

Texas Community Solar Guidelines

for Electric Cooperatives and Municipally Owned Utilities



Produced by the North Central Texas Council of Governments
in partnership with the State Energy Conservation Office (SECO)

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Prepared in cooperation with the State Energy Conservation Office. The contents of this report reflect the views of the authors who are responsible for the opinions, findings, and conclusions presented herein. The contents do not necessarily reflect the views or policies of the State Energy Conservation Office.

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Thank you to our helpful interviewees who provided valuable insight into the development process of community solar programs.



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I. Purpose

This document was developed as a high level primer for how a Texas non-profit utility can launch a community solar project. It provides a summary of community solar, its recent growth in Texas, technical resources to reference, and an overview of the major community solar decision points.

This document is for Texas non-profit utilities and was informed by Texas community solar project managers.

II. Introduction

What is Community Solar?

"Community solar is a cooperative approach to solar. It enables... utilities to do what they do best: engage with their members, provide affordable power, and maintain a safe and reliable grid."

-- The National Rural Electric Cooperative, The Community Solar Playbook

Community solar is the sharing of renewable solar power from a centralized source. As distributed generation and customer demand for solar grow, community solar offers an excellent opportunity for utilities to give their customers what they want while retaining control of generation in their service area. Also referred to as shared solar or solar gardens, community solar consists of a utility-scale central installation that provides customers with an opportunity to opt into the solar installation and receive a proportional share of financial or energy output of the system, thereby allowing customers to realize the environmental and economic benefits of solar energy without requiring a solar installation of their own.



Figure 1-- Austin Energy Solar Installation

The Case for Community Solar in Texas

Because of its many benefits, community solar has taken off. Today, there are over 100 active community solar projects that have been established across 26 states, and another 30 + projects are in the planning phases.ⁱ Within Texas, at least seven electric providers have developed or are planning to develop a community solar program. Community solar is being actively pursued by Texas Municipally Owned Utilities (Munis), Electric Cooperatives (Co-ops), Investor Owned Utilities (IOUs), and Retail Electric Providers (REPs) proving that Texas offers a conducive environment for community solar. Moreover, Texas is poised to further expand community solar thanks to its permissive regulatory environment, availability of financing (in part due to the extension of the Federal Investment Tax Credit), and falling solar costs.

In this way, community solar offers a promising opportunity to extend access to solar electricity for almost half the country who cannot install residential rooftop systems because of a lack of “solar ready” roofs and difficulty financing standalone photovoltaic (PV) systems.ⁱⁱ

Community Solar and Texas Non-Profit Utilities

While community solar programs can be offered by community groups, companies, REPs or IOUs, they are most often offered by co-ops and munis. In fact, 87% of all community solar projects are administered by non-profit utilities.ⁱⁱⁱ Munis and co-ops are uniquely positioned to launch community solar programs because of their ability to swiftly deploy innovative services, their responsiveness to customer demand, and their alignment with local energy or environmental policy goals.

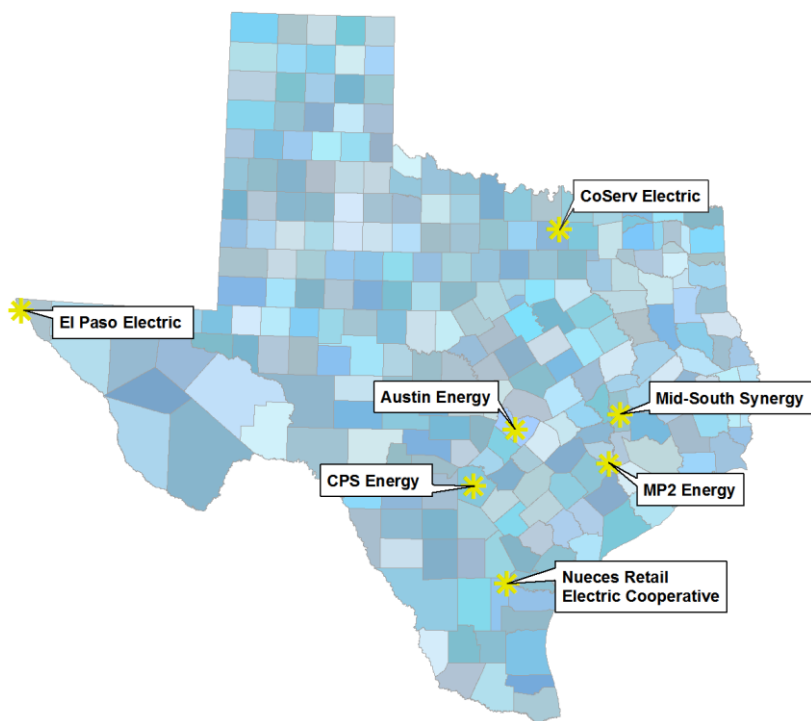


Figure 2-- Distribution of Community Solar Projects across Texas

Benefits of Community Solar

For Utilities

- ❖ Control distributed generation
- ❖ Gain experience with renewables
- ❖ Improve standing in community
- ❖ Reduce Transmission and Distribution maintenance costs

For End Users

- ❖ Access to solar for anyone!
- ❖ Offset electricity costs and hedge against future price increases
- ❖ Zero-emission Energy!

“Community solar projects are a universal win at this point – the energy source is close to the customer, and centralized equipment and minimal connections to the system make installation and maintenance easier for distribution service providers.”

– Warren Lasher, Director of System Planning at Electric Reliability Council of Texas

Getting Started

Building a community solar project is a serious endeavor which requires a dedicated staff and coordination across departments and disciplines, as well as with external services and contractors. The following guidelines will walk through the key decisions that should be considered during the planning process. These include understanding regulatory requirements, identifying the project site, determining ownership structure, evaluating financing options, setting rates, and marketing and promoting the program. Many of these actions can be performed concurrently, but the consensus from Texas community solar program managers is that site selection is the most critical step. System size, procurement and contract requirements, customer offering, and rate setting are all conditional on the site. Another key early stage decision is whether your community solar project will be built or managed by a third party developer. If yes, developing the Request for Proposals (RFP) and selecting your developer will be the first step; site selection would then typically be pursued in partnership between the utility and developer.

