.

 **Put findings into action.** Take the lessons that you learned from analyzing these outreach results and use them to begin creating your program siting, design, financing, customer acquisition, and marketing plans (see workbook Chapters 3 through 7).

LANDSCAPE ANALYSIS TAKEAWAYS

See takeaways from [TEPRI and Go Smart Solar \(GSS\)'s landscape analysis](#) on existing community solar models.

1. Define customer eligibility.

- Early in the design process, establish eligibility criteria for participating in the community solar project.
- Reduce administrative costs by utilizing existing low-income programs for eligibility.
- Use additional community-specific market segmentation criteria to focus limited project funds on groups most suited for the programs. Based on market assessment, target participants of existing programs or nonparticipating customers for complementary benefit.

2. Design your program.

- Remember that immediate bill savings and no upfront costs encourage low-income participation.

- Note that community-owned models offer low-income customers the opportunity to build wealth and to build credit when taking out a loan. There are only a few ownership model examples for low-income groups, and they are often subsets of projects primarily designed for all income groups.
- Emphasize project design aspects found to encourage participation, such as minimal initial costs, unrestrictive eligibility by renters and owners, and immediate savings.
- Consider risk mitigation strategies that provide a nonpunitive termination option for low-income customers.
- Design programs to ensure consumers can monetize tax credits, rebates, and/or down payment assistance.

continued on next page...



Landscape Analysis Takeaways continued...

3. Diversify your customer base.

- Projects with a diversified mix of customer types are in a better position to achieve efficient project financing structures. A high concentration of low-income customers may require grants and/or public funds to reach the same level of efficiency.

4. Build community trust in your program.

- Transparency about costs, pricing schedules, loan terms, and commitment timelines is critical in low-income customer outreach.
- Community partnerships are key to building trust and ensuring that community needs are being represented.
- To enhance familiarity and trust, associate the project with existing federal or state incentivized programs or utility-administered low-income programs.

5. Market your program.

- Embed messaging in preexisting channels such as mail, websites, public spaces, and community events.
- Co-market the low-income community solar program with other programs and services that have the same or overlapping market segments.
- Incentivize word-of-mouth publicity by offering referral rewards or discounts.
- Introduce redundancies in outreach channels; use multiple modes of communication including mail, social media, and radio announcements in different languages.
- Tailor the project narrative to speak to diverse local needs and customer preferences.

- Make customer financial expectations concise, clear, and transparent while marketing the program so as to overcome the perception of the program being “too good to be true” or possibly predatory.
- Incorporate nontangible benefits in addition to cost savings, such as benefit to the local environment and future generations.



EQUITY CALLOUT

- Note that unless you already have a strong relationship with customers in LMI households, direct outreach may be less effective than mobilizing existing community groups that have built trust with these communities over time (community centers, churches, etc.). See the [Community Outreach and Solar Equity: A Guide for States on Collaborating with Community-Based Organizations from the Clean Energy States Alliance](#) for best practices and principles for developing relationships with community groups.

- Do not assume that customers in LMI households have different values than the broader customer base:
 - In a [research study of solar adopters](#), findings suggest that customers in LMI households may be just as concerned about climate change and environmental stewardship as other groups.
 - In a [landscape analysis](#) conducted by the TEPRI and GSS, low-income energy customers reported caring about and prioritizing upfront cost savings, "maintenance and monitoring (at no additional costs)," and "clean energy for a cleaner future."
- Consider presenting pricing models, especially opportunities to invest in projects, to customers in LMI households early on as you educate them about community solar. For more details, please see Chapters 4 and 5 of this workbook.
- Make sure that your knowledge collection process is an exchange between you and your respondent. For example, you could offer survey respondents some form of monetary compensation as a thank you for their time and information.
- Do not end your outreach once you have gotten feedback and responses from your community. As a part of your community solar project, continue to ask for feedback and talk to the customers you serve, especially customers in LMI households. Keeping your customers informed and engaged in all aspects of your community solar project ensures that they will be invested in the project and assist in its success and growth.
- When selecting areas to prioritize for community solar outreach, use the [Department of Energy's Low-Income Energy Affordability Data \(LEAD\) Tool](#) to explore which areas, communities, and neighborhoods have the highest energy burden based on their income.

Section III: Additional Resources

Landscape Analysis and Lessons Learned

Download the following presentation (Municipal Utility Community Solar Working Group Session #2, May 26, 2021) to review key findings from a landscape analysis of industry, government, and scholarly publications about and lessons learned from existing low-income community solar models across the United States.

[Download the presentation.](#)

Understanding Energy Poverty

This landscape analysis of energy poverty research provides further information on the unique priorities and behaviors of LMI households as well as guidance on designing programs that address LMI energy burdens.

Stakeholder Engagement

This toolkit provides a brief overview of the different formats for convening and engaging stakeholders as well as prompts for discussing solar energy with community members.

 Find more resources in Appendix II: Further Resources



CHAPTER 3

Choosing a Community Solar Project Site



Section I: Learning Objectives

In this chapter, you will:

- Learn how different site characteristics impact project costs and benefits
- Become aware of issues relevant to different land types
- Consider the pros and cons of siting on public property versus private property
- Use available tools and resources to identify potential sites in your jurisdiction
- Determine rooftop feasibility for solar
- Understand how to prioritize equity and inclusion in site selection
- Explore how to create public awareness and educational opportunities
- Consider interconnection issues and opportunities, grid capacity, and costs when siting distributed generation

Section II: Recommended Process

 **Find potential sites.** Based on your current knowledge, create an exhaustive list of potential sites for community solar in your jurisdiction. Consider the following questions.

- To what private and public properties do you have access?
- Are there local partners or landowners who may be interested in a land-use partnership?

 **Narrow down sites by looking at physical feasibility.** Create a site and development planning summary by collecting and organizing information about your potential sites using the following process and the expertise of the solar development community. Compare sites and understand which ones will be best suited for the installation. Find more details about the following listed items in [this PowerPoint](#) on solar project siting from the National Community Solar Partnership (NCSP) Municipal Utility Working Group.

- **Get an aerial view.** Use [Google Maps](#) to visualize the current layout of your proposed sites.
- **Clarify the authority having jurisdiction (AHJ).** Assessor records, plat maps, site plans, and other maps and documents can clarify which jurisdiction has authority over land development on a site.
- **Site conditions.** Investigate the characteristics of the site, such as its topography, the surrounding land use, and vegetation so that you understand any site constraints or conditions you will have to work with.
 - What is the topography of the site? Is it level?
 - If applicable, what are the surrounding land uses? Are there adjacent residential properties? Where is the point of interconnection?
 - What kinds of vegetation are on the site? Are there trees that will need to be cut down? Are there trees or buildings on adjacent properties that will cause shading?
- What type of stakeholder engagement might be required with adjacent property holders? Are nearby landowners amenable to solar development in their backyard? Do you need to consider deals with them to get their sign-off (planned vegetation, wildlife habitat, energy offers, etc.)?
- Are there abandoned pipelines, wells, or irrigation ditches that could be site constraints? (This information may be shown on historic maps of the area.)
- **Zoning (AHJ zoning map, zoning code).** Research the zoning laws that apply to your site and the surrounding areas.
 - How is the site and any new interconnection line pathway zoned? What forms of development are allowed in this zoning district? Is large-scale solar allowed as a primary or accessory use? Is a special or conditional use permit or re-zoning required? Do you need or have a utility easement for access to the site?

- **Land use plans (AHJ comprehensive plan and area plans).** Find out what the future goals and land use plans for the site are.
 - Does the proposed solar development align with comprehensive plan goals and land use plans for the site? For example, look at the transportation and residential plans for your potential site.
- **Master plan, site plans.** Examine the master plan and other plans specific to the district.
 - Are there other uses for the potential site? Is solar development in conflict with other plans for the site?
- **Soil data.** Inspect the soil conditions of your potential site, as they impact structural design and site feasibility.
 - Additional site studies may be required to survey for potential impacts. Caliche or bedrock may require costly drilling. Sandy soils may require deeper post embedment to meet wind and snow loading requirements. Corrosive soils can require additional measures to protect embedded steel posts.
- [U.S. Department of Agriculture Web Soil Survey](#)
- **Critical habitats.** Check for critical habitat, riparian areas, and endangered species of flora or fauna that may be impacted.
 - Additional site studies may be required to survey for potential impacts. Construction timelines may be impacted by nesting seasons or other mitigation measures.
- [U.S. Fish & Wildlife Service Critical Habitat mapper](#)
- **Historic and cultural resources.** Check that your potential site does not include any historic or cultural resources that need to be protected.
 - Are there registered historic districts or buildings on or near the site? Are further studies required?
 - [National Register of Historic Places](#)
- **Wetlands.** Look to see if there are wetlands or other watershed elements on your site by using existing maps and by visiting the physical site.
- Are there wetlands, water bodies, washes, arroyos, or other drainage considerations on site? These areas may be protected by state or federal policies.
- [U.S. Fish & Wildlife Service National Wetlands Inventory Wetlands mapper](#)
- **Floodplain.** See if there is a floodplain on or near the site to avoid potential flooding of the solar infrastructure.
- [FEMA Flood Map Service Center](#)

 **Narrow down your site list based on your community's preferences.**

- Where do community members want solar? For more information, see Chapter 2 and [Equity Callout](#).
- Is project visibility a priority or a liability? For more information, see [Equity Callout](#).

 **If you have the financial and staffing resources available, conduct a technical and economic solar feasibility study of the sites identified earlier.** Using the following tools, you can do an analysis to see which sites would be better suited for community solar placement.

- **National Solar Radiation Database.** Download hourly and half-hourly values of solar radiation from this [database](#).
 - Find instructions on using this database [here](#).
- **GIS (LIDAR) analysis.** This presentation includes specific GIS considerations, available datasets, layer features, and calculations for capacity and costs.
 - [Buildings vector data](#)
 - [Photovoltaics Rooftop Dataset](#)
 - [SolarGIS's Photovoltaic Power Potential \(PVOUT\) GIS Data](#)

- **System Advisor Model.** The National Renewable Energy Laboratory's (NREL) [System Advisor Model](#) is a free techno-economic analysis software model that enables detailed performance and financial analysis for renewable energy systems. Further instructions for using SAM can be found in Chapter 5.

 **Conduct a physical site visit.** Physically visit and walk around the site to understand its layout and ensure that you have not missed any important landmarks or features of the site.



Lincoln Electrical Service (NE) Sun Shares



EQUITY CALLOUT

Tools

- Explore EJScreen, the Environmental Protection Agency's (EPA) [environmental justice screening and mapping tool](#), to access high-resolution environmental and demographic information for locations in the United States. Use this tool to decide where the most equitable placement of your site can be. For example, you can ensure your selected site will not add industrial vehicle traffic and pollution to a community already overly impacted by poor air quality, or you can identify areas that have fewer parks and make your community solar site a green space. Communities of color and low-

income households are often disproportionately impacted by environmental degradation, so energy equity work should prioritize environmental justice for these communities.

- In addition to the EJScreen, the EPA created a [map showing power plants and their neighboring communities](#). You can use this mapping tool to see which communities are disproportionately impacted by air pollution from existing power plants.
- As mentioned in Chapter 2, there are many methods you can use to connect with and hear from your community, especially your customers from LMI households. Ask for feedback on your potential sites from community leaders and organizations to best reflect the needs of your customers.
- Siting your community solar project on affordable or multifamily housing can help you meet your goal of increasing equitable access to renewable energy sources. The U.S. Department of Housing and Urban

Development created a [Renewable Energy Toolkit](#) to clarify and outline this process — see Phase 3 for solar-specific considerations. Also, the DOE has a [Multifamily Affordable Housing Collaborative](#) where you can find resources regarding this option.

- Siting choices can impact future solar adoption. Historically, solar adoption has not been equal across all households and communities and tends to skew toward communities with higher incomes and higher populations of White and Asian residents. Studies show that the number of solar panels within the shortest distance from a house is the most important factor in determining the likelihood of that house adopting solar. This effect is more pronounced in low-income neighborhoods. These studies suggest that to increase more equitable adoption of solar, priority should be given to siting panels in areas where few exist. Learn more about the "Peer Effect" and how to drive more solar adoption from this [2021 study](#) by the Potsdam Institute for Climate Impact Research.

Section III: Additional Resources

Analyze Potential Sites

This presentation created by NREL (Municipal Utility Community Solar Working Group Session #3, June 23, 2021) details the features, records, and data utilities should consider in their site selection, along with the tools, websites, and datasets utilities can use to complete this analysis.

[Download the presentation.](#)

This technical report (December 2013) reviews the literature and available techniques for estimating the technical potential of solar energy given total available land and rooftop area. It also provides an alternative method developed by NREL for estimating rooftop suitability for photovoltaics.

Local Government; Public Facilities

This guide is provided to help local governments adopt solar on public facilities. Topics covered include site development, financing, regulatory issues, and municipal projects on brownfields.

[Download the guide.](#)

Contaminated Sites

This toolkit provides a brief overview of the different formats for convening and engaging stakeholders as well as prompts for discussing solar energy with community members.

[Download the toolkit.](#)



Find more resources in Appendix II: Further Resources

GIS Resources

GIS Considerations and Available Datasets

This presentation (Municipal Utility Community Solar Working Group Session #3, June 23, 2021) provides information on how to evaluate technically available land or roofs for distributed solar development, lists common inputs and scenarios related to varying system configurations and land exclusiveness, and estimates generation potential and costs for development of new distributed solar sites.

[Download the presentation.](#)

SolarGIS's Photovoltaic Power Potential (PVOUT) GIS Data

This data resource contains global photovoltaic power potential (PVOUT) in kWh/kWp.

[View this data resource.](#)

CHAPTER 4

Investigating Program Designs & Subscription Models



Section I: Learning Objectives

In this chapter, you will:

- Learn about program design elements and options
- Learn about different subscription models and pricing options
- Explore options for designing a community solar program to enable participation by low- to moderate-income (LMI) households

Section II: Recommended Process

Review goals and information gathered through site analysis and stakeholder engagement.

When designing your program and subscription models, be sure to keep in mind the utility goals, customer needs, and other project considerations you investigated in previous chapters.

For example, if one of your goals is to create a community solar program geared toward LMI households, and a survey of those households revealed that upfront fees would be a barrier to join the program, then use this insight to design a subscription model that removes upfront fees for LMI households. See Figure 4.1 for more information on connecting program goals to design considerations.

Consider program design options.

Figure 4.1 and the sections that follow present a summary of program design options.

DESIGN OPTIONS	COMMUNITY SOLAR GOALS (AS STATED BY WORKING GROUP PARTICIPANTS)			
	LMI ACCESS TO SOLAR	CUSTOMER COST SAVINGS	RENEWABLE ENERGY GOALS OR ENVIRONMENTAL LEADERSHIP	CUSTOMER DEMAND FOR ACCESS TO SOLAR
Anchor Tenants		○		○
Customer Classes Eligible to Enroll	○	○		○
Project-Based vs. Portfolio-Based Program		○		
Subscription Minimums and Maximums	○			
Term Limits, Exit Rules, and Transferability	○			○
Renewable Energy Credits & Environmental Benefits			○	○
Upfront and Fixed Fees	○	○		
Fixed or Floating Monthly Payment	○	○		○

FIGURE 4.1.

Community solar design options and their connection to project goals. (Created by Joyce McLaren and Tyler Orcutt from the National Renewable Energy Laboratory for the Municipal Utility Community Solar Working Group.)

TABLE 4.1.
PROGRAM DESIGN OPTIONS



Click on the gear icons below to take you directly to the page with more detailed information on that topic.

PROGRAM DESIGN TOPICS/OPTIONS	DEFINITION
Anchor Tenants	Anchor tenants are large customers that subscribe to a significant portion of a community solar array and reduce the risk of the project.
Participant Mix	The participant mix includes the customer classes eligible to enroll in the community solar program (e.g., LMI, residential, commercial).
Project-Based versus Portfolio-Based Programs	Project-based programs allow subscribers to sign up for a specific project; portfolio-based programs allocate subscriptions based on aggregated solar capacity across the utility's solar portfolio.
Subscription Capacity Minimums or Maximums	Subscription capacity minimums require subscribers to commit to a minimum monthly allocation; subscription capacity maximums limit an individual subscriber's monthly capacity.
Term Limits, Exit Rules, and Transferability	These types of community solar program rules regulate the ease through which customers can start, transfer, or stop their subscription to your community solar program. Shorter subscription terms with an easy in/out process typically lead to reduced subscriber acquisition costs.
Renewable Energy Credits (RECs) and Environmental Attributes	RECs represent the energy generated by renewable energy sources and the clean energy attributes of renewable energy. There are many options for what to do with these credits, and you will need to determine whether subscribers get to claim the environmental benefit of the community solar program.
Upfront Signup Fee versus No Upfront Fee	Upfront fees may prevent some customers (especially those from LMI households) from participating in your community solar program, but upfront fees may be necessary to cover solar construction costs.
Monthly Subscription Payment: Fixed versus Floating Payment	Fixed rates are set charges for a certain period for community solar subscribers; floating rates fluctuate based on solar production.



