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Community Renewables Rising

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ABSTRACT

Renewable power generation capacity continues to see significant growth worldwide, with more new renewables capacity than fossil fuel generation capacity being added each year since 2013, and the United States is among the countries seeing record growth in recent years. However, these trends have not meant that there is "equal opportunity" access to distributed renewable generation and the associated benefits. Most existing business models and regulatory frameworks are designed for sites under individual jurisdiction serving customers on a one-to-one basis. There remains a significant number of potential customers who do not have access to renewable energy options.

This white paper looks at community renewables programs, which extend access to renewable energy to a broader base of customers and are growing in number both in the United States and around the world. The paper focuses on initiatives for solar and wind systems, which represent the fastest-growing elements of community-based renewable energy portfolios. Much of the detailed information in the paper involves solar power, but many of the general principals are equally relevant to wind energy.

The paper explains the underlying rationale for community renewables initiatives and looks at the four main types of models that have been applied in setting them up: off-site shared renewables programs, on-site shared renewables programs, community group purchasing models, and community-driven financial models. Benefits and challenges of each are considered, as are the various approaches that have been applied to pricing or rate-setting. Profiles of a number of utility-owned and non-utility-owned projects are also presented.

INTRODUCTION AND BACKGROUND RATIONALE FOR COMMUNITY RENEWABLES

What Are Community Renewables?

The U.S. has seen tremendous growth in renewable generating capabilities and implementation in the last decade. However, access to distributed renewable generation development and associated environmental, economic, and social benefits has not been entirely democratic. Most current business models and regulatory environments are designed for sites under individual jurisdiction, and serve

customers on a one-to-one basis. In an effort to provide viable options to the significant portion of potential renewable system customers who have not previously had access to distributed renewable projects, community renewables programs have started to become more widespread.

Overall Definition

Community renewables models allow multiple energy consumers to share the benefits of a single renewable generating system by allocating the electricity and/or financial benefits of the system to offset individual consumers' electricity bills [1]. Both wind and solar community renewables projects have been developed, with solar projects most common. Community wind projects are owned by local communities where the power is being used instead of companies with limited local ties, and typically consist of a single turbine or small cluster [2]. Community solar projects can take several different structural forms, including community group purchasing, off-site shared, on-site shared, and community-driven financial models. These models are defined below and explored in greater detail in the Overview of Recent Growth in Community Renewables section.

- ***Off-Site Shared:*** Program participants in these programs purchase shares from a grid-connected, off-site renewable system, such as a solar array or wind turbine.
- ***On-Site Shared:*** These systems are installed on multi-unit buildings with benefits shared out among participating residents.
- ***Community Group Purchasing:*** A system in which several generating sites are connected to form a "renewable energy plant" that is metered as whole. For example, the Flagstaff Pilot run by Arizona Public Service (APS) is a 1.5 MW solar PV system that combines 125 residential rooftops with installations at an elementary school and ground-mounted neighborhood-scale solar plant. APS owns, operates, and maintains all of the systems.[1]
- ***Community-Driven Financial Model:*** Similar to community group purchasing, several sites are interconnected to form one metered unit. However, these models include different or innovative ownership or financing mechanisms (investors, donations, etc.).

Three main business models fund community renewables projects. The first is a utility sponsored model, meaning the utility owns and/or operates a generating system that is opened up to voluntary ratepayer participation. Under this model, program participants have no ownership stake in the system, but instead buy rights to the benefits of energy produced by the system. Note that this differs from "green power" programs because instead of selling renewable energy credits (RECs), these projects sell energy or the rights to energy at rates that are usually locked for a period of many years in an effort to hedge against electricity price increases [1]. A second model, Special Purpose Entities (SPEs), includes projects structured as a business enterprise in order to take advantage of the tax incentives available to commercial solar projects. Finally, the nonprofit model includes projects administered by a nonprofit organization on behalf of its donors or members.

Typical Sizes and Sites

A 2014 Solar Electric Power Association (SEPA) survey found that the average community solar installation was a 1 MW system with an average of 213 participants [3]. Furthermore, the study found that customers' ownership portions typically averaged between 0.5 kW and 4 kW; for states that have legislation that supports community solar development, project size limits vary from state to state. On the lower end, projects are limited to 75 kW in Washington State, and on the higher end, projects are limited to 5 MW in the District of Columbia [2].

Sacramento Municipal District's SolarShares program is an example of a typical utility-sponsored community solar program. Under SolarShares, the utility purchases solar energy from a third party under a long-term power purchase agreement (PPA) and then resells the power to program participants. In turn for paying a fixed monthly fee, customers receive credit for the energy production from their portion of the system. The actual solar generating sites are spread out over numerous locations, including the Sacramento Zoo, the Sacramento Children's Museum, etc. Since its inception in 2008 the program has generated an average of 1,745 MWh per year, 85% or more of which has been sold to program's roughly 600 participants [4].

Benefits and Challenges

The main benefit of community renewables projects is that they make distributed renewable generation a possibility for customers who have property that is not suited to renewable generation or choose not to install a residential system for financial or other reasons. The National Renewable Energy Laboratory (NREL) estimates that up to 49% of households and 48% of businesses are unable to host photovoltaic solar systems on site because they are either renters or do not have the suitable roof space (solar PV systems require largely unshaded area) [5]. Community solar provides these customers with direct access to solar when it would otherwise not be available.

There are several additional financial benefits to community renewables. Larger systems mean that community renewables projects experience economies of scale. Additionally, when system costs are spread over several customers, up-front investment costs can be reduced. As with distributed generation in general, community renewables can be strategically located to supply necessary distribution system support and can play a vital role in avoiding costly transmission or distribution upgrades. Finally, community renewables generate local jobs and increase local awareness of green energy [6].

