



Valuing the Costs and Benefits of Solar

Workshop of Benefits and Costs of Distributed Generation

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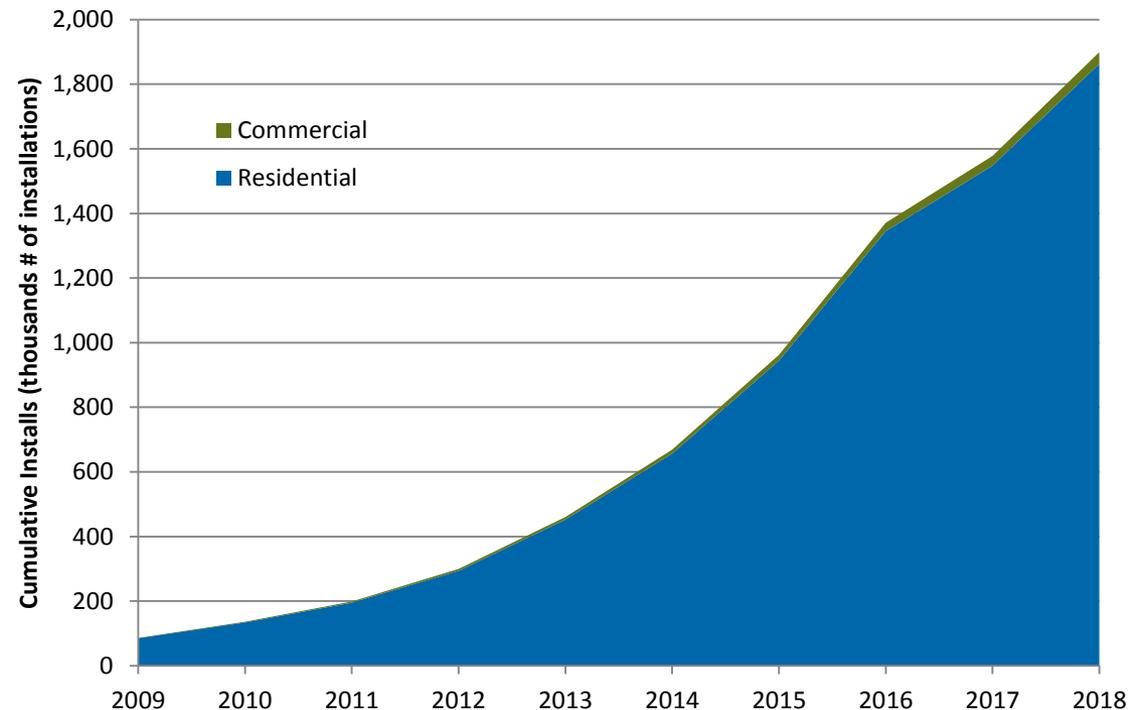
Agenda

- Solar adoption and the grid
- Existing value of solar studies
- Pulling it together and next steps

