Utilities Solve for Solar:

Practical Analytics for Local Community Solar Planning

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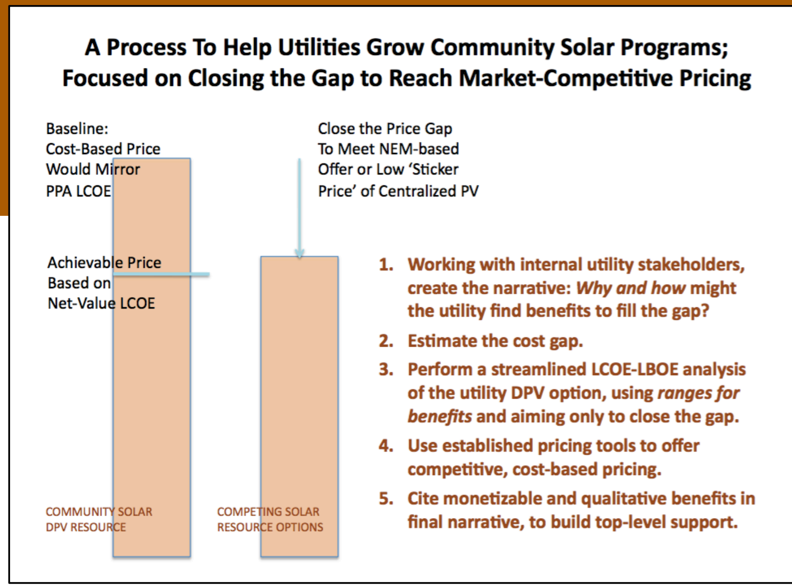

Figure 1. The authors have found, through work on the Community Solar Value Project, that utilities find it difficult to justify truly cost-competitive pricing for local (DPV) community solar. Following a standard for cost-based pricing, utilities would typically "pass through" the resource cost, expressed as the gross levelized cost of energy (LCOE) and add wires costs. That approach misses monetizable utility benefits. However, a standard value of solar analysis can be long and contentious, even among internal utility staff. In contrast, the process discussed here is sharply focused on meeting a pricing target. Further it supports a broader narrative case, which can include both easily monetizable values and qualitative benefits. This builds a narrative that can be compelling to utility decision-makers.

Overview

Whether utilities or third parties are the main drivers of local community solar, the challenge of reaching market potential will only be met if parties can agree that program pricing is both fair and competitive. In particular, critiques of utility-led community solar programs often center on the high net premium charged to participating customers. In most cases, this is largely due to limitations of the standard solar levelized cost of energy (LCOE) calculation, which is the basis for setting the cost of the power purchase agreement (PPA) and in turn, program-participant pricing. Often a non-bypassable wires charge or customer charge adds even more to the premium price for community solar. The debate over value-of-solar policies is ongoing in the policy arena, examining these and many other issues. Yet a concurrent challenge is, how to scale up community solar and establish the strategic value of community-scale distributed PV (DPV) without delay? Here, the authors describe a ready process to achieve cost-based pricing solutions and grow larger, high-value community solar programs today.

This cost-based pricing solution (summarized in Figure 1) was developed in working with more than a dozen utilities on the *Community Solar Value Project (CSVP)*, a 2.5-year effort, co-funded by the U.S. Department of Energy SunShot Solar Market Pathways Program. This solution includes a process model and analytic approach. Defining characteristics include:

- It assumes market-ready strategic solar design;
- It conservatively calculates a small number of levelized benefits, to derive a new *net LCOE* that specifically closes the gap between the standard LCOE and a program target-price;
- It sidesteps the contentious process of developing an extensive and precisely calculated list of solar benefits, aiming instead to develop a well-supported narrative; and
- It relates directly to pricing options that are familiar to utility rates departments today.

Methodology

LCOE is defined as the net present value (NPV) of project costs divided by the NPV of generation (kWh), evaluated over the life of the project. When nearly all generation resources were centralized on the transmission grid, this metric was simply applied to various resource acquisitions. But increasingly, distributed energy resources are providing strategic value as well as kWh generation, and utilities must also consider the incremental *levelized benefits* of strategic distributed PV (DPV), as well as the levelized costs. The generic equations for this *net LCOE* are:

$$LCOE_{DPV\ NET} = LCOE_{DPV\ GROSS} - LBOE_{DPV}$$

where ↖PPA Price ↖DPV Benefits

$$LBOE_{DPV} = LBOE_{GENERATION} + LBOE_{TRANSMISSION} + LBOE_{DISTRIBUTION} + LBOE_{SOCIETAL}$$

Many benefits may be included in the project narrative, but only monetizable project-specific benefits are included in the LBOE. Thus, the net LCOE represents an adjusted PPA. It may be used to compare community solar project choices—e.g., a local project with grid benefits vs. a larger, remote project, or a half-dozen smaller, strategic projects vs. a standard larger-scale project. Figure 2 summarizes how a small number of benefits can impact the net LCOE and help to meet a target price.

Elements of this approach are familiar and hardly innovative—except in how they are applied to enhance specific project net value and meet a program pricing target. Here planners engage in an iterative process that emphasizes reaching agreement quickly. Typically, utility staff are asked to provide ranges for each value, and to apply caveats as needed. The analyst also may offer strategic improvements to the baseline project design. If accepted, these can increase the levelized benefits of energy (LBOE) for the community solar project and make strong progress toward competitive pricing.