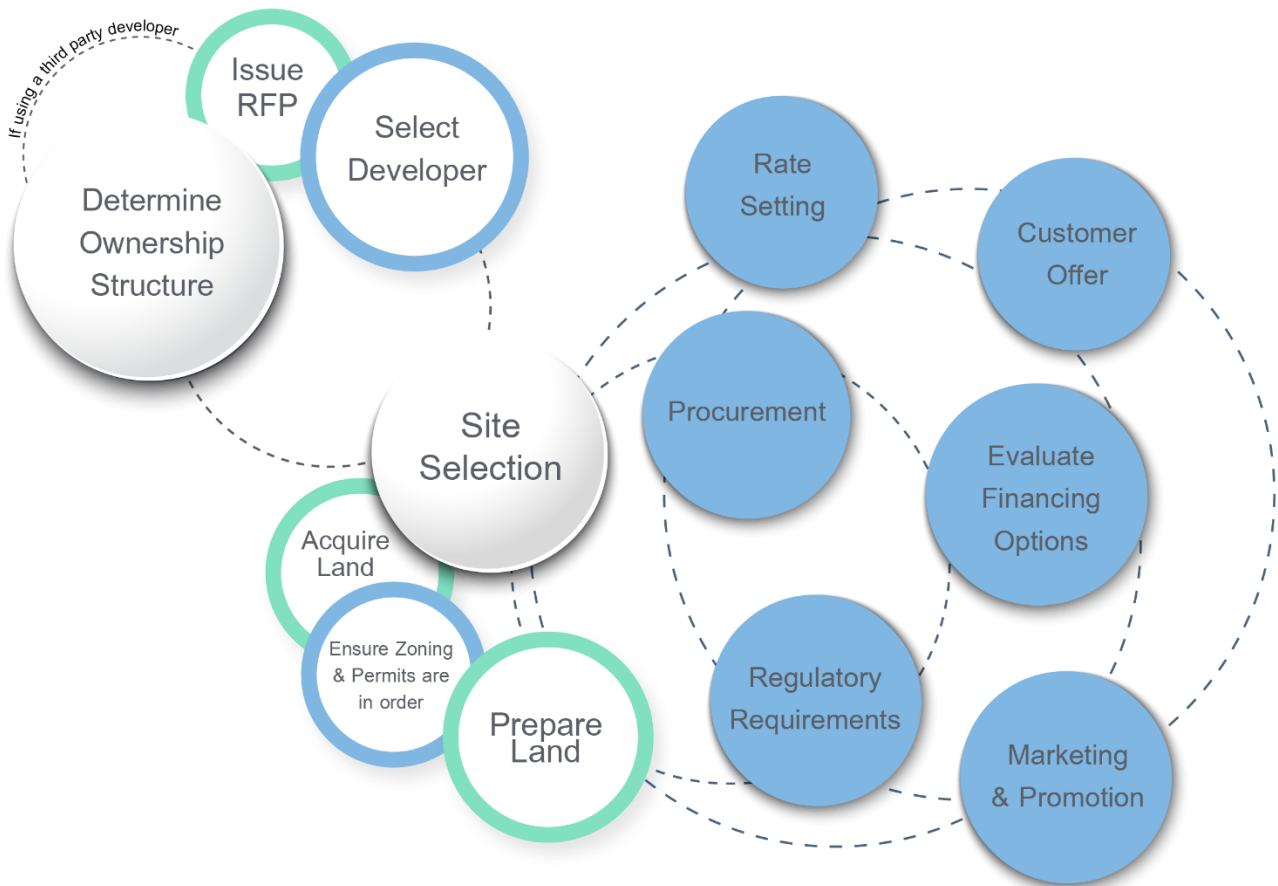


Figure 3-- Critical decisions: *With community solar, there is no set process to follow. After deciding on site selection and whether to use a developer or not, most key actions can be pursued simultaneously.*

A utility will also need to make sure to have the right specialists on hand. Legal counsel can provide guidance on ownership issues and to ensure compliance with federal and state requirements; financial analysts can help with rate setting and to ensure the program is based on solid economics and financial structures; and administrative and marketing staff will help build and maintain strong subscribership. It is common to contract with external service providers to meet specialized needs and to ensure the system’s long term optimal performance. These

can include: third party developers, engineering procurement construction firms (EPCs), operations and maintenance service providers (O&M), land brokers and more. Importantly the cost of external service providers are often overlooked but need be factored into the project’s financial equation.

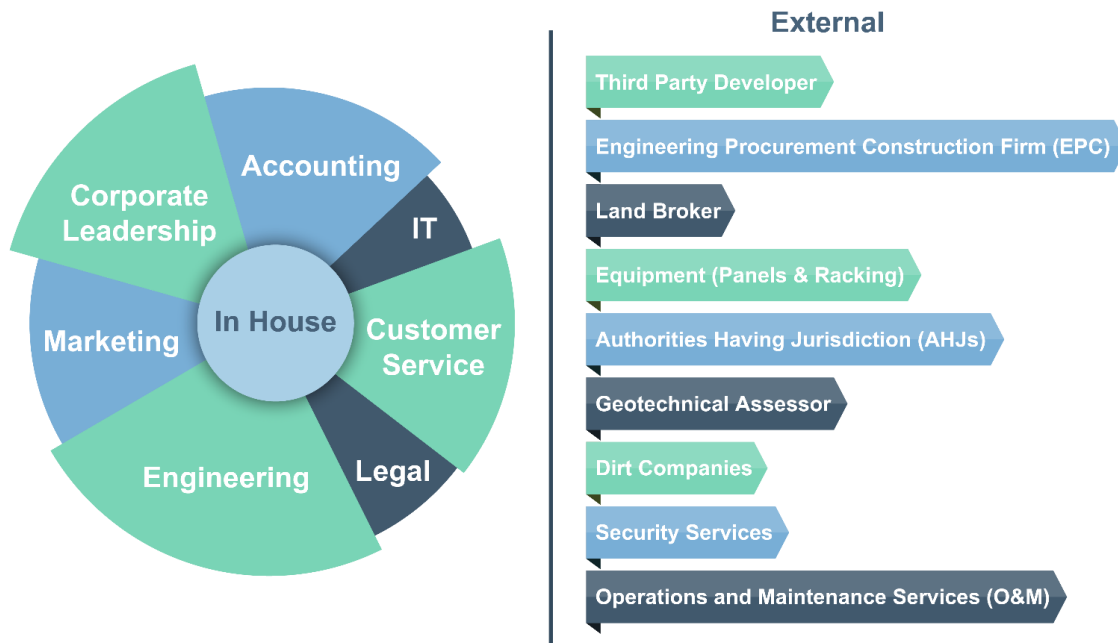


Figure 4-- Types of Personnel, Expertise, and Services Needed

Essential Resources

Community solar is a relatively young concept. Still, many resources exist to help guide a utility in executing a community solar program that balances business priorities with customer goals. Some of the most useful resources to reference are cited below. Additional topic-specific, resources can be found at the end of this document on page 26.

- **Solar Market Pathways** resources, funded by the Department of Energy, has developed a toolkit to assist utilities launch community solar, [Working With Utilities to Advance Solar Toolkit](#). It includes information on rate design, interconnections, permitting, and more.
- **The Solar Electric Power Association (SEPA)** has done considerable research on community solar programs and provides resources on program design, [Accelerating Adoption of Community Solar](#).
- Materials developed by the **National Rural Electric Cooperative Association (NRECA)**, [Cooperative Utility PV Field Manual, Volume 1, Business Models and Financing Options for Utility-Scale Solar PV Installations](#).

III. Developing a Community Solar Project

The following guidelines provide an overview of major topics to consider while planning and executing a project:

- Regulatory Requirements in Texas
- Project Development
- Economic and Financial Considerations
- Customer Engagement

IV. Regulatory Requirements in Texas

The current regulatory landscape in Texas is ideal for launching a community solar program. As of 2016, no regulations block the addition of distributed generation (DG) to the Texas electrical grid. From a policy and administrative perspective, munis and co-ops have very few challenges to overcome because they are self-governed. These utilities have the freedom to respond to customer interest for solar energy and diversify power portfolios with the inclusion of the renewable energy resources like solar.^{iv}

The Electric Reliability Council of Texas (ERCOT) is responsible for the operational management of the flow of electric power to customers, and for the reliability of the electric grid within the State of Texas. The Public Utility Commission of Texas (PUCT) is responsible for the regulatory oversight of investor owned electric utilities and rule making regarding changes made by state legislation. Non-profit munis and co-ops may use the PUCT rules as guidelines for decision making.

Interconnection Standards

Every distributed generation resource added to the ERCOT grid requires an interconnection agreement. Munis and co-ops should be aware of additional county and city permit regulations and building codes that may affect DG system when developing the interconnection agreement.^v Utilities typically develop interconnection agreements prior to the construction of a solar array with the distributed service provider. This agreement also accounts for the transferring of the power benefits and is usually negotiated through a power sales agreement between the project owner and the utility or host.

Distributed Generation Regulatory Requirements

A DG resource of 1 megawatt (MW) or greater is required to be registered with ERCOT in accordance with Section [16.5 of ERCOT Nodal Protocols](#). If the DG Resource is ≥ 1 MW and will supply net power onto the ERCOT System, the owner of the DG resource should complete the following actions:^{vi}

- Complete interconnection requirements with host Distribution Service Provider (DSP).
- Submit the [Resource Entity Registration Form](#) to ERCOT
- If metering is ERCOT-polled (ERCOT reads the meter), complete the design and installation of an ERCOT Polled Settlement (EPS) meter. See the [Settlement Metering Operating Guide](#) for more information.
- If metering is read by the Transmission/Distribution Service Provider (TDSP), not ERCOT-polled, then the Resource Entity contacts the TDSP to request copy of a completed TDSP Read Generation Registration Form and submit to ERCOT along with the Distributed Resource Registration Form.
- Submit the [Distributed Resource Registration Form](#) to ERCOT. Designate a registered load serving entity (LSE) to serve the generation facility during "net load" conditions.
- [Designate and acknowledge](#) a Qualified Scheduling Entity to financially settle with ERCOT in advance of injecting power onto the ERCOT System.

