NREL

Community Solar Program Design Considerations & Modeling Inputs

Simon Sandler

National Renewable Energy Laboratory

NREL is a national laboratory of the U.S. Department of Energy
Office of Energy Efficiency & Renewable Energy
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Introduction

The Southern Environmental Law Center (SELC) requested technical assistance through the US Department of Energy's (DOE's) National Community Solar Partnership (NCSP). The National Community Solar Partnership is a coalition of community solar stakeholders working to expand access to affordable community solar to every U.S. household and enable subscribers and their communities to realize meaningful benefits, such as reduced energy burden, increased resilience, community ownership, and equitable workforce development. SELC asked for a subject matter expert from NCSP to review the SELC proposed Community Solar (CS) program model, and underlying assumptions, with the goal of providing feedback along with proven practices from across the country to inform and improve the proposed program.

Designing and modeling a CS program is a complex process with numerous variable inputs that are interconnected. Modeling a CS program can be useful to inform the program design itself while also providing a diverse set of stakeholders with information. Accurate data inputs and assumptions are key to ensuring that a model is informative and as representative of real market conditions as possible. What follows is an exploration of community solar program modeling considerations, especially as it relates to data inputs, using a CS program in North Carolina as a case study.

The discussion and factors explored in this report can be informative for other programs in markets across the U.S. While the underlying methodology is applicable to the broader market, specific data points, engineering assumptions, and the conclusions drawn may not be transferable to other analyses and additional research should be considered before using the findings of this report in other circumstances. The report provides national averages from the literature for multiple data inputs used in modeling a project and program. These values are a useful starting point for modeling and a reference for grounding costs and other data assumptions determined when using local inputs. The best data will always be local (ideally state level or further granular) data compiled with input from stakeholders and experts involved in the development of the specific project or program under consideration.

Case Study Background

SELC developed a proposed CS program in light of the current CS market in North Carolina (NC). CS in NC is governed by House Bill 589 (HB 589)[1] , which was passed in 2017 and enables numerous clean energy requirements, and by rule R8-72[2] of the North Carolina Utilities Commission (NCUC). CS rules are prescribed for regulated utilities in section 62-126.8[3] of HB 589. Per the two above presiding policies, CS projects will be no larger than 5MW with no single subscriber making up more than 40% of a project and each subscription will be sized at or above 200W and no more than

[1] https://www.ncleg.net/Sessions/2017/Bills/House/PDF/H589v6.pdf

[2] https://www.ncuc.gov/ncrules/Chapter08.pdf

[3] https://ncleg.gov/EnactedLegislation/Statutes/PDF/BySection/Chapter_62/GS_62-126.8.pdf

100% of the subscriber's maximum annual peak demand. The utilities will make facilities available until the combined nameplate of all projects equals 20MW. CS subscribers must be located in the same utility territory as the project and either the same or adjacent county to the project, with an exception being allowed for subscribers within a 75-mile radius if filed with the NCUC. Finally, and highly relevant to this discussion, is that subscribers will be credited at the avoided cost rate for all energy subscribed.

Rule R8-72 mandated that regulated utilities submit a proposed program by January 2023. The proposed programs that were submitted had to include numerous provisions including some key variables such as recovery of interconnection, administrative, and project specific fixed and variable costs, how subscription costs will be determined, how the avoided cost bill credits will be calculated, and how the program will not affect any non-participating program customers.

NC is served by 5 investor-owned utilities (IOUs) and 126 public, cooperative, federal, or other types of utilities[4]. The 3 largest utilities by customer basis in the state are the IOUs: Duke Energy Progress, Duke Energy Carolinas, and Virginia Electric & Power Co (Dominion Energy). The subject of this discussion, at the request of SELC, are the two Duke Energy companies (Duke Energy Progress & Duke Energy Carolinas, henceforth referred to as Duke Energy) as they serve the majority of the state's population and have the largest impact by customer and load served.

