

# Distribution Monitoring for Renewables Integration

Project to be funded by PIER: CIEE with research partners UCI and UCSD

Collaborative effort with California utilities

Phase I: share and analyze measurements from existing hardware, such as substation monitors and power quality monitors where available

Phase II: install additional line sensors and monitors (anticipate ca. 3 each on ca. 20 circuits for each utility) with sub-cycle sampling rates

Include circuits with different penetration levels of DG installed

- look for comparative impacts of DG
- obtain baseline feeder behavior data
- attempt typology of distribution feeders in California
- use data to validate existing distribution circuit models
- use data to develop and validate models of new components
- identify data resolution useful for routine monitoring efforts (Phase III)

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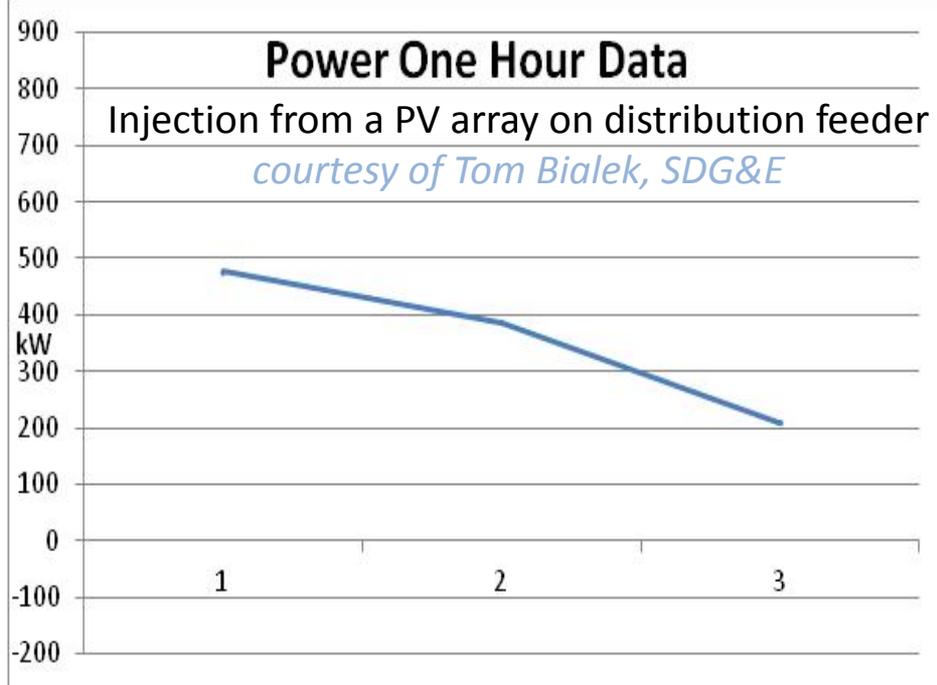
California Institute for  
Energy and Environment

Alexandra von Meier  
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<http://uc-ciee.org>

