

Valuing Clean Distributed Energy

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Distributed Energy Resources

- “DER”
- Generation, demand response, efficiency, storage, electric vehicles, etc.
- Embedded in the distribution system
- “Smaller” in scale
- Often, “behind the meter”
- Can be provided by “3d parties”
- 2-way, 3-way transactions

Responses to DER

- Prohibition vs. mandates
- Regulation (define as “utility,” or not)
- Extra charges vs. extra incentives
- Eliminate benefits vs. incentives
- New services from utilities vs. others
- Technical, regulatory, economic - internalization vs. bypass
- Utility transformation

Cost of Service Ratemaking

- Properly set retail rates =
 - Cumulated costs to provide delivered kWh @ meter
 - Plus, a margin (for profit, debt service coverage, etc.)
- A kWh of energy produced at or very near the point of consumption avoids all the costs reflected in proper cost-based rates, plus:
 - Customer bears financing, insurance, and operational risk
 - Renewable energy is drought-proof; carbon-proof; not subject to price volatility
 - Excess will, according to physics, serve the nearest unserved load; often higher-than-average value

Value-Based Rates – A Way Forward?

- Price \neq value; price \neq cost
- Economic efficiency, price signals
- Decoupling
 - Incentives from compensation
 - Compensation from consumption
- To “animate” DER markets
- For Solar, Savings, Storage, Smart, and Security

Compensation & Incentives

- Compensation should be fair rate for value received
 - *In God We Trust . . . All others bring data*
- Incentives should support policy preferences and be scaled to overcome market failures
 - *The “Goldilocks” test*
- Both are more easily managed apart

Ideal Solar Programs

- Fair to the utility and non-solar customers
- Fair compensation to the solar customer
- Decouple compensation from incentives
- Align public policy goals (decouple compensation from consumption)
- Intuitively sound and administratively simple

Core Objective of Solar Valuation

- “Rates and services in the public interest” that support:
 - Economic efficiency
 - Societal equity
 - Technological innovation
- “Cost of Service” - Quantitatively assess benefits and costs to the utility, utility customers, and society
- Establish the economic indifference value at which the utility can compensate the customer, or make and deliver the service themselves
- Rates should be based on data and analysis, not suppositions

Value of Solar Analysis Tool

- Developed in 2006 with help from Clean Power Research
- First used to benchmark IPP offers and PPA pricing
- Then used to benchmark commercial PBR (performance based rate)
- Covered energy, capacity, T&D, fuel price volatility, environmental for utility analysis
- Separate study characterized jobs and other economic development benefits (not everything belongs – hard to quantify, better venues)

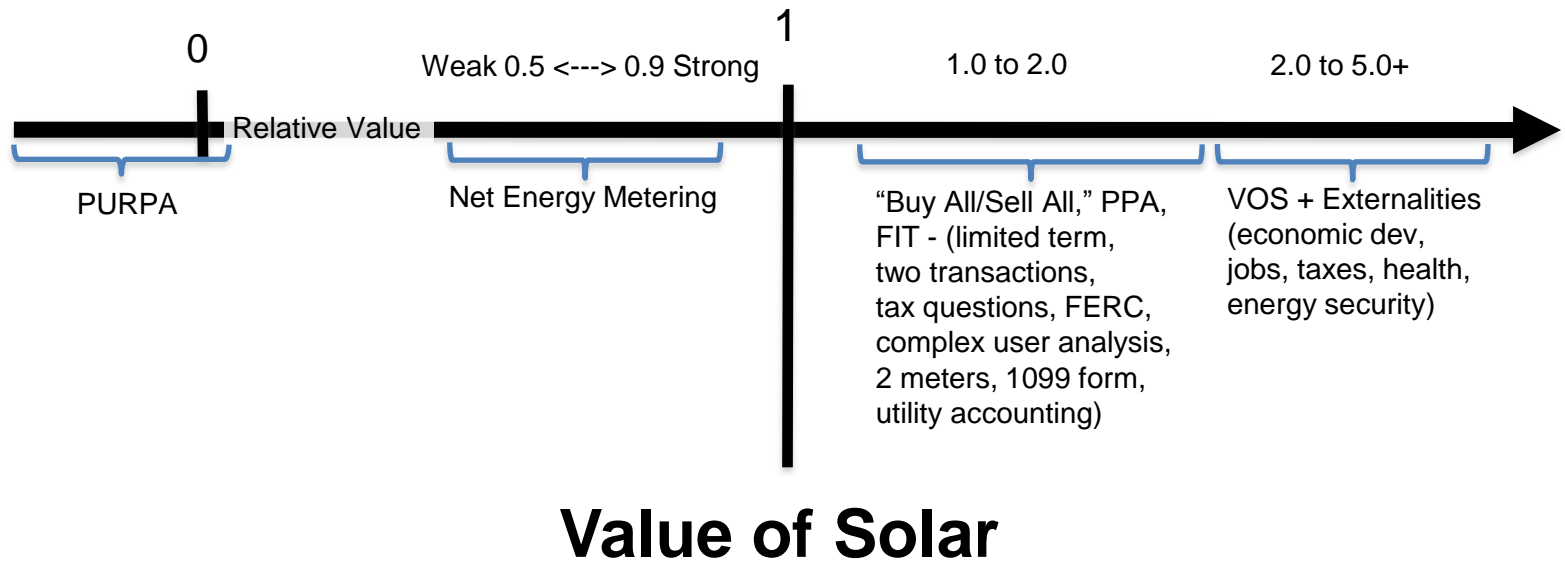
Solar Value: Analytical Approach

- When a customer and the community invest in solar, it provides valuable, privately-funded, clean electricity—at or very near the point of use. (Customer capital at risk)
- If the utility had to provide that same quality electricity, what would it be worth? What is the fair **value**?
- Analysis shows value or avoided expenses for:
 - Electric energy and capacity
 - Transmission & distribution (energy & capacity)
 - Line losses (transmission & distribution)
 - Fuel price hedging (cost to maintain stable fuel prices)
 - Environmental value (non-fossil, carbon-free, "waterproof")
- Analysis shows additional societal value, often >2X utility value, for jobs, economic development, local tax revenues, etc.