However, as an emerging practice, community renewables also faces some unique challenges including financial and regulatory issues. With no legal precedents for the interaction of community renewable projects with existing financial regulations, there remain considerable complex financial, legal, and tax questions associated with all of the financing structures described above [7]. For example, there is uncertainty regarding the applicability of SEC requirements for registration and disclosure of shared solar projects, as well as the applicability of federal tax credits. Utility rates and rate structures and net energy metering policies are also subject to change, which can provide additional uncertainty and risk for community renewables project developers. These challenges can provide barriers to entry for new projects, especially for community renewables projects in new areas.

Community renewables projects also experience some of the same problems that affect other renewables projects, such as siting issues. Site costs can be prohibitive for communities that need to rent or purchase space for off-site systems, cutting into some of the returns from the project. Off-site systems may also pose the need for additional distribution and transmission infrastructure to be built, particularly if the system is close to or larger than 2 MW in capacity [5]. The Minnesota PUC recently enacted a 5 MW capacity limit on community solar projects in Xcel's Solar*Rewards community solar program. This capacity limit will be reduced to 1 MW after Sept. 25th, 2015. Although there are economies of scale with larger projects, the relatively small number of customers enrolled in the program leads to challenges with managing rate impacts to all of its customers. In short, the premium that Xcel pays to projects enrolled in the program is transferred to all rate payers, despite the limited number of subscribers [8]. Finally, specific to community wind projects, the most convenient site for building a community wind turbine may not have the best wind speed or reliability in the area [9].

OVERVIEW OF RECENT GROWTH IN COMMUNITY RENEWABLES

Generation Capacity

Conceptually planned in 2003, the first community solar project of just 36 kW came online in Ellensburg, Washington in November 2006 [10]. Following its installation, community solar grew relatively slowly for several years, and through 2010, just 2.5 MW of projects had been installed across the entire U.S. However, community solar capacity additions began to take off in 2011, and from 2011 to 2014, installed capacity increased by nearly 16 MW per year. As seen in Figure 1, about 66 MW of community solar capacity was installed through 2014, with over 96% of this capacity installed from 2011–2014.

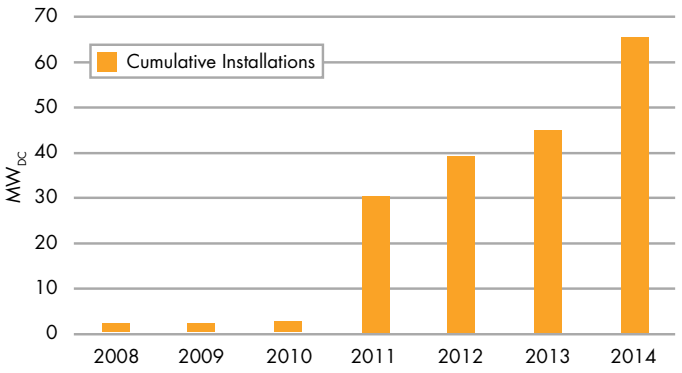

Figure 1 – Cumulative Community Solar Installations through 2014 [11]

Generation capacity for other community renewables capacity types, such as wind, is not readily available.

Number of Programs

Similar to installed capacity, the number of community solar programs has expanded considerably since 2006. As seen in Figure 2, shared solar programs have grown from a single program in 2006 to 41 programs as of September 2014. The number of active projects has expanded as well: the Solar Energy Industry Association notes that there are currently at least 52 ongoing shared renewables projects in 17 different states across the United States.

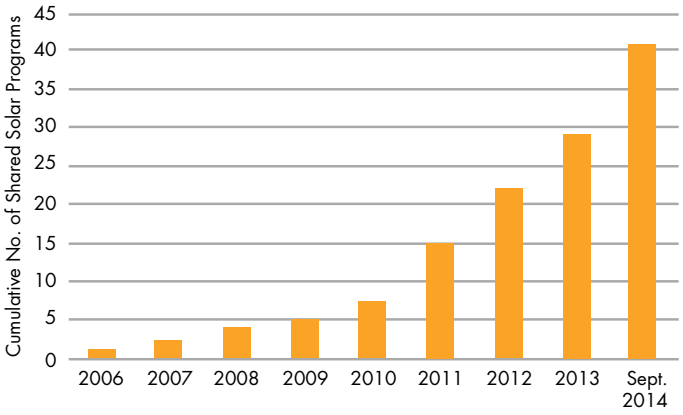

Figure 2 – Number of U.S. Community Solar Programs by Year [12]

In terms of number of programs and project, the community solar landscape is currently dominated by Massachusetts and Colorado. However, significant expansion of community solar has begun, with at least one completed project in 20 different states across the U.S. In addition, there are proposed projects in four new states: Texas, Montana, Nebraska, and New York [13].

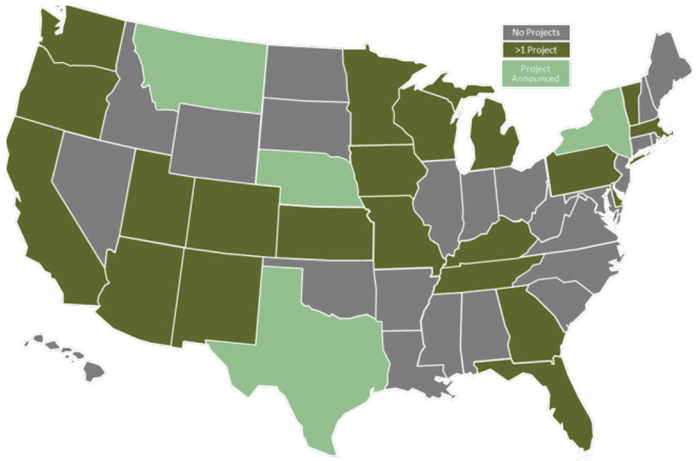

Figure 3 – Community Solar Status by State

Pertinent Regulatory and Public Policies that Impact Community Renewables Growth

Community renewable energy programs share several different design models. These are discussed in more detail in the Overview of Recent Growth in Community Renewables section of this paper. Nevertheless, as a general model, community or shared renewable energy projects involve a "host" (utilities, businesses, local governments or community groups) that delivers energy or economic benefits to "participants" (homeowners, businesses, non-profits). There are several important federal and state policies and regulations that impact community, especially shared solar programs.