Anchor Tenants: inclusion or exclusion.

- Anchor tenants are large customers that subscribe to a significant portion of a community solar array. These tenants may be:
 - Local businesses or franchises with large electricity demand.
 - Municipal buildings/accounts (library, schools, city hall, etc.).
 - Community partners or nonprofits with strong local presence.
- Anchor tenants can potentially:
 - Provide more revenue certainty and improve the “bankability of the project.”
 - Reduce total project costs through reduced financing and customer acquisition costs.
 - Reduce subscription costs to non-anchor subscribers.
- Programs can limit the subscriptions held by anchor tenants to maintain the “community” element and ensure sufficient shares for smaller subscribers. For example:

Some states limit the capacity that can be held by anchor tenants (California, Illinois, Maryland, Minnesota, North Carolina, New York, Oregon).

- The inclusion of an anchor tenant (and how much of the project they subscribe to) impacts whether the project is representative of the customer base.



Participant Mix: customer classes eligible to enroll (residential, LMI, commercial).

- Some programs prioritize a participant mix that reflects the utility customer mix.
- Many programs include a carve-out for LMI household participation:
 - Typically, a certain percentage of the project is set aside for subscribers from LMI households. The National Community Solar Partnership has set a target for 40% of subscriptions to be set aside for subscribers from LMI households.
 - Including an LMI household carve-out may increase subscription costs for other customer classes.

- The participant mix will inform other program design elements, including:

- ***Subscription minimums and maximums.*** Subscription minimums may limit participation by excluding customers that have small electrical loads or may not be able to afford the minimum payment.
 - ***Term limits, exit rules, and transferability.*** Exit rules may discourage the participation of customers that have transient lifestyles.
 - ***Upfront fees.*** Upfront fees may discourage the participation of customers in LMI households.
 - ***Monthly payment structures.***
- ***Best Practices:***
 - Allow all customer classes to participate.
 - Provide an LMI household carve-out that ensures cost parity or cost savings for customers from LMI households.
 - Do not include upfront fees in payment structures for LMI customers.



Project-Based versus Portfolio-Based Programs

- **Project-based programs** allow subscribers to sign up for a specific project:
 - Permits subscribers to know exactly where their project is located.
 - Improves marketing opportunities and customer identification with solar development in the community.
 - Assures subscribers concerned about land use (or other issues) that their project meets their personal criteria.
- **Portfolio-based programs** allocate subscriptions based on aggregated solar capacity across the utility's solar portfolio:
 - Ties subscription costs to overall portfolio cost.
 - Aggregates projects that have different installation costs.
 - Distributes the advantage of falling solar prices across all program subscribers.



Subscription Capacity Minimums or Maximums

- **Subscription minimums** require subscribers to commit to a minimum monthly allocation:
 - A subscription minimum may be a barrier to entry for some customers (e.g., apartment dwellers have a smaller energy profile compared to single-family homes).
 - Estimated cost to manage subscribers can inform a minimum subscription level. If the estimated cost to manage a single subscriber is high, the utility may want a relatively high minimum subscription level to reduce administrative costs.

If adding additional subscribers is not considered an administrative expense, the minimum subscription level should be low.

- **Subscription maximums** limit an individual subscriber's monthly capacity:

- Most programs set the maximum subscription level at approximately 100% of a subscriber's average annual load, based on the previous year's utility bill.
- Another way to set a maximum subscription level is to divide total project capacity by the minimum number of customers to which you want to offer shares.



Term Limits, Exit Rules, and Transferability

- **Term limits** set the minimum time a subscriber is required to maintain their subscription (multiyear, annual, or month-to-month). Shorter subscription terms with an easy in/out process typically lead to reduced subscriber acquisition costs.

- **Exit rules** determine if a subscriber must pay a fee for ending their subscription prior to the term limit, and how early they must provide notice.
- **Transferability** either allows or disallows subscribers to “transfer” their subscription to a different utility account within the utility’s territory. This can ease the impact of exit fees and term limits if:
 - The customer moves and wants to keep their subscription.
 - The customer wants to transfer their subscription to another customer’s account.
- **Best Practices** allow for transfer of subscriptions within the utility territory.
 - Do not include a cancellation fee.
 - Use shorter subscription terms with an easy in/out process.



RECs and Environmental Attributes

- RECs and Environmental Attributes determine who gets to claim the environmental attributes of the community solar project/program.
- RECs from a community solar project can be:
 - **Retained** by the solar project owner, utility, or administrator to use for its own claims.
 - **Retired** on behalf of the subscriber (person or business buying from/participating in the community solar program).
 - **Provided** to the subscriber. Due to the complexity of the REC market, this option may be desirable only for large commercial customers.

- Only the party that owns the RECs can claim the green power benefits from the solar project.
- Subscribers should be informed about how RECs are handled and given appropriate language to help them make claims consistent with standard environmental practice.
- States with existing renewable portfolio standards (RPSs) or clean energy standards have implemented ways to procure RECs from community solar projects (e.g., Massachusetts, Colorado).



Upfront Signup Fee versus No Upfront Fee

- **Upfront Fees Options** (see Figure 4.2): In a survey of existing community solar programs, typical upfront fees ranged from \$75 to \$325.

- ***Upfront Fees Pros:***

- Can help the utility hedge against a community solar project's construction or financing costs.
- Can help with customer retention.
- Can be combined with monthly payments.

- ***Upfront Fees Cons:***

- Can present a barrier to entry for LMI households.
- Programs with no upfront fees (easy entry) typically have lower customer acquisition costs.

- ***Best Practices:*** Low or no upfront fees to reduce barriers to entry for LMI households.

OPTION	DESCRIPTION	SUBSCRIBER SAVINGS BEGIN...
Full Upfront Payment	Subscriber pays for all projected solar electricity generation over a set duration (e.g., 20 years), locked in at a set rate per kWh. Some companies offer a discount for upfront payment vs. ongoing payments. Utility applies solar credits to the customer bill over the duration of the contract.	In a few years – this arrangement is akin to purchasing a system, in that savings are deferred until the initial investment is recouped.
Upfront Payment + Monthly Payments	Hybrid that combines an upfront payment with either a fixed or floating monthly payment (continue reading to see monthly payment options).	Immediately or in a few years – depending on the price of solar electricity under the program.

FIGURE 4.2.

Upfront fees options. (Note that slides pertaining to monthly payment options can be accessed at Municipal Utility Community Solar Working Group Session #4, July 21, 2021.)



Monthly Subscription Payment: Fixed versus Floating Payment

- **Fixed Monthly Payment Options:**

For more details, see Figure 4.3.

- **Fixed Monthly Subscription Pros and Cons:**

- Provide cost stability/predictability to subscribers.
- Offer simple marketing and customer communication.
- Are not sensitive to retail rate changes year-over-year.
- May or may not be a cost premium or cost saving to subscribers.

- **Floating Monthly Payment Options:**

For more details, see Figure 4.4.

OPTION	PAYMENT	SUBSCRIPTION & FEE DESCRIPTION	BILL CREDIT DESCRIPTION	SUBSCRIBER SAVINGS BEGIN...
Fixed Monthly Fee	Fixed	Fixed monthly subscription fee.	Set number of solar credits (kWh) every month. OR Bill credits vary each month based on actual solar production of the capacity associated with the subscription.	Immediately or in a few years. Savings seen as utility rates rise and solar payments remain fixed.
"Lease to Own"	Fixed	Fixed monthly fee for a set number of years, after which point solar credits are "free".	Bill credits vary each month based on actual solar production of the capacity associated with the subscription. Most similar to rooftop solar ownership.	Immediately or in a few years – depending on the price of solar electricity under the program.
Fixed per Kilowatt Hour (kWh) Solar Rate	Fixed	\$/kWh rate for solar paid by subscribers never increases.	a) Set number of solar credits (kWh) every month. OR b) Bill credits vary each month based on actual solar production of the capacity associated with the subscription.	Immediately or in a few years – initial solar rate may be higher or lower than standard electricity rate.

FIGURE 4.3.

Monthly payment options. (Access source presentation at Municipal Utility Community Solar Working Group Session #4, July 21, 2021.)

OPTION	PAYMENT	SUBSCRIPTION & FEE DESCRIPTION	BILL CREDIT DESCRIPTION	SUBSCRIBER SAVINGS BEGIN...
Fixed Discount	Floating	The \$/kWh rate for solar fluctuates with the utility rates but will always be lower than the standard rate.	Subscriber bill is credited a certain % of monthly load. Subscription could be kW based, but credits are usually kWh based.	Immediately, unless program charges a membership/signup fee. Subscriber receives set discount over utility electricity tariff rate, typically 5% to 15%.
Dynamic Solar Subscription Rate	Floating	In year one, subscriber pays a set rate for solar (per kWh or kW). In all subsequent years, solar rates are re-evaluated and either increase or decrease.	a) Set number of solar credits (kWh) every month. OR b) Bill credits vary each month based on actual solar production of the capacity associated with the subscription.	Immediately or in a few years – depending on the price of solar electricity under the program.

FIGURE 4.4.

Floating monthly payment options. (Access source presentation Municipal Utility Community Solar Working Group Session #4, July 21, 2021.)

- *Floating Monthly Payments Pros and Cons:*

- Can guarantee savings for subscribers while providing greater utility cost recovery.
- Allows the utility to hedge against retail rate changes year-over-year.
- May or may not be a cost premium or cost saving to subscribers.
- May be more complicated to explain to subscribers.

- *Best Practices:*

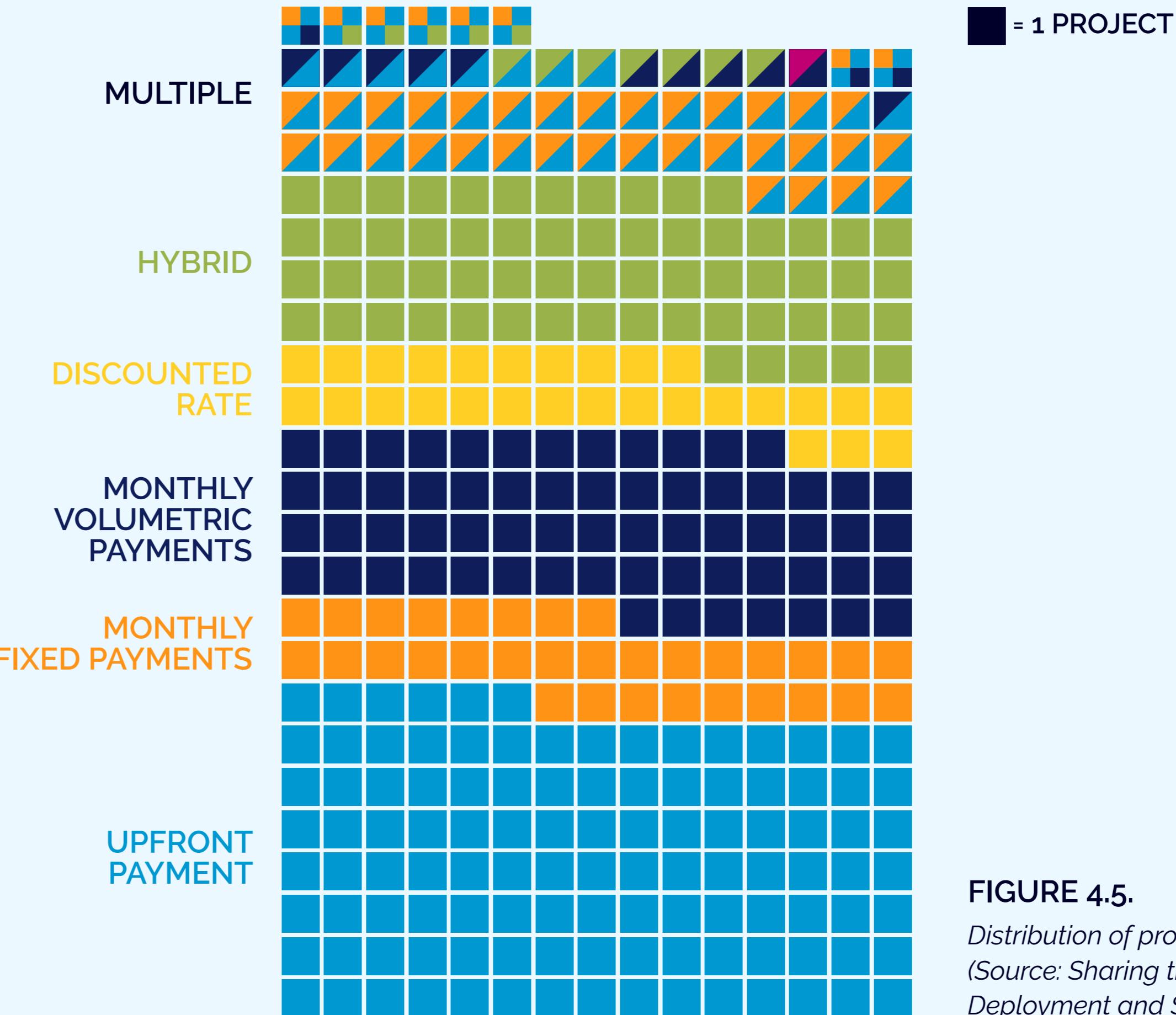
- Customers should see a 5% to 10% or more savings off the standard utility rate. The U.S. Department of Energy's National Community Solar Partnership has set a target of 20% bill savings for community solar subscribers by 2025.
- Implement consolidated billing, where all of the subscription payments and credits earned appear on one bill. If a third party is responsible for the community solar project, they will have to work with the utility to have the subscription payments added to subscriber utility bills.

RESIDENTIAL PAYMENT TERMS ARE DIVERSE.

What fits one utility may not be best for your own.

A survey conducted in 2020 of community solar projects throughout the country showed the following (see also Figure 4.5):

- Full upfront payments are the most common payment structure (46% of projects).
- Monthly volumetric payments are the second most common payment structure (22% of projects).
- About 21% of projects offer a hybrid model (combining different upfront and monthly payments).
- About 15% of projects offer multiple payment structures, most commonly a combination of upfront and fixed monthly payments.
- About 8% of projects offered a fixed discount over the customer's electricity rate instead of a payment. This model is expected to grow.



 **Keep best practices in mind.** The following best practices may not fit your utility and customer needs, but you should keep them in mind as you design your program.

- Charge no upfront fees.
- Month-to-month terms provide the most flexibility and encourage participation across customer classes, while 1-year term limits may ensure that customers provide ample opportunity to understand the community solar program and its benefits.
- Inform subscribers of 5% to 20% or more savings off the standard utility rate.
- Require no credit checks for subscribers, as these discourage participation.
- Offer consolidated billing.
- Provide easy onboarding.
- Engage subscribers with updates and news about their solar project.
- Use surveys to gather regular feedback on your program design.

- Ensure engagement, especially with month-to-month subscribers. (Research shows that 25% of customers will leave the program after one bad experience.)

 **Include these program and subscription design options** as you develop a financial model for your community solar program through the process outlined in Chapter 5.

- Using the considerations and best practices presented in this chapter, outline design ideas for your program and use the process in Chapter 5 to model the economics of your potential community solar program.
- Make sure your subscription model works toward the goals for community solar you set in Chapter 1 and addresses the needs of your community.



EQUITY CALLOUT

- Many programs set aside a certain percentage of the project for subscribers from LMI households to ensure that they receive cost parity or cost savings.
- Keep in mind what you learned (in Chapter 2) from surveying your customers and lessons learned from other programs about the unique needs of LMI households.
 - Include immediate bill savings and no upfront costs to encourage participation of low-income households.
 - Consider providing a nonpunitive termination route for low-income households.
- Avoid a complex verification process for LMI households. Specifically, programs should rely on self-reported income to qualify customers as LMI participants.

Section III: Additional Resources

Pricing and Subscription Models

In this presentation created by the National Renewable Energy Laboratory (Municipal Utility Community Solar Working Group Session #4, July 21, 2021), you will find a breakdown of different pricing and subscription models and other topics to consider when designing your program and subscription. Also presented is a case study from Austin Energy.

