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Utility Community Solar Handbook

Understanding and Supporting Utility Program Development

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Carl R. Siegrist
Carl Siegrist Consulting, LLC

Bianca Barth, Becky Campbell,
Bart Krishnamoorthy, Mike Taylor
Solar Electric Power Association

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Cover Photo

Boulder Cowdery Meadows Solar Array in Boulder, Colorado. Utility program: Xcel Energy Solar*Rewards® Community®
(Courtesy: Clean Energy Collective)

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I. Introduction

In communities across the United States, there is a rising interest in community solar programs as a means to increase participation in solar energy for people who may have physical, financial, or other limitations to installing solar on their own property. Additional drivers for community solar include interest in increasing energy independence, offering a hedge against rising fuel costs, cutting carbon emissions, and providing local jobs. Community solar programs provide an alternative to the traditional process of individuals or businesses placing solar on their property. Instead, customers can utilize a solar energy system installed offsite and benefit from its output remotely through billing and accounting mechanisms.

In general, there are three main types of a community solar programs or projects:

- Utility Managed: A utility designs and operates a community solar program that is open to voluntary participation by their ratepayers.
- Private Investment: Individuals join in a business enterprise to develop a community solar project.
- Nonprofit Managed: A charitable nonprofit corporation administers a community solar project on behalf of donors or members.

Each has a unique set of costs, benefits, responsibilities, implications, rewards and challenges. For some communities, the local electric utility is either the origin of a community solar program or a likely candidate for starting one. Depending on the status of the state or local solar market, the utility may have legal, financial, and program management infrastructure capabilities to handle organizing and implementing a community solar project. To be sure, a utility community solar program is a significant undertaking and the required efforts on part of the utility and local stakeholders should not be underestimated as there are many internal and external design needs.

This handbook provides the utility's perspective on utility managed community solar program development and is a resource for government officials, regulators, community organizers, solar energy advocates, non-profits and interested citizens who want to support or educate their local utility in implementing a new or improving an existing community solar project. It describes the major design elements the utility needs to address during program development and provides suggestions for how to constructively engage with the utility and support program implementation from a well-informed perspective.

II. Community Solar Business Drivers

It is important to understand the utility's motivation for considering a community solar program. A panel of utility participants was surveyed regarding utility managed community solar programs and the following list provides a high-level overview of potential drivers for a utility, though not all will apply for every utility.

- A broader pool of customers can participate in solar: From a utility's perspective, community solar programs can help their customers overcome both physical and financial barriers to install solar on their property, including rental properties, properties limited by shading, customers with lower credit scores, customers with lower incomes and properties with unsuitable roof orientation or design.
- Customer satisfaction and engagement: A community solar program can get customers more positively engaged with the utility and thereby, enhance customer relationships and the

customers' solar experience. In general, surveys show that customers tend to support solar as an energy resource and want their utility to increase the amount of solar in its generating portfolio. Additionally, community solar programs enable customer choices in their electricity sources with similar benefits to third-party or customer-owned systems.

- Improved customer equity: Community solar can potentially address the issue of subsidization of distributed solar customers by non-participants, under circumstances where there remains an imbalance in credits and charges to customers with distributed solar. A program can be designed so that participating customers support the full cost of the program and non-participating customers are held neutral.
- Economic Development: By supporting the regional solar PV industry and by keeping the financial benefits local, a community solar program can support local economic development, which typically is of interest to the utility serving its community.
- Lower and more equitable incentive requirements: Larger-scale community solar installations should prove more cost effective than smaller, distributed solar installations and as a result may improve the ability of rate payers to deploy more solar for a lower total investment.
- Potentially meet policy requirements at lower costs: A community solar program may be a way to help meet Renewable Portfolio Standard (RPS) goals or requirements at lower costs relative to customer-sited systems.
- Potential distribution system benefits: If strategically located, community solar arrays could provide distribution system benefits, though this is not a universally recognized value and depends on placement, design configurations, and existing penetration levels.

These business drivers, with supporting detailed analysis, can be used by the utility to build support for the program among utility management, regulators, and/or stakeholders. Similarly, stakeholders can relay the benefits as outlined above to their local utility in an effort to get the utility interested in pursuing a feasibility assessment of a utility community solar program. Understanding what is driving the utility's interests is important to developing a community solar program that benefits all parties involved in the venture.

III. Market Research

Prior to developing a community solar program, a utility should carry out thorough market research in order to understand its customers' willingness to participate in a community solar program and their motivations for doing so. From a utility's perspective, the new program needs to fill a real or perceived market gap or differentiate itself from other customer options. Most importantly, there needs to be enough demand for community solar to justify the development efforts now and in the future.

Some utilities that have undergone the process of developing a community solar program found it valuable to complete a market research survey and/or conduct formal customer focus groups prior to developing a new solar program. These methods can save both time and money, help improve program development and increase the effectiveness of program promotion.

The utility may conduct public opinion research on interest in community solar to determine the most attractive benefits, the most appealing model, and any barriers to participation. It is highly recommended that any community members interested in this new option participate in the utility's efforts. Engaging in or helping coordinate outreach for market research efforts is a relatively easy venue for communicating interests and expectations to the utility.

IV. Working with Stakeholders

Most utilities realize that stakeholder engagement, both within the utility and among the community served, is critical to the success of any community solar program. A program developed in utility isolation has a high risk of not meeting stakeholders' expectations. Ideally, community solar program goals and program design are collaborative processes. Regardless of whether the program is developed by the utility or with the use of third-party consultation/provider, it is crucial for the utility to have a detailed stakeholder engagement plan. Key stakeholders such as local government representatives, relevant non-profits or solar advocacy groups interested in community solar should be constructively engaged by their utility and raise awareness around the stakeholder drivers throughout the program planning and development process.

From the utility's perspective, key external stakeholders are trade associations, active interveners and consumer advocacy groups, business and labor groups, solar industry companies, elected local officials, regulators and their customers. From the perspective of those stakeholders, it is crucial to engage with the utility early on in the development process to discuss their interests, expectations, needs and concerns. The earlier a dialogue has been established between all impacted stakeholders and the utility receives constructive feedback, the easier it will be for the utility to consider those comments in the design process. In addition, listening to and understanding the utility's intentions may help avoid the emergence of misperceptions.