To date (December 2023), the programs developed for both Duke Energy territories have yet to see any projects be developed due in part to disadvantageous economics for the developer[5]. With the introduction of new tax and financial incentives by the federal government (e.g. Bipartisan Infrastructure Law (BIL) and Inflation Reduction Act (IRA)) SELC was motivated to revisit the CS program in NC to identify what changes both in the market and program design might drive a more active and thriving program in the state.

The following sections are discussions of key components used in modeling a theoretical CS program with specific values based around the NC market. The discussion is not exhaustive and should be reviewed in context of the current program. All conclusions are based on data driven assumptions based in actual or theoretical market and technical considerations. These actual or theoretical market data assumptions may change over time and therefore inputs into CS program models may also need to be modified.

[4] https://www.eia.gov/electricity/state/NorthCarolina/

[5] https://starw1.ncuc.gov/NCUC/ViewFile.aspx?Id=8c4bd9d7-4e11-4d4d-b540-e6aff64e3a98

Residential Average Peak Demand & Subscription Sizes

Table 1 – Summary of average community solar subscription sizes from the literature referenced in the discussion.

Modeled Subscription Size	Reference	Notes
5kW	*SELC Model*	*Value proposed by SELC*
3kW	NCSP Sharing the Sun Report	Value reported in 2021 data
4kW	NCSP Sharing the Sun Modeling Assumptions	The value used to calculate equivalent households in NCSP modeling
5kW	EIA & SEIA	Average size of residential solar systems as a stand in for CS subscription
7kW	NREL ATB	Average size of residential solar systems as a stand in for CS subscription

When modeling a CS program, a key question is how many customers (subscribers) can the program expect to reach, given the size (capacity in kW) of each customer's subscription? In the CS program developed by SELC an average subscription size of 5kW per customer was assumed. Using an average value for all customers is a simplification as actual customers subscription sizes will vary. It is a good modeling practice to use a single subscription size to simplify modeling to estimate the number of customers enrollable in the program and the associated potential costs and savings.

As noted in the introduction, the CS rules in NC dictate that the minimum subscription will be sized at or above 200W and the maximum subscription can be no more than 100% of the subscriber's maximum annual peak demand. The ideal way to calculate the average largest subscription size possible, would be to work with Duke Energy and calculate the average annual peak demand by residential customer class/rate type. In the absence of this data, public data may provide insight into whether a 5kW subscription is a reasonable assumption.

Older data (published in 2015) from the Energy Information Administration (EIA) and the Solar Energy Industries Association (SEIA) show that the average residential rooftop solar system is 5kW [6,7]. More recent data from NREL's Annual Technology Baseline shows that the average residential array is now 7kW.[8] Data from NCSP's Sharing the Sun reports and modeling has found the historically the average solar subscription size is as low as 3kW but has used 4kW as an average subscription size for many modeling activities[9, 10]. Therefore, using an average subscription size between 3kW and 5kW is a reasonable assumption for most modeling activities[11]. EIA publishes the Residential Energy Consumption Survey (RECS) approximately every 5 years to provide data on energy consumption by household type, income, size, reginal location, and more[12]. Using data specific to NC from the most recent data set (2020) would be a reasonable manner by which to select an appropriate representative subscription size, even if it does not provide the necessary maximum annual peak data used to limit the subscription size. It is important to select the appropriate demographic specific consumption data from the RECS so that the data accurately reflects the size, income, ownership type, and age of household. The most accurate and granular data that could be used to calculate the average subscription size would be actual data from Duke Energy, used to calculate historically accurate averages by demographic.

It is worth noting two additional considerations that may impact the modeled subscription size. One is the electrification of homes. As homes continue to be electrified with new appliances and changes to electric cooking, heating, and the adoption of electric vehicles across the U.S. it is reasonable to expect electric demand in homes to increase[13, 14, 15]. The second is not setting the minimum subscription size too high, both from a programmatic and a modeling perspective. The subscription size necessary to cover the majority of a households energy use varies a great deal based on the type of household, occupants, ownership type, location, income, and other factors[16]. If the program rules set the minimum subscription size is too high, it may

6 https://www.eia.gov/todayinenergy/detail.php?id=23972#:~:text=Although%20each%20distributed%20PV%20system,amount%20of%20electricity%20generating%20capacity.