- ***Net Metering Policy:*** Net metering allows participants, residential as well as commercial, to send excess energy from on-site renewable energy systems back to the grid. Typically, customers can receive a kilowatt-hour credit 1:1 on their electric bill for that energy [14]. Primarily a state-level policy, net metering policies now are in forty-four states [15].
- ***Virtual Net Metering Policies:*** In cases where the net-metered generation is not in the same location as the load of the participating customers, virtual net metering allows a participant to subtract their portion of the power generated off-site from the load at their location. Some states' policies explicitly exclude these projects; other states' net metering polices are silent; however, Delaware, California, Maine, Massachusetts, Minnesota, New Hampshire, and Vermont have passed laws that specifically allow virtual metering [16].
- ***Net Metering Caps:*** Caps on the total capacity eligible for net metering have been set in twenty-four of the forty-four state with net metering laws and regulations [17]. And, it is possible that five states, California Delaware, Massachusetts, Nevada, and New York may reach existing program net metering caps in the 2015-2018 time period [18].
- ***Interconnection Policy:*** Interconnection rules and standards are requirements for connecting renewable energy projects to the electrical grid. In many states, the interconnection process involves complex application and in many cases lengthy approval processes. The interconnection of customer-owned solar generation, for example, to the grid including projects with net metering is under state jurisdiction. Standards vary from state to state; however, some states are simplifying the interconnection process [19].
- ***Federal Tax Credit Policies:*** The Federal Investment Tax Credit (ITC) provides a one-time 30% tax credit under Section 25D of the Internal Revenue Code for residential owners of qualifying installed solar projects and under Section 48 for properties. Both the commercial and residential investment tax credits apply to installed property placed in service before December 31, 2016 and after that the residential tax credit drops to zero and the commercial tax credit is reduced to 10%. Moreover, depending on how projects are structured, community shared solar projects may be eligible for

Section 48 commercial tax credits [20]. In 2013, the IRS clarified the issues as to whether the ITC was available for shared solar projects by issuing Notice 2013-10, which stated that shared solar projects do qualify for the Section 25D tax credit [21].

- ***Renewable Energy Credits/Certificates (REC):*** Many states have renewable energy portfolio standards (RPS) that require utilities to produce a certain amount of the energy they generate or sell from renewable energy sources. Utilities in states with RPS requirements obtain RECs for the power generated from renewable energy sources including shared renewable projects. Currently, 18 states have RPS requirements with so-called "carve outs" or a minimum capacity distributed generation or certain types of renewable energy [22]. These RECs can be used to meet state RPS requirements [23].

Cost Drivers

Technology (Capital and O&M) Cost and Performance

Community renewables, and particularly community solar, benefit from many of the same technology cost and performance trends that have been driving renewable energy costs down in the past several years. These trends have brought the levelized cost of energy of solar PV down significantly, to a point where community solar projects can provide subscribers with a discount over their current energy bill.

Nearly every component of solar PV cost and performance has been improving over the last several years, which has driven down the levelized cost of energy (LCOE) for solar PV substantially.

- ***Hardware Costs:*** Hardware costs, of which module costs are the largest component, have fallen substantially. According to the National Renewable Energy Laboratory [24], US PV module prices during Q1 2015 are between $650/kW and $700/kW.
- ***Soft Costs:*** The SunShot program's bottom-up PV system price model indicates that soft costs have fallen by over 30% for commercial systems (larger than 100 kW) since 2009 [25]. Soft costs include balance-of-system, permitting, design, engineering, interconnection, overhead, and profit components.
- ***Total System Costs:*** Reported system prices fell by nearly 55% for commercial systems (at least 100 kW, roof-mounted) and nearly 53% for utility-scale systems 100 MW, ground-mounted, fixed tilt) from Q4 2010 to Q1 2015 [26].
- ***Fixed Operations and Maintenance (FO&M) Costs:*** FO&M costs for solar PV fell from approximately $30/kW-year in 2011 to about $20/kW-year in 2014 [27].
- ***Module Efficiency:*** Module efficiency, which is the efficiency at which a PV module turns energy from the sun into electrical output, increased by an average of about 0.4% per year from 2009–2013 [28]. These efficiency gains were an average of several different module types including thin-film Cadmium Telluride modules and several types of crystalline silicon modules. Efficiency by year for these module types is presented in Figure 4.

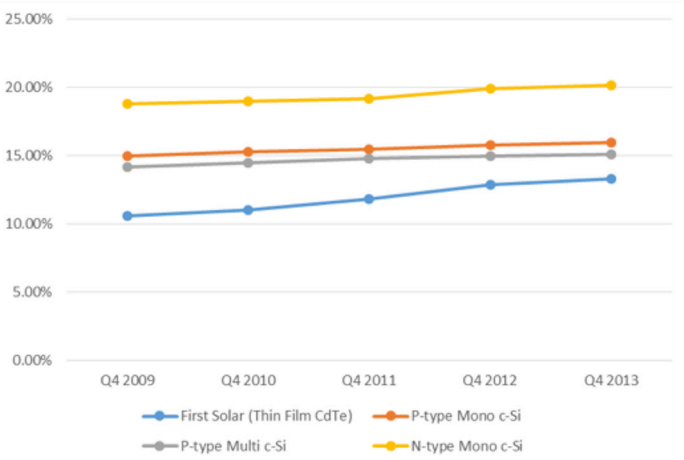

Figure 4 – Average Commercial Module Efficiency, 2009–2013

In addition to benefitting from general technology cost and performance improvements, community solar projects also benefit from economies of scale over distributed solar projects, which helps to drive adoption. Installed prices for residential and commercial systems over 1 MW were nearly 1/3 lower than installed prices for systems that were between 5–10 kW [29]. The average size of a residential solar PV system is 5 kW [30].