If a DG resource of ≥ 10 MW is going to supply net power to the grid, ERCOT requires a more regimented interconnection process in addition to registration requirements. While the PUCT requires no regulatory actions from munis and co-ops, PUCT resources regulating electric service providers can and have been used by non-profit utilities to guide decision making when developing a distributed generation resource. The sections below, from [Chapter 25. Substantive Rules Applicable to Electric Service Providers](#), may be useful when considering the development of a community solar program:^{vii}

- Section 25.109 – Registration of Power Generation Companies and Self Generators
- Section 25.211 – Interconnection of On-Site Distributed Generation (DG)
- Section 25.213 – Metering for Distributed Renewable Generation and Certain Qualifying Facilities
- Section 25.217 – Distributed Renewable Generation

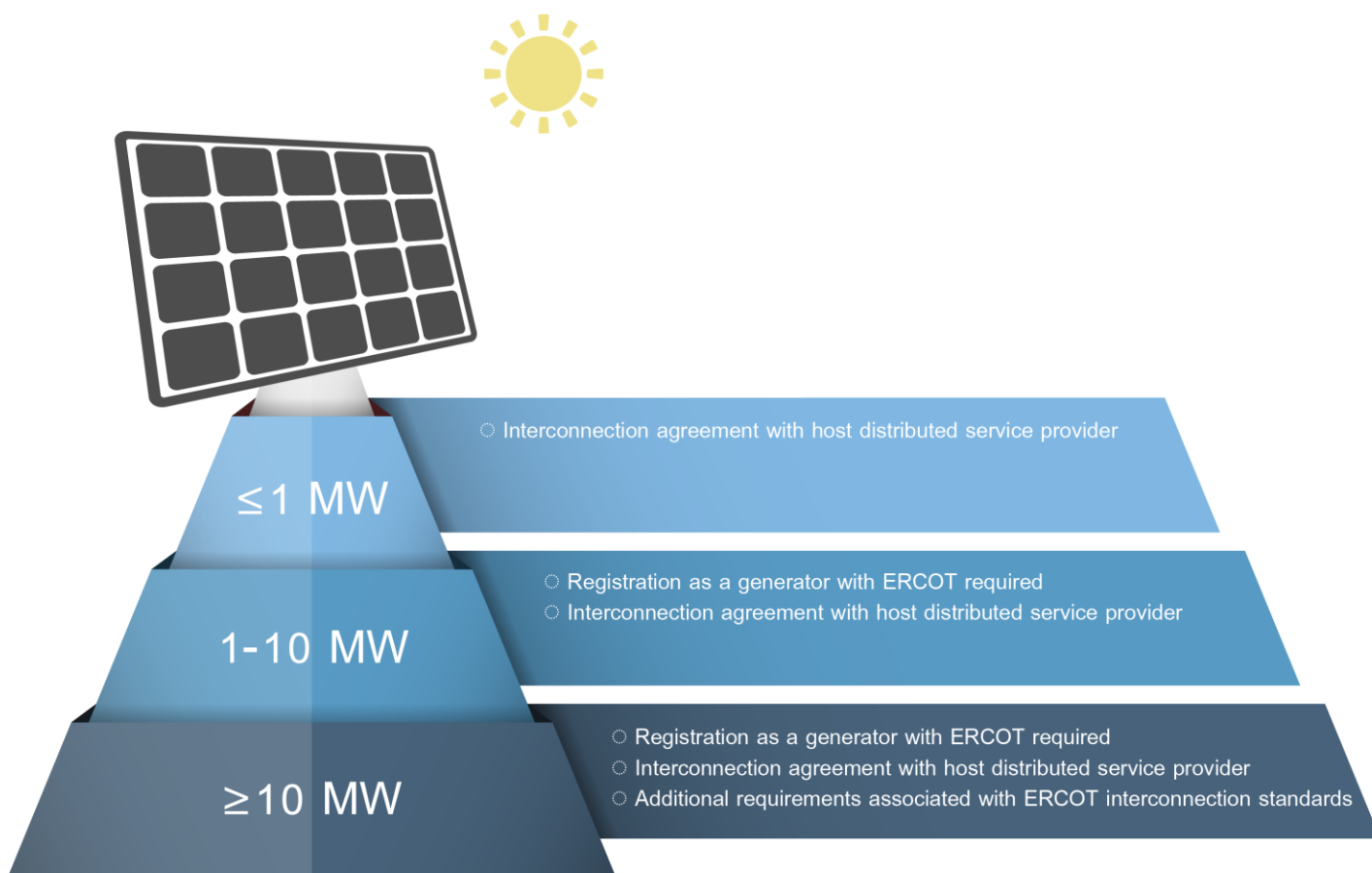


Figure 5 -- Regulatory Requirements in Texas

V. Project Development

Project development encompasses the most critical components of developing a community solar project. Decisions made regarding the ownership structure and site selection will influence all other pieces of the process. A utility needs to commit the time necessary to research solar photovoltaic (PV) equipment, the solar industry in the region, market opportunities, and other external factors that may influence demands for renewable energy generation in the area. This research will be important for understanding the different models for developing community solar and for choosing which model works best for your utility. The following is a guide through key topics for consideration that will shape a community solar project.

“Right Size” a System

The size of a solar array is often influenced by land availability, cost of interconnection, land prices, transmission charges and various stakeholder demands. The average 1 MW community solar array is sited on 6 to 7 acres of land.^{viii} A larger system (> 1 MW) could serve more customers and potentially have lower participation costs, but a smaller system (<1 MW) might have more flexibility regarding land availability, lower capital costs and fewer regulation requirements.

Interconnection of a solar array ≥ 1 MW is required to be registered with ERCOT. Many utilities in Texas are choosing to size their community solar system just under 1 MW in order to reduce annual fees associated with transmission services calculated from the 4 Coincident Peak (4CP) methodology, which is the customer demand measured during the 4 peak hours of June, July, August and September. Since projects below 1 MW do not have to be registered with ERCOT, they can effectively reduce transmission charges because the customer demand for the munis and co-ops are a measured net of the output of the solar facilities. ERCOT is required to file the customer demand of the 4CP for each distributed service provider (DSP) and the PUCT uses that information to set a wholesale transmission rate for each DSP. The PUCT develops a transmission charge matrix for review from interested parties which is finalized as the transmission charges for each DSP for the subsequent year.

The cost of transmission in the ERCOT grid has been going up over the last few years, so savings realized from projects under 1 MW area expected to increase. However, as more projects come online just under the registration requirement with ERCOT, thus increasing the overall impact on the electrical grid, the regulatory body may establish new standards associated with system size and registration.^{ix}

Co-op Highlight: Mid-South Synergy



In July 2014, Mid-South Synergy’s Electric Cooperative Board overwhelmingly approved its first community solar project. Eleven months later, in June 2015 the 0.99 MW system was fully subscribed and energized, demonstrating how quickly community solar systems can be built. Mid-South is currently finalizing construction of their second system, where energy blocks will be available to commercial and residential customers.

Details:

- ❖ System size: 0.997 MW
- ❖ Subscription rate: 100%
- ❖ Finance used: CoBank and Cooperative Financing Corporation (CFC) financing; ITC through subsidiary
- ❖ Land used: 8 acres
- ❖ Ownership type: Hybrid; partnership with water utility subsidiary
- ❖ Customer offer: solar energy blocks

“You are building a power plant...this will require communication across multiple disciplines and multiple departmental lines... you have to know what you are trying to accomplish before you start.”

