



Solar Valuation in NEM 2.0



Task Force on Energy Supply
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Prepared by
Clean Power Research

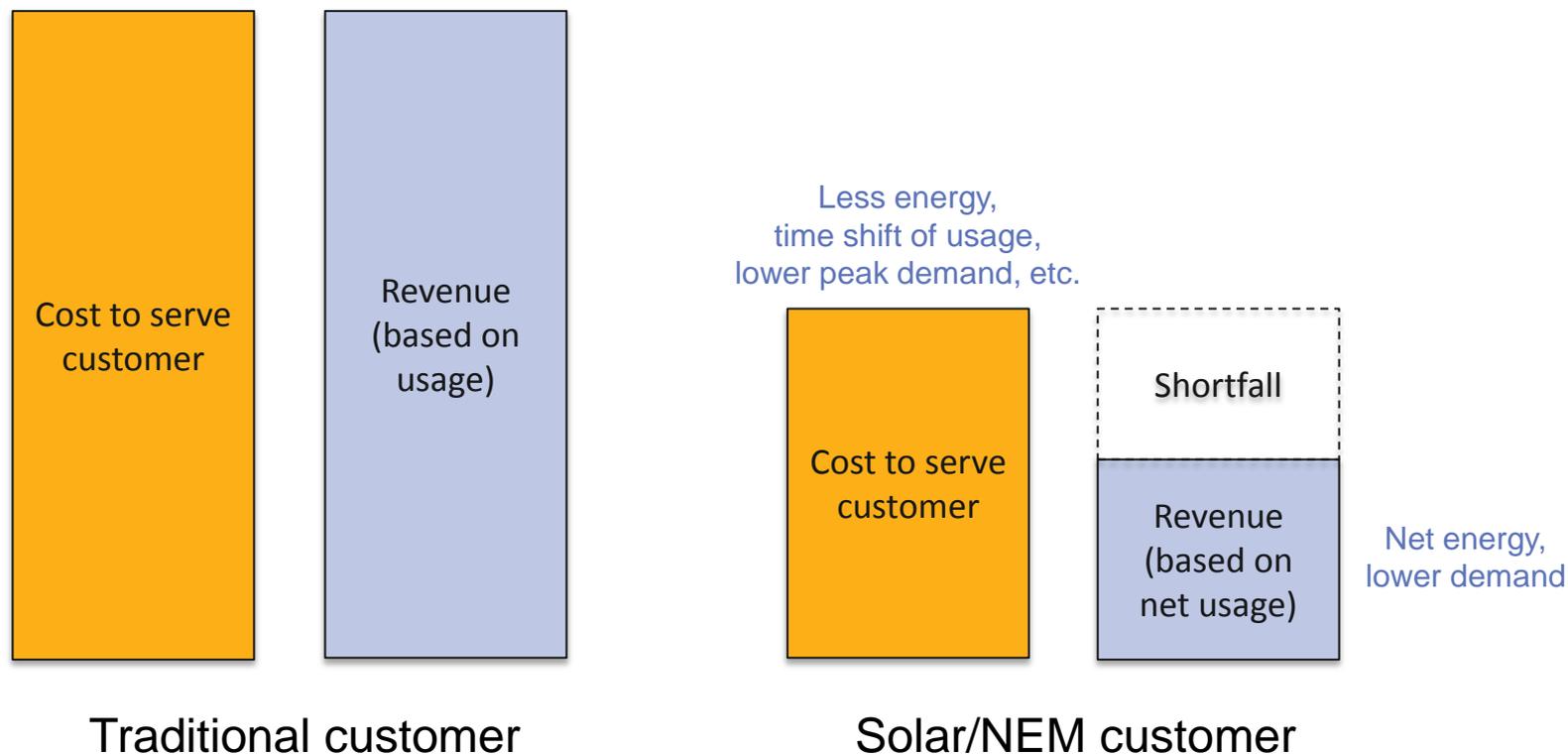
Clean Power Research solar valuation and fleet modeling studies

Utilities	Energy Agencies	Renewables Organizations
We Energies Nevada Power Austin Energy SDG&E (USD) Duke Energy CEPCI "Utility X"	NYSERDA CPUC Minnesota Dept. of Commerce	MSEIA Solar San Antonio IREC Utah Clean Energy "Organization Z"