Program Administration Cost Considerations

There are a number of decisions that community renewable program administrators have to consider when designing and implementing a new program. First, administrators must analyze all costs associated with a community solar program including administration, marketing, supply, operations and maintenance, and interconnection. Once these costs have been determined, they must be allocated

between participants and ratepayers, which can be accomplished in several different ways depending on the goals of the program: [31]

- All costs may be fully paid by participating members
- All ratepayers may cover certain program costs.
- Subsidies may be allocated to the program. For example, if a utility has an existing solar incentive program, it may be applied to the community solar project in accordance with the existing rules.
- Some, but not all, of the solar costs are allocated to the program. Examples include standby or grid integration charges.

While making these decisions, administrators must take into account several important considerations, including whether or not certain costs can be quantified, what the goals and objectives of the community solar program are and how the program can best be aligned with those, and what the current customer preferences and tolerance for the community solar program are. Working through these important issues helps administrators create an equitable, viable program this is embraced in the community.

DESCRIPTION OF COMMUNITY RENEWABLES BUSINESS AND FINANCING MODELS

According to the SunShot Initiative, there are four main types of community renewables business models: off-site shared renewables, on-site shared renewables, community group purchasing, and community-driven financial models. This section explores each of these business models in detail.

Off-Site Shared Renewables Programs

Off-site shared renewables are projects in which voluntary program participants purchase shares of capacity or energy from a grid-connected renewable system that is sited in a location separate from the actual consumers. In the case of a community solar project, an off-site solar project is also sometimes called a solar garden. Output from an off-site shared renewables project can be shared among residential, commercial, industrial, non-profit and municipal consumers, which makes them truly community projects. However, costs for off-site projects may be higher than on-site locations in situations where new land or roof space must be leased or purchased, or in situations where additional infrastructure is needed to connect the project to the existing system [32].

Off-site shared renewable projects also have several associated benefits. One of the main advantages is that off-site shared renewables programs offer renewable energy options to all customers instead of the limited subset of customers for whom rooftop solar is possible. NREL estimates that 49% of residential customers and 38% of businesses are unable to host a solar PV system themselves, either because they do not own their facility or because of site restrictions such as tree cover or insufficient space [33]. Community renewables can provide all of these customers with an additional option. Another important advantage to off-site shared renewable projects is that they allow for site optimization: off-site projects can be sited according to which locations have the best characteristics, including sites such as unused roofs, marginal land such as brownfields, and unused municipal land [34]. Site location can have important implications for a project's cost and performance.

On-Site Shared Renewables Programs

On-site shared renewables are projects in which a renewable system is installed on-site and its associated output is shared out among multiple participating partners. Prominent examples of facilities where on-site community renewables would be appropriate include apartment buildings and shopping centers, such as shopping malls and strip malls. With nearly 5.6 million commercial buildings [35] and about 61% of renters in multi-family housing in the United States, [36] on-site applications represent a huge opportunity for community renewables, especially for solar PV.

Similar to off-site shared renewables, on-site community renewable projects have some associated benefits. The primary benefit is that these projects overcome the challenges posed by the split-incentives apparent in the rental market. According to the NC Clean Energy Technology Center, "A split-incentive problem occurs when tenants desire the benefits of going solar, but the building owner is responsible for the costs of the solar energy system." [37]

On-site shared renewables overcome this problem by introducing innovative mechanisms that reduce or eliminate costs for the owner while sharing the benefits amongst multiple tenants.

Additional benefits to on-site shared solar include the fact that larger, aggregated systems generally drive economies of scale.

Community Group Purchasing Models

Community group purchasing is a unique, hybrid shared renewables model in which several local sites are interconnected to form a renewable energy system that is metered as a single facility. This model is best illustrated by Arizona Public Service's (APS) Flagstaff Pilot, which combines 125 residential rooftop solar PV systems with a larger PV installation at an elementary school and nearby ground-mounted PV system to form what APS refers to as a "renewable energy plant." [38] All equipment used for the installations is owned and maintained by the utility. In return, participating customers receive credit for a fixed proportion of their energy use that is based on the size of the PV system installed on their property [39].

The metering and interconnection mechanisms appear to be key to this arrangement qualifying as community solar. Without them, the installations would be a series of utility-owned rooftop and ground-mounted systems as opposed to a community solar installation.

Community-Driven Financial Models

Any community renewables project or program that uses a special purpose entity (SPE), such as a limited liability corporation, or a nonprofit organization for funding is characterized as using a community-driven financial model. As a result, a community-driven financial model can be applied to any of the models described above (off-site, on-site, or community group purchasing projects or programs). Therefore it brings with it the benefit of the other models. However, using a special purpose entity or a nonprofit to fund or develop a community renewables arrangement does introduce a number of challenges, including legal, logistical, and financial hurdles. Both the special purpose entity and nonprofit models and their challenges are described in greater detail below.

A special purpose entity for community renewables forms individual investors into a business enterprise for the purpose of developing a community renewables program or project, and in many states, there are a number of suitable business vehicles including a general partnership, a limited partnership, a limited liability corporation (LLC), a cooperative, and a for-profit corporation [40]. In addition to choosing the right business vehicle, there are a number of difficulties associated with establishing a special purpose entity community solar project, including:

- Taking full advantage of tax benefits, such as the Investment Tax Credit (ITC) and advanced depreciation under the Modified Accelerated Cost Recovery System, when tax liability among investors may be limited [41].
- Ensuring that a community solar project established by a special purpose entity is not subject to securities regulation, which would make the project subject to associated securities laws and taxation. As such, project developers must ensure from the beginning that their project is viewed as legally distinct from a conventional investment in the eyes of the law [42].
- Navigating numerous legal and financial hurdles including contract negotiations, establishing processes for sharing out project benefits, and managing business operations [43].