7 https://www.seia.org/research-resources/solar-photovoltaic-technology

8 https://atb.nrel.gov/electricity/2021/residential_pv

9 https://www.energy.gov/eere/solar/webinar-getting-5-million-current-community-solar-deployment-and-pathways-reach-5

10 https://nrel.primo.exlibrisgroup.com/permalink/01NREL_INST/1gn35g9/alma991001138467003216

11 For reference, a 5kW subscription provides enough energy over the year to cover the majority of an average household's energy consumption making less than $60,000. According to EIA (2023) data, households earning less than $60,000/year use around 9.3 MWh/year. To offset annual electricity use, those households would need to subscribe to roughly 5 kW of capacity (assuming a 20% PV capacity factor).

12 https://www.eia.gov/consumption/residential/data/2020/index.php?view=consumption

13 https://www.eia.gov/todayinenergy/detail.php?id=56040

14 https://www.epa.gov/climate-indicators/climate-change-indicators-residential-energy-use

15 https://www.eia.gov/outlooks/steo/report/elec_coal_renew.php

16 https://www.eia.gov/consumption/residential/data/2020/index.php?view=consumption

exclude households that use less power or that cannot afford to subscribe to the minimum size. When modeling the average subscription size used should account for lower consumption or income households by not assuming all households will be able to partake in a larger subscription size.

Capital Cost

Table 2 - Summary of average community solar capital costs (CAPEX) from the literature referenced in the discussion. "" refers to the value and related units, $/W or $/kW, provided in the literature, while the other is provided for direct comparison.*

CAPEX ($/W)	CAPEX ($/KW)	Inverter Loading Ratio (ILR)	Project Capacity Cost Basis	Reference
$1.8	*$1,800**	*NA*	*5MW-AC (or less)*	*Value proposed by SELC*
$1.76	$1,761*	1.34	3MW-DC	PV and Energy Storage Benchmark report
$1.94*	$1,940	1.34	500kW-DC	PV and Energy Storage Benchmark report
$1.85	$1,848*	1.23	200kW-DC	NREL ATB
$1.33	$1,331*	1.34	100MW-AC	NREL ATB
$2.2*	$2,200	1.26	0.1 to 5MW-DC	LBNL Tracking the Sun
$0.99 to $1.55	$990 to $1,550	1.32	5 to 100MW-DC	LBNL Utility-Scale Solar

A key component of modeling the value proposition for a community solar project and program is determining the capital cost (CAPEX) to build a solar project. The SELC proposal provided a default input value of $1,800/kW (kW-AC), based on available industry data and interviews with local NC solar developer/installers. SELC asked for a review of this default value to provide context on CAPEX costs and the role of interconnection in these costs.

When modeling solar and CAPEX costs, NREL and the national laboratory consortium aim to standardize analysis by using the best available data. NREL and the Lawrence Berkley National Laboratory (LBNL) release annual data surveying solar costs for all system sizes, from residential through large, utility scale projects. NREL updates and publishes two different data resources, the PV and Energy Storage Benchmark report[17] and the Annual Technology Baseline (ATB) Data[18], the former of which helps to inform the latter's calculations. The PV and Energy Storage Benchmark report, most recently released in September of 2023, includes for the first time a community solar PV cost benchmark based on a 3MW fixed tilt ground mount array (previous versions only had a 500kW commercial ground mount array for reference). The 2023 data reports that the modeled market price for a 3MW-DC community solar system was $1,761/kW-DC (1.34 Inverter Loading Ratio (ILR) used, $2,360/kW-AC). Previous data from the same report in 2022 found the 500kW-DC system to cost more at $1.94/W-DC ($1,940/kW-DC) which follows expectations for economies of scale.

