U.S. DEPARTMENT OF ENERGY | Office of ENERGY EFFICIENCY & RENEWABLE ENERGY
SOLAR ENERGY TECHNOLOGIES OFFICE

NREL Transforming ENERGY

Community Solar Program and Subscription Design

WORKSHEET

NREL/OT-7A40-88674 • January 2024

Community Solar Program and Subscription Design

Worksheet

How To Use This Worksheet

This worksheet assists you in the early stages of designing a community solar program that meets your specific goals and context. By selecting from the program design options presented in this worksheet, you will draft a community solar program that can serve as a starting point for discussions with colleagues and stakeholders. The worksheet helps you think through each program design element, providing considerations about subscriber impacts, interactions with other program elements, and high-level implications for program finances. You are encouraged to select an option for each design element, even if you are uncertain. The goal is to arrive at a conceptual program design that can be the subject of further discussion. Be sure to take notes to record your reasons for selecting one design element over its alternative and any additional ideas or concerns.

Table of Contents

Program/Project Goals and Priorities

The first step is to state your goals for the community solar program/project. Community solar can serve a wide variety of stakeholder types, depending on the design and implementation of the program.

Before continuing, write down some words or phrases that capture your own thoughts regarding the goals for your community solar project or program (suggested <10 words).

Below are some examples of goals that may be applicable. Check those that apply in your case, limiting your selections to the highest priorities.

- ☐ Generate local, low-cost energy for customers
- ☐ Advance equity and inclusion in clean energy
- ☐ Reduce energy burden/support customer utility savings
- ☐ Address customer demand for shared solar
- ☐ Demonstrate environmental leadership
- ☐ Support community participation in environmental stewardship
- ☐ Increase local generation to reduce utility peak demand charges
- ☐ Provide grid support through strategically placed solar generation
- ☐ Support renewable portfolio standard (RPS) goals
- ☐ Provide solar access to those with high barriers (e.g., renters, multifamily housing occupants, those with limited access to capital)
- ☐ Increase energy choice for consumers
- ☐ Provide community investment opportunities
- ☐ Provide backup power to community buildings
- ☐ Provide shading (e.g., in a public park or parking lot)
- ☐ Demonstrate dual land use (e.g., agrivoltaics, floating solar).

Goals for community solar can be highly targeted or broadly encompassing. To create a meaningful goal statement, consider the following guidelines. Goals should be attainable, time-constrained, and quantifiable, and the statement should use precise language. Some details to consider are how large the program/project could be, when it should be deployed, how many or what types of customers to include or target, and where projects may be located.

A few example goal statements are:

D.C. Solar for All

"Solar for All aims to bring the benefits of solar energy to 100,000 low- to moderate-income families in the District of Columbia. The D.C. Department of Energy and Environment is partnering with organizations across the district to install solar on single-family homes and develop community solar projects to benefit renters and residents in multifamily buildings. All Solar for All participants should expect to see 50% savings on their electricity bill over 15 years and can be proud to have gone solar!"

Oregon

"The goal of the Oregon Community Solar Program is to expand the state's renewable energy portfolio and make solar energy available to customers across the state who previously did not have access."

Course Example

Our community solar program aims to provide residential low- and moderate-income (LMI) households and nonprofits with access to solar while reducing their energy burden. We will work with community members to install 500 kW of solar projects across at least five local nonprofit properties, which will serve at least 50 LMI homes. The program aims to be operational by 2025 and will provide

bill savings to all LMI customers within the first year, and for the remainder of the project's life for all subscribers.

Drawing on your initial phrases and the example goals you selected above, write a more thorough and targeted goal statement, ideally 2–5 clear sentences.

Eligible Customer Classes

Definition

Eligible customer classes define electricity customers eligible to enroll in the community solar project or program (e.g., residential, commercial, industrial, LMI). Carve-outs can be used to ensure that a portion of the community solar project is reserved for certain customer classes.