– Troy Morris, VP Mid-South Synergy

To learn more about the processes of setting transmission rate charges, view the recent PUCT regulatory docket #45382, the [PUCT Application to Set 2016 Wholesale Transmission Service Charges for the Electric Reliability Council of Texas](#). The filing will provide insight to the procedures and schedule associated with setting the wholesale transmission rate.

Site Selection

Locating an array is a crucial step and has lasting impacts on many other components of a community solar project. There are several characteristics that need to be met, such as adequate access to sunshine, however site selection is often ultimately determined by land availability. According to local community solar managers, site selection was the most time intensive step of developing a community solar project which often held up other significant aspects of project development.

Developer Highlight: Clean Energy Collective



The Clean Energy Collective (CEC) is a leading community solar developer and a pioneer of the community solar model. They operate 40 community solar projects across the country; two in partnership with Texas electricity providers— Nueces Electric Retail in South Texas and CPS Energy in San Antonio. Because of their established role and significant experience working in the community solar space, CEC installations have moved beyond the pilot project size of 1 MW and tend to be 2MW or larger to take advantage of economies of scale.

“Finding land is not easy because of the proximity to metropolitan area[s, such as San Antonio]. We also faced a challenge because several of the considered sites came with strict zoning and ordinance requirements.”

— *Bernadette Jendrusch, CEC referring to development of the CPS Energy Community Solar project*

It is important to dedicate internal resources and work with local experts to create an efficient pathway for community solar development. Community solar managers in Texas have worked with consultants, land brokers, engineering procurement construction (EPCs) firms, and developers to effectively review and identify land parcels. There are several elements to think through when choosing the size of a solar array. One of the largest challenges will be finding land big enough to house the desired array size. A 1 MW array typically requires about 6 or 7 acres for the array and associated equipment.

Other major elements to consider when looking for land include cost, quality, and accessibility to both land and the existing transmission and distribution (T&D) grid equipment, such as the substation and distribution lines. These elements are dependent upon one another and must all be taken into consideration when acquiring land. The following chart further explores these significant siting considerations in relation to the land and the electric grid equipment.

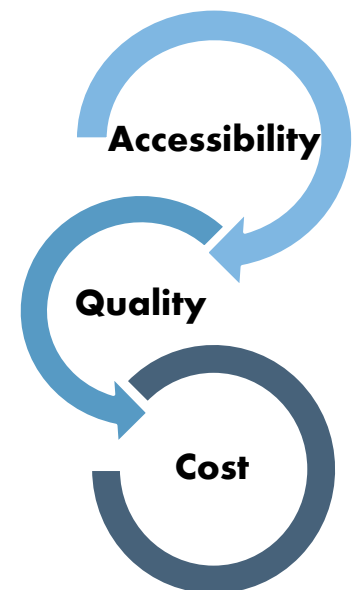


Figure 6-- Important components of site selection

Siting Considerations

Siting Considerations		
Important Components	Land	Substation
Cost	<p>It can be challenging to find land that meets acceptable characteristics and falls within a reasonable price range. Local community solar managers worked with external experts such as land brokers and consultants to evaluate land options to help identify parcels that were cost effective as well as adequately visible to their customers.</p>	<p>Substations that require extensive upgrades to equipment or codes standards will have a large cost associated with the interconnection agreement. The cost will pose challenges to the economies of scale for the development of the solar array.</p>
Quality	<p>The quality of the land parcel impacts the production and efficiency of the solar array. Topography of the land is an important component when siting and could influence project costs if actions need to be taken to transform the land to be suitable for a solar development.</p> <p>Other elements affecting land quality include: easements, zoning, ordinance restrictions, erosion challenges, floodplains, trees, and structures present. When evaluating the quality of the land and preparing for design and construction, a geotechnical analysis can provide necessary technical information about the land for the engineering team.</p> <p>Alternatively, underutilized lands create an opportunity to bring value to a parcel of land that otherwise would not be used for any development (e.g. landfill, brownfield, etc.).</p>	<p>The quality of the substation determines the interconnection costs. Some substations will cost significantly more to interconnect to because of the need for technical and equipment upgrades. If a utility aims to add a certain amount of megawatts onto a substation, upgrades to equipment will be necessary so the substation can handle the load of the new DG system. Some distribution lines were installed back in the 1940's and need to be brought up to code to deliver the power that will be added to it, which will increase the quality of the equipment for future use, but create additional cost to the overall project.</p>
Accessibility	<p>Road access is necessary for construction and maintenance of an array. If road access is unavailable, development of such would need to be included in the overall cost of the project.</p> <p>An important part of community solar is the accessibility and visibility of the array so a customer can have the opportunity to see their investment.</p>	<p>Proximity to a substation is a major priority when choosing a site to locate your array. Having easy access for interconnection will cut costs and increase the amount of power that can be supplied to customers.</p> <p>Take advantage of utility easement rights when acquiring land. Utilities sometimes have knowledge of predetermined locations for future substations or new distribution lines.</p>



Time Constraints

For Texas community solar projects, site selection had the biggest impact on the project timeline. The lengthy process associated with site selection can hold up other aspects of project development, such as design and construction. Local community solar managers suggest getting ahead of land selection and doing some “boots on the ground” analysis of what is available. Having an idea of land options prior to developing a request for proposals or moving forward with other aspects of project development could cut costs and save time. A utility needs to consider how delays in land acquisition will affect the business plan schedule.

Underutilized Lands

Many communities restrict large scale solar arrays to rural, industrial, agricultural, or certain commercial zoning districts. Community solar arrays can be a great match for vacant industrial or brownfield sites, repurposing the underutilized land. In many cases, solar arrays are perceived as better neighbors than the contaminated sites. Policymakers can play an important role in helping their communities evaluate and embrace solar energy by encouraging the integration of solar into vacant land management, policies, and programs of the city.

The U.S. Environmental Protection Agency (EPA) in collaboration with the U.S. Department of Energy’s National Renewable Energy Lab (NREL), developed the [RE-Powering Mapping and Screening Tools](#) for entities to review potential energy production from clean energy sources at underutilized sites. Information about renewable energy potential is provided for contaminated lands, such as: landfills; mine sites; brownfields; and superfund sites. [The RE-Powering Mapper](#) is a series of files that contain screening information for over 80,000 sites for solar, wind, biomass, and geothermal energy. With this tool, entities can view EPA’s information about renewable energy potential on contaminated lands that have already been identified. Additionally, the [RE-Powering Electronic Decision Tree](#) tool helps entities learn what characteristics make a site more attractive for solar or wind energy development, which can assist in determining whether a site previously identified by a utility would be suitable. The North Central Texas Council of Governments has identified sites in Texas highlighting potential solar PV production at landfills and brownfields, available for use by regional and local governments. Information can be found on www.GoSolarTexas.org.

Local Jurisdiction Regulations

Local Jurisdictions

The local city, county or Authorities Having Jurisdictions (AHJs) will be the entity authority on questions and regulations regarding the construction of the solar array. A utility should seek guidance on requirements for solar installations from the local jurisdiction where the array will be constructed. Local community solar managers stressed the importance of interactions at this level as well as keeping surrounding cities informed about the development and encouraging conversations about the benefits. Different jurisdictions will have diverse standards, requirements, ordinances, and permitting processes associated with large scale solar development which can influence the project timeline.

“Even though we weren't within the city limits, we communicated with surrounding cities just to keep them aware of what's going on.”

– **Dustin Brown**, Energy Engineering Manager at CoServ Electric

Property Taxes

When valuing a property with a solar installation, the Texas Comptroller's Office has issued guidelines for how to properly account for the exemption. However, grid-supply PV facilities, such as community solar, would presumably not fall under the exemption described in the [Texas Tax Code 11.27](#). The [2014 Texas Property Tax Assistance Property Classification Guide](#) classifies an electric generation plant as Category F2, Real Property: Industrial, which are "land and improvements of businesses that add value to a product through development, manufacturing, fabrication or processing of that product". As required by legislation enacted in June 2013, any appraisers must value solar installations used for commercial purposes using the cost approach for any systems installed after January 1, 2014. The appraisal must use cost data from generally acceptable sources, make appropriate adjustments for physical, functional or economic obsolescence, use a useful life that does not exceed 10 years and use a floor value of 20%.^x

A project should be careful to include property tax in the financial model. Ideally, a program can work with the local AHJ to implement a [tax abatement](#), a local agreement between the taxpayer and the taxing unit that exempts all or part of the increase in the value of the real property and/or tangible personal property from taxation for a period of time, not to exceed 10 years.