Most Systems Will Be Residential, Pressure on Net Metering Programs

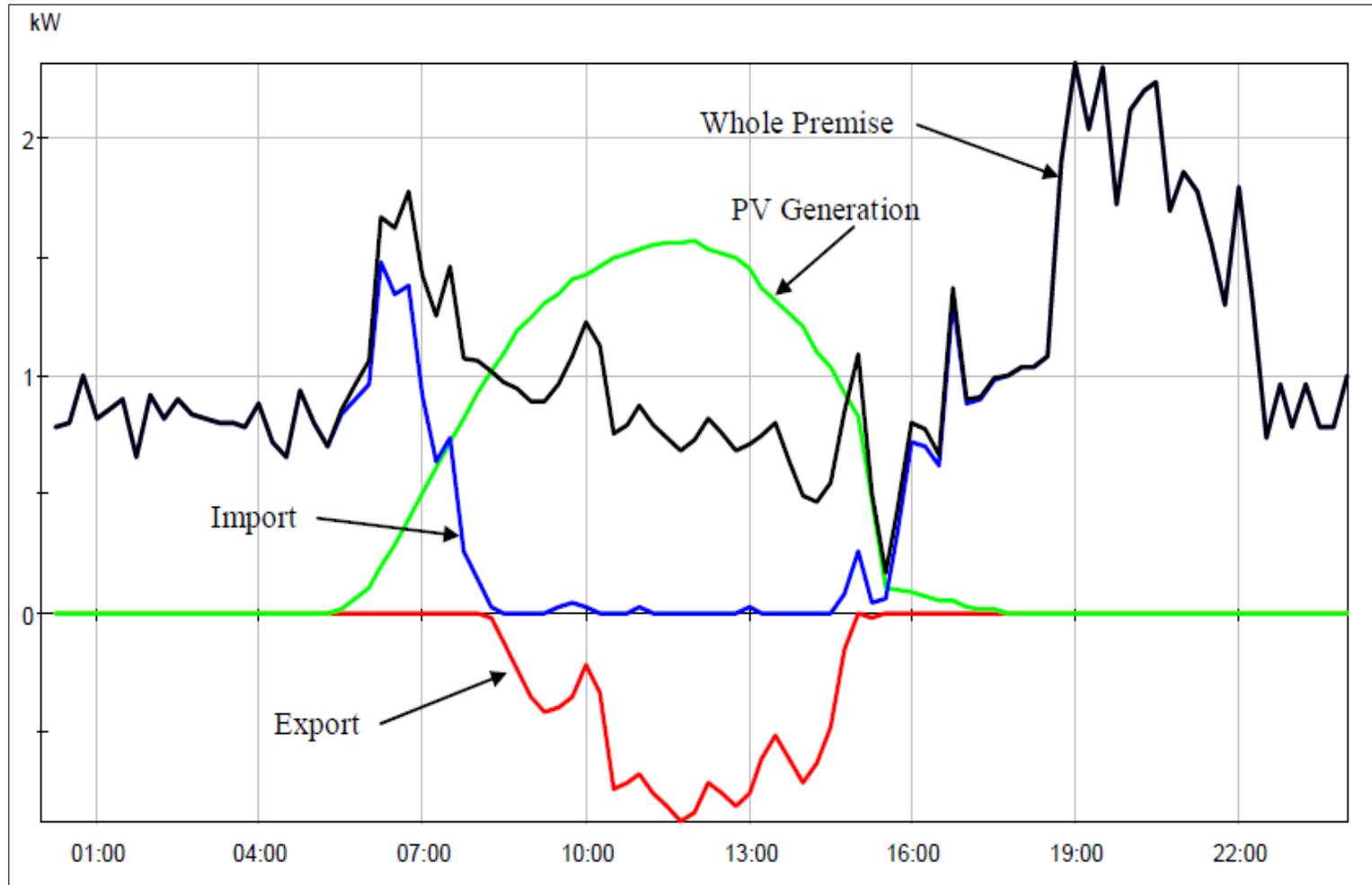
- Over 1.8 million DPV systems by 2018
- Over 25 GW installed
- 96% are residential systems
- Net metering/value of solar debates to intensify