DGValuator™ evolution

	Project	New methods and features
2012	NYSERDA/CPUC	<ul style="list-style-type: none"> Built DGValuator from prior study methods Public sources for hourly loads and economic data
	Mid-Atlantic SEIA	<ul style="list-style-type: none"> Market price reduction methodology
2013	Solar San Antonio	<ul style="list-style-type: none"> Reserve capacity
	SDG&E (USD)	<ul style="list-style-type: none"> Fleet profiles Separate T&D loss calculations
	Utility X	<ul style="list-style-type: none"> Future year generation investments Gas transport costs New final results chart
	Organization Z	<ul style="list-style-type: none"> Support for any DG production profile (e.g., export power)
	Utah Clean Energy	<ul style="list-style-type: none"> IRP generation data
	Austin Energy	<ul style="list-style-type: none"> Nodal pricing
2014	Minnesota	<ul style="list-style-type: none"> Capacity/heat rate linkage Representative fleet modeling Simplified ELCC method

How do we allow solar onto the grid while making sure that utilities can recover their costs?



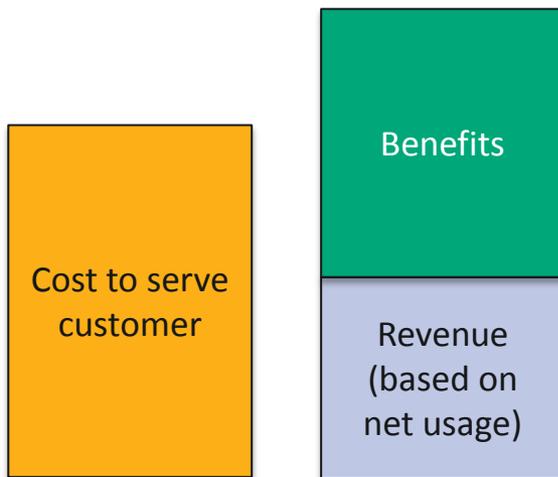
Yes, but what about the benefits of solar?

Utility costs		Examples	Impact of solar
Energy costs		Fuel, plant O&M, wholesale power purchases	Reduces all of these costs
Capacity costs		Plant capacity, transmission lines, substations, distribution lines	Can reduce these, depending upon solar/load match
Fixed costs		Metering, line maintenance, billing customer service	Generally, no impact

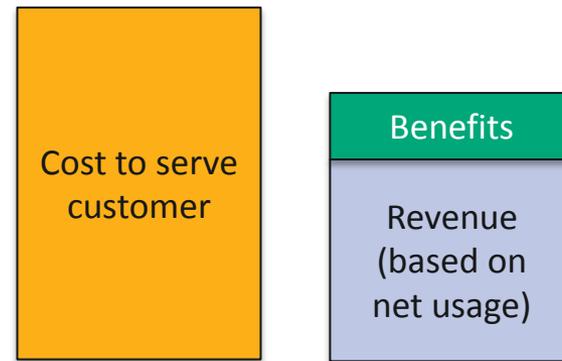
So, do the benefits make up for the shortfall?

“Of course they do. DG reduces line losses. You don’t have to build new plants. They create jobs, help the environment, and....”

“There are some savings, such as fuel. But there are also costs to handle variability, ramp rates, and...”



Optimistic view.