Permitting and Zoning

After the utility has identified a site for their community solar array, they must begin the permitting process. This process will depend on the size and location of the community solar array. Permitting for a large scale solar requires many different types of permits from the local jurisdiction. Be aware that the permitting process may be time consuming, as many jurisdictions do not yet have a streamlined solar permitting process. It is important to anticipate and consider all related elements including federal, state, and local requirements when pursuing the permitting process.

In Texas, large scale solar development is typically not a category in zoning regulations and utilities must obtain a conditional use permit. Strict zoning and ordinance requirements could make the cost of land too high for site consideration. In some cases a utility can initiate a process to re-zone the land with the AHJ. Austin Energy, a muni for the City of Austin, underwent a re-zoning process for the land chosen for the community solar project. The utility took the project plan to the city planning commission and then sought approval by the Austin City Council. The request was approved, however the utility is in the process of applying for a conditional use permit because the large solar array is not considered typical land use even for the re-zoned area.

Permit Requirements to Consider

- ❖ Land survey
- ❖ Fire code compliance
- ❖ Compliance with zoning and land use regulations
- ❖ Floodplain delineations
- ❖ Easement boundaries
- ❖ Environmental studies
- ❖ Conditional use permit
- ❖ Stormwater permit
- ❖ Soil studies
- ❖ Tree ordinances
- ❖ Environmentally sensitive zones
- ❖ Construction permits

Working with Policy Makers and Developmental Regulations

An important step in developing a community solar project is reviewing local development regulations, such as zoning ordinances and permitting requirements. This will help to identify and overcome any barriers to solar implementation and create appropriate standards for future renewable energy growth. When working with local regulations, it is critical to provide outreach and education aimed at the community, as well as community's policymakers. For more information on resources available to educate a diverse group of community members (utilities, regulators, policymakers, planning and zoning officials, building officials, private and commercial businesses, community members, etc.) please see the [SunShot Solar Outreach Partnership Material](#).

Integrating Solar Energy into Local Development Regulations

The process of engaging and educating a community on the diverse benefits, both environmental and economic, will help to break down barriers associated with solar energy. Additional tasks to aid with the removal of barriers to solar include: review of current solar regulations; review of zoning requirements, land use standards and solar ordinances; and development of a streamlined permitting processes. If a local government does not have a permit process established, several resources exist to create best management practices that assist with streamlining the permitting process. The North Central Texas Council of Governments has worked with stakeholders to create three steps to streamlined permitting:

1. [Develop Criteria for Expedited Process](#)
2. [Create a Permit Checklist](#)
3. [Provide a Central Information Source](#)

Policymakers must work with experts to begin implementing policies or initiating actions to help incentivize the use of solar energy. A municipality could incorporate solar requirements into municipal green building programs or include solar energy as a requirement for renewable energy standards or community strategic goals. To enact standards, policymakers must clarify what type of solar systems are allowed and where, help define solar easements and access requirements, and consider solar development versus community objectives.

See the Great Plains Institute's [Grow Solar - Local Government Solar Toolkit](#) for an overview of planning, zoning, and permitting concepts related to solar implementation. See the [North Central Texas Council of Governments Go Solar Texas Government Resources](#) for a guide to best practices and access to model documents.

Ownership Structure

The ownership structure affects what type of local, state, and federal incentives are available based on factors such as the owner's credit rating and tax appetite.

Third Party Ownership

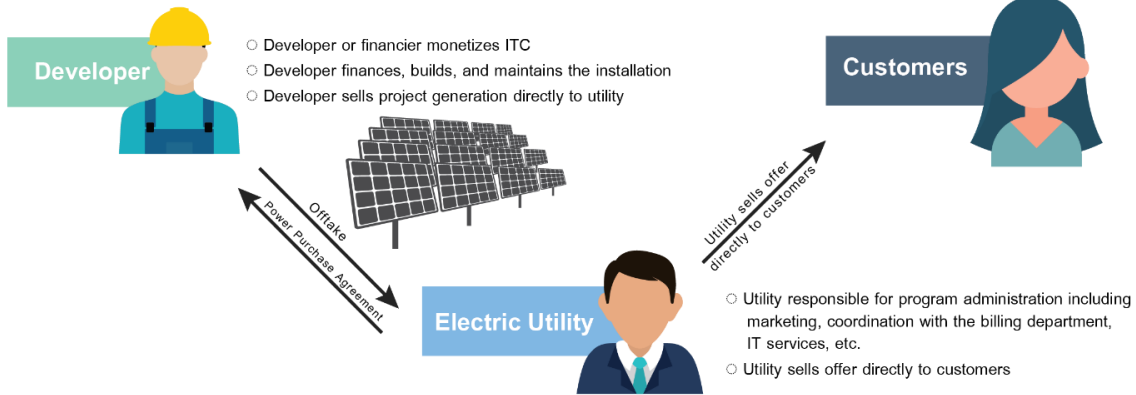
Third party ownership occurs when a utility partners with a third party to develop and/or administer the community solar program. Third party ownership can occur two ways: the third party builds and maintains the array and manages the program, working with the utility to credit the customers for their offer choice; or the third party builds and maintains the array while the utility manages all aspects of the program, providing the program offer directly to the customers. Third party ownership can help navigate utility's concerns involving integrating billing and credits and help the utility take advantage of the Investment Tax Credit (ITC), which the federal income tax-exempt utility cannot do alone.

Utility Ownership

A utility could work with a third party to construct the solar array or could reallocate utility-owned projects and supply electricity to themselves via a power purchase agreement (PPA) which allows the utility to purchase the power produced from the solar array. Utility ownership is typically driven by the wish to expand customer choice with the option for community solar and is manageable because utilities often have adequate administrative experience to manage a program. Participants either contribute upfront or with ongoing payments to support the solar project, and the utility sells energy or the rights to energy to participants. If the owning utility is exempt from federal income taxes, hybrid ownership can occur to access federal tax credits. Utilities can partner with a third party entity or utilize a subsidiary to create their own business formation to receive the federal tax incentives. Please see Appendix A of "[A Guide to Community Solar: Utility, Private, and Non-profit Project Development](#)" for more information about different Business Formations.

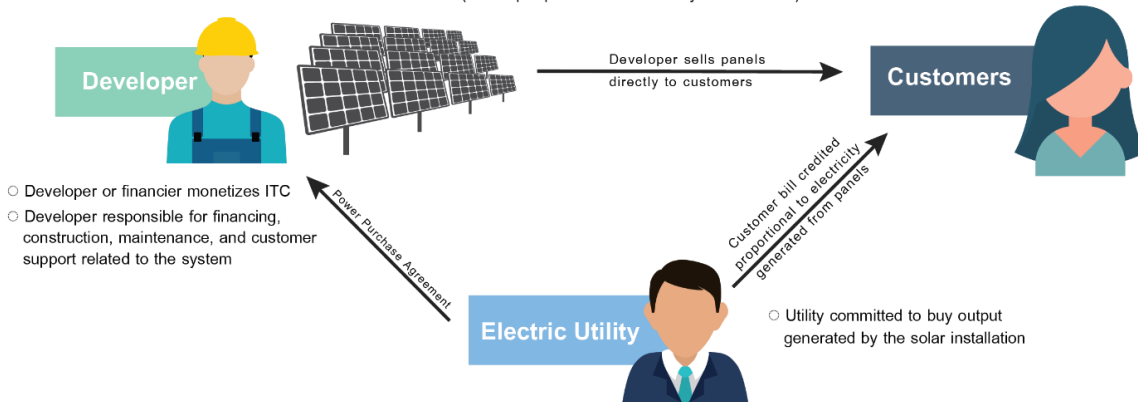
Third Party Ownership

(Developer sells power to utility and utility provides offer to customers)