[Download the presentation.](#)

LMI Community Solar Design

This report draws from literature and interviews with representatives from solar developers and state community solar programs to provide experience on community solar design for LMI households.

[View the report.](#)

Case Studies

In this report to the City of Dallas, researchers provided case studies of LMI solar programs, a review of different financing mechanisms and program design options, and recommendations.

[View the report.](#)

This report from the Community Solar Value Project provides an overview of community solar pricing strategies from utilities in Arizona, California, Colorado, Massachusetts, Iowa, Minnesota, and Texas. Read through these strategies to see the range of program and pricing options in the marketplace.

[View the report.](#)

Toolkits and Templates

This handbook was developed to help guide utilities through the process of researching, designing, and evaluating a community solar program.

[Download the handbook.](#)

Stakeholder Perspectives

Table 4.2 (next page) and linked resources were developed by the National Renewable Energy Laboratory in 2020 to demonstrate different stakeholder perspectives on community solar models.

[View the report.](#)



Find more resources in Appendix II: Further Resources

TABLE 4.2.
STAKEHOLDER PERSPECTIVES ON COMMUNITY SOLAR

Note: These perspectives are general in nature and may not reflect individual organizations' perspectives.

STAKEHOLDER TYPE	PROJECT OWNERSHIP	SIZE & LOCATION OF PROJECT	RELATIONSHIP TO OTHER GOALS	SUBSCRIPTION STRUCTURES	LMI BENEFITS	ANCILLARY PROJECT OR PROGRAM ELEMENTS
State Legislator	Might favor investor-owned utility	Might favor least cost PV projects	Might favor allowing the utility to keep the RECs	Might favor any design with consumer savings	Might favor a LMI carve-out	Might favor workforce development
Environmental Advocates	Might favor third-party ownership	Might favor smaller projects on the distribution grid	Might prefer to have subscribers keep the RECs	Might favor any design with consumer savings	Might favor a carve-out or dedicated LMI program	Might favor projects with grid benefits, resilience, storage
Subscribers (LMI and non-LMI)	Indifferent	Might favor smaller projects on the distribution grid	Might favor allowing the utility to keep the RECs	Might favor any design with consumer savings	Might favor LMI carve-out	Might favor workforce development
Solar Project Developer	Might prefer being the project owner	Might favor smaller projects on the distribution grid	Might favor allowing the utility to keep the RECs	Might favor any design with consumer savings	Might favor no LMI carve-out	Might oppose projects or elements that increase cost without providing direct value
Investor-Owned Utility	Might prefer being the project owner	Might prefer least cost PV projects	Might favor allowing the utility to keep the RECs	Might favor upfront payment	Varies	Might favor projects with grid benefits
Cooperative or Municipal Utility	Might prefer third-party ownership	Might prefer smaller pilot programs	Might prefer to have subscribers keep the RECs	Might favor upfront payment	Might favor a default supply for all customers	Might favor projects with grid benefits

Source: Community Solar Models and Stakeholder Perspectives. [View here.](#)

CHAPTER 5

Exploring Project Economics & Financials



Section I: Learning Objectives

In this chapter, you will:

- Gain an understanding of basic considerations for determining the technical and financial feasibility of a community solar project
- Learn how to use the National Renewable Energy Laboratory's (NREL) System Advisor Model (SAM) to analyze the feasibility of potential projects
- Calculate the cash flow of potential projects (see Figure 5.1)

Section II: Recommended Process

Figure 5.2.

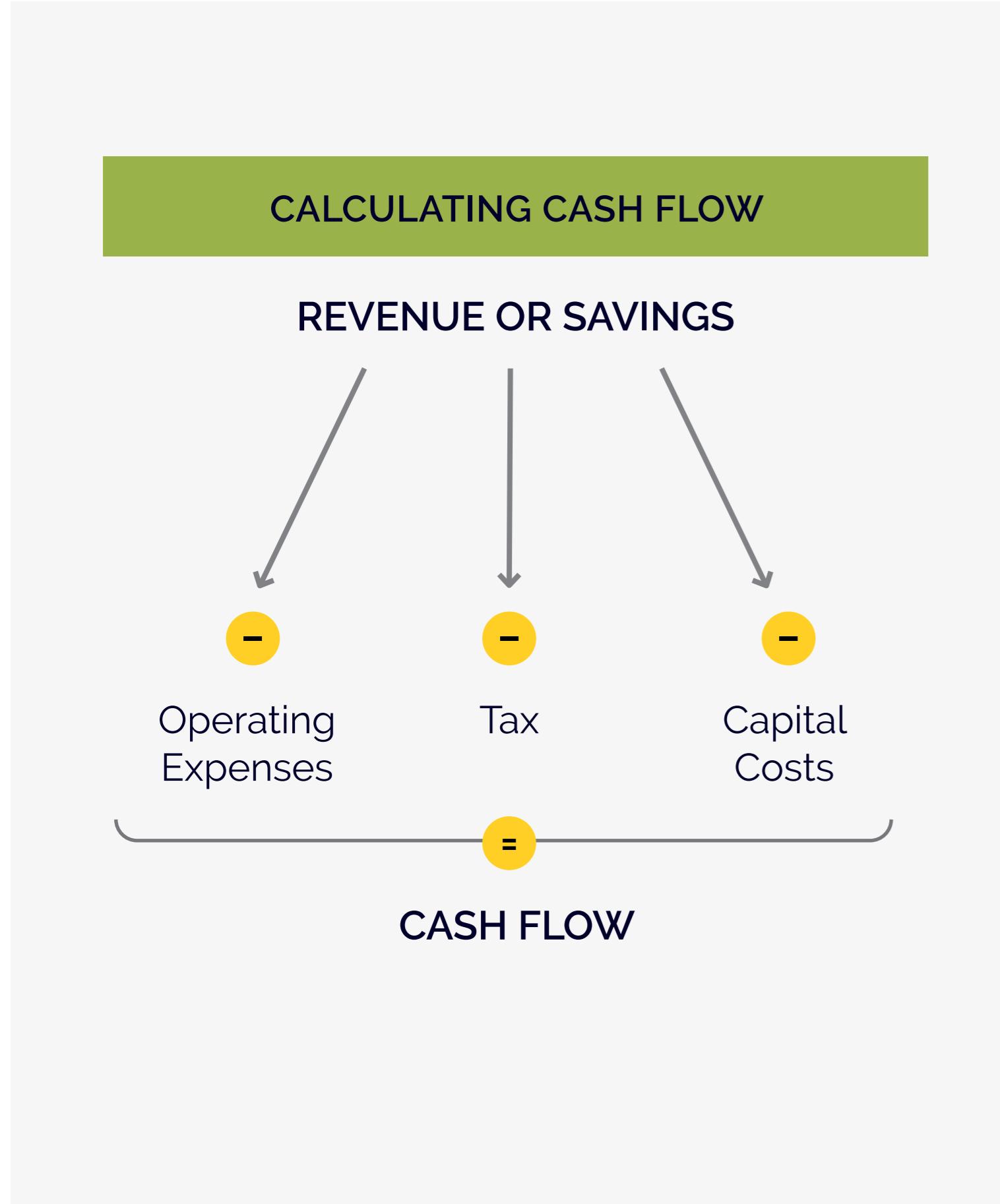


FIGURE 5.1.

Formula for calculating cash flow. (Source: Community Solar Project Planning: Working Group Session #5, NREL.) [View here](#).

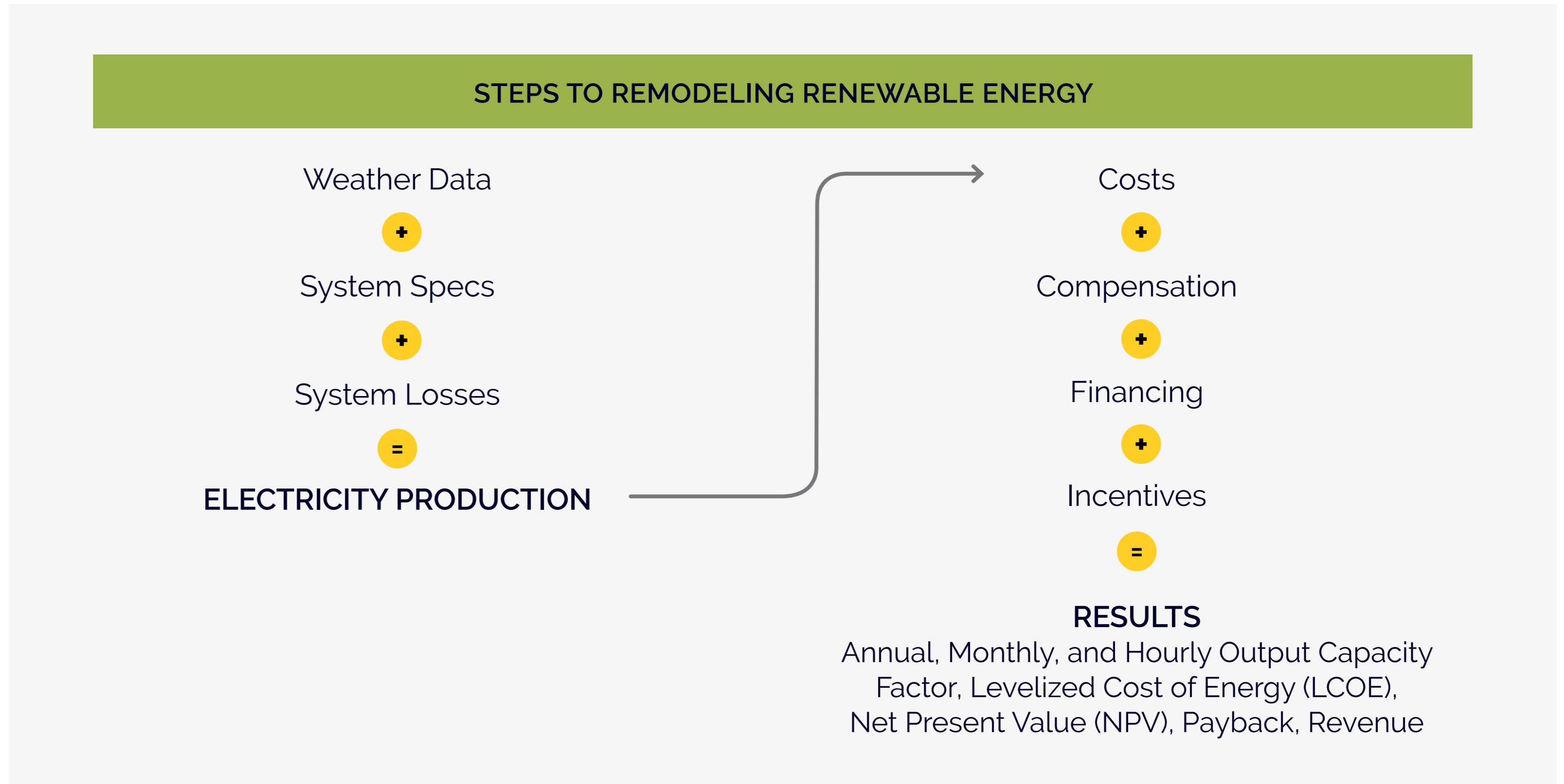


FIGURE 5.2.

Process for modeling feasibility of your solar project. (Source: Community Solar Project Planning: Working Group Session #5, NREL.) [View here](#).

 **Gather solar resource data.** Understanding the solar resources in your chosen location is foundational to modeling the economic feasibility of a solar photovoltaic (PV) project. Solar resources refer to the amount of solar energy you can feasibly expect to generate with a particular PV system. For a more in-depth explanation of solar resources, check out [this PowerPoint](#) from the Municipal Community Solar Working Group (August 2021).



IMPORTANT SOLAR RESOURCE CONCEPTS

Direct Normal Irradiance (DNI): the amount of solar radiation per unit area reaching a surface that is perpendicular to the rays of solar radiation from the sun.

Diffuse Horizontal Irradiance (DHI): the amount of solar radiation per unit area that is not directly from the sun or reflected from the ground.

Global Horizontal Irradiance (GHI): total solar radiation on a horizontal surface.

Plane of Array (POA) Irradiance: the sum of DHI and DNI components dependent on the position of the sun and orientation/tilt of the array. POA is used for modeling array performance.

FACTORS THAT AFFECT THE AVAILABILITY OF SOLAR RESOURCES

Tilt: pitch angle of the modules from horizontal.

Azimuth: angle relationship of an array relative to true north (0° represents north-facing array, 180° represents south-facing array).

Weather and environmental conditions: high ambient temperatures, clouds, rain, snow, fog, and design conditions tied to strong local winds and dust/soiling on panel that can decrease performance.

 **Model an estimated forecast of monthly and annual solar production at your proposed site.**

Estimated solar production is a touchstone for due diligence with proposals and contracts. You can use the results of your initial solar resource screen as a reality check throughout the Request for Proposal (RFP) and deployment processes.

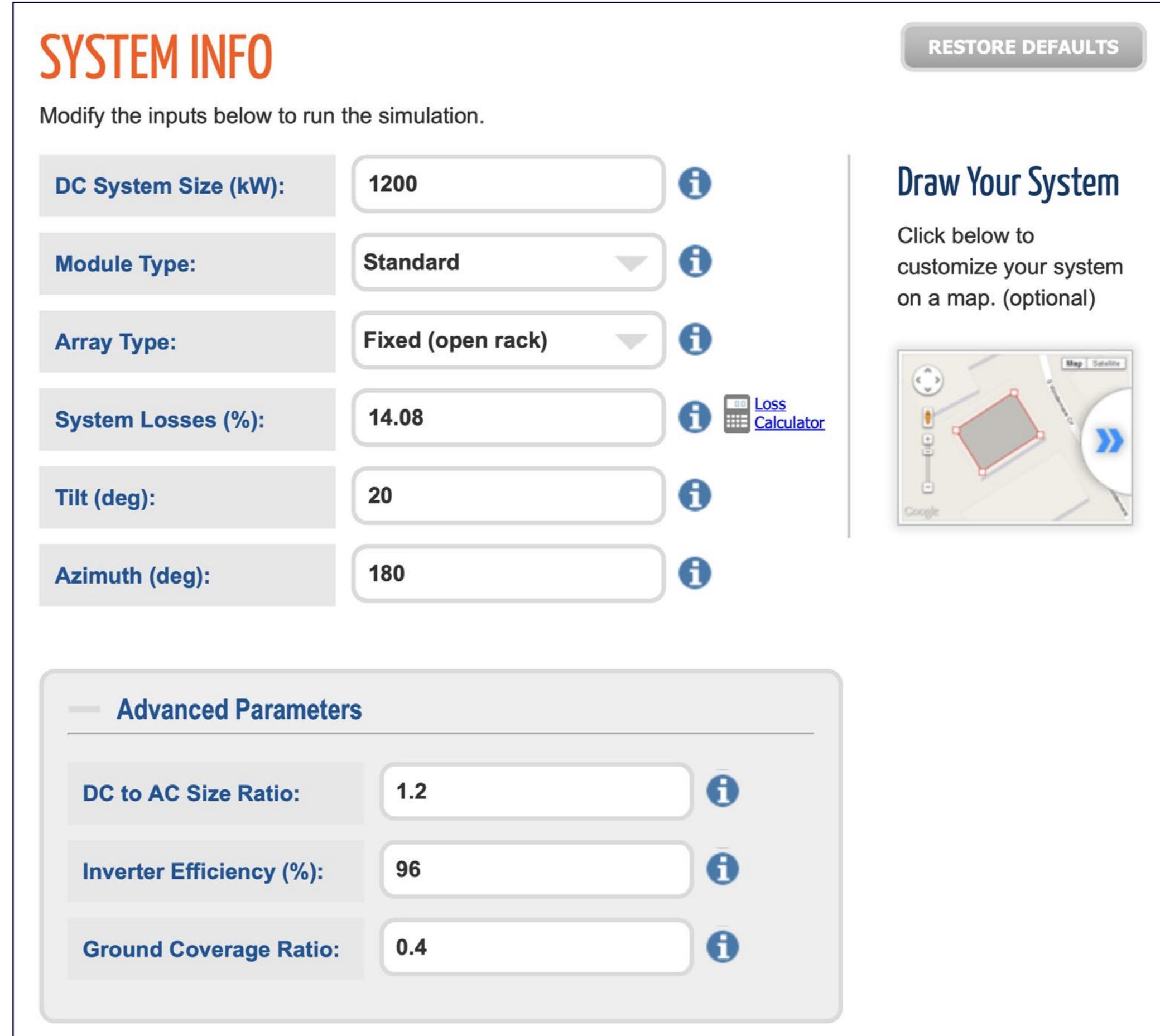
- Navigate to PVWatts, a user-friendly modeling tool, to start the process of creating this forecast (Figure 5.3).
- Enter your project's address or coordinates in the "Get Started" field.
- Verify the tool has the correct location on the generated map.



