

Business case analysis for community solar

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Presentation Layout

1. What/when

- business case results

2. How

- Conservative modeling with respect to Return on Equity

3. How, but faster

- TOU rates vs fixed, load carrying capacity of solar, monte-carlo simulations of LCOE capturing full range: exemplary-conservative

What / when: Main takeaways

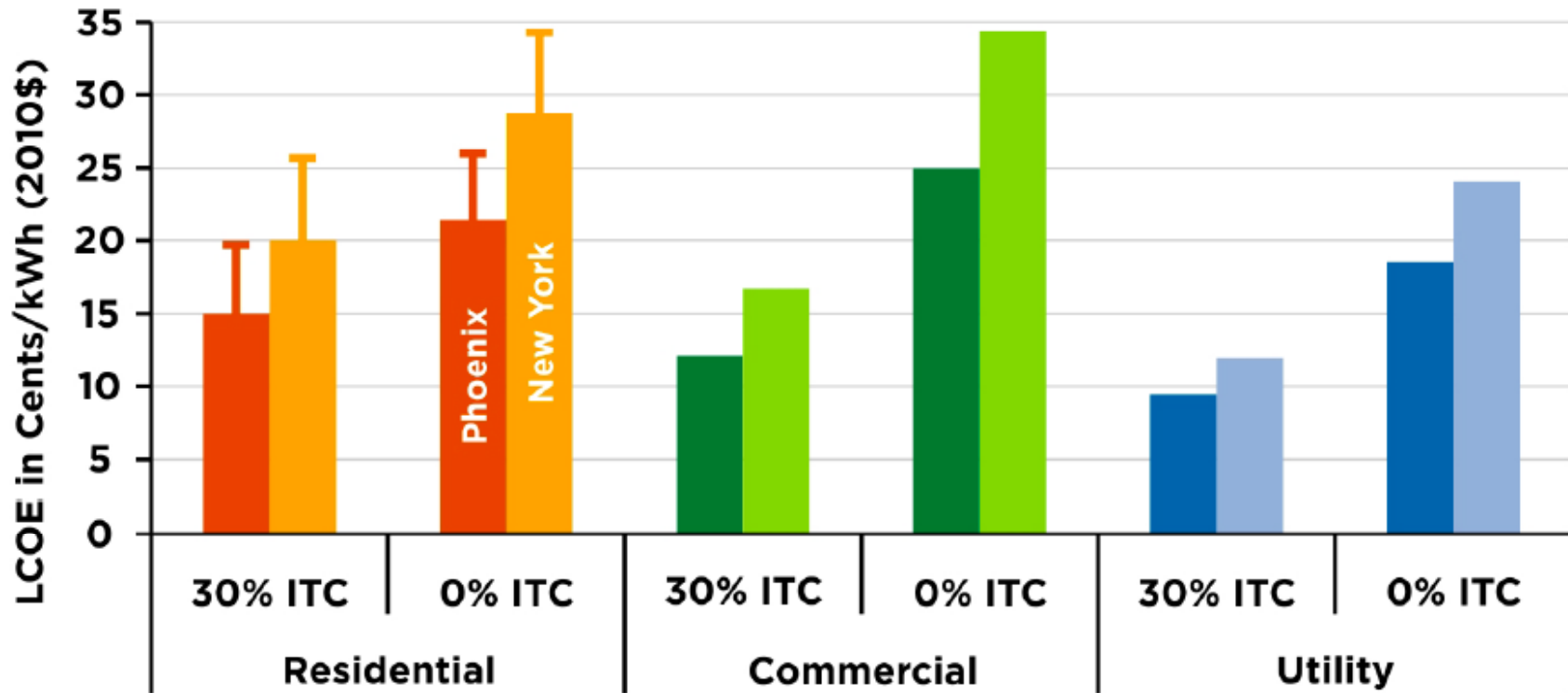
1. **Grid Parity of unsubsidized Community Solar in moderate insolation areas with rates within a few cents of national averages, s.a. Illinois is estimated in this scenario to occur in 2018**
1. **Same for residential solar is projected to occur in 2016**
2. **A conservative investment case for an unsubsidized community solar project under a delivery-balanced utility program may have to wait until 2020.**

How.