Third Party Ownership

(Developer provides offer directly to customers)



Hybrid Ownership

(For-profit subsidiary is engaged to monetize tax benefits and utility retains ownership of all project functions)

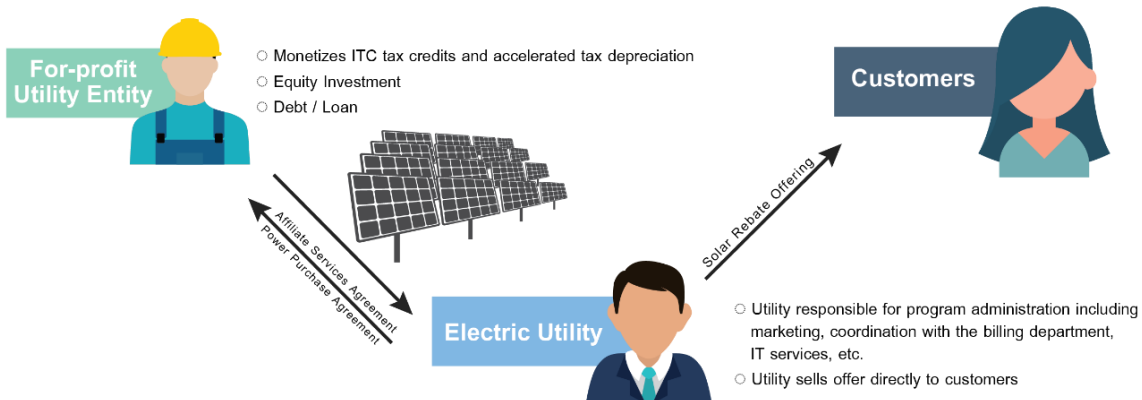


Figure 7-- Ownership model structures: Community solar ownership can be structured in a number of ways to best take advantage of tax benefits and utility strengths. Among Texas community solar projects, almost half formed PPA agreements with developers, while the other half formed PPA agreements with an associated for-profit utility. In some cases, the utility will retain all administrative functions (marketing, customer care, billing, IT) and in others, they can outsource these functions to specialized community solar service providers.

Customer Offer Options

The customer offer options determine how customers will interact with the community solar project. A utility can identify the best option to engage the community with solar based on feedback from customers.

Capacity-based Structure

Participants of the program pay for the system upfront or take out a loan to purchase a share of the community solar array. This structure is based on the number of panels or watts purchased. The utility maintains ownership of common assets, such as the land, wiring, and inverters and a customer's share in the community solar array will pay for itself as the system produces power over the lifetime of the array. If a capacity-based structure is adopted, the program administrator must create strict guidelines to make sure that customer participation isn't considered an investment and subjected to securities laws through the Securities Exchange Commission (SEC). To protect participants, all subscribers should be located within the utility service area and should not be allowed to source more than their annual needs.^{xi}

Rate-based Structure

The system is owned by a utility or third party and participants purchase the output of the solar array, usually as solar energy blocks. Solar energy blocks are units of solar energy production from the community solar array, based on the number of kilowatt-hours (kWh) produced and is typically an ongoing payment that is applied monthly to the customer's electricity bill. Rate-based structure has similarities to a solar lease or PPA agreement: the project developer/administrator is responsible for the solar installation and maintenance costs, and sells the electricity to the customer at a fixed or variable rate.

VI. Economic and Financial Considerations

Optimizing the program's finances and taking advantage of available financial tools is directly tied to the program's ownership model. For instance, a non-profit utility will need to partner with a for-profit entity (bank, for-profit business arm, etc.) to take advantage of tax credits or certain other beneficial tax programs such as the Modified Accelerated Cost Recovery System (MACRS). However, even if a utility chooses to retain total or partial ownership of the program there are still numerous loan and beneficial tax programs to take advantage of. In reality, tradeoffs exist between each ownership model. No matter which ownership structure is used, the utility should evaluate the following factors while building out the program's cost benefit analysis:

- ❖ Cost of wholesale power
- ❖ Internal capital rate of return
- ❖ Price escalation rate
- ❖ Economics on various project scales
- ❖ Changes in the equipment price—hardware costs have been gradually dropping. How will this affect the project in the next 5, 10, 15 years?
- ❖ What is your break-even point?
- ❖ Subscription rates; what if the program is undersubscribed?

“Our aim was to lower the barriers to participation in solar in a way that benefits all customers- not just customers who can afford to install their own rooftop systems.”

– Rick Luna, CPS Energy

See the NRECA's [Cost and Financing Screening Tool for Utility-Scale Solar projects](#) for a comprehensive financial analysis tool.

Finance Tools and Incentives

To best understand pros and cons of the various ownership structures, it's important to have basic knowledge of the relevant finance tools and incentives:

Federal Investment Tax Credits (ITCs)

Tax credits reduce the cost of installing a solar system and ultimately make the electricity more affordable. Use of tax credits require an adequate tax appetite and are not available to non-profits. For community solar projects, the ITC is typically monetized by a for-profit subsidiary or the financing entity. For more information, see the U.S. Department of Energy's [fact sheet](#) or the [DSIRE](#) program overview.

Modified Accelerated Cost-Recovery System (MACRS)

MACRS is a beneficial tax program allowing for quicker asset depreciation. For more information, see the [DSIRE program overview](#).

Clean Renewable Energy Bond Program (CREBs)

These provide a smaller but still significant financial benefit to tax-exempt co-ops. CREBs present a low-cost opportunity for public entities to issue bonds to finance renewable energy projects. The federal government lowers the cost of debt by providing a tax credit to the bondholder in lieu of interest payments from the issuer. See [NREL's fact sheet](#) on CREBs for more details. [The IRS](#) recently announced a new allocations of CREBs, in March 2016.

CoBank

CoBank is a national cooperative bank serving industries across rural America. The bank provides loans and leases to rural power. <http://www.cobank.com/About-CoBank.aspx>

Tax Equity available through the National Rural Utility Cooperative Finance Corporation (CFC)

The CFC has made \$100 million of tax equity available to co-op solar projects. <https://www.nrucfc.coop/>

USDA Strategic Economic and Community Development Grants

Available to co-ops, this program will fund projects that support strategic economic and community development. <http://www.rd.usda.gov/programs-services/strategic-economic-and-community-development>

USDA Rural Economic Development Loan and Grant (REDLG)

Available to co-ops, this program provides zero interest loans to local utilities.

<http://www.rd.usda.gov/programs-services/rural-economic-development-loan-grant-program> *USDA Rural*

Utilities Service, Powering Sustainable Rural Communities

Available to co-ops, provides direct loans and loan guarantees, as well as grants and energy project financing to electric utilities that serve customers in rural areas. <http://www.rd.usda.gov/programs-services/all-programs/electric-programs>

Financing Options Based on Ownership Structures

Full Ownership

Under the full ownership model, the utility retains control of every element of the project and expenses including construction, maintenance, taxes, and administration.

Without a for-profit partner, the project will not be eligible for federal tax credits. However, a co-op program would likely be eligible for loans available through the U.S.

Department of Agriculture, CoBank, or the National Rural Utility Cooperative Finance Corporation (CFC). Munis are eligible for tax-free bonds and can take advantage of the newly reallocated Clean Renewable Energy Bond (CREB) program.

Although less common, there are examples of self-funded programs where the program's costs are covered by consumer-owner buy-in fees, under the capacity model.