In particular, sharing out the benefits from a special purpose entity community renewables project can be challenging. This is due to the number of decisions that must be made, as the system electricity, renewable energy credits, and federal tax credits or deductions must all be utilized and allocated effectively in conditions where multiple options exist for each item.

Under the non-profit model of community shared renewables, non-profits may interact with a shared renewables project in one of at least two distinct ways. In the most straightforward manner, non-profits may solicit tax-deductible donations for a particular project. Under this model, the donors do not have a direct share in the benefits of the project they donate towards, but they do share indirectly through their tax deduction and their community support [44]. One of the earliest examples of this model was the "Solar for Sakai" project, which was installed in 2008. The project was setup as a non-profit community solar project because the Washington State Production Incentive required that a project have a single owner and be connected with a single meter (the eligibility requirements for the incentive were later expanded in 2009) [45]. As a result, local residents formed a non-profit called Community Energy Solutions, which funded the project through a $25,000 grant and $30,000 in donations from the local community [46]. The project is hosted and owned by Sakai Middle School.

The other model of non-profit community shared renewables is fairly similar to the special purpose entity model. In much the same way as many special purpose entities, a non-profit may organize and establish a community renewables project that shares its benefits with participating members. The main difference between projects administered under a non-profit versus a special purpose entity, other than the lack of profit, is that non-profit organizations cannot take advantage of any of the tax benefits of a community renewables project [47]. However, individual donors to the non-profit may still receive a benefit in the form of a tax deduction. And while similar

decisions regarding the project benefits must still be made (including those allocating the electricity and RECs), there are relatively fewer decisions to make without eligibility for federal tax credits and accelerated depreciation.

PRICING IN COMMUNITY RENEWABLES PROGRAMS

Rate Setting

Setting the rate for a community renewables program or project can be a complicated process, as there is not a single "one size fits all" approach. To-date, this has resulted in a wide array of rates and rate mechanisms. However, there are certainly some guiding principles that are important to keep in mind when establishing the rates for a new project. This section focuses on these principles and how they are manifested in the rates for various community renewables projects.

According to the Solar Electric Power Association (SEPA), the rate for a community renewables program should reflect the goals and objectives of that particular program, and proper price-setting will be reflected in the participation rates [48]. Possible objectives for community renewables programs can include providing a new alternative to traditional energy services, providing a renewable energy option for customers that cannot host their own on-site system, providing a renewable energy alternative for low-income customers, and providing renewable energy cost-savings for customers. In particular, offering cost-savings can mean the difference between a successful community renewables projects and one that suffers from low enrollment figures. One of the Interstate Renewable Energy Council's (IREC) four guiding principles for shared renewable energy programs is that customers should see a direct economic benefit to their participation reflected in their energy bill [49]. Community renewables projects should also reflect the community that they serve. In communities where renewable energy penetration is lower, the economic benefits associated with a shared renewables project may have to be more tangible than in communities where citizens are more motivated by the environmental attributes of the project.

As such, rate setting can be conceptualized and accomplished in several ways. For instance, SEPA recommends that utilities take a very straightforward bottom-up approach that begins by assessing and accounting for all of the known and anticipated costs associated with the shared renewables program. Elements to this analysis may include administration, marketing, supply, operations and maintenance, and integration costs, and future costs may be converted into present day dollars using net present value calculations [50]. The necessary rates for the project can be determined by dividing these costs by either the project's capacity (in watts, kilowatts, or the preferred panel ratio) or the project's projected generation (in kilowatt-hours).

However, in contrast to SEPA, IREC recommends that project developers think about the rates for community renewables projects based on the value or benefit they provide, rather than the costs that are incurred to provide the service. This can be manifested in a couple of ways. One such approach is to think about the value of a community renewables program or project as it relates to the current utility rate and billing structure [51]. For instance, if a shared renewables project is located within the same service territory but still utilizes the transmission and distribution system to reach the customer, then the rate paid by the community renewables customer should only replace the generation component of their current rate while retaining the transmission and distribution components. However, the opposite is also true. If a project and a subscriber are both located on the same distribution feeder, then that particular customer is not taking advantage of the full transmissions and distribution infrastructure and it may be appropriate to credit their consumption from the community renewables project at the full avoided cost of the retail rate [52]. While the outcome varies, in either case, the value of a community renewables program and the affect that the program has on a participant's utility bill is determined by the existing utility and billing structures.

The other approach favored by IREC is a value-based approach, where the value of a community renewables program is independently determined based on the benefits that the shared renewables program brings to the utility and its ratepayers. This process is similar to the procedures undertaken by Austin Energy, the Minnesota Public Utilities Commission, and others to determine a "value of solar tariff", however, while the value of solar tariffs correspond to all distributed energy, the value-based approach is specific to a community renewables program or project. Both the value of solar tariff and a value-based approach to community renewables take a similar approach. The value is dictated by the generation, the avoided transmission and distribution costs such as infrastructure costs and line losses, and the green attributes of the generation (often reflected in RECs) [53]. Aside from the benefit of determining the full value of a shared renewables project, the value-based approach can also be easier to administer, since participants receive the same rate regardless of their current rate structure [54].

Finally, there is another popular shared renewables rate mechanism that is structured a lot like another renewables participation program known as a green tariff. The World Resources Institute defines a green tariff as, "a utility program that allows customers to source up to 100 percent of their electricity from renewable sources located on their local grid" [55]. Green tariff program participants generally pay a premium for their participation. Similarly, community renewables programs that are structured like a green tariff generally charge customers a premium compared to the current retail rate, at least from the outset of the project. However, many of these programs provide a mechanism for customers to hedge against future rate increases, either by locking in the premium rate for the duration of the program or by exempting the program from certain price increases associated with generation or renewable energy procurement. As a result, although participants may pay more in the short-term, they are expected to save in the long-term.