The 2023 ATB data only includes a commercial system comprised of a 200kW-DC roof mounted fixed tilt system and a utility scale system at 100MW single axis tracking. The moderate scenario in the ATB report for a commercial system in 2023 was determined to be $1,848/kW-DC for a capital cost while the utility scale solar system was $1,331/kW-AC (n.b. There is a difference in units between the two).

LBNL publishes the Tracking the Sun[19] report and the Utility-Scale Solar[20] reports, which document the costs of installed solar projects across the U.S. Tracking the Sun reports on projects up to 5MW-AC and the Utility-Scale Solar reports shares data for projects above 5MW-AC. Tracking the Sun reports that large non-residential (100kW to 5000kW) systems had an average installed cost of $2.2/W-DC in 2022. These costs are on the higher end of the range provided across the literature which follows logically since the costs for projects as small as 100kW are included. The 20%-80% percentile costs for large non-residential ranged from $1.7/W-DC to $3/W-DC with the lower end fitting more closely with the numbers reported in NREL's ATB and PV and Energy Storage Benchmark report. The Utility-Scale Solar report showed that smaller utility scale projects (5-20MW) had a range in cost of $0.99/W-DC ($990/kW-DC) to $1.55/W-DC ($1,500/kW-DC) (correlating with $1.31/W-AC to $2.05/W-AC, 1.32 ILR used) for the 20%-80% percentile. The 80th percentile being closer to, but still less expensive than, the other NREL and LBNL reports.

It is worth noting that for all the models discussed here, interconnection costs **were** included. This is relevant as interconnection costs can sometimes change the total capital cost of smaller utility sized projects considerably. The values included were for projects that have been successfully constructed. Individual projects may have a range of costs, which are averaged in the final data sets. Therefore, when calculating how interconnection costs may play into the economics, projects with higher than the average reported values are less likely to be built and commissioned and can be

[17] https://nrel.primo.exlibrisgroup.com/permalink/01NREL_INST/1e90bo2/alma991001133208903216

[18] https://atb.nrel.gov/electricity/2023/data

[19] https://emp.lbl.gov/tracking-the-sun

[20] https://emp.lbl.gov/utility-scale-solar/

assumed to be excluded from data in the literature and therefore also excluded the modeling exercise at hand.

The cost values presented show a significant range of costs from multiple studies which utilize different methodologies to report on average costs of nationwide projects, that deploy different local design techniques and utilize different supply chains and markets. The variation in costs both between different studies and between the national average cost and different localities can be notable and means that including cost sensitivities is essential to modeling a CS program. Because the data provide by SELC comes from local installers with real and up to date market costs and it falls within the range of national data, $1,800/kW-AC appears to be a reasonable assumption. This value is likely to shift up or down based on specific projects and will almost certainly change between the publication of this report and the beginning of construction of any project in the region.

Program Fees

Table 3 - Summary of community solar customer acquisition and management costs from the literature referenced in the discussion.

Subscriber Acquisition Costs ($/kW)	Subscriber Management Costs ($/kW)	Reference
$60 - $250	$120 - $350	Vote Solar
NA	$120	SEPA
$51 - $175	NA	Wood Mackenzie
$80	$17.41	NREL

The administrative and programmatic costs to develop and run a CS program can determine whether a project or program is viable. The costs include everything from integrating billing system upgrades, to customer recruitment and retention, to customer service. Due to the range of components included in the costs, variation in market, program goals, and utility regulation, these costs vary a great deal and can be difficult to quantify accurately for a specific program without performing real world calculations.