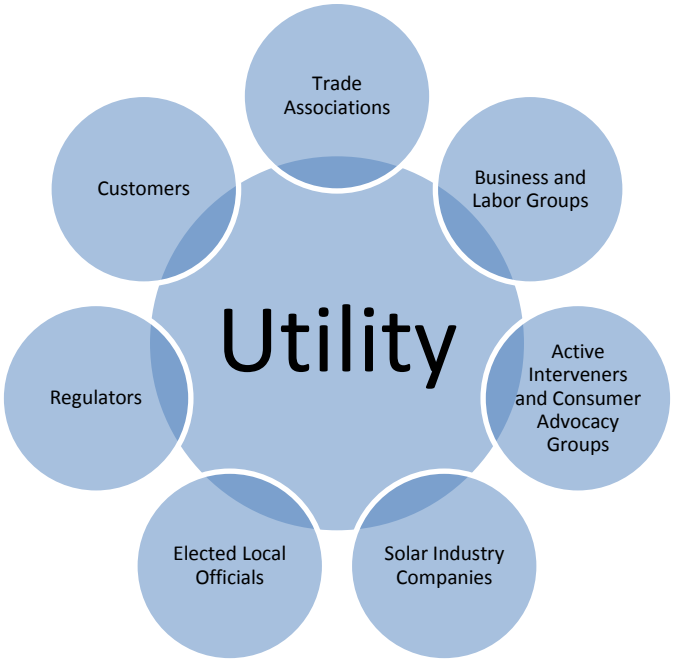


Figure 1: Schematic diagram for stakeholder engagement

V. Program & Infrastructure Development

When considering program design options, the utility needs to weigh many choices and options. The following section provides an overview of many components the utility needs to address. Having a highly educated stakeholder constituency to provide constructive feedback on major design components can help ensure the program's success.

Product Offer

There are two distinct ways to structure the product offered through a utility community solar program:

1. *Sell solar kilowatt-hours* through a solar rate that can be lower, equal to, or higher than retail rates. Effectively, the program is offering a new solar tariff that is distinct from current rate structures and reflects the unique benefits of solar. This could be a fixed rate, creating a spread with retail rates over time, or variable to track inflation or retail rate changes. Some programs exempt participants from general renewable energy recovery or fuel resource charges as an alternative benefit to a wholly fixed rate. This model will be compared to existing and future retail rates and/or the equivalent customer options for a solar power purchase agreement or lease from a third-party solar vendor.

   Energy variations can include:
   - Preset kilowatt-hour blocks on a monthly or annual basis
   - Actual kilowatt-hour performance from the PV system on a real-time, monthly or annual basis
   - Estimated kilowatt-hour performance on a real-time, monthly or annual basis with or without a true-up based on actual performance

2. *Sell or lease solar kilowatts* that produce benefits based on actual or estimated output of the participant's share of solar capacity. The participant is becoming a solar generator and compensation can occur through billing credits, i.e. mimic net metering, or a wholesale purchase from the customer, i.e. a solar feed-in-tariff or purchase rate. This model will be compared to the customer costs of installing and owning a system themselves and will be subject to the eternal question, "What is the payback?"

   Capacity variations can include:
   - Actual panel sizes used in the installation, e.g. 230-watts, and possibly fractions therein, i.e. ¼, ½ or full panel.
   - Kilowatt increments, i.e. ¼, ½, or full kilowatt(s).
   - Contribution percentages, i.e. a contribution equal to 1% of the costs of the system equates to 1% of the system output in benefit.

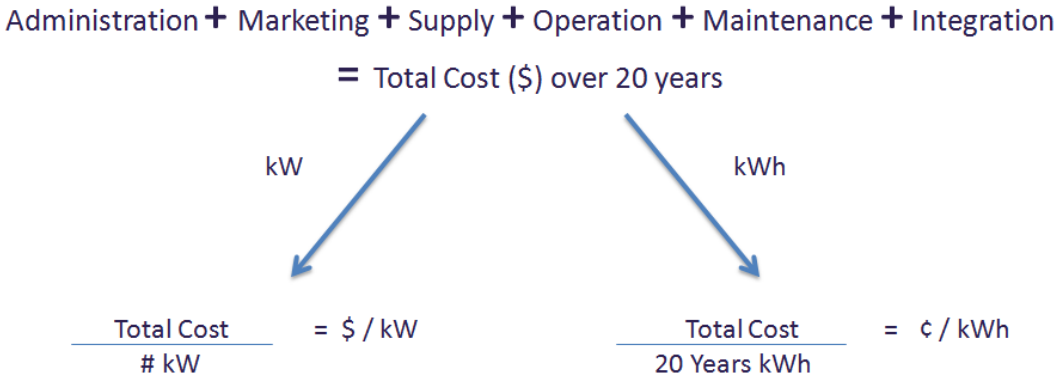
A solar kilowatt-hour rate program could be set exactly to a retail rate, providing the same initial benefits as a solar capacity program that reduces the customer's bill at retail rates. However, the ownership and product structure may have different implications for tax, legal, and regulatory issues, as well as divergent economics as retail rates change.

Price setting

The first step in setting the community solar price is to analyze and assess all of the known and anticipated costs associated with the program, including administration, marketing, supply, operation and maintenance, and integration costs over the program's anticipated lifetime. Future costs can be rolled into a current dollar amount through net-present value calculations. The utility can then allocate these costs between program participants and all ratepayers in various ways:

- *All costs fully paid by participants*: No subsidies are inherent in the program and participants receive all resource benefits.
- *Certain program costs are recovered from all ratepayers*: As an example, program administrative costs might not be included because they are difficult to quantify or they are already recovered through other means. Another example might be that if the project output is being counted toward a renewable requirement and the costs are normally recovered through a rate surcharge; perhaps supply and O&M costs are not included.
- *Certain subsidies are allocated to the program*: One example might be that if the utility has an existing solar incentive program, a similar incentive is applied to the community solar program, i.e. $0.50/watt buydown.
- *Certain solar costs are allocated to the program*: If the utility utilizes standby charges, grid integration or other costs to net metering customers or wholesale systems, those costs could be allocated to this program as well.

Each utility can determine the stringency of their cost quantification and the degree of any adjustments that are made to those costs. The adjusted costs are then used to calculate the program price. For solar rate-oriented program designs, the costs are divided by the estimated aggregate solar performance over the PV systems' lifetime to determine a fully-loaded price in cents per kilowatt-hour. For kilowatt-oriented programs, the adjusted costs are divided by the PV system capacity to determine the price in dollars per kilowatt (or other metric, such as a full or half solar panel).



Pricing-setting may also relate to the goals and objectives for developing a community solar program, which generally aims for healthy customer participation. Customer participation will certainly correlate with the degree of economic benefit, especially relative to what local solar markets are currently exhibiting. Developing a program that is significantly above retail rates or a customer's other solar options will likely have slow uptake, which should be taken into consideration during the 'go/no-go' decision-making process. Another consequence of slow uptake is the reduced effectiveness of key drivers, including customer satisfaction, engagement, and equity, as described in Section II.