Equity: Balancing Needs of Program Participants and Non-Participants

Equity, as relating to community renewables, means creating a viable community solar program that brings benefits to consumers without bringing undue costs to bear on non-participating ratepayers. This can be done through properly accounting for all of the costs associated with a new community renewables program, which can include administration, marketing, supply, construction, grid integration, and operations and maintenance costs, and properly assigning those costs to the program so that participants cover them. In their "Utility Community Solar Handbook" SEPA notes that such accounting can sometimes be challenging, especially in cases where administrative costs are challenging to quantify or difficult to separate out from general utility administrative costs [56]. As a result, they note utilities can ultimately choose how they allocate costs between participants and ratepayers.

The California Public Utilities Commission (CPUC) also took a stance on equity when producing their final ruling on California Senate Bill 43, which set a formal requirement for establishing community renewables programs for the state's three major investor-owned utilities. One of the four key findings of the CPUC was that, "(community renewables) procurement must result in ratepayer indifference to ensure that no costs are shifted from participating ratepayers to non-participating ratepayers" [57]. The general consensus appears to be that the full costs and benefits of any community renewables program or project should be reserved for participants to the greatest degree possible.

However, community renewables programs do carry some risk in that even with careful planning, the program is undersubscribed. In these cases, there would be excess capacity or generation that cannot simply be absorbed by non-participating consumers, as general ratepayers would then have some program costs shifted onto them. In these cases, program administrators must have a contingency plan. Possible mitigating measures may include assigning excess generation to meet other clean energy goals (such as a renewable portfolio standard requirement) and actively managing program demand through marketing [58]. Pricing a community renewables program appropriately can also cut down on the risk that a program may be oversupplied.

Example Pricing Mechanisms

As previously mentioned, there is currently a wide array of rate mechanisms employed by community renewables programs. This section provides several examples of shared renewables programs that employ the various rate structures described above.

- ***Bottom-Up Approach:*** While not explicitly stated, United Power's Cooperative Solar Farm has the appearance of a program that is built upon a bottom-up approach. Participants purchased individual panels with a capacity of 210 watts for $1,050 per panel and receive credit for their panel's production for 25 years at slightly above the retail rate [59].

Figure 5 – United Power's Cooperative Solar Farm (Source: Colorado State University)

- ***Rate Based on Current Utility Structure:*** Customers enrolled in Xcel Colorado's Solar*Rewards Community may purchase shares in 1 kW increments to cover up to 120% of their previous year's energy usage. The generation associated with their capacity enrollment is credited at the total aggregate retail rate, less several billing components including transmission and distribution charges, the transmission cost adjustment, and the renewable

energy charge [60]. Participants also receive quarterly payments for REC sales from their panel's production [61].

- ***Rate Based on the Value-Based Approach:*** The El Jebel Community Shared Solar project is a 78 kW community solar project developed by the Clean Energy Collective (CEC). Twenty (20) participants originally enrolled as panel owners, purchasing shares to cover the up-front costs of approximately $3,150/kW [62]. Holy Cross Energy, the interconnected utility, purchases the energy through a PPA at a rate equal to the value that the utility believes the project brings to their operations. Owners received a credit on their bill each month for $0.11/kWh. Holy Cross also purchased the project's associated RECs for $500/kW at the beginning of the project.
- ***Rate Similar to a Green Tariff:***
  - The Orlando Utilities Commission (OUC) Community Solar Program consists of a single 400 kW solar PV array built on covered parking on OUC property. While the program is now fully subscribed, participating customers could claim shares in 1 kW capacity increments up to 15 kW. Customers pay $0.13/kWh for the energy production associated with their capacity share and OUC guarantees the rate for 25 years. With OUC's current residential rate set at $0.10143/kWh, the community solar rate is about 28% higher than the current rate. However, the community solar rate will serve as a hedge against future rate increases [63].

Figure 6 – Orlando Utilities Commission Carpark Community Solar Project (Source: Orlando Utilities Commission)

  - The California Green Tariff Shared Renewables Program is a community solar program that is currently under development. Under the program, the state's three main investor-owned utilities will enroll customer commitments for up to 600 MW of capacity at small to mid-size solar PV facilities located in their respective service territories [64]. The proposed program rates for the three utilities are at a premium compared to current rates. For example, Pacific Gas & Electric (PG&E), the state's largest utility, expects to charge an initial premium of $0.02-$0.03/kWh over current retail rates for generation associated with the shared renewables program. However, the utility expects the premium to fall over time, as customers will also receive a bill credit for the generation the program allows PG&E to avoid, and as PG&E's costs increase over time, they expect the shared renewables premium to decrease [65].

Securities Regulation Effects on Program Structure and Participation

The Securities and Exchange Commission (SEC) regulatory requirements for registration and disclosure of community renewables projects can create a significant challenge in the design of projects [66]. The issues can be very complicated; and, they should be evaluated from both the utility and the participating parties' perspectives [67]. One key question is whether an interest in a shared renewables project is a security. If it is determined to be a security, the SEC then regulates it, and it has the potential to significantly impact the operation of a community renewables program [68]. Two factors used in determining whether the design model of a community renewables project is considered a security include: the motivation of the participants and the perception of the participation [69]. The SEC has provided some guidance on this question through issuing a No-Action Letter to the solar developer CommunitySun, LLC [70]. According to this No-Action Letter, participation in a community or shared solar project likely will not be considered an investment contract and may not otherwise be a security when the participants' primary motivation for engaging in the shared solar program is personal consumption (for example, reducing a participants retail electric bill) and not the expectation of profit. Also, the terms of the participation should include certain provisions to prevent the use of the agreement as a financial play [71, 72].