- Modeling objective: ROE for community solar > 0
 - Projections from DOE SunShot projections
 - Independent LCOE/ROE analysis using the SEDICO model that was developed and stress tested with VC group and
- Key Drivers
 - Community solar programs enabled by utilities
 - » $(\text{SCE Credit}) = (\text{TARR}) - (\text{Delivery Charge to utility})$
 - Argonne LCOE sensitivity study: Discount rate most sensitive parameter in LCOE analysis

LCOE for PV

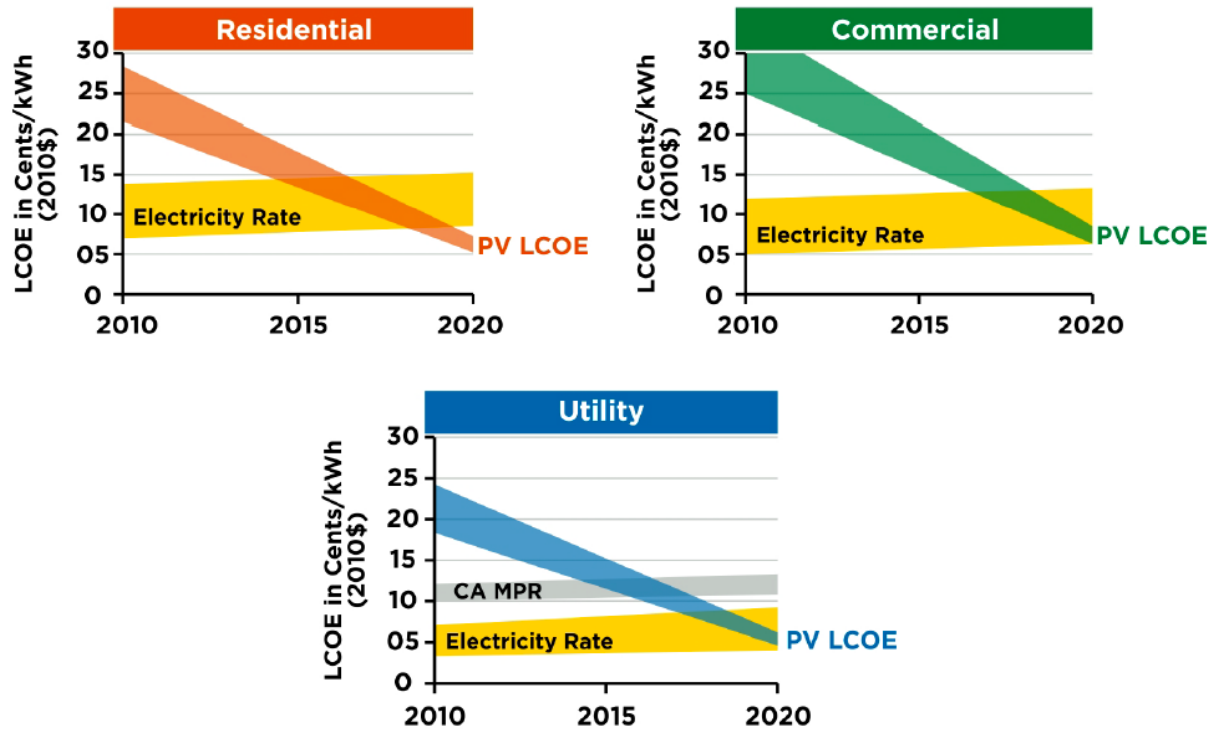
SunShot Vision Study February 2012



LCOE for PV Systems in Phoenix (left bars) and New York City (right bars) in 2010, with and without the Federal Investment Tax Credit

