

Comparing Benefits and Generation Costs of PV Utility- and Residential-Scale Solar

Dramatic efficiency gains in photovoltaic (PV) technology and rapidly-falling costs are making PV technology a key component in addressing global climate change issues and meeting mainstream energy demands.

A July 2015 study from The Brattle Group, titled “Comparative Generation Costs of Utility-Scale and Residential-Scale PV in Xcel Energy Colorado’s Service Area,”* provides important new information for policy makers, regulators, and industry leaders faced with meeting current energy challenges. For more information visit brattle.com.

Generation cost savings scale with installation size

Most studies compare the cost of solar to the cost of other resources, but a “solar to solar” comparison demonstrates that utility-scale deployment of solar PV achieves many of the same benefits at about half the cost of residential-scale PV.



* Source: “Comparative Generation Costs of Utility-Scale and Residential-Scale PV in Xcel Energy Colorado’s Service Area” report July 2015, The Brattle Group.
 ** Refers solely to generation costs projected in 2019 based on the study. Prices noted are based on historic data and not necessarily reflective of current pricing.

WHY THE GAP?

The large gap in per-MWh costs between utility- and residential-scale systems results principally from: (a) lower total plant costs per installed kilowatt for larger facilities; and (b) greater solar electric output from the same PV capacity due to optimized panel orientation, tracking; and (c) other economies of scale and efficiencies associated with utility-scale installations. Based on a review of literature, avoided transmission and distribution costs by residential-scale systems are not large enough to close this gap in generation costs.

300 MW utility-scale solar PV plant = 60,000 residential installations

3 KEY BENEFITS OF UTILITY-SCALE PV

- \$=↓ REDUCED GENERATION COSTS**
- CO₂ EMISSIONS REDUCTIONS**
- EQUIVALENT TOTAL JOB CREATION***

*Reflecting both direct and indirect jobs.

50% 300 MW Utility-Scale PV Solar Avoids About 50% More Carbon Dioxide Creation Than 300 MW Equivalent Residential-Scale PV*



* Higher carbon reduction with utility-scale due to the efficiencies at scale allowing fewer panels to produce same MWh.

* Source: “Comparative Generation Costs of Utility-Scale and Residential-Scale PV in Xcel Energy Colorado’s Service Area” July 2015 Brattle Group study examines residential-scale rooftop systems and utility-scale solar power plants utilizing a Reference Case and five scenarios with varying tax credit (ITC), PV cost, inflation, and financing parameters to assess performance and payback. First study to compare direct solar-to-solar generation costs between residential-scale rooftop systems and utility-scale solar power plants when adding 300 MW_{DC} PV panel capacity in the form of either 1) 60,000 distributed 5 kW residential

(rooftop) systems owned or leased by retail customers; or 2) 300 MW_{DC} of utility-scale solar power plants that sell their entire output to Xcel Energy Colorado under long-term purchase agreements. Report prepared for First Solar with support from the Edison Electric Institute. Peer Reviewers: Mr. Frank Graves and Dr. Jürgen Weiss, Principals, The Brattle Group; Dr. Steven Hegedus, Senior Scientist, University of Delaware College of Engineering; and Dr. Jan Kleissl, Associate Professor, UCSD Department of Mechanical and Aerospace Engineering.