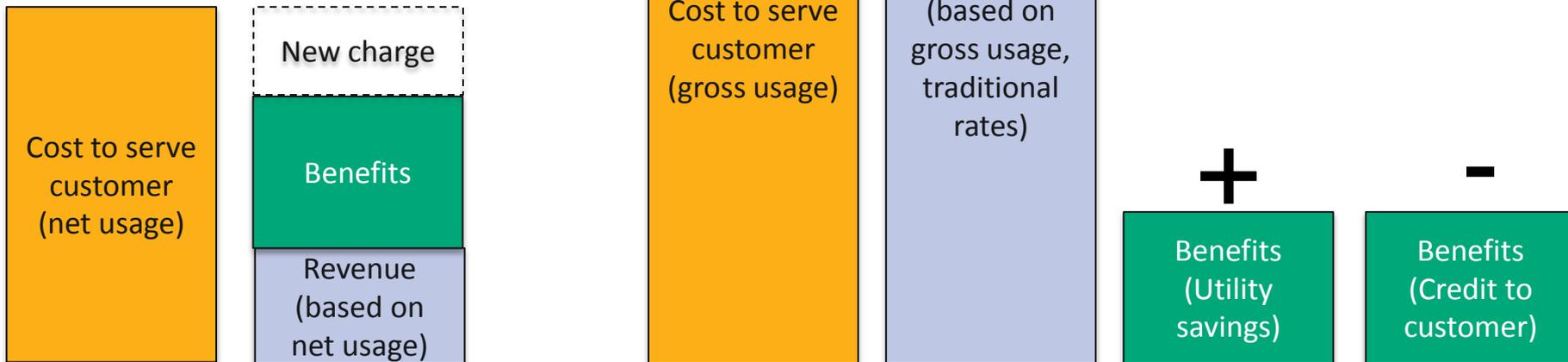


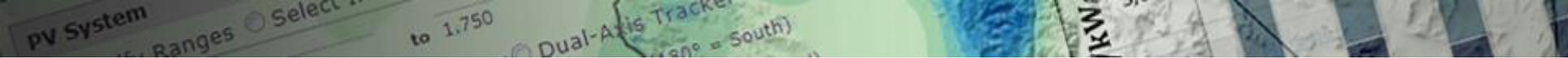
Cautious view.

NEM 2.0 - Two possible solutions

Solution 2. Charge for usage as always, but credit solar based on value/savings ("value of solar," VOS)

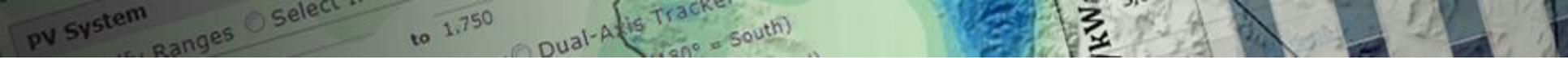
Solution 1. Add new demand charges or fixed charges





Solar valuation

- Regardless of solution, the key is to be able to analytically determine the benefits.
- Benefits are net benefits: savings to the utility minus added costs associated with adding DG onto the grid.
- Benefits under NEM are evaluated for export energy; benefits under VOS are evaluated for gross solar production.
- Public policy shapes analysis methods and results.
- Valuation methodologies vetted through the stakeholder process (e.g., Minnesota). Requires high transparency of methods, assumptions.



Valuation principles

- The value represents locality-specific long term savings, minus costs, of distributed solar generation.
- The value does not represent an incentive, but does not preclude add-on incentives.
- The value must distinguish between utility avoided costs and societal benefits (which do not accrue to the utility).
- Utility avoided costs should be calculated such that the utility is economically indifferent to paying solar customers and delivering conventional energy.
- Societal benefits are a public policy decision. These are paid for by all ratepayers (solar and non-solar) to allow the utility to recover costs.