Benefits of Multiple Customer Classes	Drawbacks of Multiple Customer Classes
a. Allowing all customer classes makes solar accessible to more customers. b. A single program that is available to all customer classes may reduce confusion about who can subscribe. c. Subscription costs may vary across customer classes. Higher subscription costs for one customer class may allow for lower subscription costs for another.	a. With more customer classes comes additional administrative decisions and potential costs. b. Different subscription payments across customer classes may complicate subscription and credit design. c. Without limitations (sometimes called "carve-outs") in place, one customer class may monopolize subscriptions.

Considerations

The mix of eligible customer classes will dictate a lot of other program elements, so considering who will be eligible is an important first step. If the goal of community solar is to target a specific group, then consider making the entire program, a carve-out in the program, or specific projects eligible to only those customer classes. Allowing multiple customer classes may be beneficial to the program, even if the primary goal is to target a single customer class, by balancing program and subscription acquisition costs among multiple classes.

Design Choices

Customer Class	Inclusion in the Program	Carve-Out (% or capacity)	Maximum (% or capacity)
Residential	☐		
Commercial	☐		
Industrial	☐		
LMI	☐		
Other	☐		

A carve Out is a portion of the project's capacity that is only available to be subscribed to by a certain customer class (or classes)

The NCSP has set a target for 40% of subscriptions to be set aside for subscribers from LMI households

Section Notes

Anchor Tenants

Definition

Anchor tenants are large customers that subscribe to a significant portion of a community solar array. An anchor tenant may be a local business, government entity, school system, or other community organization that can commit to a community solar subscription.

Benefits	Drawbacks
a. Improve project "bankability" and potentially lower financing costs by reducing perceived risk by investors. b. Reduce overall subscription costs for other customer classes through improved project economics. c. Reduce overall project customer acquisition time and costs.	a. Anchor tenants, by design, consume large portions of the project's generation, reducing the total possible number of subscribers in other classes. b. With a large anchor tenant, the overall subscriber mix of the project may not represent the utility's customer base.

Considerations

Anchor tenants can add certainty in the revenue stream and potentially reduce participation costs for smaller subscribers. However, too large of an anchor tenant may limit the number of subscriptions available to remaining customers, so consider limiting the size of an anchor tenant to balance the benefits and drawbacks.

At least 7 states limit the capacity an anchor tenant can subscribe to. States with anchor tenant limits also have a larger average project size than states without.

Design Choices

Consideration	Details		
Inclusion of anchor tenants	Allow: ☐	Restrict: ☐	Require: ☐
Limit on anchor tenant capacity	Set cap: ◯ Yes ◯ No	Limit (if yes): (% or capacity [kW])	

Section Notes

Subscription Minimums and Maximums

Definition

Subscription minimums require subscribers to commit to a minimum monthly or annual allocation of the system's capacity or generation.

Subscription maximums place a limit on an individual subscriber's allocation of the system's capacity or generation.

Benefits	Drawbacks
a. Subscription maximums ensure that a few customers do not monopolize the project's capacity or generation. b. Subscription minimums help reduce administrative costs of billing and customer acquisition by setting a cap on the number of subscribers.	a. Subscription minimums may exclude customers that have small electrical loads (e.g., apartment dwellers or customers with low electricity loads). b. Subscription maximums may restrict customers with large electrical loads from meeting their entire load through the community solar subscription

c. The program can provide flexibility to subscribers by allowing them to change their allocation within the minimum and maximum range at any time.	

Considerations

Minimum subscription levels can be informed by the estimated cost to manage subscribers. If the estimated cost to manage a single subscriber is high, relatively high minimum subscription levels may be helpful to reduce overall program administrative costs. If adding additional subscribers does not add a lot of administrative expense, it is best to have a low minimum subscription level. Setting a subscriber maximum ensures equitable access to the project, and maximum subscription levels can differ across customer classes.

