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 ≠ value; price ≠ cost
- Economic efficiency, price signals
- Decoupling
  - Incentives from compensation
  - Compensation from consumption
- To “animate” DER markets
- For Solar, Savings, Storage, Smarts, 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)

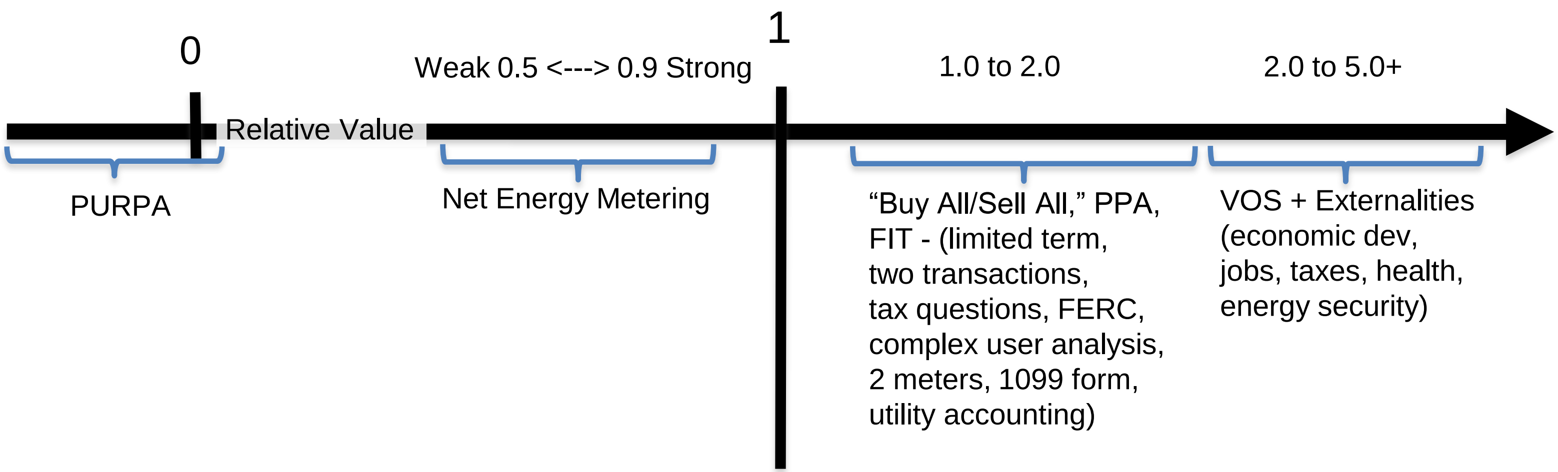
Solar Value: Analytical Approach

- 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



Value of Solar

Sample Solar Valuation - Maine

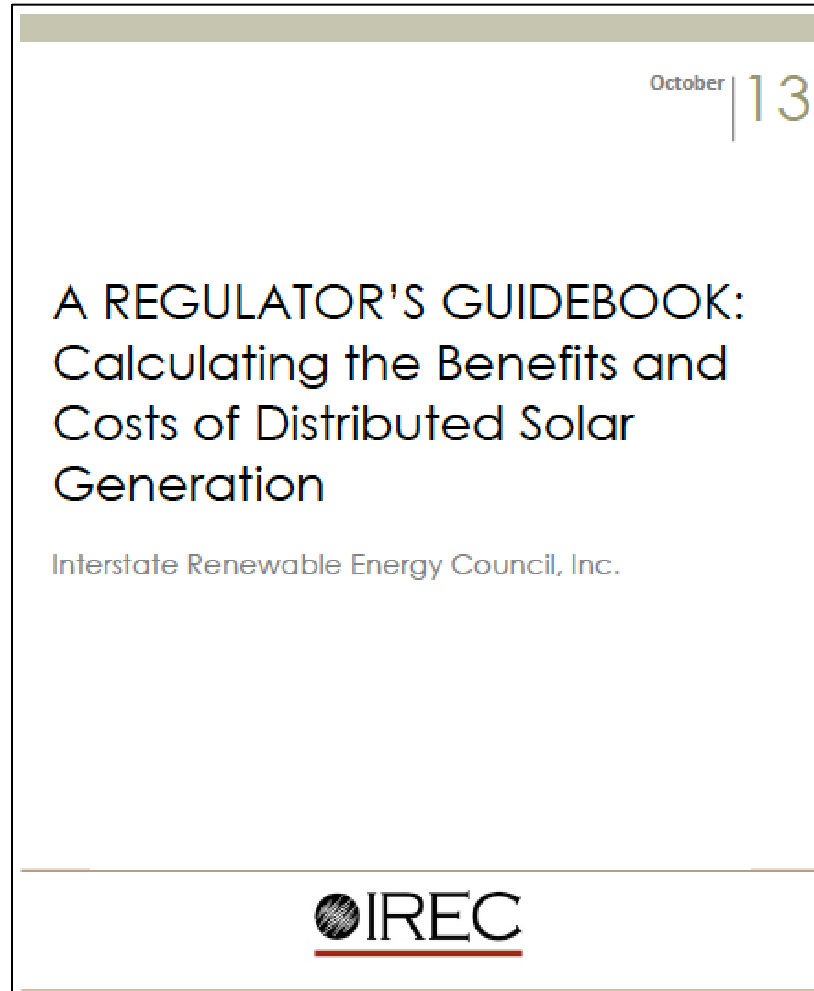
Figure ES- 2. CMP Distributed Value – 25 Year Levelized ($ per kWh)

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 Market Costs $0.138
	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	
Distribution Delivery Service	Avoided Dist. Capacity Cost								
	Voltage Regulation								
Environmental	Net Social Cost of Carbon	$0.020				6.2%		$0.021	Societal Benefits $0.199
	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	

Distributed Solar Valuation: “A Regulator’s Guidebook”

Available through:

http://irecusa.org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A REGULATOR’S GUIDEBOOK: Calculating the Benefits and Costs of Distributed Solar Generation

Interstate Renewable Energy Council, Inc.

IREC

Thank you!

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