U.S. Distributed PV Installation



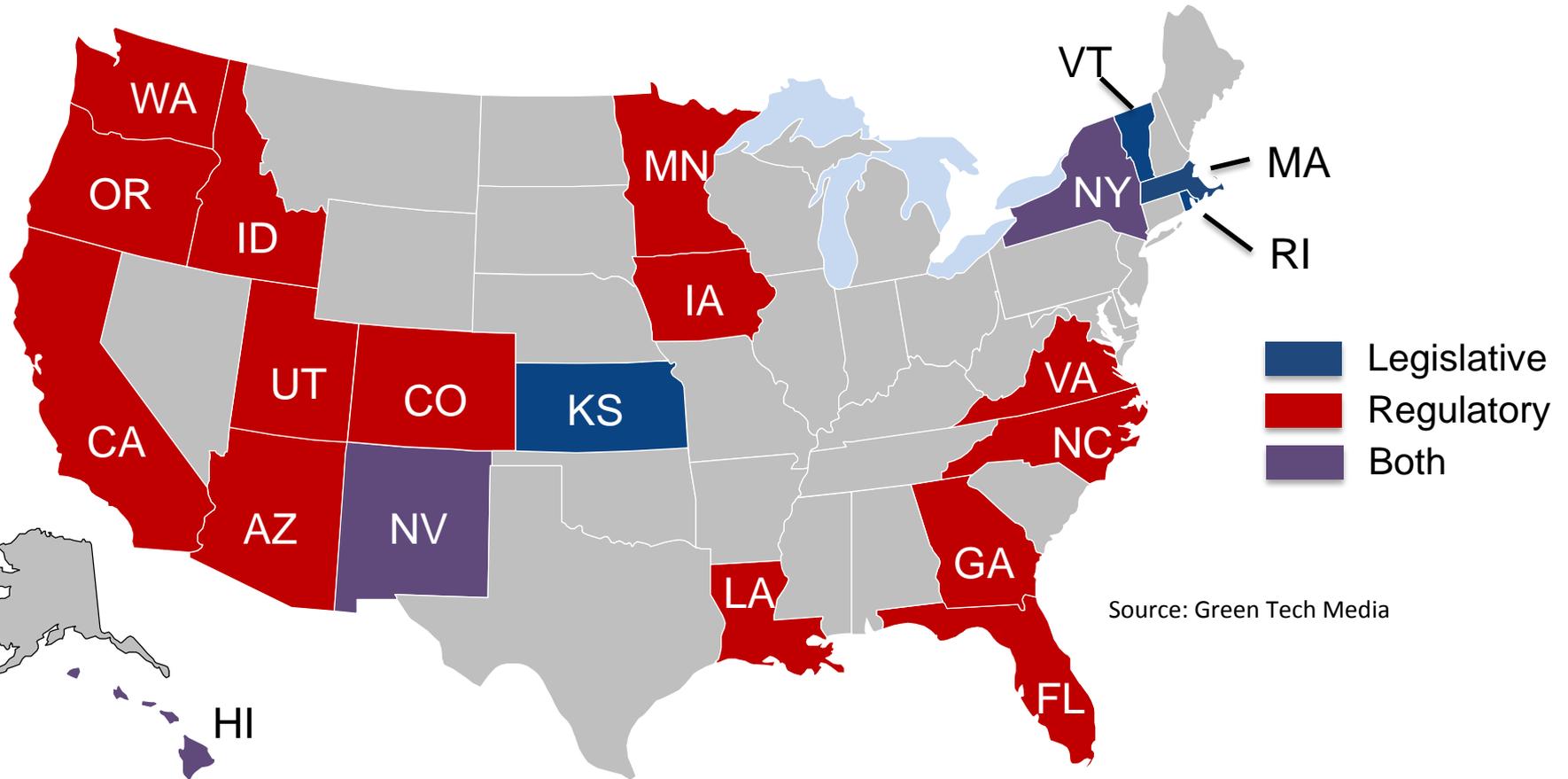
Source: Historical: SEIA | Projections: ICF

Predictable but not Coincidental with Peak – Residential Example



Source: CPUC California Solar Initiative 2009 Impact Evaluation Final Report, June 2010.

NEM In Flux Nationally



43 states and DC currently have NEM policies. ID, TX and SC have voluntary NEM. TN, MS, AL & SD have no NEM policy

Value of the Grid

- “Recovering the fixed costs of the grid is becoming more challenging. While customers are discovering new opportunities that enhance the value that the grid brings to them, **policy makers should rethink how utility costs are recovered, with consideration needed for new rate designs and new approaches that balance the desire to promote innovation while still enabling recovery of the capital investment that recognizes the value of the grid to all customers and their new uses of the grid.**” NRDC and the Edison Electric Institute, February 2014.
- "If a regulatory and societal objective is to integrate DG into the grid in a manner that provides maximum value and minimum harm to the grid and the customers it serves, then consumers and participants must be provided the tools and prices designed to achieve that objective...**New regulatory policies and new rate designs are critical. Merely tweaking traditional rate design and regulation will not be sufficient.**" Gale Brent Gale, Berkshire Hathaway Energy's senior vice president, according to a copy that was provided to SNL Energy.

Major Issues to Address with Widespread DER Adoption

- Rate Reform
- Distribution system operator
- Utility of the future
- System resource planning
- Value of solar and value of the grid

Net Value of Solar Cost & Benefit Categories Reviewed



Energy and Capacity

- Avoided Energy, Losses and Generation Capacity
- Avoided T&D losses and capacity



Grid Support Services

- Reactive supply and voltage control, regulation and frequency response, energy and generator imbalance, synchronized and supplemental operating reserves



Financial

- Fuel Price Hedge & Market Price Response



Security

- Reliability, Resiliency



Environmental

- Air emissions, water, and land



Social

- Economic development (jobs, economic activity)