It should be noted that community solar offerings that are classified as securities can still be bought and sold if they are registered with the SEC and follow stringent procedures or if they qualify for an exemption. As indicated in a leading law review article and in a recent NREL publication, several relevant exemptions are Regulation D including Rule 506 which says that non-public offerings are exempt

from the registration requirements (vii) (17 C.F.R. § 230.506(a)); Rule 504, which provides an exemption for the offer and sale of up to $1,000,000 of securities in a 12-month period (vii) (C.F.R., §230.504); and, the interstate exemption [73, 74]. One interesting approach is crowdfunding, "a cooperative financing approach that occurs when small investments are aggregated to collectively finance a single initiative" [75]. In April 2012, the Jumpstart Our Business Startups Act amended the current regulatory regime by allowing startups to offer and sell securities through crowdfunding and social networking websites. Solar Mosaic, a company based in Berkeley California, is an example of "solar" crowdfunding in operation [76]. The company hosts solar projects on "community sites" and allows individual investors to connect to the projects. The arrangement between the host site and the investors is a lease with the investors being paid back through monthly lease payments plus other incentives processed through Solar Mosaic [77].

Community renewables projects, especially solar projects that avoid SEC regulation through exemption or by not being considered a security may be subject to other federal, state and local regulations and laws. It is important to keep in mind that state securities statues may treat securities differently from federal law. Currently, the Department of Energy's SunShot Initiative is working to clarify the securities issue at the federal level [78].

PROFILES OF COMMUNITY RENEWABLES PROGRAMS

Utility Owned (US)

*Xcel Energy's Solar*Rewards Community, Colorado*

Xcel Energy's Solar*Rewards Community shared solar program is the largest utility program in the country to-date, with over forty projects built or in-development totaling about 28 MW [79]. Xcel has plans to continue building the program at a fast pace as well. While there was initially a cap of 6 MW of community solar capacity additions for the first three years of the program's existence, the Colorado Public Utilities Commission increased the cap to 30 MW beginning in 2014. Xcel released a request for proposal (RFP) for up to 29.5 MW of community solar additions in early June for systems ranging from 10 kW to 2 MW in direct current (DC) terms [80]. signaling that the Solar*Rewards Community program will continue to grow.

The Solar*Rewards Community program is fairly unique among utility-sponsored community solar programs. Community solar projects are developed exclusively by subscriber organizations, which act as intermediaries. The subscriber organizations are contracted with Xcel through an interconnection agreement and a Solar*Rewards Community Producer Agreement, and also contract with subscribing customers through a lease or purchase agreement. To-date, projects have been developed by four subscriber organizations: Clean Energy Collective, SunShare, Community Energy Solar, and Ecoplexus.

Xcel has established a number of rules that dictate system structure and consumer participation in their program. Participants subscribe by purchasing capacity increments in kW. The minimum subscription is just 1 kW (except for low-income subscribers), and participants may purchase capacity to cover up to 120% of their consumption from the previous year [81]. A single subscriber may not purchase more than 40% of the output of any single community solar facility, however, participants may engage with up to five unique facilities [82]. In addition, 5% of every array must be reserved for low-income customers.

There are also directives related to the location of a community solar garden in regards to the location of its subscribers. Customers must locate in the same county as a particular community solar facility unless their county has fewer than 20,000 residents [83]. In those cases, customers may subscribe with a facility in an adjacent county, provided that the population of that county is also less than 20,000.

Solar*Rewards Community customers are credited for the generation associated with their capacity subscription on a monthly basis. The generation is credited at a tariff equal to the total aggregate retail rate, minus several billing components such as transmission and distribution charges, the transmission cost adjustment, and the renewable energy charge [84]. The 2014 tariff for residential subscribers was $0.07441/kWh [85]. Xcel also purchases the RECs from all of the community solar facilities. Finally, Xcel also purchases unsubscribed energy from the community solar gardens; the current rate for these purchases is about $0.026/kWh [86].

The Xcel Solar*Rewards Community program has been very successful thus far by most metrics. As of April 2015 Xcel Colorado had 14 operating gardens with 530 subscribers and 98% of available capacity was subscribed [87]. However, the program has not been without its challenges. Xcel has received strong feedback from community solar advocates for not processing project requests quicker. Xcel expressed resistance to co-located projects greater than 1 MW. Developers liked the economies of scale that come with larger projects, but Xcel was concerned about the impact to the distribution system. In short, the larger projects could lead to distribution upgrades that would passed down to the entire customer base. Earlier this year, the Minnesota Public Utility Commission agreed to allow Xcel to cap co-located projects under the program to 5 MW, instead of the 10 MW that was being suggested by developers. There are an estimated 420 MW of community solar projects in the queue, making Minnesota a leader in the community solar arena [88].

Bright Tucson Community Solar Program, Arizona

The Bright Tucson Community Solar Program was established by Tucson Electric Power (TEP) in 2011 with the completion of a 1.6 MW solar PV array at the University of Arizona Science and Technology Park. TEP expanded the program's supply two more times in 2011, with an additional 2 MW of capacity in March 2011 and an additional 5 MW in December 2011. All three systems are owned and financed by TEP. As of 2012, the program had more than 550 participants [89].

Subscribers may purchase shares in increments of 150 kWh per month, and each block increases the participant's utility bill by $3 each month. TEP customers may choose to cover as much of their energy consumption with solar shares as they please, adhering to the 150 kWh increments, with any excess generation rolling over to the next billing period [90].

Solar shares purchased through the Bright Tucson program are also exempt from a couple of billing charges, namely the Renewable Energy Standard Tariff and the Purchased Power and Fuel Adjustment Clause. These charges will rise over time, providing subscribers with a partial hedge against increases in their utility bills. Indeed, TEP recently announced that they are filing to increase the Renewable Energy Standard Tariff from $0.008/kWh to $0.013; participants would be shielded from that increase [91]. However, in contrast to some community renewables programs, TEP declares that the program is not ultimately designed to save consumers money on their energy bills, but rather to provide all customers with a simple, affordable way to replace their current energy consumption with renewable energy [92].