FIGURE 5.3.

PVWatts Calculator. (Source: NREL's PVWatts® Calculator.) [View here](#).

- Enter your project design (Figure 5.4).
 - Model the System Size at 1,000 kWAC (1,200 kWDC and a DC-to-AC Size Ratio of 1.2), as this allows you to easily scale up or down for a different-sized system.
 - PVWatts provides default inputs for all other variables.
 - Explore each variable using the “HELP” menu.
- Go to “RESULTS” to view the estimated system output, economics, and performance metrics (Figure 5.5).
- Play around with the design variables to view different results. You can also download your monthly and hourly results and graph them.
- If you would like, compare the generated PVWatts outputs with data from existing solar projects in the region. The U.S. Energy Information Administration has a [webpage](#) where you can search for energy data from active community solar projects. (Click on a state under “Child Series” to see available projects.) Read through [this PowerPoint](#) to understand how to use PVWatts.



The screenshot shows the 'SYSTEM INFO' section of the PVWatts calculator. At the top right is a 'RESTORE DEFAULTS' button. Below it is a heading 'SYSTEM INFO' in orange. A sub-instruction says 'Modify the inputs below to run the simulation.' On the right, there's a 'Draw Your System' section with a map icon and a link to a 'Loss Calculator'. The main area contains six input fields:

Parameter	Value	Help
DC System Size (kW)	1200	i
Module Type:	Standard	i
Array Type:	Fixed (open rack)	i
System Losses (%):	14.08	i Loss Calculator
Tilt (deg):	20	i
Azimuth (deg):	180	i

Below these is a 'Advanced Parameters' section with three more fields:

Parameter	Value	Help
DC to AC Size Ratio:	1.2	i
Inverter Efficiency (%):	96	i
Ground Coverage Ratio:	0.4	i

FIGURE 5.4.

Enter your product design at PVWatts. (Source: NREL’s PVWatts® Calculator.) [View here](#).

RESULTS



Print Results

1,772,344 kWh/Year*

System output may range from 1,646,330 to 1,824,628 kWh per year near this location.

Click [HERE](#) for more information.

Month	Solar Radiation (kWh / m ² / day)	AC Energy (kWh)
January	3.70	115,560
February	4.38	121,028
March	5.56	164,309
April	5.86	163,980
May	6.18	175,391
June	6.68	176,549
July	6.52	173,834
August	6.12	165,439
September	5.89	155,915
October	4.89	140,519
November	3.97	117,446
December	3.30	102,376
Annual	5.25	1,772,346

Location and Station Identification

Requested Location	40.5006,-105.1313
Weather Data Source	Lat, Lng: 40.49, -105.14 0.7 mi
Latitude	40.49° N
Longitude	105.14° W

PV System Specifications

DC System Size	1200 kW
Module Type	Standard
Array Type	Fixed (open rack)
Array Tilt	20°
Array Azimuth	180°
System Losses	14.08%
Inverter Efficiency	96%
DC to AC Size Ratio	1.2

Performance Metrics

Capacity Factor	16.9%
-----------------	-------

FIGURE 5.5.

PVWatts "Results" page. (Source: NREL's PVWatts® Calculator.) [View here](#).



Determine your project's economic considerations.

Economic considerations involve market pricing, project costs, and policy influence — in other words, customers, builders and regulators.

- Research current data on solar industry capital costs to get pricing estimates for your analysis. Explore [NREL's Solar Installed System Cost Analysis webpage](#) to find an analysis of the total costs associated with PV systems. You can use [this template spreadsheet](#) to organize your estimates using example data gathered by Edward Settle, NREL's Senior Project Leader of Financing, in 2021.

Take into account the Capital Expenditures (CapEx) provided in Figure 5.6 when determining your list of pricing estimates.

- The [U.S. Solar Market Insight Report](#) is a quarterly and annual report with in-depth analyses and forecasts on the solar industry. Each quarter's free Executive Summary provides an overview of the current state of the PV market in the United States.

BALANCE OF SYSTEM	BALANCE OF SYSTEM	
Electrical Infrastructure & Interconnection (electrical interconnection, electronic, electrical infrastructure, electrical)	Internal and control connections Onsite electrical equipment (e.g., switchyard) Power electronics Transmission substation upgrades	AC wiring and installation DC wiring and installation Distance-based spur line cost (GCC) Inverters
Generation Equipment & Infrastructure (civil works, generation equipment, other equipment, support structure)	Plant construction Power plant equipment	Foundation Hardware Module supply Racking
Installation & Indirect	Distributable labor and materials Engineering Start up and commissioning	
Owner's Costs	Development costs Environmental studies and permitting Insurance costs	Legal fees Preliminary feasibility and engineering studies Property taxes during contruction
Site	Access roads Buildings for operations and maintenance Fencing Land acquisition	Site preparation Transformers Underground utilities

FIGURE 5.6.

List of capital expenditures. (Source: Edward Settle, NREL, 2021.) [View here.](#)

ALL TECHNOLOGIES UTILITY PV

Inclusions in CAPEX. Technology-specific items are shown in pink and items included for all technologies projected in the ATB are shown in blue.

- Lazard's **Levelized Cost of Energy Analysis** is another resource you can use to estimate costs of a potential system. The webpage allows you to download the latest version of the analysis. You can also find estimates from the 2021 report shown in Figure 5.7.
- The **NREL Annual Technology Baseline (ATB)** provides a consistent set of technology cost and performance data for energy analysis. The ATB **electricity** and **transportation** datasets are freely available.
- The **Lawrence Berkeley National Laboratory's annual update** of utility-scale solar data and trends provides an overview of key trends in the U.S. market.



Determine your project's financial considerations. Financial considerations involve looking at capital structure and the cost of capital. Additionally, you must determine where and how to involve lenders, investors, and tax equity partners. Further information on community solar business models can be found on pages 4–10 in the **Community Solar Value Project's Community Solar**

Program-Development Landscape report (December 2016).

- Weigh the pros and cons of different business models — for example, a single-owner business model versus a tax equity partnership flip business model. Find more information (pages 45-46) on these models in Figure 5.8 and Figure 5.9.
- Keep in mind typical capital structures when planning for your project's finances.
 - **Tax Equity:** driven in part by your project's cash flow model and the desired return on investment by your tax equity partner (typically 7% to 9%), tax equity may represent 30% to 50% of the project capital stack. Cash distributions in a tax equity partnership go primarily to the tax equity partner first until the minimum rate of return on an investment that will offset its costs accrues (no earlier than year 6, typically year 10).

CATEGORY	LOW (\$/W)	HIGH (\$/W)
Rooftop Residential	\$2.52	\$2.82
Rooftop Commercial	\$1.60	\$2.82
Community Solar	\$1.30	\$1.50
Utility Scale	\$0.82	\$0.98

FIGURE 5.7.

Estimates from Lazard's Levelized Cost of Energy Analysis Report 14.0. (Provided by Edward Settle.) [View here.](#)

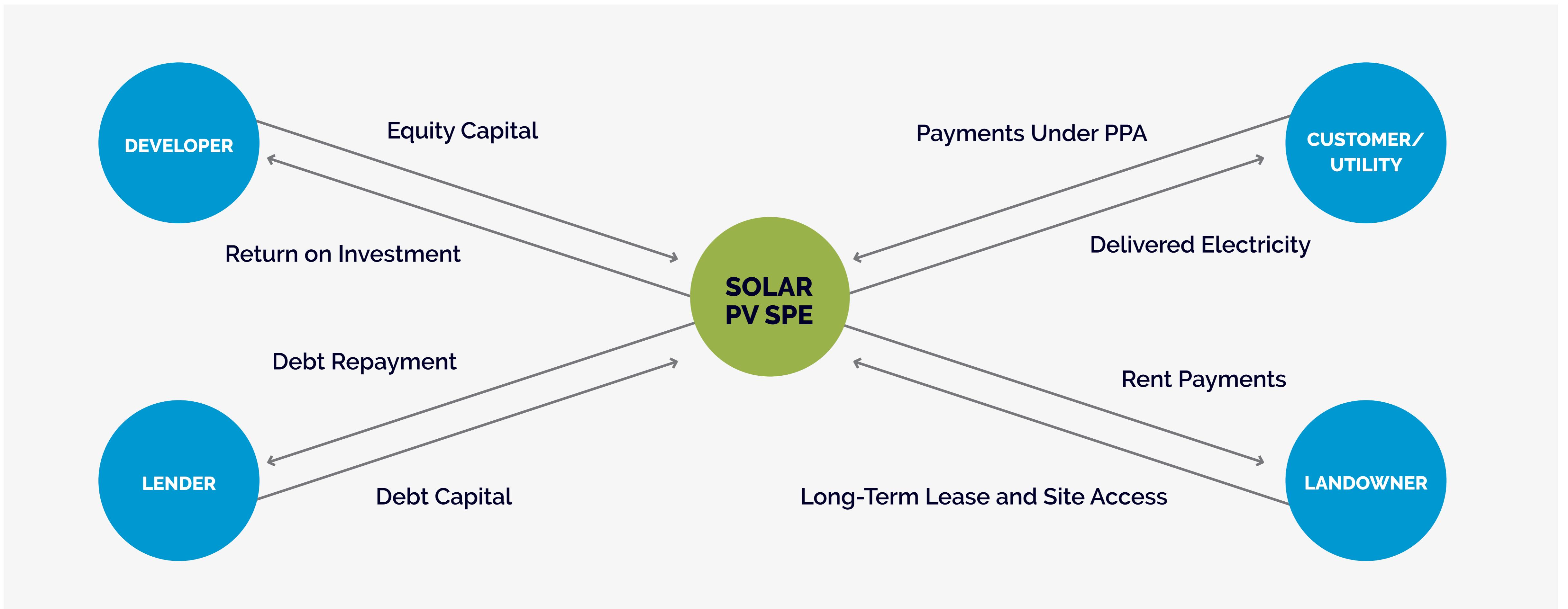


FIGURE 5.8.

Single-owner business model. (Source: Edward Settle, NREL, 2021.) [View here](#).

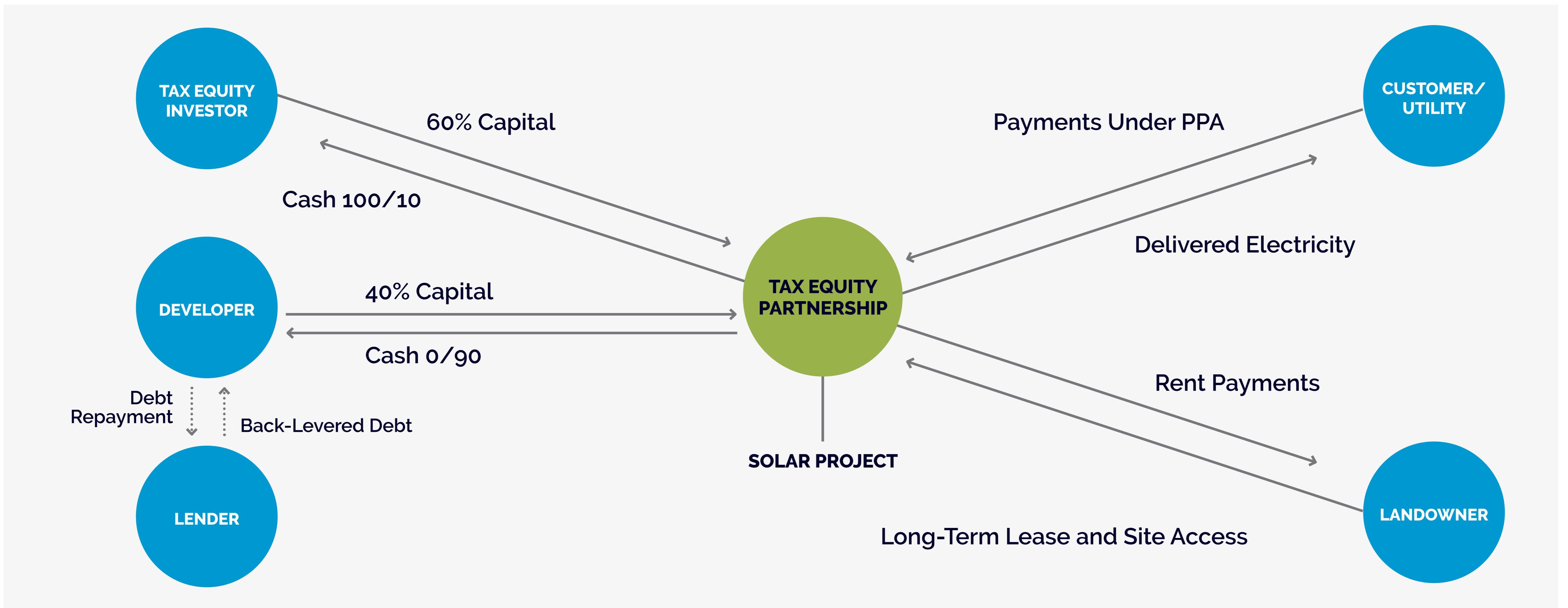


FIGURE 5.9.

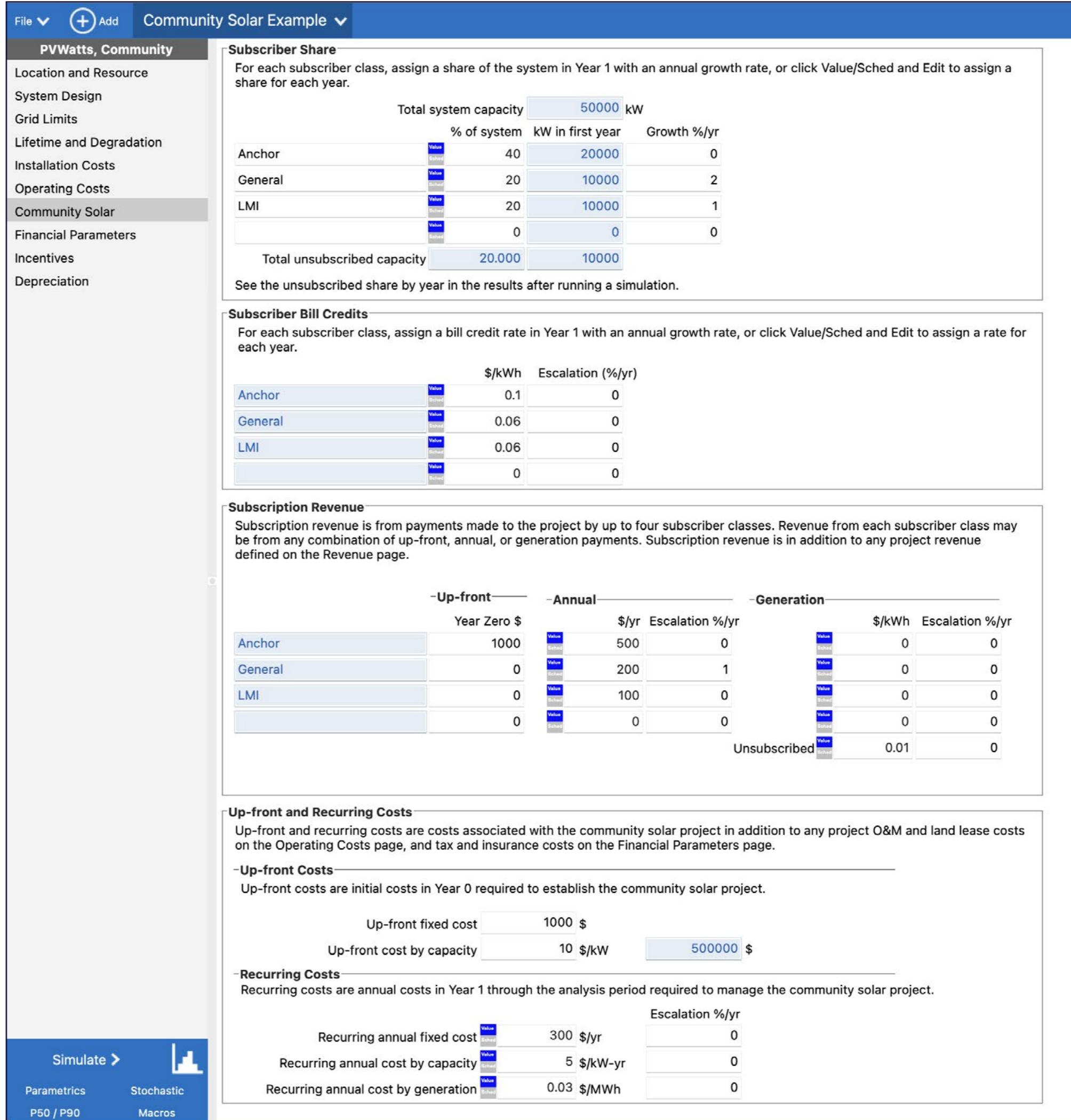
Tax equity partnership flip business model. (Source: Edward Settle, NREL, 2021.) [View here](#).