In starting a community solar program, the utility provides a service to customers by taking on technology, financing, marketing or other risks, and potentially opens the market to new customers. The cost of these services may be difficult to quantify. However the utility prices its program, it is necessary to balance a wide range of competing factors. Prices need to be low enough for customers to recognize the economic value of participation while allowing the utility to recover program costs. Each utility will need to find the correct balance between these varying interests and determine their best path forward for pricing strategies.

Renewable energy 'ownership'

The utility will need to decide who 'owns' the renewable energy benefits from the program, i.e. the utility, the participating customer, or a shared approach. Renewable energy benefits are often assigned through renewable energy credits (RECs) which may have some regulatory or monetary value. This is important for determining ownership options that could include:

- Either the utility owns and utilizes the RECs for current or anticipated state or federal renewable energy requirements or the customer owns the RECs and sells them to the utility for regulatory compliance.
- Either the utility owns and sells the RECs into local or regional REC markets to subsidize the program's cost or the customer owns and sells the RECs in a similar fashion for their benefit.
- The utility 'retires' the RECs on behalf of the customer.

The REC allocation could include the utility owning all RECs, the customer owning all RECs, or a prorated sharing of the RECs.

Several variables may factor into decisions on which option to pursue:

- The goals of the program.
- The type of program design utilized, i.e. solar rate versus solar sales/lease program.
- Past utility programs or regulatory orders.
- For tariff programs, the price relative to retail rates; for sales or lease programs, the degree to which all costs were covered by the participant.

Customers and stakeholder advocates may have some expectation that their participation supplements solar activity above and beyond regulatory requirements. Others may be satisfied with the new solar project(s) being built and the economic benefits of the program and may not have a strong opinion on REC ownership, especially if no state REC market exists or there aren't regulatory renewable requirements for the utility. It is worth considering whether any REC ownership precedent was set through past or existing solar incentive programs, net metering contracts, or green pricing programs. Ideally, this issue would be discussed as part of the stakeholder engagement process, through which a consensus on the matter should be reached with all involved parties is reached.

VI. Other Important Issues

The following section seeks to broaden stakeholders' understanding of the utility's internal processes and requirements when developing a community solar program.

Securities, Taxes, and Regulatory Issues[1]

In general, complying with investment securities, tax, and other legal issues, such as investment structures, needs careful consideration when designing a community solar program. These issues can be very complicated, nuanced and depending on the program's design, need to be considered from both the utility's and the participants' vantage points. Careful consideration minimizes the program's costs through efficient use of tax credits and avoiding unforeseen legal or compliance costs.

If either state or federal regulators view the utility's community solar program as issuing securities, the utility must comply with securities laws. In addition to working with the utility's legal counsel, it is

[1] Disclaimer: Nothing provided in this handbook should be considered legal, tax or financial advice. A utility interested in developing a community solar program should consult with an attorney and financial experts before taking any action. See Stoel Rives Memorandum to NREL, Securities Law Issues Relating to Community Solar Projects: http://nwcommunityenergy.org/solar/financing/NREL%20-%20Securities%20Memo.pdf.

recommended to check with the appropriate state securities administrator before proceeding with a community solar program offering.

On tax issues, utilities will want to maximize tax and depreciation benefits to lower project costs, either through utility ownership of the project or through a PPA with a project developer who utilizes the benefits. Residential customers cannot generally take the tax credit directly as the off-site community solar facility does not fit the ITC requirements for residents.

These securities and tax issues will differ according to the system ownership structure and how the utility chooses to offer its community solar product to participants, and will need to be assessed by qualified counsel with input from other utilities who have researched the issue.

Billing and IT

Billing issues may well be the utility's greatest challenge outside of securities and tax issues. Though it may seem basic, integrating the new program with the utility's billing system is a key part of program implementation. A new billing mechanism is required for tracking and applying the solar production customers are purchasing (kWh), or the bill credits they are receiving (kWh or dollars), or the solar payments they are receiving (dollars). Such a system also needs to provide customers with the opportunity to see the results of their investment directly on the bill in a simple, uncomplicated way. Based on other utilities' experiences, this issue cannot be underestimated and should be assessed early.

VII. Supply Management

Before determining which supply procurement option to choose, the utility needs to define a clear goal or outcome that it expects from the community solar project; e.g., the number of participating customers desired or a certain project capacity. This will begin the process of estimating how much supply to procure.

Basic procurement options

A utility generally faces two basic procurement options – buy or build.[2] Under the "buy" option, the utility signs a power purchase agreement (PPA) to buy the electricity output from a third-party provider. Another "buy" option is the utility purchasing the electricity from customers' solar installations. The utility may purchase the customer generation to provide output for community solar programs or the output can be purchased for other reasons, such as renewable energy compliance. Under the "build" option, the utility owns and operates the solar generation, usually after hiring one or more third-party contractors for construction. As an alternative, the utility could decide to re-allocate existing projects, either utility-owned or projects supplying electricity via a PPA, to the community solar program. Each option has different implications and needs to be thought through carefully.

When considering whether to own the solar projects, utilities should be aware they may not be able to take direct advantage of the federal Investment Tax Credit (ITC) or accelerated depreciation. Investor owned utilities (IOUs) are able to take advantage of the ITC and accelerated depreciation, but the benefits must be normalized over the book life of the solar facility. This will induce a particular shape to the revenue requirement cost recovery curve. Public power utilities and tax-exempt cooperatives do not

[2] For a detailed discussion on the basic options see "Buy versus Build: A Qualitative Comparison of Financial, Tax and Regulatory Issues Influencing Utility Solar Procurement - December 2011".

http://www.solarelectricpower.org/media/233245/buy%20versus%20build%20-%20final%20report.pdf

have a tax liability and are therefore not eligible for the ITC[3] or accelerated depreciation. One option for these utilities would be to set up a subsidiary LLC owned by the utility, a solution applied by at least two cooperative utilities, but which requires additional legal and financial arrangements. If the utility opts not to own the project, it may be able to indirectly capture the ITC (to some degree) through the PPA price paid to the third-party provider.

Direct ownership tends to give the utility greater control over site selection, permitting, development and operations. However, a PPA offers the convenience of construction, technology and operational risk remaining with the developer as payments are based on the system's actual performance, and typically PPA payment terms more closely resemble the shape of utility rates. Financial considerations regarding buying vs. building a solar generation asset include credit rating impacts of imputed or new build debt, increased need and competition for capital, effects on cost of capital and accounting treatments, as well as possible rate making treatment.