Grid Parity Projections

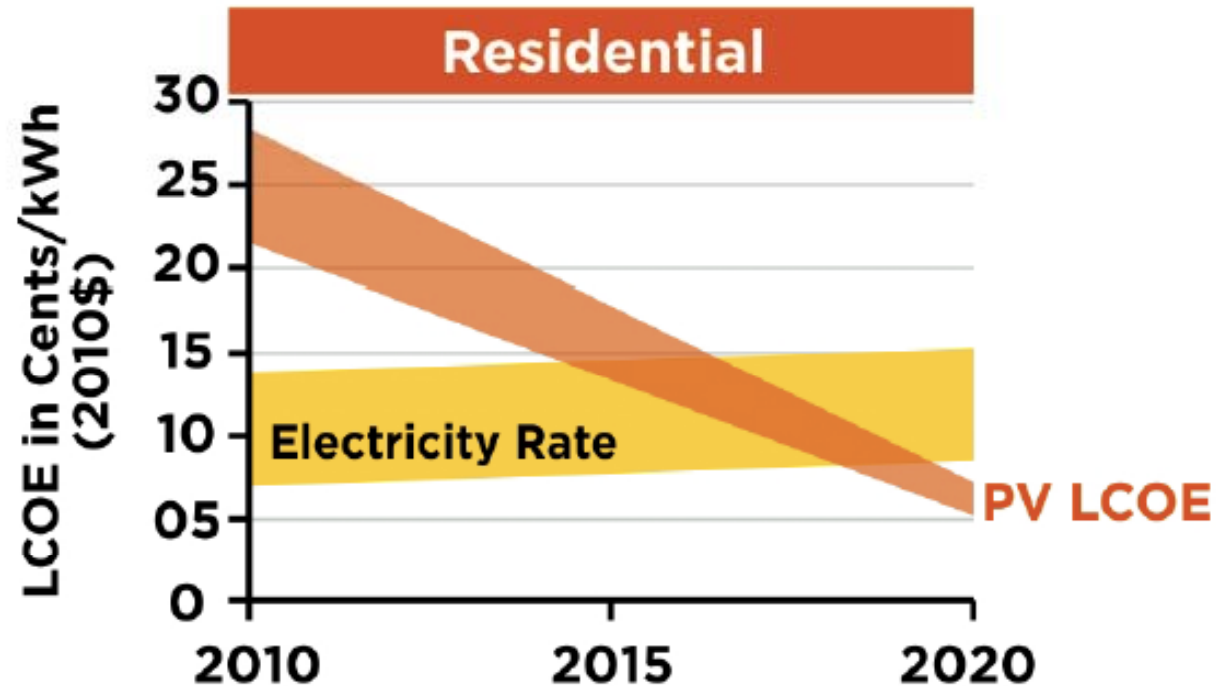
SunShot Vision Study February 2012



LCOE for PV Systems without the Federal Investment Tax Credit

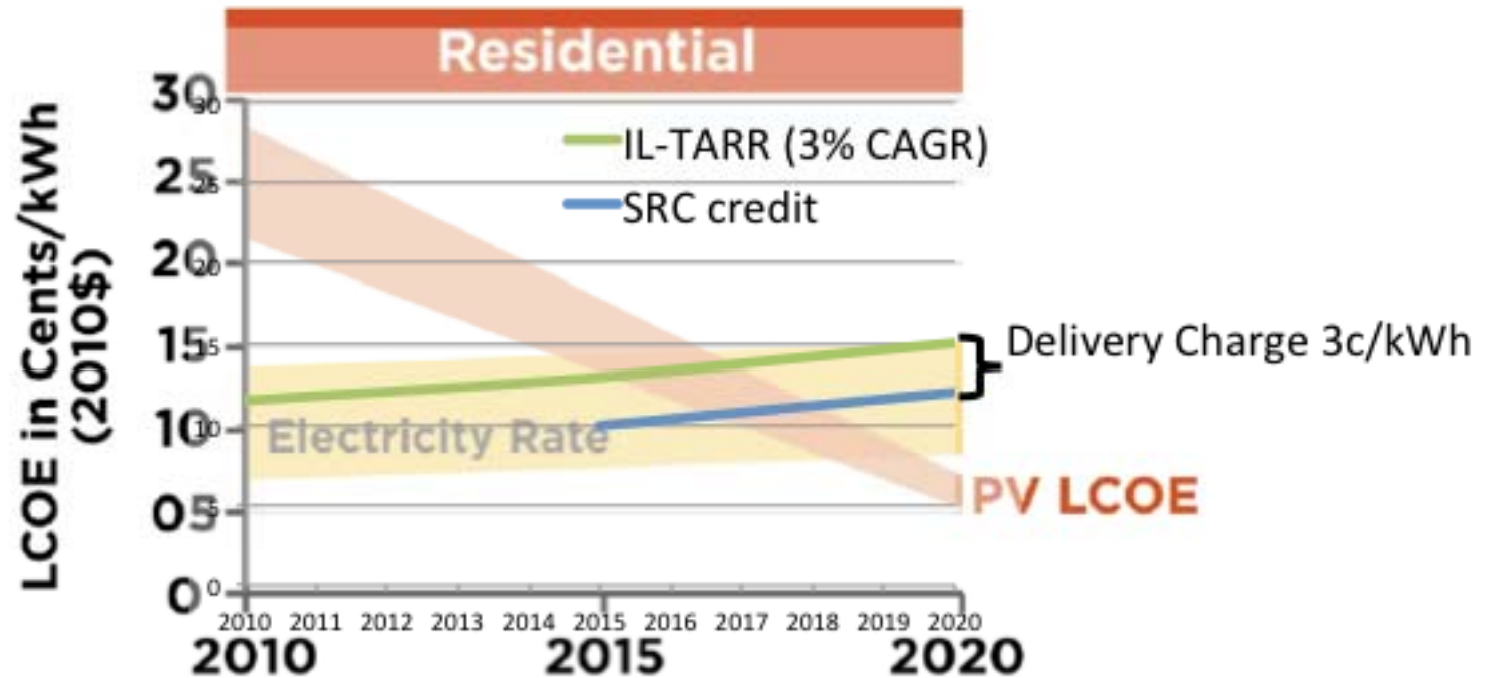
On-site roof-top solar