Data points from a report commissioned by Vote Solar in 2018 found that, anecdotally, subscriber acquisition costs can range from $60/kW to $250/kW[21]. The report also found that ongoing billing and subscriber management (including subscriber replacement costs) ranged from $120/kW to $350/kW[22]. A report from the Solar Electric Power Association (SEPA, 2018) found that first year median utility marketing and

[21] https://votesolar.org/reports-and-filings/the-vision-for-u-s-community-solar-a-roadmap-for-2030/

[22] The report is unclear on if this is an annual or upfront cost to be annualized and over how many years.

customer admin costs were $120/kW ($80/kW billing and $70/kW marketing)[23]. The most current Wood Mackenzie report on community solar reports that customer acquisition cost is $85/kW for residential and between $51/kW and $61/kW depending on commercial customer size ($/kW-dc)[24]. The report also shared the LMI customer acquisition tends to cost more at $175/kW, but that subscriber management companies that are more efficient in their process report costs of $104/kW for LMI customers.

The PV and Energy Storage Benchmark report from NREL referenced earlier includes an average customer acquisition rate of $0.08/W-DC ($80/kW-DC) in their models when accounting for the customer mix of most CS projects. The report also provides an ongoing cost for subscriber management (reported under operation and maintenance costs) which is set at $17.41/kW-DC/yr (using a 3% turnover rate provided through the Elevate Community Solar Cost Model).[25]

The variability in administrative and programmatic costs is just as notable as the variability in how costs are reported. Collecting and interpreting such costs is complex as project and program administrators calculate and separate program costs in different manners across different markets and program designs. Additionally, costs such as IT and billing system upgrades or marketing can vary quite a bit based on the utility under consideration, program design, knowledge and interest of the local community, and program partners and stakeholder involvement in the community.

Duke Energy Proposed Program Fee Notes

Duke Energy in a filing before the NCUC in relation to Docket Nos. E-7, Sub 1168 and E-2, Sub 1169 provided comments on June 4th, 2018, that proposed updated values to the previously proposed community solar program fees[26]. The newly proposed fees are broken into upfront and ongoing monthly fees and are based on 1kW subscriptions. The newly proposed fees are also based on expected ranges of costs for projects at 1MW, 3MW, or 5MW in size. These proposed fees range from $295.20/customer to $137.81/customer with acquisition accounting for $102 and $95 of those total costs, respectively. IT costs make up the second largest portion of this cost in all project capacity models provided by Duke Energy. The ongoing fees proposed range from $15.19/customer/month to $12.58/customer/month. However, that cost includes the subscription cost (which will be recovered through monthly payments by the subscriber), making the administrative cost for management $4.67/customer/month and $2.06/customer/month respectively with IT and labor costs making up the majority of these costs.

[23] https://sepapower.org/resource/community-solar-program-designs-2018-version/

[24] https://www.woodmac.com/reports/power-markets-us-community-solar-market-outlook-h2-2023-150151967/

[25] https://nrel.primo.exlibrisgroup.com/permalink/01NREL_INST/1e90bo2/alma991001133208903216

[26] https://starw1.ncuc.gov/NCUC/page/docket-docs/PSC/DocketDetails.aspx?DocketId=f14c8254-25b7-4feb-a2f5-24e6f8264b2a

Overall, the costs proposed by Duke Energy do not sit outside the range of costs seen in the market. There are however still opportunities that may further reduce program costs. Duke Energy noted that back in 2018 the billing system for its customers needed an update to enable consolidated billing for customers. The upgrade at the time was not yet complete but was expected to be complete by 2022. The improvement in billing software has the potential to make communicating program costs and benefits to customers easier and has the potential to reduce the IT component of the up-front fee. Utilizing existing communication avenues already available to the program administrator, Duke Energy in this case, may be able to reduce costs or increase efficiency in messaging. Tactics that leverage existing communication avenues could include targeting messaging or advertising only to the communities with eligible projects.