If there is a goal for getting a number of subscribers, then determining the project capacity and dividing by goal subscribers could give a starting point for maximum

Design Choices

Customer Class	Minimum Subscription	Minimum Size (capacity [kW] or %)	Maximum Subscription	Maximum Size (capacity [kW] or %)
Residential	☐		☐	
Commercial	☐		☐	
Industrial	☐		☐	
LMI	☐		☐	
Other	☐		☐	

Section Notes

Term Limits

Definition

Term limits define the minimum time a subscriber is required to maintain their subscription (multiyear, annual, or month-to-month).

Benefits	Drawbacks
a. Shorter subscription terms with an easy-in/easy-out process typically reduce subscriber acquisition costs and increase customer satisfaction with the program. b. Month-to-month terms provide the most flexibility and encourage participation across customer classes.	a. Short-term subscriptions can be riskier for program administrators and financiers looking for income certainty. b. Long term limits can make customers hesitant to commit to a subscription.

Considerations

Balancing ease of access with revenue certainty is important when considering term limits. Term limits can be different for different customer classes. Term limits might not pose a barrier for large customers, but may pose too much of a risk for residential customers.

Design Choices

Customer Class	Minimum Term Set	1 Month	1 Year	Project Life	Other
Residential	☐	☐	☐	☐	
Commercial	☐	☐	☐	☐	
Industrial	☐	☐	☐	☐	
LMI	☐	☐	☐	☐	
Other	☐	☐	☐	☐	

Section Notes

Exit Rules

Definition

Exit rules determine if there is a fee for ending a subscription prior to the term limit, as well as when and how subscribers must provide notice.

Benefits	Drawbacks
a. An exit fee encourages subscribers to maintain subscriptions, potentially reducing customer acquisition and administrative costs.	a. Exit fees can increase perceived risk for potential subscribers, especially low-income customers or those who anticipate moving out of the service territory, making them less likely to enroll. b. Exit fees can disproportionally burden subscribers that already have limited access to solar (e.g., renters, LMI).

Considerations

Exit fees can inhibit participation of certain customers. If exit fees are required to decrease risk for program administrators, consider applying them only to larger subscribers or anchor tenants.

Design Choices

Customer Class	Exit Fee	Fixed Fee or Relative to Subscription Size
Residential	☐	
Commercial	☐	
Industrial	☐	
LMI	☐	
Other	☐	

Section Notes

Transferability

Definition

Transferability rules define whether and how subscribers may transfer their subscription to a different account or meter within the utility territory.

Benefits	Drawbacks
a. Allowing subscription transfers provides flexibility to subscribers, especially those with limited-term housing or those that anticipate moving. b. Allowing transfers can reduce customer acquisition costs and increase revenue certainty.	a. Allowing transfers involves some administrative effort to manage the transactions.

Considerations

Allowing customers to transfer their subscription to another account within the territory will not likely add excessive administrative burden and provides flexibility that makes customers less hesitant to enroll.

Design Choices

Customer Class	Transfers Allowed	Transfer Fee	Program/Project Operator Transfer Support (e.g., maintain a waitlist, offer a platform for communications)
Residential	☐	☐	◯ Yes ◯ No What type of support
Commercial	☐	☐	
Industrial	☐	☐	
LMI	☐	☐	
Other	☐	☐	

Section Notes

Upfront Fees

Definition

Upfront fees are payments that a customer makes during enrollment or before their subscription begins. An upfront payment may represent a small sign-up fee to cover administration costs. In some cases, entire subscription costs are collected upfront. Collecting subscriber payments upfront can be used to

cover construction or financing costs, customer acquisition costs, or other program administration costs.

Benefits	Drawbacks
a. Can provide capital to cover program costs. b. Can help with customer retention by helping to ensure that subscribers are committed. c. Can be combined with monthly payments.	a. May inhibit customer acquisition. b. Can present a barrier for low-income households. c. Programs with no upfront fees (easy entry) typically have lower customer acquisition costs. d. Large upfront fees or full upfront payment for subscriptions delay customer savings.