SunShot Vision Study February 2012



On-site

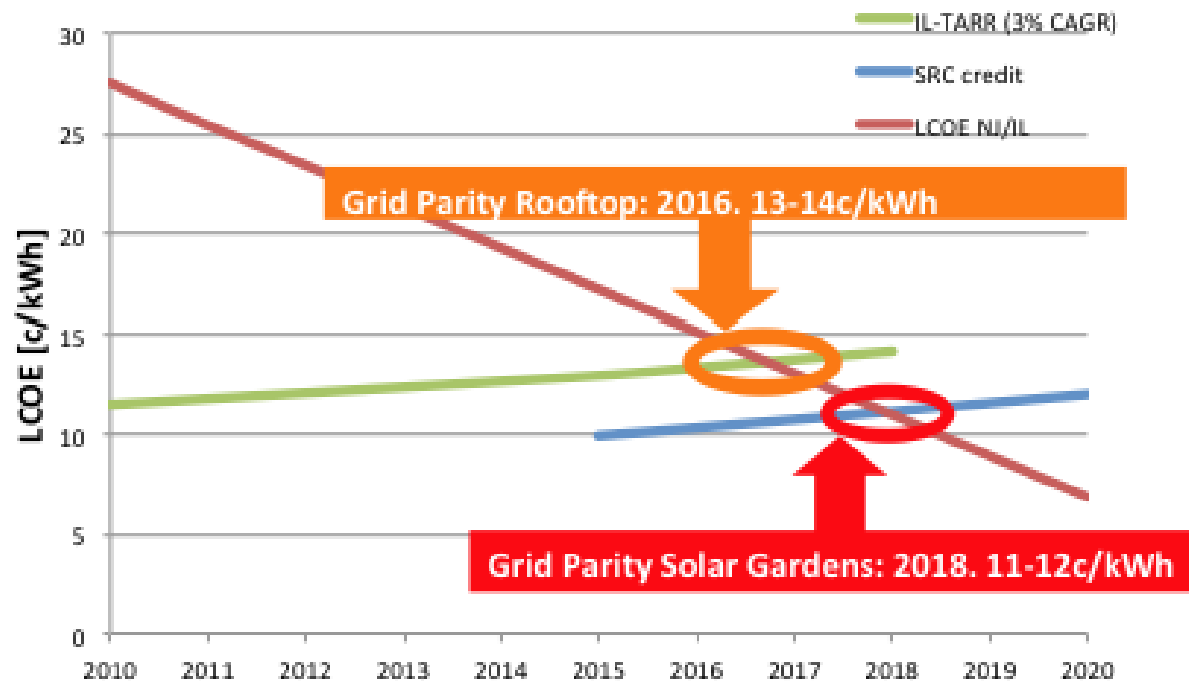
Community solar program



Program assumes 100% net metering and a fully loaded delivery charge based on the total capex, opex and revenue requirements for T&D