In addition to the Bright Tucson Community Solar Program, TEP recently filed with the Arizona Corporation Commission to launch a new community solar program. A 5 MW community-scale solar "system" built in 2016 would supply the Residential Community Solar Program, and customers would purchase shares at a fixed rate for 10 years [93].

Non-utility owned (US)

Appalachian Institute for Renewable Energy, North Carolina

The Appalachian Institute for Renewable Energy (AIRE) is a small non-profit organization that is dedicated to facilitating community renewable energy projects through a unique process that combines the non-profit and special purpose entity financing models. Coined the "Innovative Financing Model", AIRE partners with third-party investors to provide consulting services, including accounting and tax advice unique to the community solar process, as the investors form Limited Liability Companies (LLCs) that fund and own the community solar projects. The relationship is a mutually beneficial one. The investors can take advantage of the multiple tax benefits associated with the renewable energy project, which the non-profit cannot since they do not have any tax burden. In return, AIRE provides the investors with a great deal of expertise that they would not be able to bring to the project. As a result of this relationship, investors earn their returns through tax incentives, renewable energy credits, and generally a power purchase agreement with their site hosts, while AIRE covers their costs by collecting developer fees that typically range between 10% and 20% of project costs [94].

The 45 kW community solar array installed on the United Highland Methodist Church in Raleigh, North Carolina is the largest project undertaken AIRE to-date. The project is the result of a unique partnership between the non-profit and the Highland United Methodist Church LLC.

The LLC consists of 9 church members that all contributed between $10,000 and $30,000 each to cover the total project costs of $110,000 [95]. The members are primarily motivated by the tax benefits and renewable energy production associated with the project, which include the Investment Tax Credit (ITC), the North Carolina Renewable Energy Tax Credit, advanced depreciation (Modified Accelerate Cost Recovery System or MACRS), and the RECs associated with the production. The LLC will own the system and perform operations and maintenance for six years to take full advantage of the tax benefits, before donating the array to the church [96].

University Park Community Solar LLC, Maryland

University Park Community Solar LLC is one of the most well-known special purpose entity community solar projects completed in the United States. While the 22.8 kW system was installed in May 2010, the founders spent nearly two years exploring the optimal structure for the project before ultimately settling on an LLC. For instance, the project developers chose to initiate the project as a for-profit entity because they believed it would have more appeal for members than donors, and because fund-raising would be more exhaustive than finding investors interested in earning a small return [97]. In addition, the founders sought legal advice on numerous issues including securities regulation.

The project was installed on the roof of the University Park Church of the Brethren by a private solar firm, Standard Solar. The church and the LLC have a 20 year agreement to purchase the energy associated with the array, with the excess energy net metered by Pepco, the local utility. In addition to the purchased energy, the LLC members earn their return from a 30% federal cash grant (in lieu of the 30% federal ITC), a Maryland state grant, accelerated depreciation through MACRS, and the sales of solar RECs (or SRECs) [98].

The project has performed as expected thus far, with over 138,000 kWh generated as of August 1, 2015 and nearly 36,000 kWh net metered by Pepco [99]. In addition, the success of the University Park Community Solar LLC spurred the development of another local project in Greenbelt Community Solar LLC, which installed a similar sized solar array on the Greenbelt Baptist Church [100].

Berkshire Wind Power Co-op, Massachusetts

The Berkshire Wind Power Co-op wind project includes 10, 1.5 MW GE wind turbines in Hancock, MA. Hub heights are approximately 80m. The project site is located atop Brodie Mountain, a Class 6 wind resource area with average wind speeds of 8 m/s. The average capacity factor is 40%. The project was commissioned in May 2011 and costs approximately $64.7M (includes an 8 mile interconnection line).

The project is owned by the Berkshire Wind Power Cooperative Corporation, consisting of 14 non-profit public power organizations. The Berkshire Wind project is the second largest wind farm in the state of Massachusetts.

Selected International Projects

Outside of the United States, there have been a fair number of community renewables projects completed and interest in the practice continues to grow, particularly for community solar projects. Internationally, the special-purpose entity and non-profit ownership model have proven to be the most popular thus far; utility-sponsored community renewables seem to be more limited in international markets.

Wedmore Community Power Cooperative, United Kingdom

The Wedmore Community Power Cooperative is a 1 MW ground-mounted community solar project installed in southern England. The project receives its funding through an agreement with the local utility company, Good Energy, as well as feed-in tariff from the United Kingdom government [101].

The Wedmore Community Power project was established as a cooperative with more than 120 investors, who each contributed a minimum of £250 Pounds towards a total investment of £1.2 million Pounds. In addition to returns generated from selling power, investors were eligible for Enterprise Investment Scheme (EIS) tax relief of 30% of their investment. Return on the project is expected to average 9.5% [102].

Tathra Community Solar Farm, Australia

The Tathra Community Solar Farm, completed in March 2015, is one of Australia's first completed community solar facilities. The 30 kW facility was installed adjacent to a sewage treatment plant in New South Wales and will provide power to the plant. Uniquely, the panels were arranged to form the word "imagine" from an aerial view, to spread a message that, "anyone can make the switch to renewables" [103].

The project was facilitated by the non-profit Clean Energy for Eternity, but was ultimately the result of a unique partnership with the local government council, the Bega Valley Shire Council. While the council initially agreed to donate the land for the project, they also ended up matching $25,000 in private donations [104]. The project was also funded through $250 donations from individuals and businesses that each corresponded to a panel purchase and a $5,000 contribution from the New South Wales Office of Environment and Heritage. Regarding ownership, the Bega Valley Shire Council is the official owner of the project, however, the council has agreed to pass on the savings the project generates until such a time as the contribution from Clean Energy for Eternity has been repaid [105].

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