Determining the VOS Value

- Cumulative and long-term avoided cost
 - Like resource planning valuation
 - LCOE, adjusted for load match (intermittence), line losses, and risk
 - Conservative, known, and measurable
- Derives an energy value, so customer bears risk of non-performance
- Can set compensation separately from incentive levels, allowing better management of both

Solar Price Continuum vs. Value



Sample Solar Valuation - Maine

Figure ES- 2. CMP Distributed Value – 25 Year Levelized (\$ per kWh)

		25 Year Levelized			
		Gross Value A (\$/kWh)	Load Match Factor B (%)	Loss Savings Factor (1+C) (%)	Distr. PV Value D (\$/kWh)
Energy Supply	Avoided Energy Cost	\$0.076		6.2%	\$0.081
	Avoided Gen. Capacity Cost	\$0.068	54.4%	9.3%	\$0.040
	Avoided Res. Gen. Capacity Cost	\$0.009	54.4%	9.3%	\$0.005
	Avoided NG Pipeline Cost				
	Solar Integration Cost	(\$0.005)		6.2%	(\$0.005)
Transmission Delivery Service	Avoided Trans. Capacity Cost	\$0.063	23.9%	9.3%	\$0.016
	Avoided Dist. Capacity Cost				
Distribution Delivery Service	Voltage Regulation				
Environmental	Net Social Cost of Carbon	\$0.020		6.2%	\$0.021
	Net Social Cost of SO ₂	\$0.058		6.2%	\$0.062
	Net Social Cost of NO _x	\$0.012		6.2%	\$0.013
Other	Market Price Response	\$0.062		6.2%	\$0.066
	Avoided Fuel Price Uncertainty	\$0.035		6.2%	\$0.037
					\$0.337

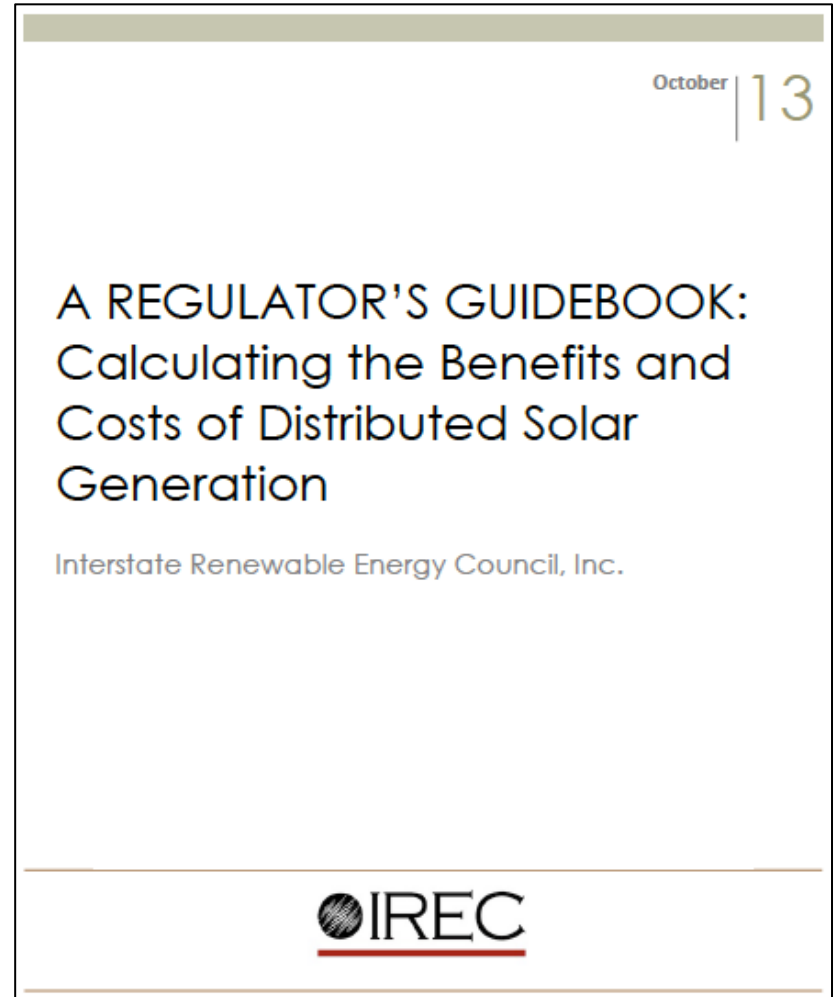
Avoided Market Costs: \$0.138

Societal Benefits: \$0.199

Distributed Solar Valuation: “A Regulator’s Guidebook”

Available through:

<http://irecusa.org>



Thank you!

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