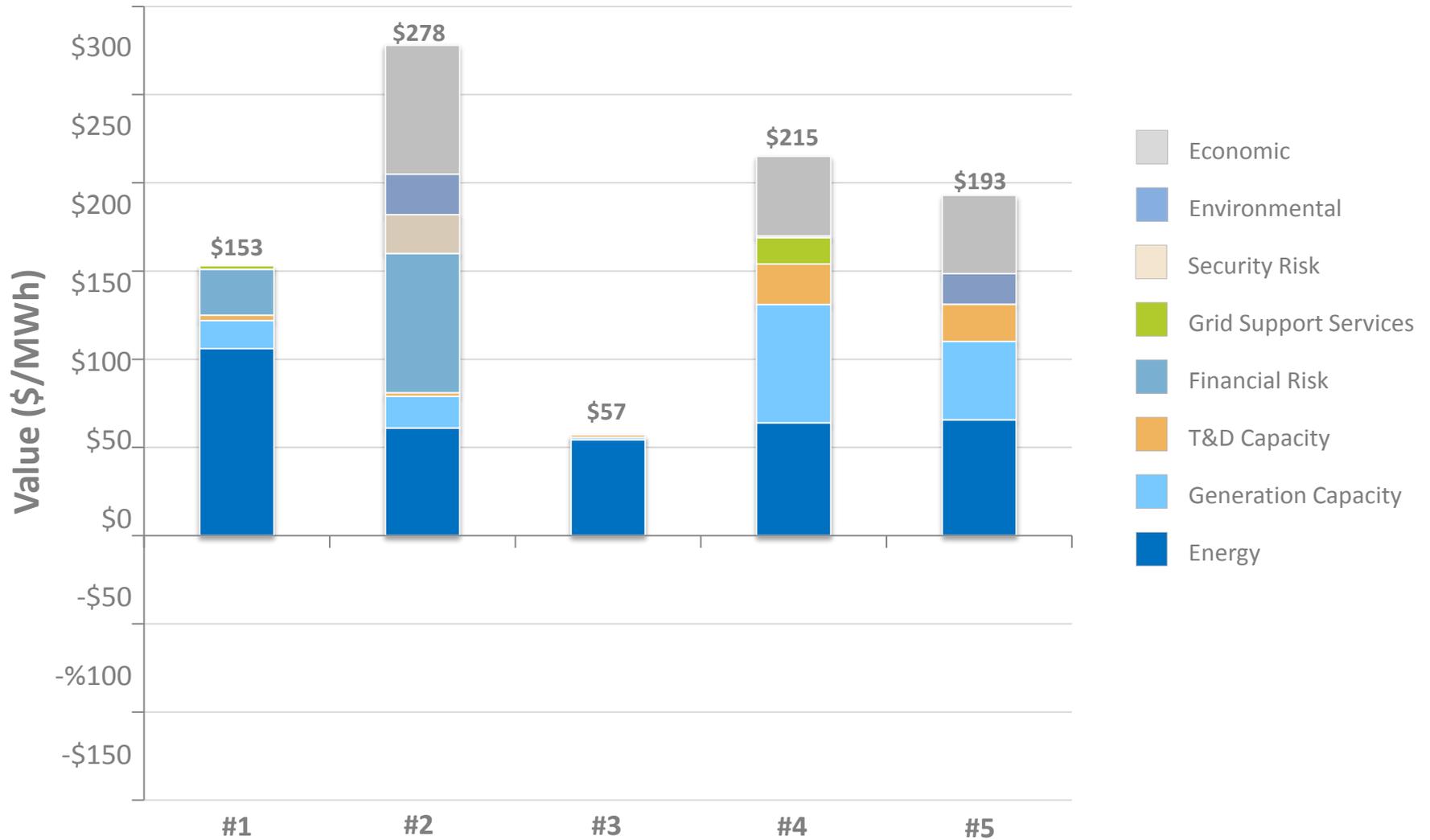
Source: SEIA, Rocky Mountain Institute.

- Six categories of values, consistent with those identified by SEIA and the Rocky Mountain Institute, are commonly used, although the studies often differ in their methodologies and in their selection of which issues fit into which criteria.