Partnering with trusted community-based organizations is another highly effective method for messaging, customer education, and customer acquisition. Community-based organizations can share program details, costs and benefits, and availability directly with potential customers, which can be more efficient than general or generic advertising and messaging. Community-based organizations are often well suited to provide information by deploying multiple forms of outreach for different customer types and drafting messaging in the common locally spoken languages, using clear, straightforward, specific, and factual text.[27, 28]

The program costs proposed by Duke Energy are based on numerous assumptions and are not definitive, as affirmed by Duke Energy in their comments filed before the NCUC[29]. The examples of opportunities to reduce costs provided in this report are not exhaustive and there are additional factors which can be explored to further refine cost assumption or reduce program costs.

In an attempt to refine costs, SELC or other similar organizations may request a regulatory or utility entity to:

1. Provide more clarity on IT costs and how they are calculated as well as if the existing billing software upgrade changes or reduces these fees or how the status of the new billing system deployment could impact or change the proposed costs in the near term.
2. Calculate the program cost requirements assuming a larger average subscription than 1kW/customer.
3. Provide more clarity based on the customer acquisition component of the upfront costs, including what proposed avenues were used to identify this value.
4. Present options for customer acquisition marketing including utilizing existing utility programs and communication routes which may yield higher success rates than general population outreach.
5. Explore the option to distribute some of the up-front costs into monthly costs.

[27] https://resource-solutions.org/wp-content/uploads/2016/10/092418-SPI-Handout.pdf

[28] https://sahfnet.org/sites/default/files/uploads/resources/ncsp_resident_tip_sheet_-_winter_2022.pdf

[29] https://starw1.ncuc.gov/NCUC/ViewFile.aspx?Id=8c4bd9d7-4e11-4d4d-b540-e6aff64e3a98

6. Update the current or expected PPA and other prices used in the model including IT and labor.

Program Design

In addition to exploring community solar program costs and other data inputs, organizations may also want to consider overall program design best practices. The resources and guidance shared in this section is based on lessons learned from projects and programs deployed across the U.S. in markets with both utility and third-party led projects.

In 2021, NCSP set target to enable community solar to power the equivalent of 5 million households and create $1 billion in energy savings by 2025. NCSP, along with numerous other federal programs, was also directed by the Justice40 initiative (via Executive Order 14008) to deliver 40% of the overall benefits of climate and clean energy investments to disadvantaged communities.[27] To support both of these targets, NCSP and its stakeholders developed a set of five meaningful benefits that can be delivered through community solar, including: greater household savings, low- to moderate-income (LMI) household access, resilience and grid benefits, community ownership, and workforce development and entrepreneurship[31]. NCSP has compiled a best practice guide to support community solar program design that includes meaningful benefits and has provided prizes (the Sunny Awards) to projects and programs that exemplified equitable community solar and access to the meaningful benefits[32].

Developing a CS program capable of delivering the meaningful benefits requires intentional design considerations. Several of these considerations are based upon the subscription design and rules. The structure of subscription payments plays a big role in enabling financial accessibility to a program. For subscribers with limited capital, up front subscription costs can be a hinderance to joining a program and delay the financial savings that a program will ideally provide. Programs that reduce or eliminate up front subscription fees and incorporate these costs into ongoing monthly or annual subscription costs can make programs more enticing and accessible to all customers.

Similarly, imposing financial or administrative barriers to subscription flexibility can increase the risk for customers and reduce customer interest or satisfaction. Reducing such restrictions by allowing subscription transferability (the ability to move a subscription to another customer/account), having shorter subscription terms (e.g. subscription commitments that are annual or sub-annual with renewal options), and not imposing exit fees (a cost for ending a subscription prior to the subscription term) can make programs more accessible.

Subscription minimums, the smallest subscription allowed, is another factor that may limit some customers from participating in a community solar program. For households that either cannot afford to subscribe to the minimum subscription or have a smaller load than others, if the minimum subscription is too large, they may not be able to afford to subscribe to the smallest option. Therefore, ensuring that the smallest allowable subscription size is inclusive of all customers ensures access to the program broadly.