- **Sponsor Equity:** this is the project developer's contribution of capital from concept through start-up and operation. As the highest-risk capital, the expected return may be 9% or higher.
 - **Debt:** a developer may secure construction debt as well as term debt, and the related term debt interest rate may be 3% to 5% over a 20-year loan.
 - **Grant:** a community solar project could benefit from grant funding. Grants or other philanthropic funding could be used to cover pre-development costs, to cover staff capacity, or may even function as additional low-cost debt.
 - **Weighted Average Cost of Capital (WACC):** combines the percentage of debt and equity and related interest rate and return on investment expectation to calculate the overall project cost of capital given the capital stack. (SAM, the modeling software discussed further in step 5, does this calculation automatically.)
- Determine inflation, escalation, and discount rate.
 - **Annual Model Inputs** over the period of analysis:
 - **Inflation:** use the Federal Reserve target of 2.5%.
 - **Escalation:** utility rates or power purchase agreement pricing may escalate at 1.25% per year.
 - **Discount Rate:** a discount rate accounts for the time value of money in a cash flow analysis. This is not the same as inflation or escalation. However, the nominal discount rate does include the assumed rate of inflation:
 - One technique is to input a real discount rate such that the nominal discount rate matches the target internal rate of return.
 - Research local taxes and available incentives (see DSIRE, the [Database of State Incentives for Renewables & Efficiency](#)).
 - Taxes are complex and may be analyzed in three primary categories:
 - **Income:** tax on gross or net income from the project (federal, state, local).
 - **Sales:** tax on purchase of equipment and services (state, local).
 - **Property:** tax on the project's land and improvements (state, local).
 - Incentives (may be limited to tax-paying entities): DSIRE keeps records of most available state and federal renewable energy incentives. For further details about potential monetary incentives, see the American Public Power Association's (APPA) [Community Solar A-Z Guide for Public Power Utilities](#):
 - **Federal:** Investment Tax Credit (ITC), 26% of eligible cost basis:
Public power utilities can work with third-party developers to utilize the ITC.

Case Study: The City of Ashland Municipal Utility in Oregon used the Oregon Business Energy Tax Credit by selling the tax credit associated with its solar project to receive a one-time payment.

- **Federal:** Modified Accelerated Cost Recovery System (MACRS), 5-Year Depreciation
- **State:** Investment Tax Credit, Production-Based Incentive
- **Other:** New Markets Tax Credits, Low-to Moderate-Income (LMI) Community Incentive, Payment in Lieu of Taxes

 **Model a potential community solar project.** Download the NREL's [System Advisor Model \(SAM\)](#) to model a potential community solar project with the assumptions you assembled in steps 3 and 4. Use the [SAM Assumptions and References template spreadsheet](#) to keep track of your assumptions. SAM can model several types of renewable energy systems to demonstrate trade-offs between different options (Figure 5.10).



The screenshot shows the 'Community Solar Example' page in the PVWatts, Community section of the SAM software. The interface includes a navigation bar with 'File', 'Add', and 'Community Solar Example'. On the left, a sidebar lists various tabs: Location and Resource, System Design, Grid Limits, Lifetime and Degradation, Installation Costs, Operating Costs, Community Solar (which is selected), Financial Parameters, Incentives, and Depreciation. The main content area contains four sections: 'Subscriber Share', 'Subscriber Bill Credits', 'Subscription Revenue', and 'Up-front and Recurring Costs'.

Subscriber Share: Total system capacity: 50000 kW. Subscribers: Anchor (40%), General (20%), LMI (20%), Unsubscribed (0%).

	% of system	kW in first year	Growth %/yr
Anchor	40	20000	0
General	20	10000	2
LMI	20	10000	1
Unsubscribed	0	0	0
Total unsubscribed capacity	20.000	10000	

Subscriber Bill Credits: Rates: Anchor (0.1 \$/kWh), General (0.06 \$/kWh), LMI (0.06 \$/kWh), Unsubscribed (0 \$/kWh).

	\$/kWh	Escalation (%/yr)
Anchor	0.1	0
General	0.06	0
LMI	0.06	0
Unsubscribed	0	0

Subscription Revenue: Revenue from payments made to the project by up to four subscriber classes. Revenue from each subscriber class may be from any combination of up-front, annual, or generation payments. Subscription revenue is in addition to any project revenue defined on the Revenue page.

	Up-front		Annual		Generation	
	Year Zero \$	\$/yr	Escalation %/yr	\$/kWh	Escalation %/yr	
Anchor	1000	500	0	0	0	
General	0	200	1	0	0	
LMI	0	100	0	0	0	
Unsubscribed	0	0	0	0	0	

Up-front and Recurring Costs: Up-front and recurring costs are costs associated with the community solar project in addition to any project O&M and land lease costs on the Operating Costs page, and tax and insurance costs on the Financial Parameters page.

Up-front Costs: Up-front costs are initial costs in Year 0 required to establish the community solar project.

Up-front fixed cost	1000 \$	
Up-front cost by capacity	10 \$/kW	500000 \$

Recurring Costs: Recurring costs are annual costs in Year 1 through the analysis period required to manage the community solar project.

	Escalation %/yr	
Recurring annual fixed cost	300 \$/yr	0
Recurring annual cost by capacity	5 \$/kW-yr	0
Recurring annual cost by generation	0.03 \$/MWh	0

FIGURE 5.10.

Use SAM to model a potential project.
(Source: Edward Settle, NREL, 2021.)

[View here.](#)

TIPS AND TRICKS FOR USING SAM

- **Creating a New Case:** When creating a new case in SAM, you can find the Community Solar Financial Model under the PVWatts, Detailed PV and Detailed PV-Battery performance models.

You can use the PVWatts model to start investigating the best orientation for your solar installation. Once you have identified the optimal orientation, duplicate your case and change the model to the Detailed PV Model, as this feature allows you to enter seasonal tilt changes and multiple orientations.
- After you create a new case, default values will be automatically entered into the model. You can simulate your project and modify these defaults to get a better sense of how SAM works.
- You do not need to know your project's specifics for every data point asked for in SAM. You can use the default values as a starting point and enter whatever information you have about your proposed project to get a general sense of its feasibility.
- **Calculating Installation Costs:** In the Installation Costs section, the default numbers do not automatically update based on the data you enter in the system. SAM is not meant to be a cost database or reference system, which is why this chapter details how to estimate your project's costs. You will need to do your own research to calculate the installation cost data for your project.
- **Simulating Project Financials:** Once you "Simulate" your project, you can see the projected Net Present Value (NPV) for your utility as well as every subscriber you enter in the model. A positive NPV means that the project is feasible, while a negative NPV means you need to restructure the project to make it more attractive for this group.
- If the calculated dollar amounts in SAM are off by a few dollars or a few hundred dollars from what you calculate in an Excel spreadsheet, don't sweat it! This may simply be caused by a rounding error.
- You can combine the output of two cases to model a simple system with two orientations. Under the "Simulate" button, there are macro buttons. The "Combine Cases" allows you to combine outputs.
- **Exploring Subscription Rates:** To find the lowest subscription rate that allows your proposed project to break even, try different numbers in the annual subscription revenue field. For a detailed explanation of how to find the lowest feasible subscription rate for your project, [watch this video](#) from 52:37 to 58:35.
- **Creating a Report:** For a final report, once you've simulated your scenario, you can click on your project's name and select "Create Report" to generate key numbers.
- You can also [watch this video](#) from the Municipal Community Solar Working Group for an in-depth look at how to use SAM.



EQUITY CALLOUT

In the **System Advisor Model's Community Solar module**, you can put assumptions such as the upfront cost, \$/kWh, annual cost, and escalation %/year for the LMI customers you want to include in your community solar project's subscriptions. See Chapter 4 for subscription model best practices.

Section III: Additional Resources

Early Solar Resource Assessment

Find more details about the first steps listed in Section II's recommended process in this presentation from the Municipal Community Solar Working Group (pre-Session #5, August 2021)

[Read the assessment.](#)

Project Economics and Financials

This presentation from the Municipal Community Solar Working Group (Session #5, August 25, 2021) details the latter half of the recommended process outlined in Section II.

[Download the presentation.](#)

Community Solar A-Z

This guidebook from APPA details key considerations a utility must keep in mind when determining if community solar is right for them. The guidebook is free for APPA members.

[Download the guidebook.](#)

Finance Structures

This 2017 report by the Rocky Mountain Institute describes how established solar financing models can be easily adapted to the community-scale solar market as well as discusses key risks and mitigants.

[View the report.](#)

LMI Financing Structures

This technical report from NREL (January 2018) provides a matrix of financing options for LMI community solar projects for different housing types.

[View the report.](#)



Find more resources in
Appendix II: Further Resources

CHAPTER 6

Developing Requests for Proposals & Project Timelines



Section I: Learning Objectives

In this chapter, you will:

- Understand the process of developing a Request for Proposal (RFP)
- Know the unique elements of developing an RFP for community solar
- Learn strategies to pick the best proposal for your project

Section II: Recommended Process

 **Develop your RFP.** Note that an RFP is a significant undertaking. Consider project funding sources and potential hurdles, such as key decision maker approval, prior to starting the process. To gain context on third-party providers and utility RFPs, read pages 10–12 in the [Community Solar Value Project's Community Solar Program-Development Landscape report](#) (December 2016).

- Begin this development by **defining your project goals** (see Chapter 1). Use these goals to inform the requirements outlined in your RFP.
 - For example, if you want to emphasize energy equity and ensure low- to moderate-income (LMI) households benefit from your project, you could consider requiring that developers engage community members in the design process. See Chapter 1 for an example list of questions to consider when defining your project goals.

- Define the **size, specifications, and attributes** of the system you want to procure.
- Decide on the project **location** (see Chapter 3).
- Set baseline requirements within the RFP, and provide an example of a project that meets the baseline requirements.
 - Include a basic information table at the beginning of the RFP. Table 6.1 provides an example of what to include.
 - Consider allowing respondents to submit a second (alternative) proposal to showcase their company's individual strengths or get creative with the resources and goals outlined in the RFP. This approach allows you to easily compare proposals that strictly adhere to your baseline requirements from different respondents as well as consider a broader variety of developer recommendations. It may, however, create more work for the review committee.
- Create a **rubric** or **criteria** that will be used to evaluate proposals.
 - Ensure that your utility's goals for community solar are prioritized when developing evaluation criteria (e.g., by giving more weight to criteria essential to meeting these goals). If one of your goals involves hiring a local workforce, include this criterion. Providing the evaluation criteria in the RFP helps respondents design proposals that are more likely to suit your needs. A best practice is to share this rubric as an appendix to the RFP.

TABLE 6.1.
EXAMPLE BASIC INFORMATION TABLE FOR RFP

Name of Developer
Number of Years in Business
Total Solar Installs
Total Installations in (Your State/Region)
Total Projects with Municipal Utilities



EQUITY CALLOUT

- You should be specific in your RFP to avoid vague or virtue signaling answers, for instance, consider including specific questions such as: "How is customer acquisition different when working with LMI households?" "How would you work with LMI households in the stakeholder engagement stage of this project?" "What kinds of monetary/community benefits can you provide to LMI households?"
- RFPs can request a "community services" section that gives developers flexibility in offering free services to the community in addition to the project itself. Examples include smaller, free systems for public buildings or schools, job training, and educational programs.

- You can work toward the goal of equity in ways beyond supporting subscribers from LMI households. Before building your installation or committing to a power purchase agreement, ask the developers or contractors you will be working with to provide a diversity, inclusion, and local workforce development plan — see if they will be providing your local workforce with development opportunities. You can also prioritize working with small, women-owned, and/or BIPOC (Black, Indigenous, and People of Color)-owned businesses as well.

- Consider operation and maintenance and end-of-life (buyout, decommissioning, and removal) terms.
- Make sure your RFP is **detailed** and contains sufficient information about the site to allow vendors to make an informed response.
- Include information such as the project scope of work, site data, project logistics, relevant policies, vendor evaluation criteria, and required proposal content/format.
- Give estimates on interconnection costs and other utility-driven cost parameters. This helps standardize the proposals and stops bidders from driving down their cost estimates using conveniently low-cost estimates.
- Consider allowing the developer flexibility with the location and type of installation. Developers may have ideas you did not consider based on their own experience. Keep an open mind, but refer to your evaluation criteria when evaluating which proposal provides the most value to your community.

- Identify **contractual sticking points** before sending out your RFP to save time and money and decrease the risk of an RFP failing at the final moment. Best practices to identify and eliminate sticking points include the following:
 - Get **buy-in** from key decision makers before any contract negotiation. If a decision maker does not have a clear understanding of the project and its goals, projects can stall in their final hours.
 - Communicate your **key contract terms** (e.g., ownership structure, construction timeline, workforce development) to avoid costly revisions.
 - If you are constrained by **legal requirements** for procurement, consider attaching these contracting conditions to the RFP.

- To the extent possible, set a high bar for developers with your RFP. This will ensure you receive proposals in line with your utility's goals and will make it easier to evaluate and choose developers that can deliver these goals.
-  **Issue your RFP.** Once the RFP is developed, you need to promote it. Post the RFP on high-traffic websites and social media, and **send it directly to local vendors** so they are aware of the opportunity.
- Aim for at least **three responses**. More is better!
 - Use **social media** like LinkedIn or Twitter to distribute the RFP.
 - Notify local vendors directly, including sharing the RFP with local chapters of major industry groups.

To download RFP samples and templates, visit the Tools and Resources page on the City Renewables website (American Cities Climate Challenge) or see additional examples in the Additional Resources section later in this chapter.

-  **Administer the RFP.** Once the RFP has been issued, it is important to be responsive to follow-up requests for information and help vendors give you the best proposal possible.
- Designate a **point of contact**. This person will need to respond to questions or requests for information in a timely manner. Making answers to questions publicly available ensures that all respondents have the same information.
 - You can engage with vendors prior to the submission deadline by hosting a site walk or other informative event, as long as this complies with internal policy for RFP administration.
 - For example, you could host a bidders' conference or a site visit. To do so, include information about the conference logistics in your RFP. Hold it about a third of the way through the response period. This gives bidders enough time to read the RFP, come up with questions, and incorporate information from the conference into their responses.

 **Evaluate the proposals.** The proposal evaluation process should include a defined scoring system with set criteria, weighting, and guidelines for assigning scores.

- Many proposals will be of similar quality, and the size and complexity of the proposals make them difficult to evaluate without having established guidelines.
- Follow-up **interviews** can be useful as a tiebreaker in deciding between proposals that have similar scores. Limit these interviews to three developers to get the most value from this step.
- Award based on **best value**, not just lowest cost. Check the rules in your jurisdiction to make sure you have this flexibility.

 **Award the contract.** Decide on which developer your utility will use for your project.

- **Best Practice:** Signing a Memorandum of Understanding (MOU) right after the project award but before the final contract can help ease contract negotiations and streamline this process.

- Inform your final choice and go through the contracting process before informing the other RFP respondents.

 **Other considerations/guidelines.** When it comes to the physical installation of panels, there is no difference between a community solar project as compared to a regular solar project. However, there are several unique features of developing a community solar project you should consider while designing your RFP.

- **Project Ownership:** Who will own and maintain the panels after they are developed? Issuing an RFP where you will be the owner is standard if your utility wants to oversee everything after installation, but third-party ownership models can work well for utilities that cannot take advantage of certain tax incentives or do not want to be responsible for ongoing operations and maintenance. For example, customer acquisition is one of the costliest parts of a community solar program — does your utility want to oversee this?