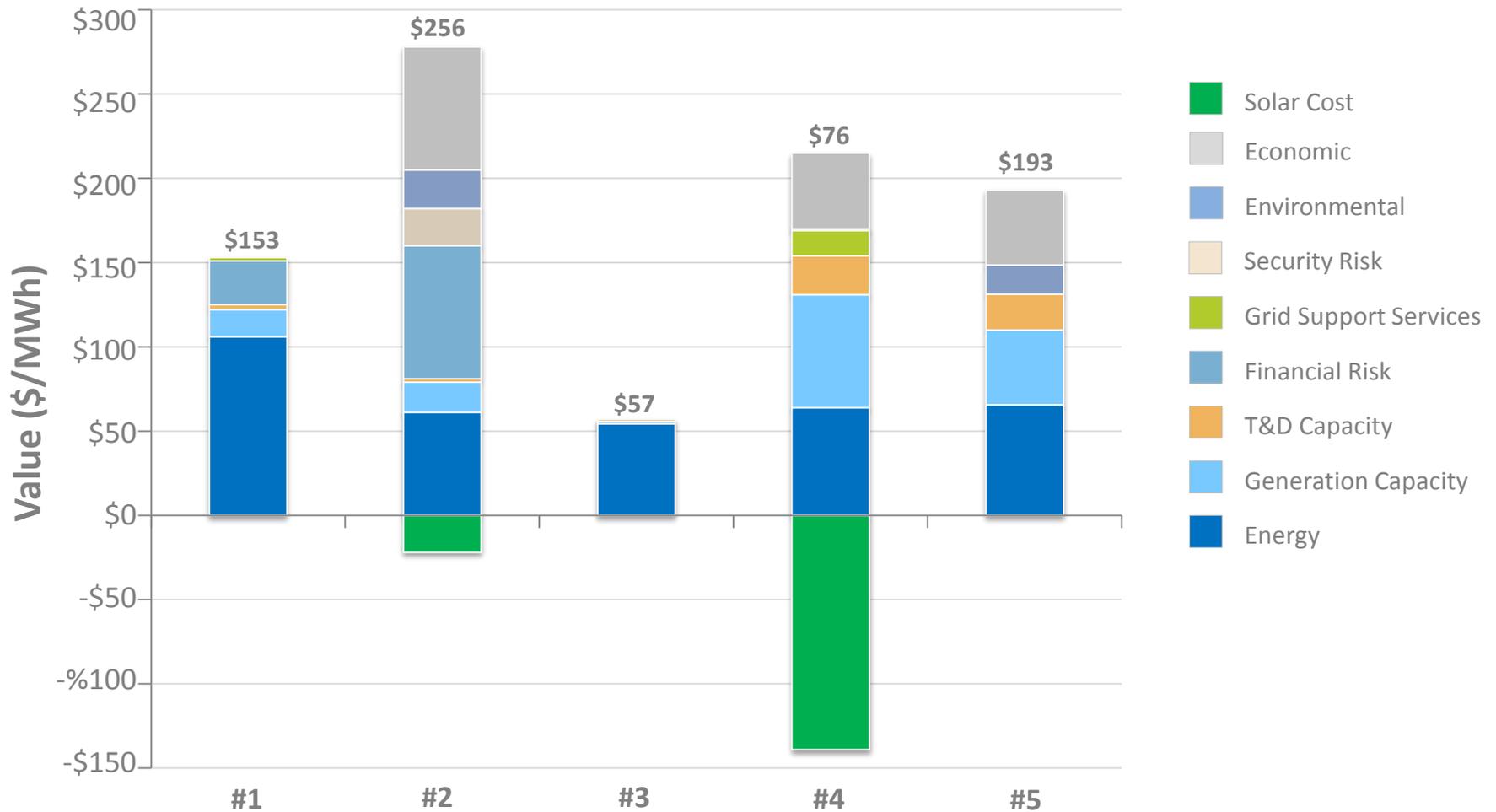
VOS – Inconsistencies Amongst Existing Studies

- Methodologies, benefit categories included and results of the studies reviewed vary substantially both across states and within states.
- ICF recommends that future policy decisions pertaining to solar PV be guided by new studies that
 1. Adopt a comprehensive and consistent set of value criteria, and
 2. Utilize methodologies that balance perspectives from all stakeholder groups.

Summary of Gross Benefits By Study (\$/MWh)



Summary of Net Benefits By Study (\$/MWh)



Pulling It Together

- Approaches need to be consistent, transparent, fair, easy to replicate and not costly to implement
 - Guard against precision without accuracy
- DPV can be more than a reduction in load but also export to the grid
- Value of solar analysis is one of many actions to take due to the rapid and successful growth in DPV and other distributed energy resources
 - Tariffs
 - Distribution planning and communication
 - Impacts across transmission and distribution investment and operations
 - Fast ramping generation and DR to account for solar generation
 - Utility of the Future, DSO's and role of 3rd parties

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