Procurement process

Regardless of the procurement option chosen (utility-owned vs. third-party solution), there are many issues in the procurement process that the utility needs to consider and carefully plan around. The following paragraphs provide a broad overview of issues the utility needs to address when developing a request for proposal (RFP). However, specifics will vary depending on the type of community solar program the utility is developing.

The utility may want to convene stakeholder meetings to allow solar developers and others to provide input into its RFP requirements before launching the procurement process. Any solar companies interested in working with the utility are highly encouraged to actively engage in this process. It may also be advantageous for the utility to keep the RFP more focused on its desired outcome rather than specifying every detail. This allows potential suppliers an opportunity to provide more creative, and possibly more effective, solutions.

Prior to issuing the request, the utility needs to determine how RFP responses are evaluated, weighed and scored. This not only helps the utility better understand its needs, but could also aid in fine tuning the RFP before it is issued, and in defending any claims made by non-selected bidders.

Considerations during project planning

The actual location and visibility of the community solar program's solar generation is important from the perspectives of both marketing and participating customers. Ground-mounted systems have great visibility, while rooftop projects are typically not publicly visible.

There may also be issues related to the distance of the solar generation from customers versus optimizing system performance and cost. Although a utility could locate its solar power generation a sizeable distance from the participating community, there are a number of reasons to locate it closer to participants:

- Customers like to see what they are getting.
- It may add to the tax base and contribute to local economic development.
- It helps demonstrate that solar is a viable energy resource.
- It may avoid transmission issues.
- Projects may be sited to help with or research distribution feeder operation.

[3] IRS Notice 2013-70 clarifies that participants that purchase panels and receive solar energy benefits from an offsite solar project may qualify for a credit under § 25C and § 25D by sections 104 and 401 of the American Taxpayer Relief Act of 2012. However, this does not address the securities concerns discussed above.

- Stakeholders often see the siting of community solar projects as a series of concentric circles. Typically, the order of preference for project location is: 1) in the immediate local community; 2) the service territory; 3) the state.

In addition, the solar electric power system's location can impact project cost and complexity. Solar power systems located on utility property can often provide a lower cost and more convenient solution than those located on customer property or on the property of a third-party owner. Siting a system on a brownfield or other unused land could provide additional support from the community but could pose more legal challenges and hurdles. The procurement option chosen (utility-owned or third-party owned) will also influence this decision.

Over and under subscription

There are a number of ways to deal with the risk of under-subscription (where customers leave and/or not enroll as expected) and oversubscription (where there is not enough generation to meet customer needs). One strategy some utilities have adopted is to not build the solar array until their program was 110% subscribed. Any subscribers in excess of the project's capacity are placed on a waiting list until there was participant turnover or sufficient interest to warrant a program expansion.

If the utility plans to use community solar to help meet RPS goals, it will be easier to move customers in and out of the program since the utility could possibly use the SRECs for compliance purposes, regardless of community solar customer participation.

If the utility's community solar program were to not meet subscription expectations and/or participation declined over time, program costs would not be adequately recovered. In this case, the excess generation could be applied to a renewable portfolio standard, added to the general generation portfolio, or somehow otherwise recovered by ratepayers. In order to mitigate this, price setting, as explained in Section V, should be thoroughly vetted.

When dealing with higher-than-expected demand for community solar participation, the utility may maintain a waiting list and continue to expand the program by developing more solar projects as needed. In some areas, "banking" excess solar power (essentially the SRECs) for future use may also be an option or could be limited or prohibited by state law. In other areas, the utility could apply this practice in the event that customer demand exceeds generation. But in reality, any excess generation could also be treated simply as another wholesale energy purchase, albeit at a higher than average cost.

VIII. Marketing and Communications

Developing a marketing and communications plan is an essential part of designing a successful community solar program. The utility needs to investigate and consider several key issues when developing a marketing plan, including messaging to customers, outreach efforts, and the role of the utility bill in communications with customers.

Unified company image and message

A consistent message is important if the utility wants to attract customers to its program, avoid customer confusion, and have internal alignment on the program objectives. It is essential to clearly define what the utility's program is, why it is being offered and how it fits into the company's values, mission, and business strategy. If the utility already has a green pricing program or other renewable energy programs, it needs to find ways to differentiate them from its community solar program through its marketing efforts.

Target audience

Much has been written about which type of customers are willing to purchase solar power.[4] Because a community solar program will not appeal to all customers, the utility can keep customer acquisition costs to a minimum by targeting its marketing and promotions to likely participants. Although demographics such as education and income are an important consideration when developing marketing targets, it is just as important that the message takes into account consumer behavior. Understanding the likes, dislikes, lifestyles and purchase behaviors of the target audience enables the utility to reach them with a message that will appeal. Some research indicates that a positive financial message appeals to a much larger group, with the environmental message playing a supporting role.

Working with others

As the utility is planning its marketing strategy, it should consider working with a variety of external stakeholders. In addition to industry allies, the utility could enlist groups that will bring more customers to the utility's program or help market the program to their members. For example, the utility could target customers that have already participated in other renewable energy or energy efficiency programs. Some utilities have had success working with religious groups, environmental organizations and other affinity groups to reach potential audiences in a relatively low-cost manner. Enlisting the support of these groups is especially important, as customer acquisition costs can have a material impact on the program budget.

For non-profit organizations, community organizers and other groups interested in community solar, these outreach and marketing efforts represent important opportunities to engage with the utility and to achieve a common goal as well as to support its program activities. Co-branding marketing materials and providing information about the utility's program at community events will most likely be highly welcome by any utility.

Additional communication channels

Garnering free press coverage; e.g. about the newness or uniqueness of the utility's community solar program, may be another way to help increase interest within the community. This is an area that could be supported by anyone interested within the community, such as through writing op-eds to the local newspaper, and is an easy way to build support for the utility's community solar program.

The utility can present program results to local media outlets, as well as to solar industry and utility audiences at national or local conferences, through printed and online media, and via other outlets. Non-profit organizations can support efforts to disseminate information about the program and its results through their websites and through newsletters, conference contributions, or other marketing efforts to which the community solar program may be relevant.

IX. Verification, Evaluation and Analysis

As with any other customer program, the community solar program will require a verification and evaluation plan. Prior to initiating a community solar program, the utility needs to develop a plan with well-defined standards for documenting program goals and the metrics to be used to evaluate the program's success. This is not only important to help the utility stay focused on its targets, but also for process improvement and accountability. The utility may also have regulatory requirements that involve reporting

[4] For example, a California Energy Commission report that includes consumer attitudes toward solar electric power and home buyers' willingness to purchase solar is accessible at http://www.energy.ca.gov/2008publications/CEC-180-2008-003/CEC-180-2008-003.PDF.

how the program is performing against goals, both in terms of customer participation (perhaps number of customers and kW or kWh) and budgeted income and expenses.