Colorado Springs Utilities (CO)

- **Policy Considerations:** Find your state's regulatory requirements and policies incentivizing community solar through the **North Carolina Clean Energy Technology Center's Database of State Incentives for Renewables and Efficiency (DSIRE)**. Be sure to include in your RFP specifics on the regulatory context that bidders must work within.
- **Design Considerations:** Use the **National Renewable Energy Laboratory's (NREL) PVWatts** and **System Advisor Model (SAM)** to evaluate the potential of a solar project on your own so you already have this information going into the RFP process.
 - Keep in mind economies of scale. It is typically cheaper to install a large community solar system instead of several smaller systems.
 - Include information on interconnection cost and timelines in the RFP. Providing it ahead of time eliminates any guesswork for developers and enables more accurate proposals.
- **Do Not Reinvent the Wheel:** Reach out to other municipalities that have successfully gone through the solar RFP process to request a copy of their RFP materials, as these procurements are all public documents.
- **Community Solar Program Design Considerations:** Often, customer benefits from community solar come in the form of utility bill savings. If this type of benefit will not work for your project, you will have to be creative about how you provide benefits. Feedback from potential customers will be important to validate which approach you take and how successful your program will be.
- **Bring in a Professional:** Consider bringing in a consultant if you do not have the expertise in-house to develop a community solar RFP that meets your utility's goals.



Pasadena Water and Power (CA) Heritage Square Solar Housing Unit

Section III: Additional Resources

Cities and Counties RFP Template (NREL)

Use this RFP template from NREL as a starting point for any grid-tied solar photovoltaic systems.

[Download the template.](#)

RFP Background

View this PowerPoint from the Community Solar Working Group (Session #7, October 6, 2021) to learn more background information about the RFP process.

[View the presentation.](#)

Community Solar RFP Tool

This database from the American Cities Climate Challenge includes many procurement resources, including a downloadable toolkit from the Rocky Mountain Institute for preparing a community solar RFP.

[View the database.](#)

Database of State Incentives for Renewables and Efficiency

Support strong proposals by including relevant policy information in your RFP. This DSIRE database maintains up-to-date information on all state policies and incentives for renewable energy and efficiency.

[View the database.](#)

Case Studies

Hear from the Fayetteville, North Carolina, Public Works Commission about their community solar and battery storage project: Fayetteville Solar + Storage Webinar (NOTE: You will need to log into your NCSP Mobilize account to view this webinar and download the slides.)

[View the webinar.](#)

The Community Solar Value Project collected RFPs from utility-driven solar procurements from 11 utilities representing various project sizes, siting choices, ownership models, and program offerings.

[Download library.](#)



Find more resources in Appendix II: Further Resources

CHAPTER 7

Considering Marketing, Customer Acquisition, & Program Implementation



Section I: Learning Objectives

In this chapter, you will:

- Understand how community solar fits within your utility's business portfolio:
Key Questions to Consider: How does the "product" of community solar fit into the rest of the products your utility offers? How does it compare to your other "green" products? Why is it appealing to different types of customers?
- Know the components of a strong marketing plan:
Key Questions to Consider: How will you market your community solar program? How do you coordinate messaging across utility activities? Who are your target audiences? What are the best ways to reach target audiences?
- Gain insight into best practices implementing a community solar program, including on-boarding customers, communicating with existing customers, managing customer turnover, and adjusting billing practices to accommodate the community solar program
- Decide which activities to complete in-house versus delegating to a developer or other third party

Section II: Recommended Process

- Engage local organizations and stakeholders** in the early stages of project goal setting and design to encourage stakeholder buy-in, customer engagement, and community feedback.
 - Consider leveraging your anchor tenants in marketing the project (nonprofits and businesses; see Chapter 4).
 - Target current commercial customers of green power purchase programs as potential subscribers.
 - Engage local clean energy, climate action, or equity advocacy groups.
 - Work with low- to moderate-income (LMI) community hubs such as poverty assistance organizations, faith-based centers, and other community groups to gather feedback and connect with potential subscribers.
- Reiterate the goals** of your community solar project when marketing your program. Identify one overarching goal for ease of messaging, and create multiple objectives that support the overarching goal. See the **Community Solar**

Marketing Plan Template from the Clean Power Marketing Group for tips on marketing your community solar program.

- Consider this example:
 - **Sample Goal:** To provide access to clean energy to all members of our community, regardless of income or home ownership status.
 - **Sample Objective:** To recruit (X number) general subscribers and (X number) LMI household subscribers.
- Keep in mind — with marketing, “the simpler, the better.” Make sure you think about how your community solar goals fit into your overall utility’s message or brand.

Consider the position of your community solar project within your utility's energy portfolio.

How does community solar “fit” into your overall product portfolio?

- Community solar can support multiple aspects of your clean energy portfolio. Figure 7.1 can be used as a template to show how a community solar project supports your other clean energy programs.

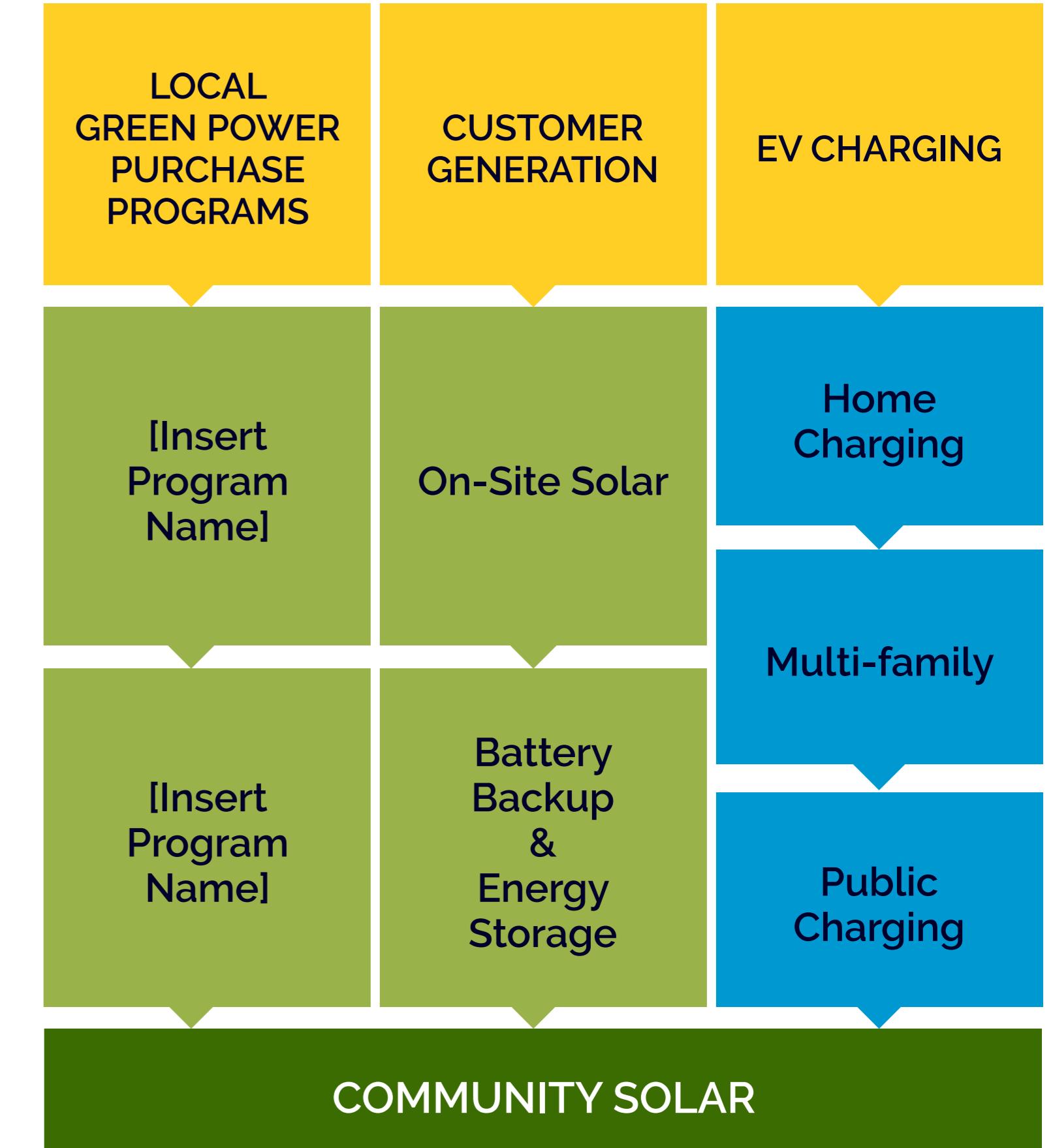


FIGURE 7.1.

Template showing how a community solar project supports other clean energy programs. (Source: Clean Power Marketing Group.) [View here.](#)

 **Brainstorm your target audiences.** Who will benefit from your community solar program?

- List all of your potential audiences for this project. Make sure to include all customer types and stakeholders with demographics/psychographics (customer attitudes and other psychological criteria) for each.

 **Identify your key messages** about community solar based on your target audience (Figure 7.2). For each message, include a value proposition with benefits that your project will provide.

- Focus on how your community solar project can help augment and support your utility's basic message (i.e., providing safe, affordable, and reliable energy). Refer to your work in Chapter 2 to tailor your message to your community's desires and needs.
- **Primary Messages:** List the most important messages to your target audience, ensuring each message contains a benefit.
- **Secondary Messages:** List any supporting messages, still ensuring each message contains a benefit important to your target audience.

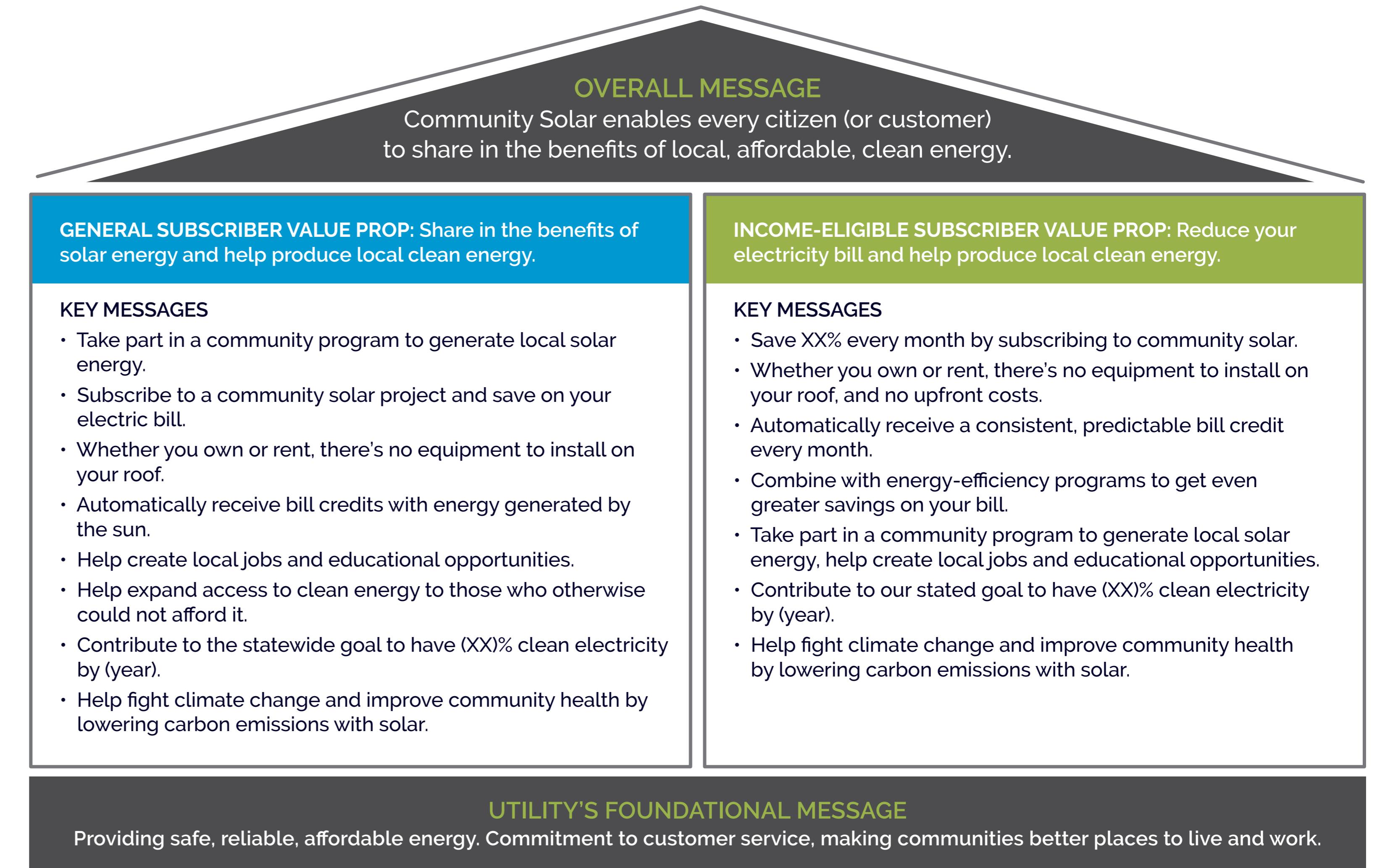


FIGURE 7.2.

Key messages of community solar marketing. (Source: Clean Power Marketing Group.) [View here.](#)

- Collect feedback from your customers on program design and messaging.
 - Target participants in other utility LMI programs with incentivized surveys.
 - Work with community groups to conduct focus groups to test your program design and messaging.
- **Best Practices:**
 - Keep it simple and repeat, repeat, repeat your key message.
 - Having a clear-cut savings message is important, but do not assume your audience does not hold other values, such as protecting the environment.

Determine the marketing strategies your utility will use for the community solar program.

- **Methods:** Find the most effective and efficient methods of outreach for your audience.
 - Media (TV, radio, Internet).
 - Events.
 - Email versus Direct mail.
 - Utility bill inserts.
 - Phone calls or text messages.

- **Prelaunch:** Begin implementing your marketing strategies in advance of siting and building your community solar project. See sample strategies that follow or are in the [Community Solar Marketing Plan Template](#).
 - Reach out to community organizations for input on the program and collaboration to reach their members:
 - Host events and orientation sessions for community members of these organizations.
 - Reach out to local businesses or organizations for possible anchor tenants.
 - Pitch local media about the program.
 - Piggyback on existing programs when reaching out to customers.
 - Recruit “Community Solar Ambassadors” and local stakeholders to champion and advocate for the program.
 - Host a groundbreaking event, and invite all participants and stakeholders to attend.
 - Shoot real-time videos and photos of the solar energy system being built. Share this on your website and social media platforms.
- **Launch:** Prepare all marketing strategies you will use as your program launches. See sample strategies that follow or are in the [Community Solar Marketing Plan Template](#).
 - Announce the launch of your program across all media platforms.
 - Issue a press release for every major milestone (e.g., reservations open, projects commissioned, subscriptions achieved).
 - Engage local students to develop an educational project that translates the benefits of community solar in terms of reductions in emissions or energy burden. Ensure students get something out of this project, such as class credits or a résumé-building experience.
 - Erect signage at each project site that identifies the key benefits of the project.
 - Integrate a site monitoring window on your community solar page with real-time energy production information.
 - Update community organizations on your program's progress with customers.

- **Best Practices:**

- Make the advertising campaign look like it is a utility or government campaign. This will increase trust in the program.
- Ensure your messaging meets these three key elements: Credibility, Simplicity, and Trust.
- Provide perks or benefits to any volunteers who help with this marketing process.

 **Estimate the cost** of each of the marketing strategies you identified earlier to create a marketing budget. Every deliverable you produce in your marketing should be tied to a strategy. See a sample spreadsheet layout in the [Community Solar Marketing Plan Template](#).

 **Consider the following marketing and communications best practices** (Source: Insights from the Colorado Energy Office — Low-Income Community Solar Demonstration Project, December 2017).

- Use multiple modes of communication and outreach.

- To avoid “not-in-my-backyard” pushback, get early buy-in on site placement, use local contractors, and highlight the benefits of clean energy.
- Ensure there is a clear contact for the program.
- Clearly highlight the benefit from community solar in your subscribers’ bills. Indicating costs and credits directly on the monthly electricity bill will help with customer satisfaction and retention. Communicate costs and savings of program participation as simply as possible on a monthly basis.
- Have a kick-off event to celebrate and draw attention to the project and continue to communicate regularly with participants, offering annual events, if possible.