Figure 3 shows how this methodology would apply to a specific utility case. Here a hypothetical wholesale energy supplier in the Rocky Mountain region is considering acquiring DPV on behalf of its utility members so they could offer community solar. The challenge is to hold the bottom line premium to two cents or less per kWh, while keeping a non-bypassable wires charge in place. The utility in this case has very low costs, intensifying the challenge. The analysis begins with fielding a strong subset from a list that could easily include eight or more DPV benefits. Selecting the *minimum* effective set of benefits can save a lot of time and avoid disputes. In at least one other hypothetical utility case tested, only three benefits were needed.

Here four benefits are enough to reach a break-even cost target and close the gap. A fifth benefit, derived from using single access tracking instead of fixed-tilt racking, would have no monetizable value for this utility today, but because the cost is currently about equal, this technical hedge against rising natural gas prices is included. Other values, such as avoided transmisson costs for DPV, have been widely documented to have value ranging higher than that taken. But if, for example, this utility had never before counted avoided transmission, a conservative value would have the best chance for acceptance without a long delay. Note that a full discussion of this methodology would reveal other under-used strategic benefits, too. For example, in this case, the utility would be more likely to accept a distribution upgrade deferral value because the analysts recognize that it is an elusive value. They suggest a 5-MW portfolio of five DPV systems, each strategically placed. The defferal value is then discounted by 50 percent, conceding that not all projects deliver deferral value as planned. Yet the discounted value is still considerable.

It is also important to note that the five-step process (Figure 1) for engaging internal utility stakeholders, is critical to this methodology. The objective is to build actionable consensus around a compelling, well-supported program narrative.

Discussion

This process grew out of discussions with utility division managers, who needed to build a solid case for community-scale solar, to win over company executives and support a more competitive program offer. They wanted a first step to build internal consensus around the value of DERs, and to move a program forward without getting caught up in far-reaching policy processes. Any solution would have to use rigorous analytics, but sparingly and in a pointed way.

This "benefits-adjusted PPA" approach is rational and direct. A net LCOE that includes levelized benefits is a suitable metric for DPV. If, by convention, the utility recovers the PPA cost through community solar subscription pricing, it would be fairly simple use a benefits-adjusted PPA. The non-bypassable wires charge can remain untouched for now. This approach also adapts to the "buy or lease a panel" model. In that case, the utility could reduce the net price per share, to recover the adjusted PPA cost. One caveat there: the utility would have to finance the value of benefits that accumulate over time. For either the subscription or panel model, benefits could alternatively be reflected simply as a bill credit.

When presented to peer reviewers, the response to this process was that it is sound, if deceptively simple. In application, it is a bit like a regulatory stipulation process, but internal to the utility. It assures reasonable fairness and maintains a commitment to cost-based pricing. The process also reveals high-value project-design strategies, easily lost in a more far-ranging and complicated process. It has been introduced to four utility community solar program-design processes so far. In each case, the analytic methodology has been partly accepted, with review ongoing. In time, sweeping policy advances may dramatically change that, but the authors believe all stakeholders benefit from practical solutions like this one, today.

Figure 2. Generic 'Gap Analysis' Calculations

Baseline Cost ↗	**PV PPA Price ($LCOE_{GROSS}$)**	**$0.075**
	DPV Value Category (LBOE)	**Value ($/kWh)**
	DPV Benefit Category #1	$0.010
	DPV Benefit Category #2	$0.005
	DPV Benefit Category #3	$0.005
Aggregated DPV Benefits ↗	**TOTAL OF DPV BENEFITS ($LBOE_{GROSS}$)**	**$0.020**
	PPA Price Adjustment Calculation	**Value ($/kWh)**
	Baseline PPA Price ($LCOE_{GROSS}$)	$0.075
	Aggregated DPV Benefits ($LBOE_{GROSS}$)	$0.020
Cost Minus Benefits ↗	**Adjusted PPA Price ($LCOE_{NET}$)**	**$0.055**
	Program Price Offering Calculation	**Value ($/kWh)**
	Adjusted PPA Price	$0.055
	Non-Bypassable Wires Charge	$0.045
Indicative Pricing Estimate ↗	**Community Solar Program Price**	**$0.10**

The generic framework for this analysis provides a benefits-adjusted PPA price, as the basis for more competitive customer-program pricing (shown here for a $/kWh subscription program). The values shown are for illustrative purposes only. For each utility, some benefits may be robust, and others simply may not be needed to reach the target net LCOE.

Figure 3. Rocky Mountain Utility Case: 'Adjusted PPA' Benefits Analysis Helps to Close the Pricing Gap

5 MW DPV Analysis Results

DPV Value Category	Value (kWh)
LCOE of DPV (PPA Price)	**$0.065**
Avoided Transmission Costs	$0.016
Strategic DPV Design	$0.000*
Avoided Transmission Losses	$0.0003
Coincident Demand Reduction	$0.011
Distribution Upgrade Deferral	$0.009
Adjusted PPA Price	**$0.029**

CS Program Price Analysis Results

Price Category	Value (kWh)
Baseline "Break-Even" Price for All Program Costs	$0.065
Non-Bypassable Wires Charge	$0.046
Community Solar Program Price Offering	**$0.111**

This figure summarizes one of three generic test cases. The authors also have tested this process with four actual utilities to date. Here, the bottom line price/offer to customers, based on the adjusted PPA, represents a slight premium in winter, and a savings on summer pricing. Market research discourages premiums over $0.02/kWh.

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