The evaluation plan needs to include a process for data collection that enables the utility to measure and report annual outcomes resulting from the program. The results can be published in newsletters, web pages, and possibly on a community solar program performance dashboard. Utility management and regulatory agency needs should also be considered when developing appropriate metrics to measure.

Finally, at some point the community solar program will end, either by design or circumstances. What is the utility's exit strategy across different decision categories?

- Active participants: The program design should give consideration to both planned program closure, as well as unexpected closure. Does the utility have any remaining contractual obligations or financial liability to participants? Were these addressed in program materials and contracts?
- Supply: Does the solar plant need to be decommissioned? If not, can the supply be reallocated to another program or the generation portfolio?
- Communications: Does the program have a consistent and logical message to participants? To the media? Regulators or decision-makers?

X. Summary

The type of approach a utility takes in community solar program development will be unique to any given utility, service territory and the utility's customers. Regardless of the drivers and benefits of these programs, community solar may not be the right choice for every utility. Not only are there differences between investor-owned utilities, municipal utilities and cooperative utilities, there are major differences in company cultures and in the political and regulatory environments. Even if one utility has a community solar program, it should not be assumed that another utility in the same state can easily apply the same program design.

That said, there is a growing interest amongst utilities across the United States to get involved with community solar. Any support that local governments, community organizers, non-profits or solar energy advocates can lend a local utility that is in the process of developing a utility community solar program will go a long way in increasing the number and success of these types of programs.

In addition, stakeholder involvement in planning is a key component in the proper execution of a successful community solar program. Stakeholders need to be proactive and constructive when working with the local utility. This includes providing specific suggestions that demonstrate a high level of understanding of utilities' interests and constraints.

Appendix A includes a list of definitions and additional resources that help define community solar, recommend model program rules, discuss the legal concerns surrounding securities issues, and provide case studies of existing utility-led community solar programs.

Appendix A – Additional Resources

Definitions

Investment Tax Credit (ITC): Section 48 of the Internal Revenue Code defines the federal ITC. The ITC allows owners of solar electric systems to take a one-time tax credit equivalent to 30 percent of the qualified installed costs of the solar electric power generation system. There are two versions of the ITC, the federal business energy investment tax credit and residential energy investment tax credit. Certain

restrictions may apply depending on the tax credit category. In November, 2013, the IRS issued Notice 2013-70, which clarifies that taxpayers who purchase panels and receive solar energy benefits from an offsite solar project may qualify for a credit.

Net metering: Many renewable energy systems use net metering to account for the value of the electricity produced when power generated is greater than demand. Net metering allows customers to "bank" this excess electricity generation on the grid, usually in the form of kWh credits during a given period.

Power purchase agreement (PPA): A PPA is an agreement between an energy producer and a buyer of the purchaser of the power. The PPA includes the terms of the agreement such as the rate paid for electricity produced and the time period it will be purchased.

Securities: A security is an investment instrument. Community solar programs must be sure to comply with both state and federal securities regulations. Most community solar programs are designed to avoid falling under securities regulations.

Solar Feed-in Tariff (FIT): A solar feed-in tariff is a financing scheme utilities can use to encourage investment to solar energy. The utility typically offers a fixed energy rate to a solar producer, which ranges from home owners to large scale solar projects, over a long-term contract. Guaranteeing stable rates over time provides the energy producer with more security in their investment and helps increase deployment of solar power generation.

Solar Renewable Energy Certificates (SRECs): A solar electric generation system produces two distinct products. The first is electricity. The second is a bundle of all of the associated renewable attributes produced by the solar electric power system. These environmental benefits result from not generating the same electricity from a conventional gas or coal-fired power plant. These environmental benefits can be packaged into a SREC and sold separately from the electricity in some markets. Some states will certify solar electric systems from out-of-state and allow the SRECs from those facilities to count towards the RPS. The sale of SRECs is intended to promote the growth of distributed solar by shortening the time it takes to earn a return on the investment. 1 SREC = 1,000 kWh of solar electricity = 1 MWh of solar electricity.

Virtual Net Metering: Virtual net metering allows net metering credits generated by a single renewable system to offset load at multiple retail electric accounts within a utility's service territory. As with traditional net metering, credits appear on each individual customer's bill.

Other Publications

A Guide to Community Shared Solar: Utility, Private, and Nonprofit Project Development (NREL)
http://www1.eere.energy.gov/solar/pdfs/54570.pdf

Community Renewables Model Program Rules (IREC)
www.irecusa.org/2013/06/irec-releases-revised-model-rules-for-shared-renewable-energy-programs/

Stoel Rives Memorandum to NREL regarding Securities Law Issues Relating to Community Solar Projects
http://nwcommunityenergy.org/solar/financing/NREL%20-%20Securities%20Memo.pdf

SEPA Technical Brief – Community Solar Program Design: Working Within the Utility
http://www.solarelectricpower.org/sign-on.aspx?noAuth=1&node=1699&type=media

Buy versus Build: A Qualitative Comparison of Financial, Tax and Regulatory Issues Influencing Utility Solar Procurement - December 2011
http://www.solarelectricpower.org/sign-on.aspx?noAuth=1&node=1914&type=media

Changing Ownership of Distributed Photovoltaics – June 2012
http://www.solarelectricpower.org/sign-on.aspx?noAuth=1&node=3979&type=media

Appendix B – Utility-Linked Community Solar Projects (as of 11/15/13)

Investor-Owned Utility program
Municipal Utility Program
Electric Cooperative Program