 **Select and test your customer management and billing software solutions early.**

- Begin researching options for adjusting your billing software and processes for the community solar program. There are third-party software options for community solar customer management and billing, but they can be expensive. Some utilities customize

their existing billing software using consultants or in-house programmers. Begin the chosen solution early to allow time for testing and adjustments.

- Create a customer management database that allows you to maintain a waiting list (once your community solar program is fully subscribed).

- **Idea:** One municipal utility in Colorado offers the option for customers to donate their community solar subscriptions to local nonprofit organizations if they are moving out of the service territory. If you want to offer this option, you may want to maintain a list of organizations that are interested in a donation of a community solar subscription. You might also advertise the option to donate a subscription in your marketing communications.



EQUITY CALLOUT

- **Preempt customer skepticism.** Your messaging should clearly convey benefits and costs. Include customers' current electricity costs, the customer's subscription cost (even if the program is subsidized), and the value of the customer's bill credits and/or savings. Including your utility's branding or other trusted logo and format will increase trust in the program.
- **Use audience-specific language.** Outreach groups should be prepared to speak languages that are prevalent in local communities and prepare promotional materials in those languages.

- **Clearly outline consumer protections.** Low-income households must have strong consumer protection clauses to protect them from hidden fees, fines, and/or penalties (i.e., overdue payments, contract termination, rate escalators, etc.). Keep in mind that historically, LMI households have been targets of malpractice by some solar and other alternative energy providers. Work to build trust by giving LMI households the tools and information they need to understand your community solar program and how they are protected.
- **Localize messaging and pilots.** Effective messaging may vary in different contexts, so use pilot programs to test and refine messaging.
- **Minimize legalese.** The contracts should be easy to understand.
- **Partner with local trusted organization(s) to help with outreach.** Once the partnership is formalized, create co-branded materials that outline community solar benefits. Many utilities

partner with local organizations that are already working with low-income households on energy efficiency, energy justice, and renewable energy issues. These organizations help establish trust, open doors, and can help qualify low-income households.

- **Integrate solar with complementary programming.** A comprehensive approach to energy burden reduction can increase program impact and efficiency. Solar is a strong complement to low-income weatherization programs as a cost-effective measure to reduce electric energy burden.
- **Focus on the correct media.** Outreach efforts should concentrate on the local media used most by community members and include basic educational information about solar and energy in general.
- **Direct marketing materials at communities' priorities.** Marketing materials must be targeted to different household types and

continued on next page...

EQUITY CALLOUT continued...

highlight the priorities for each community. Marketing materials should be multicultural and multilingual, as needed. Subscribers noted that the most important marketing aspects were the potential for much *lower bills* and (almost as important) *more consistent, predictable bills through locked-in bill credits*.

- Do not assume customers from LMI households have different values than other customers. Customers from LMI households are also interested in the *environmental benefits* created by solar. Emphasize these in your marketing.

For more information:

Visit the [Insights from the Colorado Energy Office: Low-Income Community Solar Demonstration Project](#) published in 2017 or the [Community Solar Marketing Plan Template](#) by the Clean Power Marketing Group (Figure 7.3).

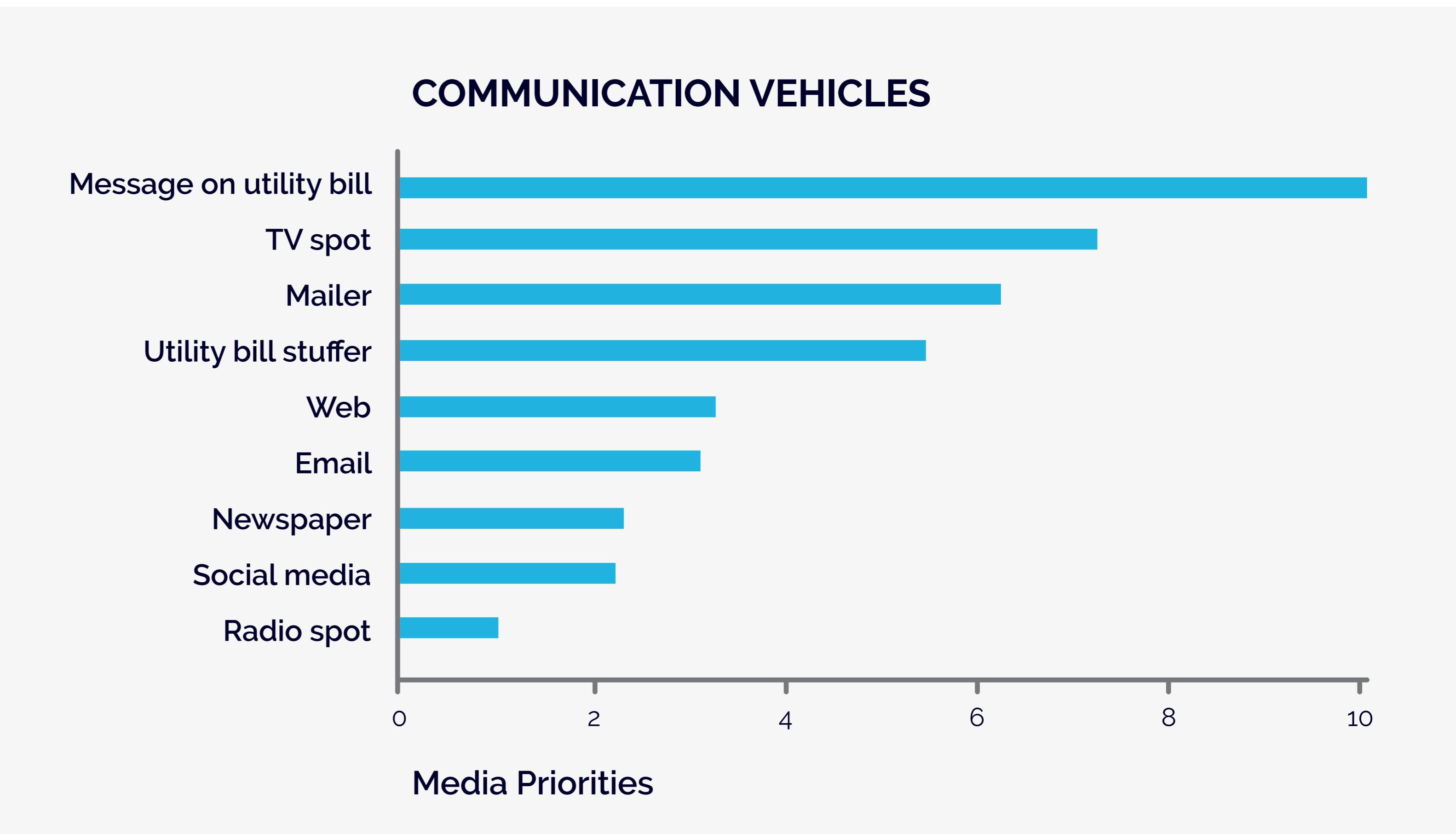


FIGURE 7.3.

Communication strategies for LMI community solar. (Source: PCG [Pacific Consulting Group]. 2017. [Community Solar for Low Income Customers](#), SEPA Webinar, Designing and Marketing Community Solar Programs for Low-Income Customers, May 11, 2017.)

Section III: Additional Resources

Utility-led Community Solar Case Studies

Read case studies from nine utilities, including details on their marketing strategies and insights from customer feedback surveys.

[Read case studies.](#)

Engaging Community Partners

Read case studies from 10 participants in the U.S. Department of Energy's "Solar In Your Community" Prize Challenge, including how each leveraged community partners to implement and sustain community solar projects, especially in underserved communities (Technical Report, May 2019).

[Read case studies.](#)

Using Market Research

Use this market research checklist and guide and view a recorded webinar on how to use market research to target specific customers with community solar messaging.

[Access checklist, guide, and webinar.](#)

Community Solar Marketing Plan Template

This presentation shown by the Clean Power Marketing Group to the Community Solar Municipal Working Group (Session #8, November 10, 2021) will walk you through the process of developing a marketing plan for community solar, including identifying your goals, positioning, messaging, target audience, strategies, and budget.

[Download the presentation.](#)

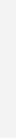


Find more resources in Appendix II: Further Resources

APPENDIX I

Facilitator Questions

Facilitators of community solar workshops can use the following questions to prompt discussion and collaboration among workshop participants. Once you have a grasp of the answers to these questions, you will have the foundational knowledge needed to begin exploring project financing, scoping, and proposals.



What are the **key objectives** for your community solar project?

- Promote equity and inclusion
- Generate local, low-cost energy
- Offer customers cost savings
- Address customer demand for shared solar
- Provide backup power to a community building
- Display environmental benefits or leadership
- Encourage community participation
- Reduce utility peak demand charges by providing local generation
- Support renewable portfolio standard goals
- Other (provide shading, demonstrate dual land use, etc.)



Which **customer types** will be invited to subscribe in the project?

- Residential
- Low- to moderate-income (LMI)
- Commercial
- Industrial
- Nonprofit entities



Will there be **multiple customer classes** served by the same project (e.g., commercial and residential customers in the same program, customers on different utility rates)?



Would a **new rate design** be required for your customers to participate in community solar?



Do you aim to have an **anchor tenant**? (Anchor tenants are large, reliable subscribers that reduce the risk of the community solar project.)



Are you considering adding **battery storage** to the community solar project?



Do you want to **prioritize LMI households** in the community solar project? (More details about this topic can be presented in later working sessions.)



What are the **regulatory restrictions** or **approval processes** that need to be considered in developing a community solar project?

- Does the utility have authority to implement a community solar program? Do you need a new ordinance?
- What are the timing considerations or restrictions? Dates to consider? (Consider, e.g., budget cycles and city council approval processes.)
- What documents will approving managers and/or city council need?

APPENDIX II

Further Resources

Chapter 1: Defining Community Solar Project Goals & Objectives for Your Utility

Start-up Questions:

- A list of questions to consider prior to developing a solar project. This guide by GRID Alternatives is designed for multifamily affordable housing projects, but it is relevant to multiple solar program designs: [Getting Started: Solar for Multifamily Affordable](#)
- A self-assessment to help determine where your utility is in the process of developing a solar project. This assessment from the U.S. Department of Housing and Urban Development is designed for multifamily affordable housing projects, but it is relevant to multiple solar program designs: [Organizational Solar Readiness Assessment](#)

Community Solar Basics:

- **National Community Solar Partnership:** Led by the U.S. Department of Energy's Solar Energy Technologies Office, the National Community Solar Partnership (NCSP) network provides technical assistance, market tracking and analysis, and resources for community solar stakeholders: [U.S. Department of Energy, Community Solar](#)
- **National Renewable Energy Laboratory Community Solar:** A lead collaborator on the NCSP, the National Renewable Energy Laboratory (NREL) develops publications, market analyses, and tools to advance community solar: [NREL Community Solar](#)
- **Community Solar Overview:** Download the following PowerPoint presentation from the Municipal Utility Working Group (April 2021) to learn about the status of community solar across the United States and better understand how to define your utility's community solar project goals and objectives: [Introduction to Community Solar](#)

- **SolSmart Toolkit for Local Governments:**

This online toolkit includes resources and information related to community solar topics, including stakeholder engagement, solar development, existing regulatory frameworks, market development and finance, siting solar on public facilities and underutilized land, and solar + storage: [Solar Energy: SolSmart's Toolkit for Local Governments](#)

Policy Screens:

- A review from the NREL (November 20, 2020) of community solar policies and programs in states with expanding markets (Hawaii, Maine, Maryland, Pennsylvania, Virginia): [States with Community Solar Policy Updates and Capacity Growth Potential \(NREL\)](#)
- A report series from the North Carolina Clean Energy Technology Center intended to keep industry stakeholders informed of policy and regulatory changes in the clean energy sector with timely, comprehensive, and unbiased updates: [The 50 States Energy Report | NC Clean Energy Technology Center](#)

- An annual report from the Institute for Local Self-Reliance that tracks and scores states based on their energy policies and how these policies help or hinder local clean energy action: [The 2021 Community Power Scorecard — Institute for Local Self-Reliance](#)
- A regularly updated database of policies and incentives for renewable energy and efficiency (provided by the North Carolina Clean Energy Technology Center): [Database of State Incentives for Renewables & Efficiency \(DSIRE\)](#)

Affordable Housing:

- An overview of incorporating renewable energy into affordable housing designed for Housing and Urban Development (HUD) Community Planning and Development (CPD) grantees: [Renewable Energy Toolkit for Affordable Housing](#)

Energy Efficiency:

- An annually updated database of state and local policies that influence energy efficiency efforts (provided by the American Council for an Energy-Efficient Economy): [ACEEE | Policy Database](#)

Municipal Utility Community Solar Case Studies:

- This report from the NREL provides learnings from six municipal utilities that developed community solar programs in 2016: [Lessons Learned: Community Solar for Municipal Utilities](#)
- These two webinars discuss community solar best practices and lessons learned from the community solar program (created by the Sacramento Municipal Utility District): [Community Solar Value Project: The Process](#)

Chapter 2: Gauging Market Potential & Customer Appetite

Target Market Research & Segmentation:

- The Solar Value Project compiled resources, guides, and a webinar detailing how to best prepare for a customer-driven community solar program design: [Solar Value Project: Target Market Research & Segmentation](#)

Stakeholder Engagement:

- This toolkit created by SolSmart provides a brief overview of the different formats for convening and engaging stakeholders as well as prompts for discussing solar energy with community members: [Stakeholder Engagement | SolSmart](#)
- This briefing paper by the American Planning Association provides guidance on initiating community conversations about solar, addressing common misperceptions, and designing stakeholder engagement: [Solar Community Engagement Strategies for Planners](#)
- This guide from the Clean Energy States Alliance is a collection of best practices and principles for partnering with community-based organizations to engage stakeholders: [Community Outreach and Solar Equity: A Guide for States on Collaborating with Community-Based Organizations \(Clean Energy States Alliance\)](#)

Community Survey Development:

- This website provides guidance on community-led planning, including examples of survey and focus group questions and guidance on how to support consensus building for solar projects: [University of Massachusetts Amherst Clean Energy Extension](#)

Creating Segmentation Frameworks:

The following toolkits offer guidance on providing personalized messaging to segments of your customer base:

- CELICA Toolkit (Better Buildings, U.S. Department of Energy): [CELICA Toolkit: Clean Energy Solutions for Low Income Communities | Better Buildings Initiative](#)
- Clean Energy for Low Income Communities: Stakeholder Engagement
- SEPA Toolkit (Smart Electric Power Alliance): [Utility Community Solar Handbook | SEPA](#)
- NRECA Community Solar Playbook (Cooperative.com): [The Community Solar Playbook](#)
- The Community Solar Playbook: Module 2: Marketing, Member-Consumer Services, and Communications

Community-Led Models for LMI Community Solar:

- This report from Fresh Energy provides case studies on successful, community-led community solar projects that serve low- to moderate-income (LMI) households as well as best practices for LMI community solar projects in general: [Bringing Community Solar to a Broader Community](#)

Understanding Energy Poverty:

- This landscape analysis of energy poverty research by the Texas Energy Poverty Research Institute (TEPRI) provides summary information on the unique priorities and behaviors of LMI households as well as guidance on designing programs that address LMI energy burdens: [TEPRI Energy Poverty Research Landscape Analysis](#)
- **Landscape Analysis & Lessons Learned:** Download the following presentation (Municipal Utility Community Solar Working Group, Session #2, May 26, 2021) from TEPRI to review key findings from a landscape analysis of industry, government, and scholarly publications about and lessons learned from existing low-income community solar models across the United States: [Texas Energy Poverty Research Institute \(TEPRI\) and Go Smart Solar \(GSS\) Presentation](#)

Consumer Values:

- This study compares the preferences of LMI solar adopters to non-LMI solar adopters, finding LMI and non-LMI adopters share pro-environmental attitudes and an interest in novel solar products: [K.S. Wolske, More alike than different: Profiles of high-income and low-income rooftop solar adopters in the United States](#)

Analysis of Community Solar Drivers:

- This scientific research article provides a detailed analysis of the drivers of community solar adoption across the United States: [E. Funkhouser et al., Business model innovations for deploying distributed generation: The emerging landscape of community solar in the U.S.](#)

Impact of Community Solar on Stakeholders:

- This solar valuation study (NREL Technical Report, August 2017) investigates how community solar impacts different stakeholders, including customers, solar subscribers, solar developers, utilities, and society at large: [Project Summary: Community Solar Stakeholder Impacts in Cook County, Illinois](#)

Chapter 3: Choosing a Community Solar Project Site

Analyze Potential Sites:

