

VALUE OF SOLAR

STUDY DESIGN ELEMENTS

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Karl R. Rábago
 Executive Director, Pace Energy and Climate Center
 Co-Director, Northeast Solar Energy Market Coalition

krabago@law.pace.edu
 914.422.4082

What is a value of solar study?

A “value of solar study” is the analytical process to quantify the levelized present value of the sum of the lifecycle costs and benefits of energy produced by a distributed solar system to the utility, its ratepayers, and society. A value of solar study is essentially a comprehensive avoided cost analysis that goes beyond the traditional energy-only PURPA analysis to reveal the benefits created by distributed solar in terms of energy, capacity, transmission, distribution, market price impacts, fuel price risk, environmental costs, and other known and measurable categories.

A good value of solar study also accounts for the integration costs associated with deployment of the solar technology that produces the quantified benefits. A value of solar study does not include the private costs incurred by the customer who installs solar or the value of federal, state, or other subsidies not paid by the utility or its ratepayers. Figure 1 provides an example of the results a value of solar study recently conducted for Maine.

Figure 1. Value of Solar Study Results Example

First Year		Distributed Value (\$/kWh)	
Energy Supply	Avoided Energy Cost	\$0.061	} Avoided Market Costs \$0.090
	Avoided Gen. Capacity Cost	\$0.015	
	Avoided Res. Gen. Capacity Cost	\$0.002	
	Avoided NG Pipeline Cost		
	Solar Integration Cost	-\$0.002	
Transmission Delivery	Avoided Trans. Capacity Cost	\$0.014	} Societal Benefits \$0.092
Distribution Delivery	Avoided Dist. Capacity Cost		
	Voltage Regulation		
Environmental	Net Social Cost of Carbon	\$0.021	} Societal Benefits \$0.092
	Net Social Cost of SO ₂	\$0.051	
	Net Social Cost of NO _x	\$0.011	
Other	Market Price Response	\$0.009	} Societal Benefits \$0.092
	Avoided Fuel Price Uncertainty	\$0.000	
		\$0.182	

Source: Figure ES-1, Maine Distributed Solar Valuation Study. Maine Public Utilities Commission. April 2015.

Key Design Elements

The methodology used to set the value of solar is critical. There are a number of key design elements that should be incorporated into the analysis to ensure a fair and comprehensive study. Any written documentation directing the conducting of a study should include the following:

- A study should calculate “*the value to the utility, its customers, and society for operating distributed solar photovoltaic resources interconnected to the utility system and operated by customers primarily for meeting their own energy needs.*”¹
- A study should assess costs and benefits over the entire useful life of a solar PV system—at least 25 years.
- A study must be **required** to establish values in certain key categories of avoided costs and should be **allowed** to establish values for other categories.

Sample language:

*The distributed solar value methodology established by the [energy office] must, at a minimum, account for the value of energy and its delivery, generation capacity, transmission capacity, transmission and distribution line losses, market price effects, fuel price volatility reduction benefits, and environmental value. The [energy office] may, based on known and measurable evidence of the cost or benefit of solar operation to the utility, incorporate other values into the methodology, including credit for locally manufactured or assembled energy systems, systems installed at high-value locations on the distribution grid, or other factors. The calculation of distributed solar value under this section shall represent the present value of the future revenue streams of the value components over the useful life of a distributed solar system.*²

- The methodology must assess both benefits and costs of solar. These can be netted in like categories or separately reported.
- The methodology must require that costs and benefits be appropriately scoped.
 - Costs and benefits to the utility, other customers, and society must be included in the analysis including costs incurred by the utility, such as the cost of additional meters, administrative and billing costs, and other integration costs.
 - Purchase and installation costs that the solar customer bears separately should not be included.
- A study should produce a value for each and every kWh generated by the solar equipment.
- A study should be reasonably sized in geographic scope. The actual value of solar varies most significantly by utility service territory, though credible results can be determined on a statewide average basis.
- A study can apply to residential installations, small commercial installations, community/shared solar installations, and/or virtual net metering installations, although the type of system generally does not influence the value. However, the actual benefits may vary depending on the location of the system or the point of interconnection.

¹ Language excerpted from Minn. Stat. § 216B.164

² Language excerpted from Minn. Stat. § 216B.164

- An energy office or other expert agency should establish the methodology for conducting the value of solar study using a stakeholder process, operating against deadlines. The methodology should be submitted to the Public Service/Utility Commission for approval.

Sample language:

The [energy office] must establish the distributed solar value methodology, no later than [date]. The [energy office] must submit the methodology to the [PSC/PUC] for approval. The commission must approve, modify with the consent of the [energy office,] or disapprove the methodology within 60 days of its submission. When developing the distributed solar value methodology, the [energy office] shall consult stakeholders with experience and expertise in power systems, solar energy, and electric utility ratemaking regarding the proposed methodology, underlying assumptions, and preliminary data.³

- The value of solar should be updated annually.

Applying Value of Solar Studies

Value of solar studies have been used for a wide range of purposes, including:

- Benchmarking solar energy offers from independent power producers. Competitive solicitations indicate the lowest price among competing offers, but provide no real understanding of whether the lowest price is a good value.
- Benchmarking direct incentives. Value of solar study results can be used to index above-market incentives like rebates, performance-based incentives, feed-in tariffs, and others. With incentives, the objective is to set a rate that induces market behavior by overcoming market failures without encouraging free riders.
- Defending net metering offset rates set at the otherwise applicable retail consumption rate. When value of solar studies are done well, they generally show value in excess of retail rates for “brown” power. As such, they demonstrate that offsetting at the retail rate does not create a subsidy to solar customers; in fact, such analysis suggests that solar customers provide long-term support to all other customers and the grid.
- Setting the offset rate for distributed solar generation by customers. To date, only the City of Austin and the State of Minnesota have developed rates that use value of solar analysis for this purpose. Several other jurisdictions are exploring such use of value of solar analysis. Notably, the Connecticut Academy for Science and Engineering recently published a study advocating the use of value of solar analysis for setting the offset rate for community or shared clean energy facilities.

³ Language excerpted from Minn. Stat. § 216B.164

Additional Resources

Karl R. Rábago

Executive Director, Pace Energy and Climate Center
Co-Director, Northeast Solar Energy Market Coalition
krabago@law.pace.edu | (512) 968.7543

The Value of Solar Tariff: Net Metering 2.0

The ICER Chronicle, Ed. 1, p. 46 | International Confederation of Energy Regulators | December 2013

A Regulator's Guidebook: Calculating the Benefits and Costs of Distributed Solar Generation

K. Rábago & J. Keyes, Interstate Renewable Energy Council | October 2013

Maine Value of Solar Study

Maine Public Utilities Commission | March 2015