The True Value of Solar

Presentation Overview – based on a compilation of various Value of Solar Methodologies

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Categories for Value of Solar

Category	Definition
Energy	Avoided energy market costs including fuel and plant O&M costs
Reserve Capacity (Resource Adequacy)	Avoided capital cost of generation to meet planning marging and ensure reliability
Generation Capacity	Avoided capital cost of generation to meet peak load
T&D Capacity	Avoid capital cost of transmission and distribution to meet peak load
T&D Losses	Avoided transmission and distribution line losses
Market Price Response (Congestion)	Avoided cost of wholesale power reduced according to reduction in demand
Grid Support Services	Avoided cost to regulate voltage and provide grid resiliency and reliability
Natural Gas Pipeline Costs	Avoided costs to build addition pipeline capacity
Fuel Uncertainty	Avoided risks in hedging future fuel prices
Safety	Improved public safety and reduced potential for property damage
Societal	Externalities associated with benefits and avoided costs to the larger society
Environmental	Externalities associated with environmental benefits and avoided costs.
Economic Development	Enhanced tax revenues associated with net job creation for solar versus conventional power generation
Security	Reduced risks derived from greater supply diversity
Integration Costs (negative value)	Additional costs incurred to accept variable solar generation onto the grid

- Key Insight: Different methodologies employ different value categories resulting in different values of solar

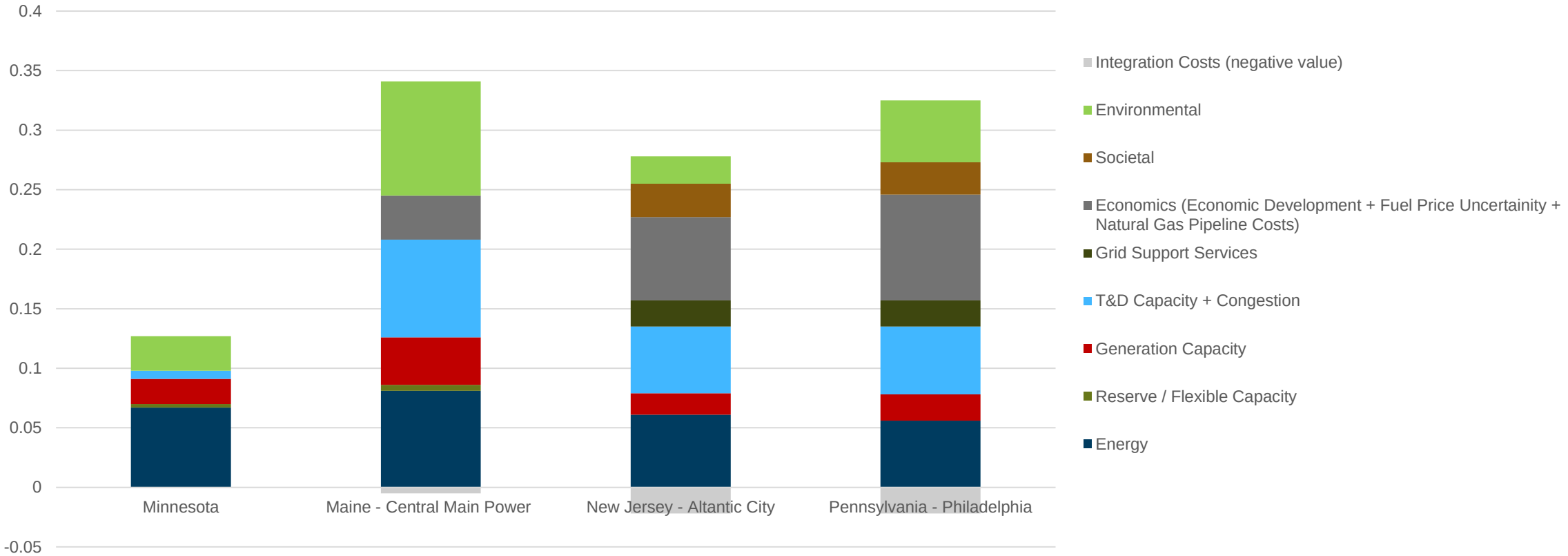
Categories for Value of Solar across Methodologies

Value Categories	ICF International (Whitepaper)	California (More than Smart)	California (CPUC Guidance)	Minnesota	Austin, Texas	Maine	Massachusetts	Arizona	New Jersey	Pennsylvania	IREC
Energy											
Reserve Capacity (Resource Adequacy)											
Generation Capacity											
T&D Capacity											
T&D Losses											
Market Price Response (Congestion)											
Grid Support Services											
Natural Gas Pipeline Costs											
Fuel Uncertainty											
Safety											
Societal											
Environmental											
Economic Development											
Security											
Integration Costs (negative value)											

	Methodology is used in the study
	Methodology is not used in the study

- General agreement that avoided energy, generation capacity, T&D capacity, and environmental degradation are benefits of distributed generation photovoltaics (DGPV)
- General debate that reserve capacity, T&D losses, congestion relief, grid support services, natural gas pipeline costs, fuel uncertainty, safety, social, security, and economic development benefits as well as integration costs should be valued.

Value of Solar Results across States



- Minnesota: $.127/kWh
- Maine: $.337/kWh
- New Jersey: $.256/kWh
- Pennsylvania: $.305/kWh

- Key Insight: Maine reported the highest energy, reserve capacity, generation capacity, and environmental avoided costs, resulting in the highest value of solar

Assumptions in these Methodologies

- Discount rate (Weight Average Cost of Capital)
- PV degradation over time (Percent loss in efficiency)
- PV system life
- Generation capacity costs
- Generation heat rate
- Generation O&M costs and cost escalation
- End of term Natural Gas Futures price escalation
- Fuel price overhead
- Peak load and peak load growth rate
- Distribution capital costs and capital cost escalation
- Transmission line life
- Transmission capital cost escalation
- Reserve Planning Margin
- Effective Load Carrying Capability
- Peak Load Reduction
- Loss Savings
- Solar-weighted heat rate
- Etc.

Key Insight: Assumptions vary across methodologies and across locations. An individualized Value of Solar study should be conducted for each service territory.