Solve for Solar:
A Streamlined Utility Analytic Process

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Community Solar Procurements, Programs and Pricing
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Community Solar Value Project

CommunitySolarValueProject.com

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- Led by Extensible Energy, with funding from US DOE SunShot. Joe Bourg, an analyst with CSVP, comes from Millennium Energy LLC, one of four firms supporting this effort.

- CSVP works with utilities, industry innovators, and community partners. The Project provides demonstration and documentation of four ways to make utility-led community solar better, including:
  - strategic design
  - target marketing
  - procurement and pricing
  - solar-plus integration

Community Solar Value Project

www.communitysolarvalueproject.com

Key Presentation Points

1) Community-scale PV in distributed applications can compete on ***price*** and ***value*** with utility-scale and customer-sited PV systems
2) A ***streamlined analysis approach*** can provide accurate information to guide the design of community solar (CS) projects and programs. This simple and flexible approach avoids falling prey to “analysis paralysis”.
3) The CSVP valuation approach can help utilities develop **cost-based pricing** for their CS program
4) A ***“fleet approach”*** to community solar can provide ***additional benefits*** and ***initial cost reductions*** through the combination of distributed and utility-scale PV projects
5) The analysis of localized value identifies ***the “sweet spot” for community solar*** in the marketplace -- often positioned between conventional retail rates and rooftop solar projects -- while balancing the needs of the utility distribution system

Overview of the CSVP Regional Scenario Analyses

- The CSVP team developed three “realistic hypotheticals” to demonstrate value and pricing approaches for Community Solar fleets in different regions of the country
- The purpose of these analyses is to illustrate the **technical and economic impacts** of various solar fleet configurations, and to assess the distributed solar values in regions with varying solar resources and distributed resource benefits
- The analyses were also designed to answer specific questions for CS project and program designs:
  - Central California: **Central PV Versus Distributed PV**
  - Desert Southwest: **Value of Solar Carports**
  - Rocky Mountain: **Program Pricing**

Analysis Approach to DPV Valuation

- One metric often used in evaluating resource acquisition decisions is the “Levelized Cost of Energy” (LCOE)
- LCOE is defined as the NPV of project costs divided by the NPV of kWh evaluated over the project life
- Traditionally, since most electricity resources were procured from central station projects on the transmission grid, only the NPV of project costs were compared
- With the increasing emphasis on distributed projects in the marketplace, it is important to evaluate the “*net LCOE*” which incorporates the *incremental* benefits of distributed generation on a levelized basis or the “*LBOE*”
- This *net LCOE* analysis approach ensures a more valid comparison of DPV resources

Methodology for Valuing and Pricing the DPV Resource

- CSVP defines the LBOE categories as falling into four areas:
  - Generation
  - Transmission
  - Distribution
  - Societal
- The equations for calculating the net LCOE are:
  - $LCOE_{DPV\ NET} = LCOE_{DPV\ GROSS} - LBOE_{DPV}$
    - ↖PPA Price
    - ↖DPV Benefits
  - Where,

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

- Once the $LCOE_{DPV\ NET}$ is calculated, the utility's non-bypassable wires charge is added to provide indicative values for CS program pricing.
- We refer to this as the "adjusted PPA" approach

Categories of Benefits for the LBOE Analysis

Benefits/Avoided Costs of Distributed PV

- Avoided costs of conventional wholesale power**
- Avoided/deferred conventional generation capacity investment**
- Fuel price hedging**

- Avoided transmission losses
- Avoided transmission ancillary services
- Reduced distribution line losses
- Distribution ancillary services
- Improved distribution capacity utilization; may avoid/defer upgrades

- Reduce GHG and other emissions**
- Reduce water use**
- Conserve ag land, sensitive land
- Meet local sustainability goals
- Other compliance values**

- Solar geographic diversity benefits, risk management
- Potential resilience benefits
- Solar siting, design & operational flexibility to capture strategic benefits

- Potential DR companion measure value
- Potential customer-side storage value
- Potential added project-design values, e.g., shading

** Also available to centralized PV projects

DPV Benefit Values Used in the CSVP Scenarios

DPV Benefit	Central California	Desert Southwest	Rocky Mountain
Avoided Transmission Costs	✔	✔	✔
Strategic DPV Design	✔	✔	✔
Customer Retention Value	✔		
Avoided Transmission Losses		✔	✔
Avoided Distribution Losses		✔	
Grid Resilience and Reliability		✔	
Coincident Demand Reduction			✔
Distribution Upgrade Deferral			✔

The Central California Scenario

For this Case:

- A municipal utility in California's Central Valley
- 20 MW Central PV project
- 6 MW of Distributed PV projects
- Tariff-based program
- Long-term customer retention a concern; competition from third party providers of NEM PV systems
- CS program interested in looking at a fleet approach to pricing, incorporating both CPV and DPV resources.