VOS categories and technical factors

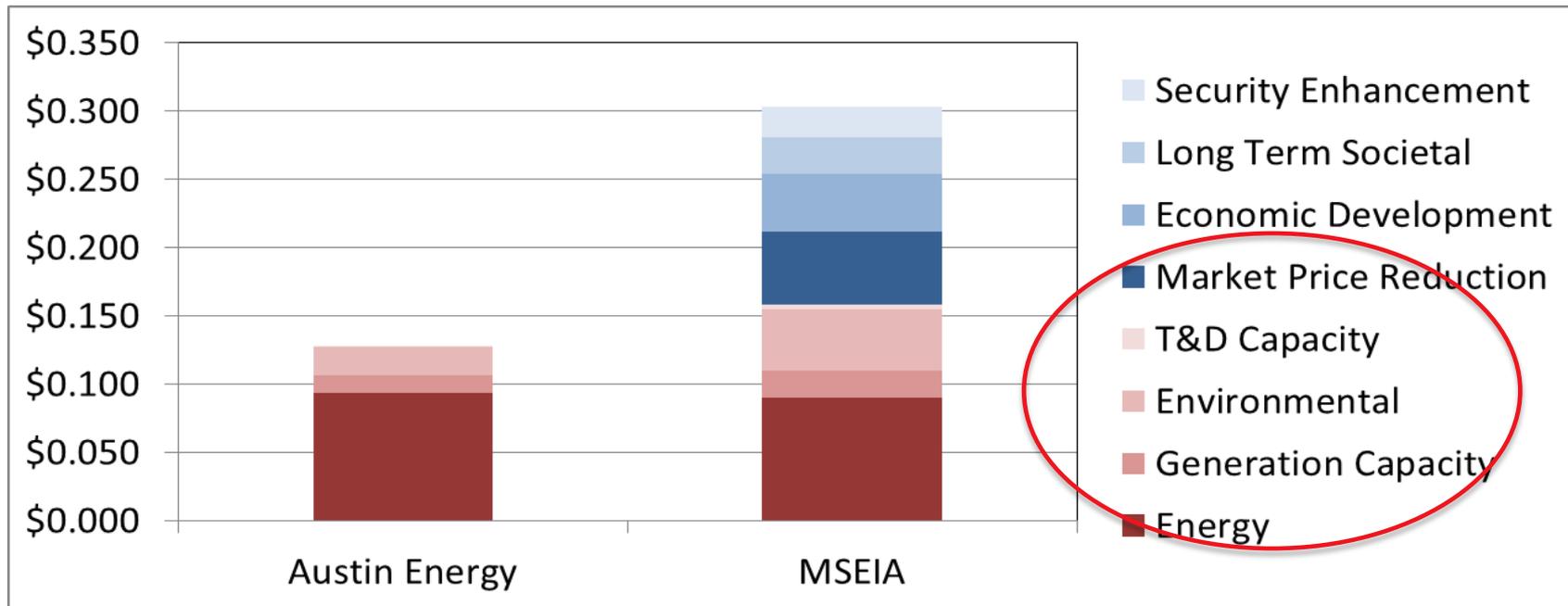
Minnesota Dept. of Commerce, 2014

- Avoided Fuel Cost
- Avoided Plant O&M - Fixed
- Avoided Plant O&M - Variable
- Avoided Gen Capacity Cost
- Avoided Reserve Capacity Cost
- Avoided Trans. Capacity Cost
- Avoided Dist. Capacity Cost
- Avoided Environmental Cost
- Avoided Voltage Control Cost
- Solar Integration Cost

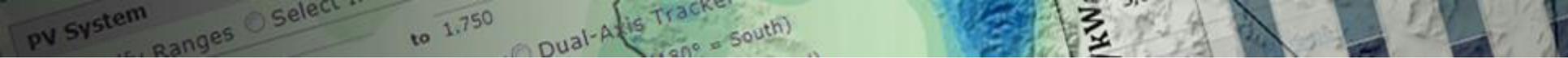
Gross Value (\$/kWh)	×	Load Match Factor (%)	×	(1 + Loss Savings Factor (%))	=	Distributed PV Value (\$/kWh)
GV1				LSF-Energy		V1
GV2		ELCC		LSF-Energy		V2
GV3				LSF-Energy		V3
GV4		ELCC		LSF-ELCC		V4
GV5		ELCC		LSF-ELCC		V5
GV6		ELCC		LSF-ELCC		V6
GV7		PLR		LSF-PLR		V7
GV8				LSF-Energy		V8

Value of Solar

Selection of value components: a matter of perspective



- (1) Proportionately allocate Loss Savings across categories for Austin Energy.
- (2) Group Fuel Cost Savings, O&M Cost Savings, and Fuel Price Hedge into Energy for MSEIA.
- (3) Allocate Solar Penetration Cost to utility benefits for MSEIA.
- (4) Location is Philadelphia for MSEIA.



Legislative guidance in solar valuation

- If possible, state the components to be included.
 - Example (Minnesota): Required that “value of energy and its delivery, generation capacity, transmission capacity, transmission and distribution line losses, and environmental value” be included.
- Otherwise, provide guidance to evaluate components.
 - Example (Minnesota): other values may be considered based on “known and measurable evidence of the cost or benefit of solar operation to the utility.”
- Consider handling societal benefits as an incentive, rather than a value component.



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