Considerations

Upfront payments may be necessary to make a project economically viable, but they can hinder customer participation and be a financial burden on the subscribers, especially the LMI customer class.

In a survey of existing community solar programs, typical upfront fees (for hybrid up front and monthly payments) ranged from $75 to $325.

Such fees can help to reduce financing risk, cover construction costs, cover program development costs, increase customer retention, etc.

Design Choices

Customer Class	Upfront Fee	Fee Type (entire subscription or partial)	Aim of the Partial Fee
Residential	☐		
Commercial	☐		
Industrial	☐		
LMI	☐		
Other	☐		

Section Notes

Recurring Subscription Fees

Definition

Subscription fees are ongoing payments made by a subscriber, usually monthly, and are typically correlated with subscription size. Recurring subscription fees may be a fixed price or variable depending on a variety of factors. Either option could provide cost savings to subscribers, depending on the amount of fees charged and credits provided.

Benefits	Drawbacks
Fixed recurring payments a. Provide cost predictability to subscribers. b. Offer simple marketing and customer communication. c. Are not tied to retail rate changes.	**Fixed** recurring payments a. Provide less flexibility for program administrators in collecting revenue to cover variable program costs.
Variable recurring payments a. Can provide guaranteed savings for subscribers while also providing greater flexibility in cost recovery for program administrators.	**Variable** recurring payments a. May be more complicated to explain to subscribers than a fixed recurring payment.

	b. May limit participation by customers that need cost certainty in the payment structure, especially LMI customers.

Considerations

Fixed and variable recurring fees can be combined into the subscription payment structure. Fixed costs provide more certainty to customers, but they are not reactive to changes in program costs or standard utility rates. Fixed costs can be structured to provide anticipated savings to subscribers based on the assumption that retail electricity rates will continue to increase over time. However, if the assumptions are wrong (e.g., retail rates decline), the anticipated subscriber savings would not be realized without a correlating change in the subscription fees. Variable fees can be crafted to ensure bill savings for subscribers. Select an option that best meets program goals, and revisit the selected payment structure as you continue to explore project financials and as your program goals mature.

Fee Option Matrix

Payment Basis	Fixed Subscription Price	Varying Subscription Price
Capacity-based ($/kW) monthly payment based on the capacity associated with the subscription.	Rate ($/kW) is set and fixed for the life of the project, meaning a consistent payment every month.	Rate ($/kW) changes (e.g., annually). Adjustments may account for changes in project maintenance costs or program administrative costs.
Generation-based ($/kWh) payments are a price per kilowatt-hour delivered.	Rate ($/kWh) for solar subscription is set and never increases. Assuming electricity rates increase, the discount to subscribers increases over time.	Rate ($/kW) changes (e.g., annually). Adjustments may account for changes in project maintenance costs or program administrative costs.
"Lease to own" model.	Fixed monthly payment for a set number of years, after which point solar credits are "free." This is most like the rooftop solar model.	N/A

Design Choices

Customer Class	Fixed Capacity	Variable Capacity	Fixed Generation	Variable Generation	Lease to Own (Fixed)
Residential	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No
Commercial	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No
Industrial	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No
LMI	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No
Other	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No

If both fixed and variable fees are deployed, how will costs be allocated to the two different fee types?

Section Notes

Subscriber Credits

Definition

Subscriber credits determine how a subscriber is compensated for their subscription. Subscribers are effectively always compensated on a kilowatt-hour basis, but the rate at which they are compensated depends on the credit design.

Credits can be allocated based on the subscriber's retail rate reducing their *net consumption*, which is similar to net metering. Alternatively, the credits can be provided via a predetermined rate separate from the retail rate, which will effectively provide a bill credit to reduce the overall cost of energy (*net bill*). A "net bill" approach can use a rate that is either fixed for the life of the subscription or variable, similar to subscription fees.