Grid Parity Roof Top vs Solar Garden

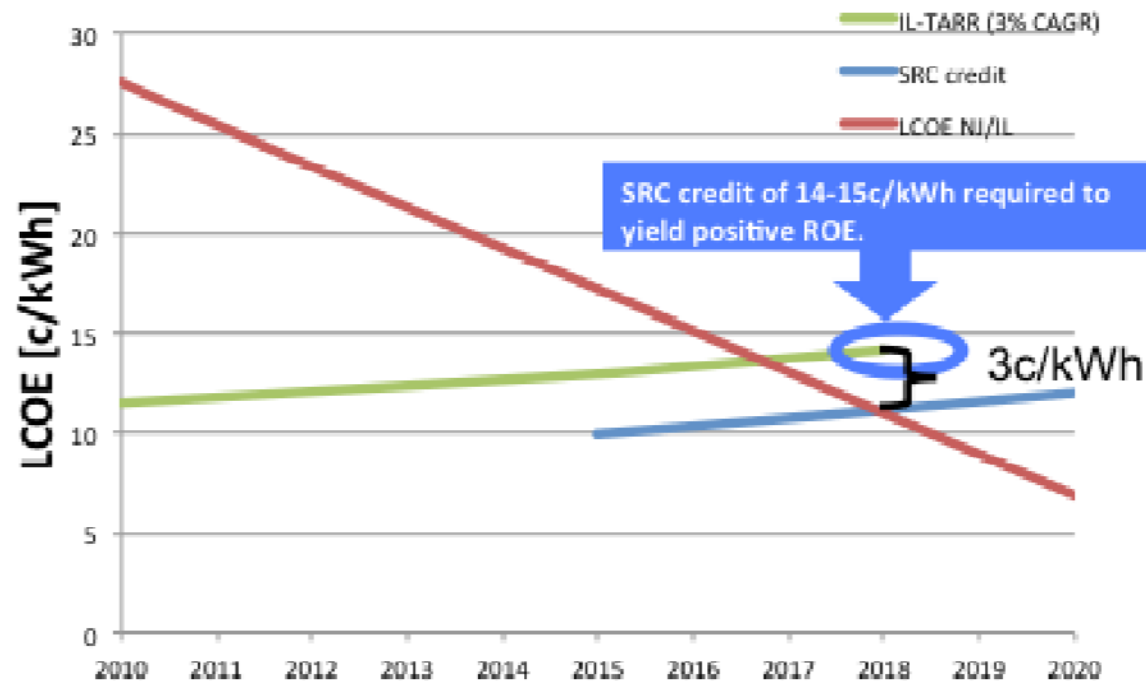
Sedico, Inc. LCOE&ROE model.



Modeling at intersection of fitted curves: In a relatively moderate insolation area like Illinois LCOE of 11-12c/kWh can be modeled using \$2.75-3.25/W installed price and typical TF n of 12% - HE Si n of 20%. 50 debt ratio, 5.5% Discount Rate, 3% inflation, 7% interest rate, 30 year meaningful system life and financial period.

ROE

Wired Group analysis



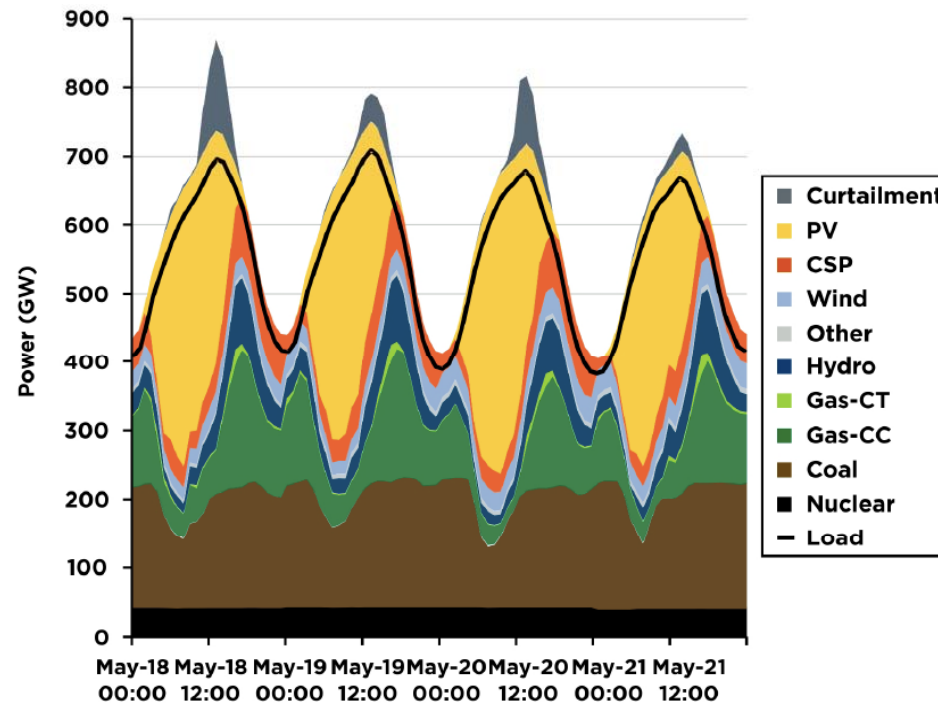
Given previous scenario. A 10kW share participation financed with \$15K equity and \$15K debt at an LCOE of 11.5 c/kWh, will yield a positive Return on Equity if the present value of the rate exceeds 14.5 c/kWh. I.e. the investment case for unsubsidized community solar project under a delivery-balanced utility program may have to wait for the successful completion of the SunShot program in 2020.