As previously noted, some consumer-owner costs can be considerable. In the case of the Okanogan County Electric Cooperative (located in Washington State), community solar buy-in fees cost \$6,000 or more per customer.^{xii}

Hybrid Ownership

Under the hybrid, or partial, ownership model, the utility is able to retain control over some components of the program, and can structure the agreement so as to recover full control after a predetermined period of time, if it so chooses. This is a common arrangement and allows the project to take advantage of tax credits and lower overall net costs. It can be structured such that the for-profit utility arm or subsidiary of the utility, or a bank contributing tax equity, owns the array and leases it back to the utility. Similar to PPAs, the agreement can be structured to include utility step-in rights that allow the utility to exercise a fair market value buyout.^{xiii} In addition to the lease payment, the utility would be responsible for all costs associated with the array: maintenance, taxes, insurance, etc.

In Texas, Mid-South Synergy and CoServ are two examples of hybrid ownership at work. Both co-ops chose to partner with a for-profit subsidiary to harness federal tax credits.

Third Party Ownership

Third party ownership typically includes a power PPA with a large solar developer. Use of third party developers are popular

Co-op Highlight: CoServ



CoServ Electric serves seven counties in North Texas. The distribution co-op pursued a hybrid ownership model for its 2 MW AC CoServ Solar Station, forming a power purchase agreement (PPA) with one of its for-profit subsidiaries to take advantage of beneficial tax programs to better control the project's finances.

Details:

- ❖ System size: 2 MW
- ❖ Land used: 16 acres (an old peanut farm)
- ❖ Finance used: ITC monetized through subsidiary
- ❖ Ownership type: Hybrid; partnership with subsidiary
- ❖ Customer offer: solar energy blocks

“We decided early on that we were going to have full ownership of the solar facility, that way we could better control the costs and ultimately the price per kWh.

CoServ considered owning the project at the non-profit co-op level, but the economics were better for the project if we could find a way to utilize the federal investment tax credit and accelerated depreciation tax benefit.”

– *Dustin Brown, CoServ*

with Texas munis, and present an opportunity to monetize the federal tax incentive. They will form a special purpose entity (SPE) that will construct, own, and operate the project. This ownership model is frequently seen with larger projects as the legal paperwork for this arrangement can be considerable, and can cost as much as \$250-\$500,000.^{xiv} Structurally, third party ownership projects can be set up differently based on size. “For systems less than 2 MW, the lease buyout structure—where the co-op initially leases the project from the developer, but has the option to buy the project for fair market value after a certain period of time—is frequently the best option. At 2 MW or more, co-ops might begin to find investors interested in tax equity flip structures^{xv}.”

After a predetermined amount of time, the utility can use a tax equity flip to take over full control of the project similar to the hybrid structures mentioned earlier. For an example of how tax equity flips have been used, see NRECA’s [Tri-County Electric Cooperative Case Study](#).

Rate Setting

Proper rate setting is critical to ensuring that the project makes economic sense for the utility. The utility must make sure that the project doesn’t cut into revenues, which can happen if the rates are set too low or if the program is undersubscribed. Therefore, subscription rates need to be set at a price attractive enough to reach the targeted number of participants. It’s also important to ensure that the rates are equitable and that community solar program costs aren’t subsidized by non-subscribers. Specifically, when determining program rates, the utility should consider:

- Expected up-front contributions, under the capacity-based model
- Expected monthly program revenue, under the rate-based model
- Expected subscription numbers, under the rate-based model
- Expected rate to be paid for excess energy produced

“We’ve always known that our residents have been interested in solar.”

– *Dustin Brown, CoServ*

Setting rates is complex and requires technical resources and knowledge. For details on how to set rates and calculators, visit the Solar Market Pathways [Rate Design and Why it’s important](#) resources.

VII. Customer Engagement & Market Research

The viability and success of a community solar project lies in its customers and subscription rate. From the very beginning, market research will help a utility determine the project’s size and design. From there, it’s critical to market the program, acquire and then retain subscribers. Positive communications and outreach to prospective and actual customers is essential, from the first steps of project planning through the duration of the project’s lifespan.

The full range of customer care and engagement efforts can be divided into three sequential phases: 1) Market and demographic research, 2) Marketing and outreach, and 3) Customer support.



During these phases there will be many questions to address, including:

- How large is the potential customer base?
- How to structure the customer offering?
- How to set rates? Will the offer include upfront costs?
- How to position your offer in comparison to the competition?
- How best to promote the program?
- How to ensure customer satisfaction?

Overall, customer engagement activities are critical to building and sustaining the program.

Market and Demographic Research

Market and demographic research is the first step to understanding the potential customer base; what are the energy needs and motivations for participating in community solar. Participant motivations can differ greatly from environmental concerns, to energy independence, to cost savings. Importantly for the utility, outcomes can help determine the program's key parameters including the size of the installation, the customer offer, and acceptable pricing thresholds.

Topics to consider when assessing your market:

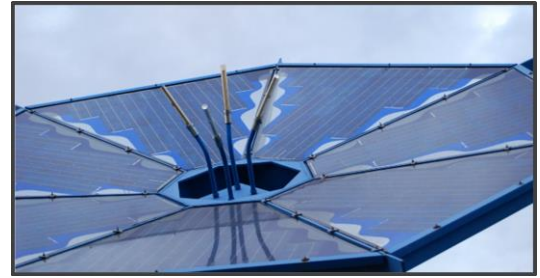
- What is the current level of solar awareness within your community?
- Who is likely to participate?
- What motivates these individuals to participate?
- How much are they willing to pay?
- What are their expectations from a solar program?

Market research and demand analysis can be conducted through a combination of focus groups, customer surveys, and open meetings. For reference, previous research to understand customer preferences of 75 active community solar programs found that the most important issues have been: 1) economic proposition, 2) the array's location, and 3) and contract length.

The market research phase is also when you should conduct due diligence on the competition. Are there third party solar DG installers operating in your service area? If yes, request proposals for their solar services to better understand their offer. In addition to surveying the market, speaking with administrators from other programs about their design process and takeaways could provide valuable insight and lessons learned.

For ideas of what to include in a program design survey, you can reference [SEPA's Accelerating Adoption of Community Solar report](#) (2016).

Muni Highlight: Austin Energy



To determine its customer offer, Austin Energy, a Municipally Owned Utility serving the city of Austin and surrounding counties, engaged the public through focus groups and online surveys. Through this outreach, Austin Energy learned that prospective customers are excited about community solar, especially if it's locally sited, but are turned off by long-term contract commitments.

Details:

- ❖ System size: 2 MW
- ❖ Land used: 16 acres
- ❖ Ownership type: Third party; PPA with developer, PowerFin

“We hope to have a dynamic community solar portfolio moving forward...I think community solar is definitely going to grow in Austin.”

– Karen Poff, Austin Energy

Marketing and Outreach

Once the program basics (size, model, and goals) have been determined, it's time to engage and acquire customers. Marketing and outreach should aim to educate customers about solar basics, how the community solar model works, and its value proposition. For most of the public, knowledge of solar power and of community solar programs is low. Consequently, the utility will need to develop written materials and train its staff to effectively communicate the program's benefits, particularly the value proposition.

Marketing and advertising strategies can range from traditional commercials, pricing tactics, social media campaigns, newsletters, press releases, website, and more. There are many messages and media types that can be used to promote programs (see Figure 7). Of these, research has shown that economic and ownership messages are the most effective at influencing customer opinions, and that messages directed at individual customers are more effective than mass media. The most effective form of marketing is believed to be including messages on the utility bill "because it is high impact, low cost, and likely to be seen by the customer."^{xvi}

Media	Source	Message
<ul style="list-style-type: none"> • Newspaper • Mailer • Utility bill stuffer • Social Media • E-mail • Message on utility bill • Radio spot • TV spot • Web 	<ul style="list-style-type: none"> • Well-known personality • Neighbor • Local community spokesperson • State Governor • Solar organization • Utility • Non-profit organization 	<ul style="list-style-type: none"> • Saves you \$ • No maintenance • Grows the solar industry • Avoids use of fossil fuels • No start-up costs or investment • Promotes renewable energy • Solar panels are not on your roof • If you move you can take with you or cancel • Every homeowner or renter eligible to participate • Hedge against rising utility costs • Growing demand for community solar • Buying or leasing too costly • Community solar is local • Get started right away, cancel anytime • Conserve natural resources

Figure 8-- Marketing Options, Source: SEPA Accelerating the Adoption of Community Solar (Feb 2016)

For a detailed guide of how to develop a marketing plan, see the [NRECA Community Solar Playbook](#).