Benefits	Drawbacks
Net consumption a. Easy for a customer to understand and see the savings on their bill. b. Reduces customer's number of bills if deployed via consolidated billing.	**Net consumption** a. Savings for the subscriber are variable and change as retail rate changes. b. Most effective if used with consolidated billing—requiring bill integration.
Net bill a. Does not require consolidated billing. b. Simple credit rate transparency. c. Can provide consistent bill credit.	**Net bill** a. Savings may not be immediately obvious if credited separate from utility bill. b. Could require additional billing and crediting software/system.

Considerations

The net consumption and net bill approaches are equally effective in providing subscribers with their credit, and the appropriate choice is largely based on the project's economic goals and administrative abilities or needs. Net consumption, most like net metering, is often easy for a customer to understand and see the reduction in their electricity consumption as if the solar were co-located on their property. However, net consumption is best when deployed with consolidated billing and when variation in customer savings over time is acceptable to subscribers. A net bill approach may be useful when separating consumption and generation is key.

A net bill approach is also more flexible to either have a fixed credit rate or a variable one that will change as project or program economics change. The savings provided by the credit are not dependent on the credit type, but rather on the relationship between the subscription cost and credit rate. Both a net consumption and net bill system can provide customer savings or be constructed to guarantee customer savings by increasing the credit rate or reducing the subscription rate. The simplest way to do so is to have a fixed subscription and credit rate, but many combinations will work.

Design Choices

Customer Class	Net Consumption Credit	Net Bill Credit (Fixed)	Net Bill Credit (Variable)
Residential	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No
Commercial	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No
Industrial	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No
LMI	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No
Other	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No

Section Notes

Unsubscribed Energy

Definition

Unsubscribed energy is the energy generated by a community solar system that, in a given billing period, does not have a specific subscription associated with it. This energy can be absorbed by a flexible subscriber who pays for a variable number of kilowatt-hours each month, or it can be absorbed by the utility and sent to the grid, which effectively socializes the cost of providing that energy. If the community solar program has a variable fee structure, the cost of unsubscribed energy can be recovered from the subscriber base through future fee changes. If the community solar fee structure is fixed, some costs of unsubscribed energy may be socialized across all utility ratepayers.

Benefits	Drawbacks
Cost of unsubscribed energy is **socialized** a. Administratively easy to manage subscriptions. b. Does not require anchor tenant or flexible subscriber base.	Cost of unsubscribed energy is **socialized** a. Requires variable subscriber rates or socializing cost to rate base. b. Could increase project financing costs due to economic uncertainty. c. Wholesale rate for unsubscribed energy is likely lower than subscription payment. d. Actual unsubscribed energy is variable.
Cost of unsubscribed energy is **paid by one or more flexible subscribers** a. No energy is unallocated on a monthly basis. b. Project economics are lower risk with guaranteed energy subscriber.	Cost of unsubscribed energy is **paid by one or more flexible subscribers** a. Requires flexible subscriber base. b. Administratively more complex to reallocate subscription size and credits regularly. c. Obtaining flexible subscribers may be difficult.

Considerations

Unsubscribed energy is rarely the first consideration when program design is being made. However, it is essential to consider as it affects project/program economics, subscription fees, credit type, and administrative design. If a project would like to provide overall rate consistency and reduce economic uncertainty for the developer and customers, finding a flexible subscriber is likely a good option. The flexible subscriber is often an anchor tenant, whether a commercial business or a community-based organization). If a flexible subscriber is not an option or subscriber rate guarantees are less important, a socialized approach could prove easier. If socializing the cost, make sure to consider whether the costs will be borne by the entire customer base or reabsorbed into community solar subscriber rates, which would increase future rates and reduce savings.

Design Choices

Will unsubscribed energy be absorbed by a flexible subscriber or socialized?
If unsubscribed energy is socialized, will it be across community solar subscribers or across the entire rate base?

Section Notes

Renewable Energy Credits (RECs) and Environmental Benefits

Definition

Renewable energy credits represent the energy generated by renewable energy sources and the clean energy attributes of renewable energy. There are several options for what to do with these credits, and the option selected determines whether subscribers may claim the environmental benefit of the community solar program. RECs from a community solar project can be (1) retained or sold by the solar project owner, utility, or administrator; (2) retired on behalf of the subscriber; or (3) provided to the subscriber for their own use or resale.