- A presentation created by the National Renewable Energy Laboratory (NREL) (Community Solar Project Planning Working Group Session #3, June 23, 2021) that details the features, records, and data utilities should consider in their site selection, along with the tools, websites, and datasets utilities can use to complete this analysis: [Community Solar Project Siting](#)

Local Government; Public Facilities:

- A guide (part of “Solar Energy: SolSmart’s Toolkit for Local Governments”) to help local governments adopt solar on public facilities. Topics covered include site development, financing municipal solar, regulatory issues, and municipal projects on brownfields: [Solar Development on Public Facilities, Brownfields, and Under-Utilized Land](#)

Rooftops:

- A guide for identifying which roofs in your jurisdiction may be good candidates for a community solar installation: [Renew300 Solar Site Selection Guide](#)

Markets:

- This slide deck from the NREL (Webinar, April 28, 2020) provides insights into the current community solar market status, impacts of market conditions, various subscription models, and data on the community solar value proposition to subscribers: [Sharing the Sun: Understanding Community Solar Deployment and Subscriptions](#)

Contaminated Sites:

- This report from the U.S. Environmental Protection Agency discusses siting community solar on superfund sites, brownfields, landfills, mine sites, as well as other formerly contaminated sites under various federal and state cleanup programs: [RE-Powering America's Land Initiative: Community Solar](#)

Affordable Housing:

- This toolkit from the U.S. Department of Housing and Urban Development Community Planning and Development (CPD) specifically addresses integrating renewable energy with affordable housing projects. The third phase includes how to select a solar site: [CPD Renewable Energy Toolkit; Phase 3: Project Evaluation and Selection](#)
- The DOE has a Multifamily Affordable Housing Collaborative to support housing providers in the effort to increase access to community solar: [Multifamily Affordable Housing Collaborative](#)

Permits:

- This resource (part of “Solar Energy: SolSmart’s Toolkit for Local Governments”) is a primer to the solar installation permitting and approval processes. Note that this is not community-solar specific: [Solar PV Construction: Codes, Permitting, and Inspection](#)

Land Use:

- This report (NREL Technical Report, June 2013) provides data and analysis of the land use associated with U.S. utility-scale ground-mounted photovoltaic (PV) and concentrating solar power facilities: [Land-Use Requirements for Solar Power Plants in the United States](#)

Ecosystem Considerations:

- This SolSmart publication outlines strategies local governments can use to address issues arising from large-scale solar photovoltaic (PV) development potentially disrupting native ecosystems and water quality: [Land Use Considerations for Large-Scale Solar](#)

Stormwater Management:

- The Photovoltaic Stormwater Management Research and Testing (PV-SMaRT) project is developing and disseminating research-based, PV-specific tools and best practices for stormwater management and water quality at ground-mounted PV sites: [NREL Solar Market Research and Analysis, PV-SMaRT](#)

Analytics:

- This report reviews the literature and available techniques for estimating the technical potential of solar energy given total available land and rooftop area. It also provides an alternative method developed by the NREL for estimating rooftop suitability for PV: [Estimating Rooftop Suitability for PV: A Review of Methods, Patents, and Validation Techniques](#)

GIS Considerations and Available Datasets:

- This presentation (Municipal Utility Community Solar Working Group, Session #3, June 23, 2021) provides information on how to evaluate technically available lands or roofs for

distributed solar development, lists common inputs and scenarios related to varying system configurations and land exclusiveness, and estimates generation potential and costs for development of new distributed solar sites: [Assessing Distributed Solar Technical Potential](#)

- **SolarGIS's Photovoltaic Electricity Potential Raster (PVOUT):** This data resource (developed by SOLARGIS and provided by the Global Solar Atlas) contains photovoltaic power potential (PVOUT) in kWh/kWp covering the globe: [World — Photovoltaic Power Potential \(PVOUT\) GIS Data](#)

Modeling:

- NREL's System Advisor Model is a free techno-economic software model that enables detailed performance and financial analysis for renewable energy systems: [NREL System Advisor Model \(SAM\)](#)

Chapter 4: Investigating Program Designs & Subscription Models

Pricing and Subscription Models:

- In this presentation (Community Solar Project Planning Working Group Session #4, July 21, 2021) created by the National Renewable Energy Laboratory (NREL), you will find a breakdown of different pricing and subscription models, insights into the topics you should consider when deciding on your program and subscription design, and a case study from Austin Energy: [Program Designs and Subscription Models](#)

Technical Assistance:

- In this report to the City of Dallas, researchers provided case studies of low- to moderate-income (LMI) solar programs, a review of different financing mechanisms and program design options, and recommendations for an action plan: [City of Dallas Low Income Solar Assistance Program Study](#)

Attracting Customers:

- This article (*PV Magazine*, January 24, 2020) details the different subscription characteristics that make up the poor, standard, and best offerings found in community solar programs. Read this for recommendations on attracting and retaining customers: [Patterns are emerging in community solar subscriptions: How does your offer compare?](#)

Stakeholder Perspectives:

- The linked resource was developed by the NREL (January 5, 2020) to demonstrate different stakeholder perspectives on community solar models: [Community Solar Models and Stakeholder Perspectives](#)

Overview; Publications:

- This NREL webpage offers an overview of community solar, as well as program design options and publications and resources you can download: [NREL, State, Local, and Tribal Governments: Community Solar](#)

Markets:

- A presentation (NREL Webinar, April 28, 2020) covering the current community solar market status, impact of market conditions, and subscriber value proposition: [NREL, Sharing the Sun: Understanding Community Solar Deployment and Subscriptions](#)

Data:

- This database (NREL) contains a list of the community solar projects across the United States as of June 2020: [Sharing the Sun Community Solar Project Data](#)

LMI Community Solar Design:

- This technical report (NREL, December 2018) draws from the literature and from interviews with representatives from LMI solar developers and state LMI community solar programs to provide experience on LMI community solar design: [Design and Implementation of Community Solar Programs for Low- and Moderate-Income Customers](#)

- This report is a 2021 update from the NREL on LMI and other incentives to increase equitable access to solar: [Equitable Access to Community Solar: Program Design and Subscription Considerations](#)

Toolkits and Templates:

- This handbook (Solar Electric Power Association, 2013) was developed to help guide utilities through the process of researching, designing, and evaluating a community solar program: [Utility Community Solar Handbook](#)
- This checklist (Interstate Renewable Energy Council [IREC], November 2018) reflects the program design considerations critical to supporting effective community solar programs that appeal to and benefit their customers and communities: [Checklist for Voluntary Utility-Led Community Solar Programs](#)

Models:

These rules (IREC, June 2013) were created to assist stakeholders in broadening customer access to shared renewables programs and renewable energy: [Model Rules for Shared Renewable Energy Programs](#)

Case Studies:

- Residents in PGE's Smart Grid Test Bed neighborhoods are enrolled in Peak Time Rebates, where they are rewarded for shifting their energy use during peak times. They then can choose to donate their rebates to support community organizations: [PGE's Smart Grid Test Bed](#)
 - If customers will receive bill savings from participating in your community solar program, consider giving them the option to donate these savings to a fund that supports LMI customer participation in the program.
- This report from the Community Solar Value Project provides a roundup of pricing strategies from utilities in Arizona, California, Colorado, Massachusetts, Iowa, Minnesota, and Texas; read through these strategies to see the range of program and pricing options in the marketplace: [Twelve Community-Solar Pricing Strategies from Utilities in the U.S.](#)
- D.C. Solar for All is a program aiming to bring solar energy to LMI residents across the District of Columbia. View examples of their resources and program guidelines on their webpage: [Department of Energy & Environment: Solar for All](#)
- The Orlando Utilities Commission has a community solar program available for customers: [OUCommunity Solar](#)
- The Western Colorado Clean Energy Network and CLEER completed a study in October 2021 that estimates the market potential for solar and storage projects in Eagle, Garfield, and Pitkin counties, and presents an action plan for maximizing solar development while securing economic and other benefits for the region: [Three-County Solar + Storage Study and Action Plan](#)

Chapter 5: Exploring Project Economics & Financials

Community Solar A-Z:

- This guidebook from the American Public Power Association details key considerations a utility must keep in mind when determining if community solar is right for them: [Community Solar A-Z: Guide for Public Power Utilities](#)

Finance Structures:

- This 2017 report by the Rocky Mountain Institute describes how established solar financing models can be easily adapted to the community-scale solar market as well as discusses key risks and mitigants: [Rocky Mountain Institute, Financing Community-Scale Solar](#)

Policies and Incentives:

- This guide (prepared by the National Renewable Energy Laboratory [NREL], May 2012) explores the range of state and federal policies and incentives to help communities plan and implement successful energy projects: [A Guide to Community Shared Solar: Utility, Private, and Nonprofit Project Development](#)

Procurement and Financing Resources:

- The Community Solar Value Project compiled resources such as a market landscape assessment guide and introduction to project financing and ownership models at this site: [Procurement for Services & Solar Resources](#)

Ownership Options:

- This toolkit provided by SolSmart covers ownership options of community solar as well as their benefits and challenges: [Market Development and Finance | SolSmart](#)

Community Solar PPA Model:

- This factsheet describes how community solar is being implemented in a community: [Fact Sheet for Community Solar PPA Model](#)

Renewable Energy:

- Developed by NREL, SLOPE provides data on technical potential and Levelized Cost of Energy (LCOE) projections for various renewable energy technologies at state and county levels to enable data-driven energy planning: [NREL SLOPE Tool: State and Local Planning for Energy](#)
- CLEER is an organization working to expand community solar and battery storage across three counties in Colorado: [Ramping Up Renewables](#)

Low- to Moderate-Income (LMI) Projects:

- **LMI Financing Structures:** This technical report (NREL, January 2018) provides a matrix of financing options for LMI community solar projects for different housing types: [Unlocking Solar for Low- and Moderate-Income Residents: A Matrix of Financing Options by Resident, Provider, and Housing Type](#)
- **Multifamily Affordable Housing:** This case study (Better Buildings Challenge, U.S. Department of Energy) describes the unique policy and process approach of the National Housing Trust to installing solar on their properties: [National Housing Trust/Enterprise: National Housing Trust Renewable Solar Financing Model](#)

Chapter 6: Developing Requests for Proposals & Project Timelines

Request for Proposal (RFP) Templates & Toolkits:

- **Cities and Counties RFP Template:** Use this RFP template from the National Renewable Energy Laboratory (NREL) as a starting point for any grid-tied solar photovoltaic systems: [Cities and Counties RFP Template](#)

- **Community Solar Value Project (CSV) Library of Utility-Led RFPs:** CSV collected RFPs from utility-driven solar procurements from 11 utilities representing various project sizes, siting choices, ownership models, and program offerings: [Library of Community Solar RFPs](#)
- **U.S. Department of Housing and Urban Development (HUD) Solar Request for Proposals (RFP) Toolkit:** This toolkit provides affordable multifamily housing providers that are procuring on-site solar electricity with practical guidance on the RFP process: [HUD Solar RFP Toolkit](#)
- **Community Solar RFP Tool:** This database from the American Cities Climate Challenge includes many procurement resources, including a downloadable toolkit for preparing a community solar RFP from the Rocky Mountain Institute: [American Cities Climate Challenge, Tools & Resources](#)
- **Selection Criteria Scoring Template:** See an example selection criteria scoring template from the U.S. Department of Housing and Urban Development Community Planning and Development's Renewable Energy Toolkit to help you evaluate proposals: [Renewable Energy Toolkit](#)
- **Model RFP for Third-Party Solar:** From Clean Energy Resource Teams, access a model RFP and guidance for how to lay out your RFP: [Model RFP for Third-Party Solar](#)
- **Local Government Considerations for Solar Financing and Procurement:** Find general resources, a [presentation on financing and procurement](#) and a [template RFP](#) on this NREL Solar Market Research & Analysis site: [Solar Decision Support and Resources for Local Governments](#)
- **Tribal Solar RFP Template and Best Practices:** NREL presents information about the RFP process and best practices and provides a tribal solar RFP template: [NREL Requests for Proposals: RFP Template and Best Practices](#)

Policy Considerations:

- **Database of State Incentives for Renewables & Efficiency:** Support strong proposals by including relevant policy information in your RFP. This DSIRE database maintains up-to-date information on all state policies and incentives for renewable energy and efficiency: [Database of State Incentives for Renewables & Efficiency \(DSIRE\)](#)

Multifamily Affordable Housing:

- **Solar in Your Community Challenge:** Read about the winning project that installed community solar on Denver Housing Authority properties (as well as other projects), and download a factsheet and report from this challenge (Office of Energy Efficiency & Renewable Energy, Solar Energy Technologies Office): [Solar in Your Community Challenge | Department of Energy](#)

Solar + Storage:

- **Solar Companion Measures:** The Solar Value Project website provides further information and resources about companion measures for community solar, such as energy storage: [Solar Value Project: Solar-Plus Companion Measures](#)
- **Solar + Storage RFP Template:** The NREL provides an RFP template: [NREL RFP Template for Grid-Tied Solar Photovoltaic Systems for State, City, and Other Entities](#)

- **Solar + Storage Guide:** This guide from the Community Solar Value Project helps utility solar program planners bring greater value into community solar by adding companion measures: [Solar Plus Storage Companion Measures for High-Value Community Solar](#)
- **Solar + Storage in Co-ops:** The Solar Value Project website offers guidance and resources for exploring a solar-plus-storage option as well as several case studies of successful co-op programs: [Solar-Plus for Electric Co-ops: An Introduction to the Project and Its Products](#)
- **Procurement Guidance and Sample RFPs:** The Solar Value Project compiled procurement guidance as well as example RFPs for projects involving solar and storage: [Procurement Guidance for Storage and Solar-Plus](#)
- **Solar + Storage Case Studies:** NRECA has case studies of co-op solar-plus-storage projects: [Solar-Plus-Storage Procurement Best Practices and Lessons Learned](#)

- **NCSP Community Solar + Storage Webinar:** Hear from the Fayetteville, North Carolina, Public Works Commission about their community solar and battery storage project: [Fayetteville Solar + Storage Webinar](#) (NOTE: You will need to log into your NCSP Mobilize account to view this webinar and download the slides.)
- **NREL Considerations for Implementing PV Plus Storage at Federal Buildings and Campuses Factsheets:** This factsheet contains helpful information about battery storage and considerations for implementing it: [Considerations for Implementing PV Plus Storage Systems at Federal Buildings and Campuses](#)
- **NREL Considerations for Universities Writing Solar RFPs:** The NREL presents issues for universities to consider when writing RFPs for solar PV: [Writing Solar RFPs: Lessons from NREL's University PV Implementation Assistance Program](#)

Chapter 7: Considering Marketing, Customer Acquisition, & Program Implementation

Marketing Templates and Toolkits:

- **Community Solar Marketing Plan Template:** This template from the Clean Power Marketing Group will walk you through the process of developing a marketing plan for community solar, including identifying your goals, positioning, messaging, target audience, strategies, and budget: [Community Solar Marketing Plan Template \(Clean Power Marketing Group\)](#)

Understanding Consumer Priorities:

- **Using Market Research:** Use this market research checklist and guide and view a recorded webinar on how to use market research to target specific customers with community solar messaging: [Solar Value Project, Target Market Research and Segmentation](#)

- **Utility-Led Community Solar Case Studies:** Read case studies from nine utilities, including details on their marketing strategies and insights from customer feedback surveys (prepared by Smart Electric Power Alliance): [Dominion/SEPA Community Solar Report: Community Shared Solar in Real Life](#)
- **Engaging Community Partners:** Read case studies from 10 participants in the U.S. Department of Energy's Solar In Your Community Challenge. Discover how each participant leveraged community partners to implement and sustain community solar projects, especially in underserved communities: [Up to the Challenge: Communities Deploy Solar in Underserved Markets](#)
- **Directly Engaging Communities:** Learn how to initiate conversations about solar directly with community members, including how to address common concerns about solar energy (American Planning Association, 2012): [Solar Community Engagement Strategies for Planners](#)
- **Stakeholder Engagement Best Practices:** Further explore best practices and tools for engaging stakeholders in renewable energy planning, including the common themes you should include in your stakeholder engagement strategy ("Solar Energy: SolSmart's Toolkit for Local Governments"): [Stakeholder Engagement | SolSmart](#)
- **Connect with Workforce Development:** Consider the potential of connecting with local workforce development programs or including your own workforce component, including successful strategies for low-income solar workforce programs: [Workforce Development | Low-Income Solar Policy Guide](#)