Customer Support

The next step after customer acquisition is to ensure customer satisfaction and retention. New customers are likely to have questions about the billing system, use of the online portal, and the economics of the program. In fact, a number of community solar programs, [documented by NRECA's case studies](#) found that their marketing and member services teams were initially overwhelmed by the number of customer service requests after a program launch. Because of this, the utility should be prepared for the increased volume of customer service requests and should hire and train staff accordingly.

Soon after the program's launch, the program administrator should follow up with subscribers, via a customer survey to gauge satisfaction and to learn if there are specifics that customers are satisfied or dissatisfied with. Because the viability of community solar programs depend on community participation and subscription rates, it is essential to be attentive and responsive to customers' needs.

Due to the importance, and sometimes large administrative requirements, associated with customer care activities, many community solar programs have outsourced some of the IT, billing, and customer service functions to a third party provider. In fact, a number of such third party companies – most notably the [Clean Energy Collective](#) — are positioning themselves in this growing market.

VIII. Conclusion

Community solar, in Texas, is well positioned for growth. Between 2015 and 2016, the number of active Texas community solar projects grew from two to five. Many more projects are expected to come online in 2017 and beyond. In addition to the increase of number of projects being developed—the size of installations are also growing from ~1 MW to larger installations indicating that the Texas community solar market is moving beyond the initial pilot stage, as non-profit utilities become more familiar and comfortable with the solar distributed generation projects. Moreover, community solar projects stand to benefit non-profit utilities and their customers, by connecting customers with low cost solar electricity while utilities retain control of DG in their service area.

Additionally, this is an exceptionally good time for utilities to pursue community solar projects while regulations and reliability requirements on distributed generation installations are favorable. As distributed generation becomes a greater contributor to the electricity mix, it is expected that distributed generation regulations will tighten. Overall the future is bright for connecting customers with low-cost solar power through community solar projects.

“Distributed generation, in and around urban load centers, is going to become an increasing part of the resource mix and a vital part of how we provide energy for customers and maintain grid reliability.”

– Warren Lasher, ERCOT



Figure 9-- Alamo 4 Solar Installation, CPS Energy utility-scale project

IX. Additional Resources

- American Planning Association briefing papers, [“Recycling Land for Solar Energy Development”](#)
- [Electric Reliability Council of Texas Services Portal](#)
- Great Plains Institute report, [“Grow Solar, Local Government Solar Toolkit: Planning, Zoning, and Permitting”](#) – Solar in Comprehensive Planning, *Considerations; Land Use Conflicts; Elements*
- Interstate Renewable Energy Council (IREC) report, [“Model Rules for Shared Renewable Energy Programs”](#) – Guiding Principles for Shared Renewable Energy Programs; Shared Renewables in States with Restructured Energy Markets
- National Renewable Energy Laboratory (NREL) report, [“Community Shared Solar Policy and Regulatory Considerations”](#) – Hosts of Community Shared Solar; Participants in Community Shared Solar ; Core Components to Consider for Shared Renewable Energy Programs (*Program Administration; Shared Renewable Energy Facility Size and Location; Shared Renewable Energy Facility Ownership and Financing Implications; Additional Program Considerations*)
- [National Renewable Energy Laboratory’s \(NREL\) Technology Deployment Portal](#)
- National Rural Electric Cooperative Association (NRECA) report, [“Community Solar Playbook Executive Module”](#) – Developing a Scope of Work and Staff Planning, 6.1.4 *Site Selection Acquisition and Permitting Tasks*; Developing a Community Solar Business Case, 5.3 *Key Elements to a Community Solar Business Plan*; Community Participation, *Selling or leasing panels, Selling or subscribing capacity, and selling or subscribing energy blocks*
- National Rural Electric Cooperative Association (NRECA) white paper, [“Solar Project Land Acquisition and Permitting: A Case Study of Four Cooperatives Participating in the Solar Utility Network Deployment Acceleration Project \(SUNDA\)”](#)
- Public Utility Commission of Texas (PUCT) manual, [“Texas Interconnection Rules for Distributed Generation”](#)
- Rocky Mountain Institute white paper, [“Community-Scale Solar, Why Developers and Buyers Should Focus on the High Potential Market Segment”](#)
- Smart Electric Power Alliance (SEPA) report, [“Utility Community Solar Handbook”](#)-- *Renewable Energy Ownership; VII. Supply Management, Basic Procurement Options; Over and Under Subscription*
- Smart Electric Power Alliance (SEPA) report , [“Community Solar Program Design: Working Within the Utility”](#)– Section 3: *Community Solar Program Design, Design Decisions; Economic Decisions*
- Smart Electric Power Alliance (SEPA) report, [“Accelerating Adoption of Community Solar”](#)
- Smart Electric Power Alliance (SEPA) report, [“Expanding Solar Access Through Utility-led Community Solar”](#)
- [State Energy Industries Association \(SEIA\) State Solar Policy Portal](#)
- U.S. Department of Energy (DOE) report, [“A Guide to Community Solar: Utility, Private, and Non-profit Project Development”](#) – *Emerging State Policies to Support Community Solar, Group Billing; Virtual Net Metering; Joint Ownership*
- U.S. Department of Energy (DOE) report, [“A Guide to Community Solar: Utility, Private, and Non-profit Project Development”](#) – *Community Solar Project Models, Special Purpose Entity Model and Utility-Sponsored Model; Getting Started, Project Development Phase; Appendix A, Advantages of Different Business Formation*
- U.S. Department of Energy (DOE), North Carolina Solar Center and Meister Consultants Group, [“Property Taxes and Solar PV Systems: Policies, Practices, and Issues”](#)

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- ⁱ Deloitte; [Unlocking the Value of Community Solar; Utilities find opportunity in the inevitable growth of distributed energy resources](#); 2016, p. 1
- ⁱⁱ National Renewable Energy Laboratory; [Shared Solar: Current Landscape, Market Potential, and the Impact of Federal Securities Regulation](#); April 2015, Introduction
- ⁱⁱⁱ Smart Electric Power Association; [Expanding Solar Access through Utility-led Community Solar](#), September 2014, p. 11
- ^{iv} Interview with David Smithson, Texas Public Utility Commission; July 2016
- ^v Public Utility Commission of Texas (PUCT); [Distributed Generation Interconnection Manual](#), 2002
- ^{vi} Electric Reliability Council of Texas (ERCOT); [Registration and Qualifications: Resource Entities](#), July 2016
- ^{vii} Public Utility Commission of Texas (PUCT); [Electric Substantive Rules, Chapter 25](#)
- ^{viii} United States Department of Energy; [Community Renewable Energy Frequently Asked Questions](#), October 2015
- ^{ix} Electric Reliability Council of Texas (ERCOT); interview with Warren Lasher, Director of System Planning; June 2016
- ^x U.S. Department of Energy, North Carolina Solar Center, Meister Consultants; [Property Taxes and Solar PV Systems: Policies, Practices, and Issues](#), July 2013
- ^{xi} Energy Sage; [Community Solar: What is it?](#)
- ^{xii} National Rural Electric Cooperative Association; [Cooperative Solar: Eight Case Studies](#), Okanogan County Electric Cooperative Case Study, p. 19
- ^{xiii} National Rural Electric Cooperative Association; [The Community Solar Playbook](#), p. 31
- ^{xiv} U.S. Department of Energy; [A Guide to Community Solar: Utility, Private, and Non-profit Project Development](#), November 2010
- ^{xv} Deloitte; [Unlocking the Value of Community Solar; Utilities find opportunity in the inevitable growth of distributed energy resources](#); 2016, p. 8
- ^{xvi} Smart Electric Power Alliance (SEPA) report ; [Accelerating Adoption of Community Solar](#), February 2016, p. 9