Consolidated billing (and costs and benefits messaging more broadly) are also key to informing and educating customers. Ensuring customers both understand what their subscription costs are and how that translates into savings can empower customers to both understand the program and make educated decisions about enrolling. One tool that has been found to be effective in ensuring clear messaging is consolidated billing, which involves combining the subscription costs and savings (energy credits) onto the single utility bill that a customer receives and pays[30]. Combining all program benefits and fees in one bill can help to increase the likelihood that a customer will understand the full picture of the costs and benefits of their subscription.

Potentially more complex than other program components noted above, is the subscription cost and credit structure. Many programs simply include a capacity-based subscription (e.g. kW) and provide the related energy-based (e.g. kWh) credit for the appropriate amount of generation. This results in a fixed subscription cost (unless subscription rates increase on $/W basis) and a floating subscription credit (a credit which changes each month as the amount of energy generated varies). While this does provide cost certainty on the subscription cost side, it does not provide guaranteed savings as solar generation and credits vary. Some programs have deployed subscription designs which provide customers the option to subscribe on an energy-basis which can either be a fixed amount of energy purchased or a floating amount based on actual consumption by the customer. For a fixed energy subscription, the cost and credit will be the same every month and the amount of energy offset will be consistent. A floating energy subscription will have a varying cost and credit, however the cost to credit ratio will always be the same since there cost and credit components are pre-determined so a customer is guaranteed to receive savings no matter how much energy they consume. Having a more complex subscriptions structure needs to be weighed against complexity of messaging to consumers and operational rollout.

More guidance, resources, and information on these topics that should be considered and explored fully to ensure an effective and equitable CS program are provided in the Appendix. The resources include some guidance on how to make an equitable and accessible CS program which can include but are not limited to:

- Limited or no upfront subscription fees
- Flexible exit rules (no exit fees, short terms, and transferability of subscriptions)
- Subscription carveouts for LMI customers, ideally 40% or more of subscriptions
- Subscriptions that guarantee bill savings of 20% or more
- Easy onboarding and no credit check
- Consolidated billing
- Engaging subscribers with updates and news of the program and projects
- Educating subscribers on the environmental impact
- Implementing continuous improvements through subscriber feedback

30 https://www.naseo.org/data/sites/1/documents/publications/Community%20Solar%20Consolidated%20Billing%20Final%5B43%5D.pdf

Conclusion

This report compiled and explored a large range of factors that are useful considerations for designing and modeling a community solar program. Subscription sizes can determine the expected cost and savings generated for a customer. Using data that is specific to the customer type being served by the program and regional/local housing electricity consumption is important. Furthermore, the average subscription size used should account for lower consumption or income households by not assuming all households will be able to partake in a larger subscription size. The cost of building a system varies across the country and even within smaller regions or states. Models should include a sensitivity of costs and use regional and local data that are specific to similar size systems or existing community solar projects where possible. The administrative and programmatic costs to develop and run a CS program can determine whether a project or program is viable. Therefore, parsing out the administrative cost components is important to identify opportunities to reduce programmatic expenses and partner with existing entities that may support operational efficiency.

The values compiled in this report are based on national averages and should be referenced as a starting point for modeling and design or used as a grounding basis. The proposed program design from SELC was considered in this framework and many proposed values fell within the range of national averages. SELC and other stakeholders in the Duke Energy territory should refine modeling inputs and program design by compiling local and utility specific data to get the most accurate inputs possible. The same approach is a best practice for all users. Local data should be utilized to refine costs while using this report to guide the process and validate the work.

Appendix – Resources

Summary: Solar Energy Technologies Office Convenings for Community-Focused Organizations

Best Practices Guide for Inclusive Solar Energy Communications

The Community Solar Playbook

Community Solar Program and Subscription Design

Striking the Balance: Allocating Community Solar Costs and Benefits

Community Solar Consolidated Billing: Review of State Requirements, Policies, and Key Considerations

Equitable Access to Community Solar: Program Design and Subscription Considerations

Community Solar Opportunities for Low to Moderate Income Households in the Southeast

Community Solar Program Design and Subscription Models