How – but faster!

1. TOU rates
2. ELCC
3. LCOE – Monte Carlo analysis by Argonne

Net metering / TOU pricing

SunShot Vision Study February 2012

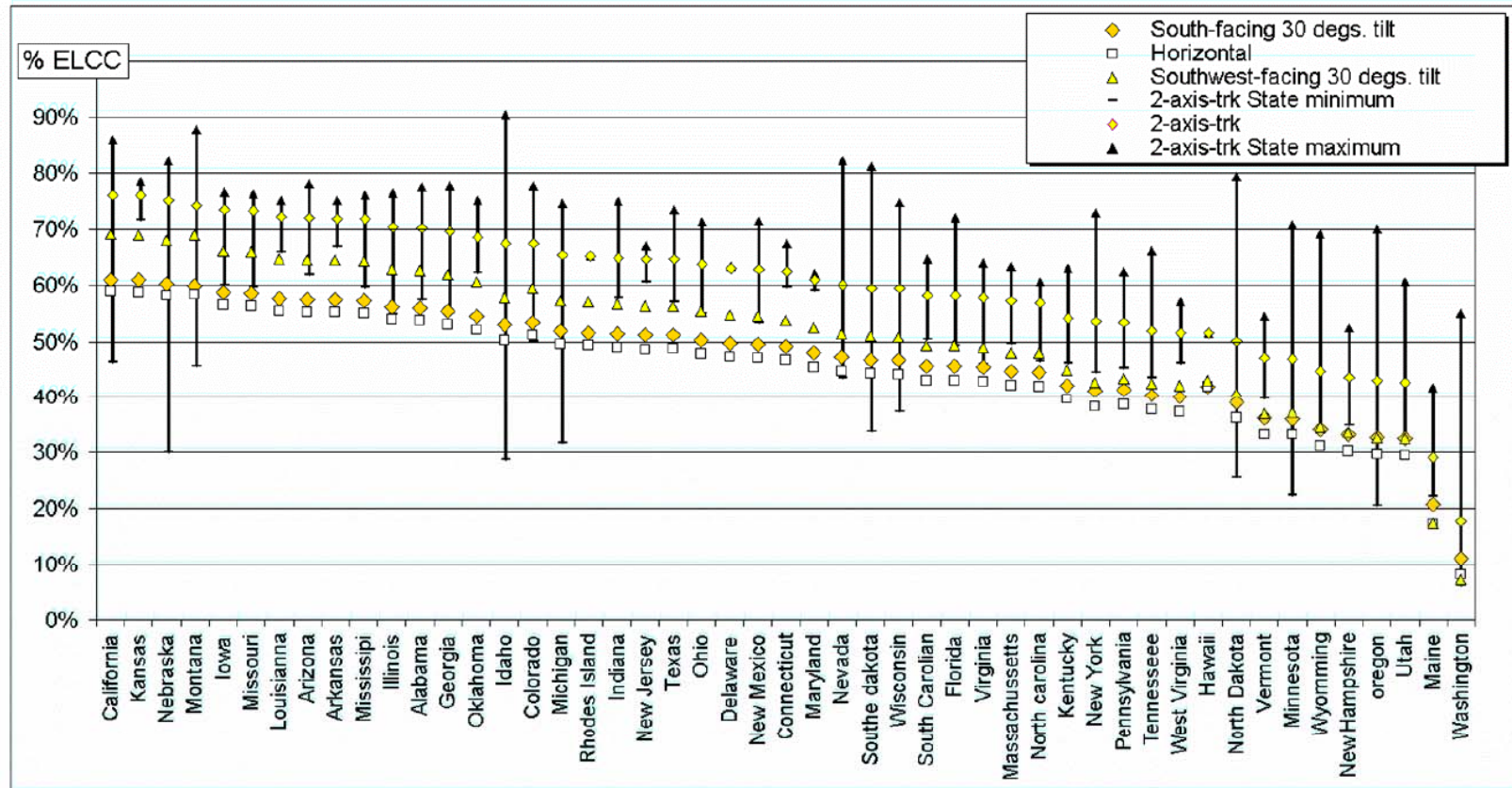


GridView-Simulated National Mean Dispatch Stack During 4 Days in Spring for the SunShot Scenario in 2050 site

PV and Reliability

Update: Effective Load-Carrying Capability of Photovoltaics in the United States Preprint

R. Perez ASRC SUNY, R. Margolis National Renewable Energy Laboratory, M. Kmiecik and M. Schwab ASRC University at Albany M. Perez University of Rochester