***** = Program operating under state community solar/renewables law
**=Pending, planned or announced

State	Utility or Project Sponsor Name	Type	Program Name	Participant Information/Eligibility	Participation Mechanism	Participation Benefit/Valuation	Supply Size	Webpage
AZ	**Arizona Public Service**	IOU	**Community Power Project Pilot**	Pilot Project: All customers on a single distribution feeder in the Flagstaff area	All solar equipment is owned by APS, APS installed the solar which is interconnected on the utility grid. In exchange for hosting the system, the customer is eligible for a Critical Peak Price (CPP) rate plan based on estimated production over 20 years for system size installed (2, 3 or 4kW system). Frozen at 2010 rates.	Customers are billed at a fixed rate for a fixed portion of their energy use, based on the size PV system installed on their property. Not based on actual production.	1.5 MWac goal, 1.338 MWac installed (as of November, 2012)	Tariff available at: http://www.aps.com/_files/rates/CMPW-1.pdf
AZ	**Salt River Project**	Muni	**Community Solar Program--Copper Farm Solar Farm**	Commercial/industrial customers of SRP (10 MW), residential customers (2 MW) and schools (8 MW)	Pilot program energy sold in blocks equivalent to about 2,500 kWh/year, up to half of customer's annual usage.	Schools, businesses: 9.9 cents/kWh fixed for 10 years	20 MW	http://www.srpnet.com/environment/communitysolar/home.aspx
AZ	**Trico Electric Cooperative**	Co-op	**Sunwatts Sun Farm Program**	No specific exclusions but a member's purchase of panel output cannot exceed their average monthly kWh energy usage in the last twelve month period, up to a maximum of 10,000 watts per member.	Customer can purchase upfront full, ½ and ¼ PV panel output of a 270- watt PV panel	Customer receives fixed kWh credits on monthly bill by panel shares owned @ 36 kWh per full panel, 18 kWh per ½ panel and 9 kWh per ¼ panel	227 kW	http://www.trico.coop/index.php?option=com_content&view=section&layout=blog&id=9&Itemid=116

State	Utility or Project Sponsor Name	Type	Program Name	Participant Information/Eligibility	Participation Mechanism	Participation Benefit/Valuation	Supply Size	Webpage
AZ	**Tucson Electric Power**	IOU	**TEP Bright Tucson Community Solar Program**	All customers except those who are currently enrolled in net metering	Customer can purchase output in 150-kWh monthly blocks	Customer purchases 150 kWh blocks for $3 each, no additional benefit beyond purchasing solar power in a shared system.	As of July 2012, the TEP Bright Tucson program included 777 customers, which were subscribed to a total of 4.13 MW in TEP or third-party-owned solar installations	https://www.tep.com/Renewable/Home/Bright/
AZ	**UniSource Energy Services**	IOU	**Bright Arizona Buildout/ Bright Arizona Community Solar Program**	Available to customers on tariffs: Residential Service, Small General Service, and Large General Service	Customers can purchase the output in 150-kWh blocks	Customers purchase for $0.02/kWh over regular tariff rate and their solar capacity component of the bill is fixed for 20 years. Purchases are exempt from Renewable Energy Standard Tariff and the Purchased Power and Fuel Adjustment Clause, surcharges that are adjusted annually.	1.7 MW	https://www.uesaz.com/renewable/home/bright/
CA	**Pacific Gas and Electric ****	IOU	**Green Tariff Shared Renewables Program**	Customers of PG&E	Under the new plan, participants will pay the full cost of the new renewable energy supplies built in direct response to their enrollment.	Participating customers will also receive credits for avoided PG&E generation costs	TBD	http://www.pge.com/greenoption/
CA	**Sacramento Municipal Utility District**	Muni	**SolarShares Program**	Customers of SMUD. SMUD's goal is to keep the system subscribed up to 95% of its full output, with the additional 5% used as a safety margin. Approximately 700 customers were sufficient to fully subscribe the system, and there is a	Customers can meet 20-40% of their energy use by purchasing 0.5-kW shares.	Customers receive kWh credit on monthly bill in relation to the quantity of output they subscribed for and the fixed energy rate they qualify for. Blended incentive is $1.50/W.	1 MW	https://www.smud.org/en/residential/environment/solar-for-your-home/solarshares/

State	Utility or Project Sponsor Name	Type	Program Name	Participant Information/Eligibility	Participation Mechanism	Participation Benefit/Valuation	Supply Size	Webpage
				persistent waiting list of approximately 60 customers. The current mix by customer size is about 27% small, 51% medium, and 22% large.				
CA	**San Diego Gas & Electric****	IOU	**Share the Sun and Sun Rate pilot programs**	Developers sign up participants; can meet up to 200% of load	Customers acquire a portion of the power produced by a solar-energy system in SDG&E's service area to cover all or part of their electricity use and receive a bill credit for the value of the solar power their portion generates. The "green attributes" of the solar power would belong to the customer and would not be applied toward SDG&E's renewable portfolio goals.	Participants receive bill credit from SDG&E. Proposal is to credit participants for their share of system at FIT rate plus an "energy payment" based on the DA PCIA + adjustments, which is intended to reflect the incremental cost of delivery. SDG&E retires RECS for subscribed energy	10 MW available	http://delaps1.cpuc.ca.gov/CPUCProceedingLookup/f?p=401:56:3288237296858501::NO:RP,57,RIR:P5_PROCEEDING_SELECT:A1201008
CO	**Colorado Springs Utilities**	Muni	**Community Solar Gardens**	A customer must have a solar garden interest of at least 0.4 kW	Springs Utilities customers may purchase or lease panels from one of two community solar project developers, Sunshare (lease) or Clean Energy Collective (CEC - purchase).	Subscribing customers will receive a fixed credit of $0.09/kWh on their electric bill for their share of the power generated at the community solar garden. In 2012, Colorado Springs Utilities will provide subscribers a one-time, $1.80 per watt incentive up to 30% of their solar garden investment.	2 MW (pilot)	http://www.csu.org/residential/customer/Pages/Community-Solar-Gardens.aspx
CO	**Delta Montrose Electric Association**	Co-op	**The Community Solar Array Program**	Co-op members may lease any portion of the array they wish - provided adequate capacity remains - in lease increments of $10.	DMEA leases portions of a solar array to members in 2.7-watt blocks. DMEA had a goal to divide up the array into small enough components that anyone can afford to participate.	The customer is credited at the full retail rate for the amount his share produces.	20 kW	http://www.dmea.com/index.php?option=com_content&view=article&id=149&Itemid=101