The Central California Scenario: DPV & Fleet Analyses

6 MW DPV Analysis Results

DPV Value Category	Value (kWh)
LCOE of DPV (PPA Price)	**$0.075**
Avoided Transmission Costs	$0.010
Strategic DPV Design	$0.006
Customer Retention	$0.012
Adjusted PPA Price	**$0.047**

26 MW Fleet Analysis Results

Price Category	Value (kWh)
LCOE of CPV (PPA Price)	$0.050
LCOE of DPV w/o Benefits (PPA Price)	$0.075
LCOE of 26 MW Fleet w/o DPV Benefits	$0.055
LCOE of 26 MW Fleet w/ DPV Benefits	**$0.049**

CS Program Price Analysis Results

Price Category	Value (kWh)
LCOE of CS PV Fleet	$0.049
Non-Bypassable Wires Charge	$0.050
Community Solar Program Price Offering	**$0.099**

The Desert Southwest Scenario

For This Case:

- A utility with a large service area in the Desert Southwest
- 5 MW CS fleet of parking canopy PV structures
  - Strategically located on the grid to optimize resiliency and reliability benefits, as well as line loss reductions (over 6%)
  - Evaluated the strategic design benefits of a flat mount system optimized for summer production
- PPA price of the 5 MW DPV canopy fleet: $0.103/kWh
- Utility-led, tariff-based CS program w/ full wires charges

The Desert Southwest Scenario: DPV & Pricing Analyses

5 MW DPV Analysis Results

DPV Value Category	Value (kWh)
LCOE of DPV (PPA Price)	**$0.103**
Avoided Transmission Costs	$0.010
Strategic DPV Design	$0.005
Avoided T&D Losses	$0.005
Grid Resilience & Reliability	$0.010
Adjusted PPA Price	**$0.073**

CS Program Price Analysis Results

Price Category	Value (kWh)
LCOE of CS PV Canopy Fleet	$0.073
Non-Bypassable Wires Charge	$0.031
Community Solar Program Price Offering	**$0.104**

The Rocky Mountain Scenario

For This Case:

- A public power utility with a JAA power supplier in the Rocky Mountain West
- A 5 MW CS fleet of fixed-tilt PV systems strategically located to capture distribution upgrade deferral benefits
- Estimated PPA price of the 5 MW DPV fleet: $0.065/kWh
- Utility-led, tariff-based CS program w/ full wires charges
- Very low avoided wholesale power purchase costs
- Analyzed a modified approach to the “adjusted PPA” pricing methodology to recover all program related costs and potential lost revenues

The Rocky Mountain West Scenario: DPV & Pricing Analyses

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**

SUMMARY

- The CSVP streamlined analysis for CS Valuation and Program Pricing offers a flexible approach that is easily adapted to different:
  - CS program designs
  - PV system types
  - Utility situations
  - Solar Plus companion technologies (i.e., storage and demand response)
  - Alternative pricing structures
- One of the keys to this approach is to conduct preliminary program planning to identify key characteristics desired for the program, and to answer important questions for the project:
  - Does the utility billing software dictate my pricing and/or billing credit structure?
  - Are the specific categories of DPV benefits that have known high values that the program and/or project can target?
  - Can the utility site projects and/or design projects to strategically maximize value ?
  - What are the risks of the program and/or project and how can I mitigate them in the planning stages of the program ?
  - Should the project be economically sustainable via the program participants, or are parts of the program going to be rate based ?

The Presenter and the Project

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The Community Solar Value Project is focused on improving community-solar program value, through solar + storage + DR and other strategies, at electric utilities in Sacramento and beyond. Led by Extensible Energy, LLC, and drawing on expertise from four energy consulting firms.

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