Benefits	Drawbacks
a. **Retained by project owner or administrator:** Can be used to fulfill utility or governmental environmental goals such as RPS. May reduce project costs for customer if project is compensated for RECs. b. **Retired by project owner on behalf of subscriber:** The customer can claim the renewable energy for their own private interest, whether personal or business-related. c. **Provided to subscriber:** Gives the subscriber the most flexibility to decide whether to retire or monetize the RECs.	a. **Retained by project owner or administrator:** Does not provide customers with a direct legal claim to renewable energy attributes, which may be useful to corporate customers. b. **Retired by project owner on behalf of subscriber:** While simple for the customer, retiring RECs on the subscriber's behalf means that the RECs cannot be used to meet utility or governmental goals and may not be available as a revenue stream. c. **Provided to subscriber:** Giving RECs to the subscriber introduces complexity for subscribers, who may not be knowledgeable on the subject or know how to use or monetize the RECs.

Considerations

The options for handling RECs and the resulting implications can be confusing to both energy professionals and laypeople. Providing RECs to customers may only be warranted when a large subscriber or anchor tenant requests them. Project economics or state programs may require a project to retain RECs to enhance project economics or for environmental reporting purposes. If you want the subscribers of your community solar program to be able to claim environmental benefits of the solar generation, then retiring the RECs on their behalf is the best option. It is important to make it clear to subscribers how the RECs are being handled and the impact on the subscriber's ability to claim environmental attributes of their solar subscription.

Design Choices

Customer Class	Retained by Project Owner	Option To Be Retired	Option To Be Provided to customer
Residential	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No
Commercial	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No

Due to the complexity of t the REC market, providing the RECs to the subscriber may be desirable only for large commercial/ industrial customers

Industrial	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No
LMI	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No
Other	◯ Yes ◯ No	◯ Yes ◯ No	◯ Yes ◯ No

Section Notes

Project-Based vs. Portfolio-Based

Definition

Project-based programs allow subscribers to sign up for a specific solar project. In portfolio-based programs, subscribers are not necessarily linked to a specific solar project; instead, the total solar capacity or generation across the utility's community solar portfolio is aggregated and distributed across all subscribers.

Benefits	Drawbacks
Project-based a. Permits subscribers to know exactly where their project is located. b. Improves marketing opportunities and customer identification with solar development in the community. c. Assures subscribers concerned about land use (or other issues) that their project meets their personal criteria.	**Project-based** a. Early adopters will likely incur higher subscription costs from higher project costs. b. Project/program availability may be harder to market due to each project's availability fluctuating.
Portfolio-based a. Ties subscription costs to overall portfolio cost. b. Aggregates projects that have different installation costs. c. Distributes the advantage of falling solar prices across all program subscribers.	**Portfolio-based** a. Requires some form of floating payment system to enable reallocation of changing costs or benefits. b. Limits developer's ability to customize project design and marketing.

Considerations

If there is only one community solar project, the program is necessarily a project-based program. If additional community solar projects are added, a decision must be made whether to combine them into a portfolio-based program. When switching from a project-based approach to a portfolio-based approach, a number of program aspects may have to be modified. If subsequent projects have more favorable economics than the initial project, using a portfolio-based approach can prevent early adopters from paying more for their subscription than later adopters. A portfolio approach requires that subscription payments for the initial project were not paid in full upfront. Ideally, subscription prices for all subscribers in a portfolio-based program will reduce over time, as more projects are added. A project approach may be preferred if each project aims to serve specific customers, or if the goals are different from project to project.

Design Choices

☐ **Portfolio-Based**		☐ **Project-Based**	

If portfolio-based: What time frame will the program use to evaluate costs and recalculate subscription costs (and benefits)? (e.g., only when new projects enter, annually, biannually)

Section Notes