State	Utility or Project Sponsor Name	Type	Program Name	Participant Information/Eligibility	Participation Mechanism	Participation Benefit/Valuation	Supply Size	Webpage
CO	**Empire Electric Association**	Co-op	**Solar Assist Cooperative Garden**	Participation is open to Empire Electric members	Members may lease one or more panels for 20 years at $1,250 each. There are 24 panels available.	Participants receive the value of the energy produced from their panels on their energy bill, at a rate of $0.11/kWh. Empire Electric will pay for the operations and maintenance of the system.	10 kW	http://www.coloradocountrylife.org/files/Local%20Co-op%20Pages/2011/06/Empire%20June.pdf
CO	**Grand Valley Power**	Co-op	**Solar Farm**	Participation is open to Grand Valley Power members	The Solar Farm allows customers to lease solar panels for 24 kW for a one-time payment.	The customer receives a monthly credit on their bill for the Panel Production Credits (PPC) generated by their leased panels. The PPC is calculated by dividing the total generation from the system by the number of panels and providing a kWh credit to a participant's monthly bill.	20.68 kW	http://www.gvp.org/Solar/SolarFarmApp.pdf
CO	**Holy Cross Energy**	Co-op	**El Jebel, Garfield County Airport (near Rifle, CO) (CEC)**	Anyone with a Holy Cross electric bill is eligible to purchase solar panels, including homeowners, businesses, renters, lessees, community organizations, etc.	Customers can purchase shares (watts) of the solar array upfront at a cost of $3.15 per watt ($3,150 per kilowatt)	Monthly bill credit of 11 cents/kWh, or 37% more than the $0.08/kWh for traditional solar systems. As rates increase, power credits will remain 37% greater than the standard credit rate.	78 kW phase 1 938 kW phase 2	http://www.easycleanenergy.com/faq.aspx
CO	**Poudre Valley Rural Electric Association**	Co-op	**Poudre Valley REA Community Solar Farm (CEC)**	The panels are purchased and are owned by individual consumers who receive electricity from PVREA.	PVREA consumers are able to purchase panels for $618 per panel phase 1, $729 phase 2	Credits from the electricity generated are applied directly to the electric bills of each participating consumer in proportion to the number of panels purchased. Phase 2 has a $0.04 PBI	116 kW phase 1 500 kW phase 2	http://www.pvrea.com/solar/index.html
CO	**San Miguel Power Association**	Co-op	**SMPA Community Solar--Paradox Valley (CEC)**	Open to members of San Miguel Power Association (SMPA)	SMPA customers purchase 240-watt panel(s)	Monthly monetary credit for the energy each panel(s) produces. Each panel will produce approximately $45 worth of electricity per year.	1.1 MW	http://www.smpa.com/Service/SMPACommunitySolar.cfm

State	Utility or Project Sponsor Name	Type	Program Name	Participant Information/Eligibility	Participation Mechanism	Participation Benefit/Valuation	Supply Size	Webpage
CO	**United Power**	Co-op	**Sol Partners Cooperative Solar Farm**	Open to all members of United Power, including those who net meter.	Customers lease 210-watt PV panels within the system, for $1,050 each, for 25 years	Customers receive a monthly bill credit for the value of their panel's production at a solar rate slightly above the retail credit rate. During the 1st year, the original 48 panels produced 17,504 kWh. Energy credits totaled $40.12 per panel, equal to a 3.8% return.	21 kW	http://www.unitedpower.com/mainNav/greenPower/solPartners.aspx
CO*	**Xcel Energy**	IOU	**Solar*Rewards Community (CEC)**	All customers within Xcel service territory. Must have at least 10 subscribers per CSG.	Subscription to particular Community Solar program	Total aggregate retail rate less T&D costs ("reasonable charge") less RESA charge less TCA charge. Range from about $0.055 to $0.07, depending on customer class plus an $0.09 - $0.11 / kWh PBI	Boulder County #1 500 kW (CEC) Jefferson County #1 116 kW (CEC) Jefferson County #2 571 kW ($0.04 PBI) (CEC) Denver County #1 388 kW (CEC) Denver County #2 500 kW (CEC) Adams County #1 500 kW (CEC) Summit County #1 500 kW (CEC) Summit County #2 500 kW (CEC)	www.coloradocommunitysolar.com

State	Utility or Project Sponsor Name	Type	Program Name	Participant Information/Eligibility	Participation Mechanism	Participation Benefit/Valuation	Supply Size	Webpage
DE*	**Delmarva Power & Light**	IOU	**Community Energy Facility (CEF)**	All customers within Delmarva's service territory; all subscribers must share "a unique set of interests"	Subscription to particular Community Solar program	If "host customer" for CEF or if on same distribution feeder as CEF: "valued at an amount per kWh equal to the sum of volumetric energy (kWh) components of the delivery service charges and supply service charges for residential Customers and the sum of the volumetric energy (kWh) components of the delivery service charges and supply service charges for non-residential Customers..." [essentially full retail rate] If not on same distribution feeder: "valued at an amount per kWh equal to supply service charges according to each account's rate schedule..." [essentially gen-only/avoided cost] Subscribers retain REC ownership. Delmarva has elected to pay (instead of credit) customers at these rates.	Sum total of capacity limits of each subscriber (25 kW res., 100 kW farm, 2 MW non-res.)	http://depsc.delaware.gov/electric/reg49%207984%20compliance%20filing.pdf
FL	**Florida Keys Electric Co-op**	Co-op	**Simple Solar Program**	Open to FKEC members.	Customers lease 175-watt panels	Members receive monthly bill credits for full retail value of the electricity generated by their leased panel(s). Anticipate approximately $36 in credits per year per panel and $1280 in credits total (assuming 3% annual increase in retail price of electricity).	97 kW	http://www.fkec.com/Green/simplesolar.cfm
FL	**Orlando Utilities Commission**	Muni	**Share the Sun**	Residential and Non-demand Commercial	Energy sold in 1-kW blocks as production (kWh's/kW)	Current premium is $.025/KWH above residential rate	400 KW	http://www1.eere.energy.gov/solar/pdfs/51055_orlando.pdf
GA	**Coastal Electric Cooperative****	Co-op	**Renewables Solar Farm (pilot program)**	Open to members of Coastal Electric Cooperative	Customers can lease one 230-watt panel for $1,295, for 25 years	kilowatt-hour credit for the energy generated by the panel	2 kW	http://www.coastalemc.com/CoastalElectricRenewables.aspx