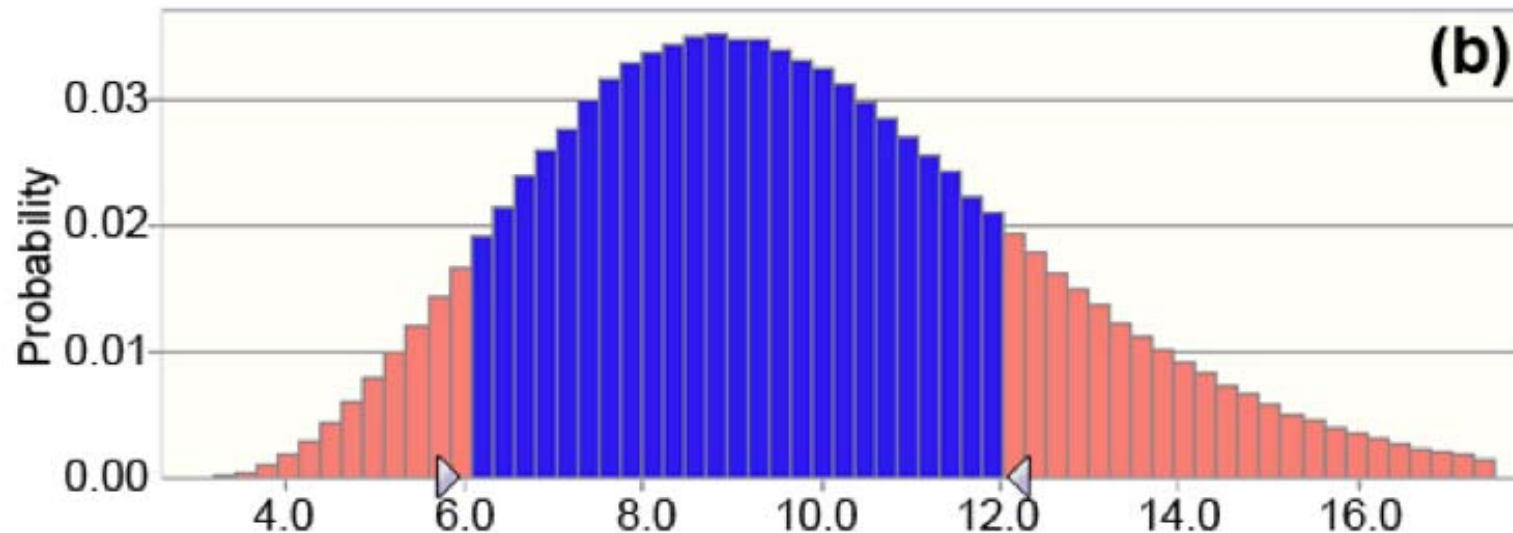


- Low-penetration ELCCs per state including statewide range

LCOE for PV

Probabilistic results Chicago [c/kWh]

“Assumptions and the Levelized Cost of Energy for Photovoltaics” Seth B. Darling^a, Fengqi You^b, Thomas Veselka^c, and Alfonso Velosa^d



- Mean: 9.71
- Median: 9.42
- Std Dev: 2.79
- Variance: 7.78
- Optimist (0-50% chance): <10
- Conservative (50+ % chance): >10