State	Utility or Project Sponsor Name	Type	Program Name	Participant Information/Eligibility	Participation Mechanism	Participation Benefit/Valuation	Supply Size	Webpage
KY	**Berea Municipal Utilities**	Muni	**Berea Solar Farm**	Open to anyone, including people who don't live in Berea, KY.	Customers can purchase a minimum of two 235-watt solar panels for $750 each, for 25 years.	In return, customers will receive Panel Production Credit (PPC) every billing period for the electricity generated by their panels. The PPC is calculated by dividing the total generation from the system by the number of panels and providing a kWh credit at the customer's rate, on the participant's monthly bill.	28.2 kW	http://bereautilities.com/?page_id=348
MI	**Cherryland Electric Cooperative**	Co-op	**Cherryland Community Solar**	Eligible to members of Cherryland Electric Cooperative or Traverse City Light and Power	Individuals will sign a 25-year lease agreement for a one-time fee of $470 per solar panel. Participants can also apply for an energy optimization rebate of $75 and a capital credit rebate of $75.	CEC members that commit to a lease will receive a monthly billing credit for the solar electricity produced in that particular month. One solar panel is estimated to produce 25 kWh per month on average.	Planned in installments based on demand (56 kW by summer 2013)	http://www.cherrylandelectric.com/content/community-solar
MN	**Wright-Hennepin Cooperative**	Co-op	**WH Solar Community project (CEC)**	Open to members of Wright-Hennepin Co-op	WH members may purchase panels for $869 each, system includes battery storage	Customers will receive monthly bill credits for the power produced by their panels.	32 kW	http://www.whsolarcommunity.com/
NM	**Kit Carson Electric Cooperative**	Co-op	**Taos Charter School project (CEC)**	Open to members of Kit Carson Co-op	Customers purchase 235-watt panels for $845 each	Credit on monthly bills for proportion of energy produced	98.7 kW	http://www.kitcarson.com/
OR	**City of Ashland**	Muni	**Solar Pioneers II**	City of Ashland residents	Customers can purchase the output of panels for 18 years: A full panel for $743, a 1/2 panel for $371.50 or a 1/4 panel for $185.70.	Customer receives monthly kWh credit at retail rates based on power produced by each member's share of project. One panel is estimated to produce $480 of savings over 20 years (below program goal of equivalent return to on-site systems).	63.5 kW	http://www.ashland.or.us/Page.asp?NavID=13368
UT	**City of St. George**	Muni	**SunSmart Program**	The Purchaser must be the owner or in lawful possession of residential property located within the geographical boundaries of the City of St. George, Utah.	Customers may purchase 'units' in 0.5 and 1 kW increments.	Customers receive a monthly credit on their electric bill based on the monthly kWh derived from % of system investment and retail rate. A minimum output of 800 kWh is guaranteed.	100 kW Phase 1 150 kW Phase 2 100 kW each Phase 3+ 2 MW max (currently at 250 kW)	http://www.sgsunsmart.com/index.htm

State	Utility or Project Sponsor Name	Type	Program Name	Participant Information/Eligibility	Participation Mechanism	Participation Benefit/Valuation	Supply Size	Webpage
VT	**Green Mountain Power (GMPSolar)**	IOU	**The Farm at South Village (South Burlington, VT)**	Farm at South Village and South Village Community's energy consumption needs. The array will also provide clean energy to the City of South Burlington for the City's traffic lights.	Group net metering arrangement	SolarGMP provides owners of solar net metering systems in the GMP service area with a $0.06 payment adder on top of the retail rate.	147.84 kW	http://www.encoreredevelopment.com/projects/renewable-energy.html
VT	**Green Mountain Power (GMPSolar)**	IOU	**Putney Solar Garden (CEC)**	Open to ownership by all GMP members, credited at full retail rate plus $0.06 PBI	Group net metering arrangement	Open to ownership by all GMP members, credited at full retail rate plus $0.06 PBI	148 kW	www.vtsolargardens.com
WA	**City of Ellensburg**	Muni	**Community Renewable Park**	Participant must own, rent or lease a business or residence that has an electrical service with the City of Ellensburg if they want to receive the periodic renewable credit toward their utility bill.	Customer's pay an initial up-front investment (minimum of $250) to co-own a share of the system	Customers receive quarterly credit on their electric bill at the BPA wholesale energy rate based on kWh's derived from % of system investment.	36 kW Phase 1 21.6 kW Phase 2 24 kW Phase 3 82 kW Total	http://www.ci.ellensburg.wa.us/index.aspx?NID=310
WA	**Seattle City Light**	Muni	**Seattle Community Solar**	City Light customers can buy a portion of the output from the project for $600 each.	500 solar units available for upfront purchase	Credit of $0.07/kWh and incentive of $1.08/kWh. Credit rises with electricity rates. Customers receive annual on-bill credit of 7 cents/kWh (approx. 50 kWh's/yr/solar unit)	24 kW	http://www.seattle.gov/light/solar/community.asp

SEPA Research Report Summaries

Centralized Solar Projects and Pricing Quarterly Bulletin Year in Review (Q4 2012) (2013)

SEPA's members-only quarterly solar projects bulletin will provide a summary and commentary on the centralized PV and CSP projects activity in the United States.

2011 SEPA Utility Solar Rankings (2012)
The fifth annual Utility Solar Rankings report ranks U.S. electric utilities based on the solar megawatts and watts-per-customer in their solar generation portfolios. The top ten rankings include national, regional by utility-type rankings. The report further examines key utility solar trends.

Utility Solar Business Model Quarterly Bulletin: "Net Metering Issues" – Version 2 (2012)
This electronic bulletin is part of an ongoing collaborative research between SEPA and EPRI to document and examine the expanding range of utility solar business model activities in acquiring solar energy and owning PV assets. The fifth edition explores impacts of net metering (NEM) on utility revenue collection and the utility customer. The report includes NEM revenue loss and ratepayer equity issues as well as two case studies that detail utility solar program alternatives to net metering offered by the City of Palo Alto and Austin Energy.

Summary Report of the SEPA Fact Finding Mission to New York and New Jersey (2012)
This Summary Report of the SEPA Fact Finding Mission to New York and New Jersey provides an overview of each presentation from the meetings and site visits with some figures for additional detail. The FFM started in Long Island, NY and finished in Atlantic City, NJ. Each day included meetings and discussion with local utilities and other hosts and included at least one solar site visit each day.

Germany Fact Finding Mission Event Summary (2012)
German policies have spurred dramatic renewable energy market growth, and the corresponding deployment of renewable energy resources has resulted in an electric utility system that is heavily saturated by intermittent energy sources, including solar. SEPA returned to Germany in June 2012, the site of SEPA's first international FFM five years earlier, to study Germany's advanced market, the country's successes, current challenges and future approaches.

Changing Ownership of Distributed Photovoltaics (2012)
Over the past decade, the U.S. photovoltaic (PV) market has grown at an average annual rate of approximately 70%, with distributed, rooftop systems accounting for much of the expansion. Indeed, at the end of 2011 there were more than 200,000 distributed PV systems totaling nearly 2,500 MWAC installed in the United States. Within this distributed market, three ownership models have emerged over time: customer-owned, solar industry-owned and utility-owned. In assessing each PV ownership model, the paper examines the advantages and the challenges of each ownership model to the respective stakeholders, and the critical issues at play as the cost of PV continues to fall.

SEPA
solar electric power association

1220 19th Street NW, Suite 800,
Washington, DC 20036, U.S.A.

Tel: 202.857.0898

www.solarelectricpower.org