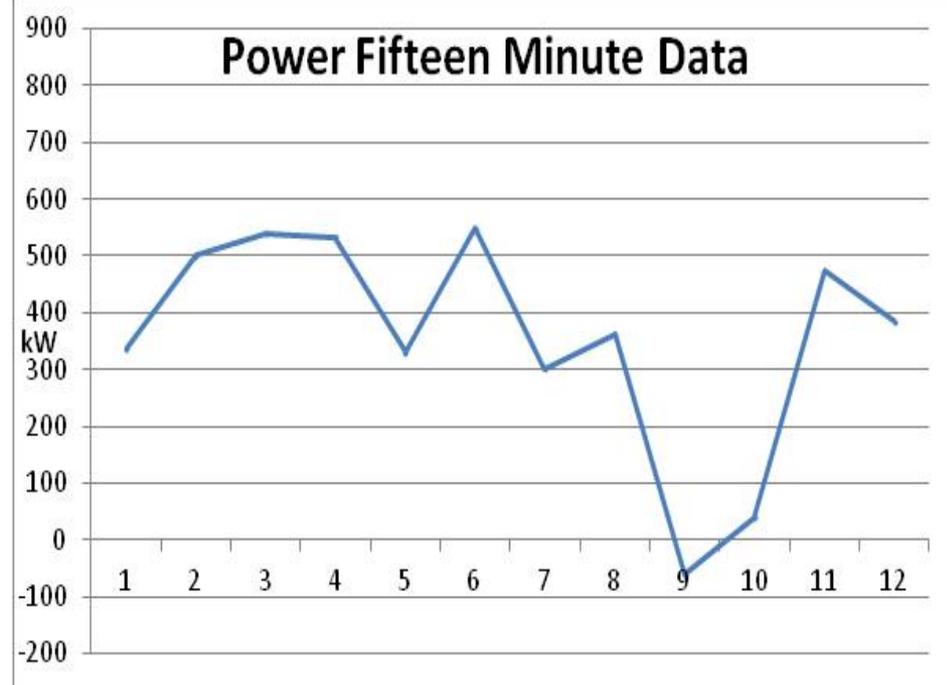
### Power One Hour Data

Injection from a PV array on distribution feeder

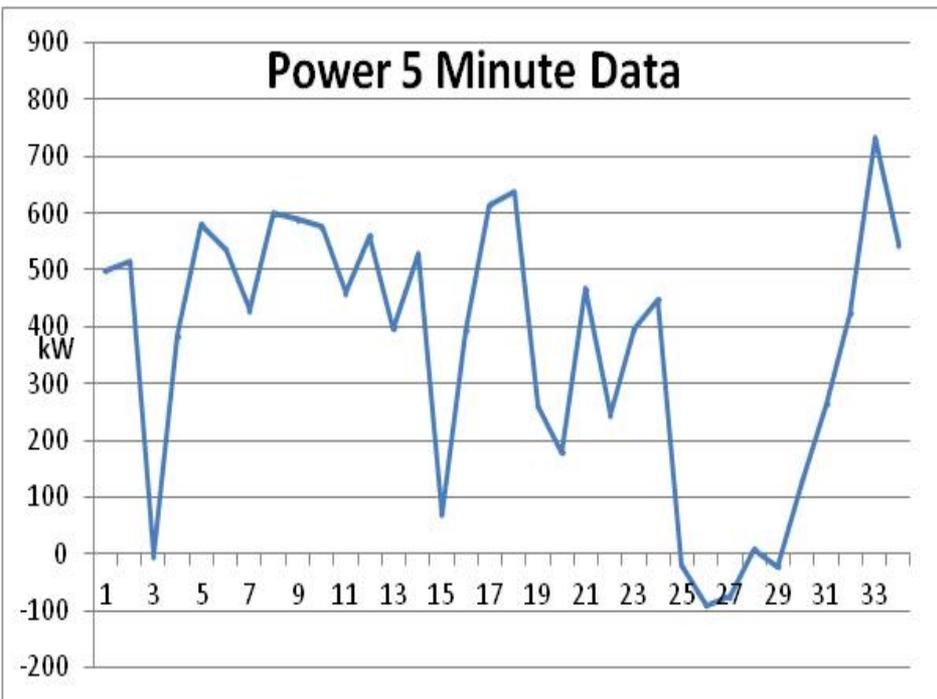
*courtesy of Tom Bialek, SDG&E*



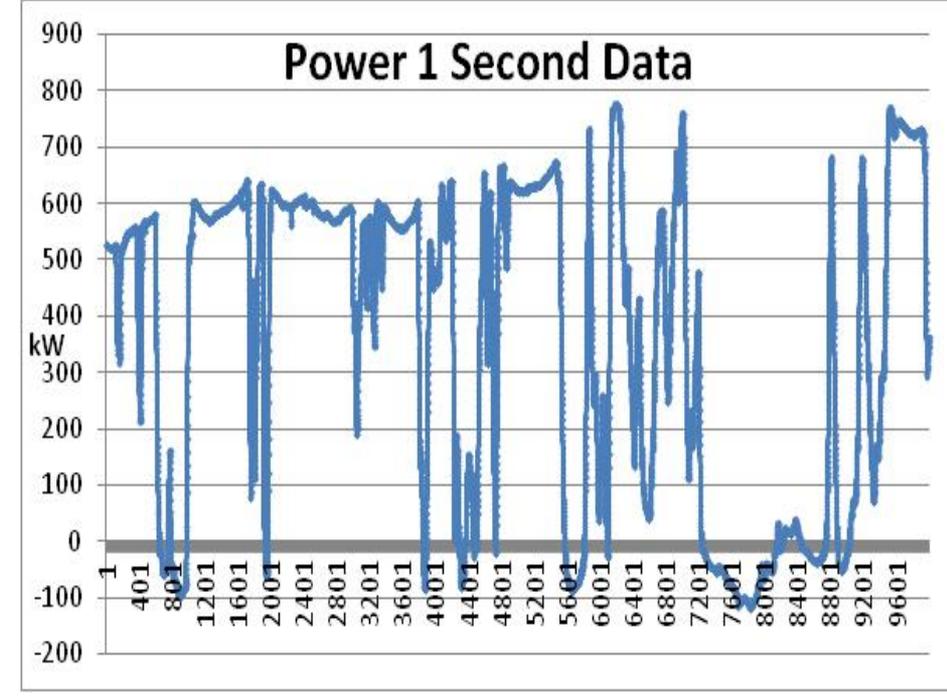
### Power Fifteen Minute Data



### Power 5 Minute Data



### Power 1 Second Data



Alexandra “Sascha” von Meier is co-director of the electric grid research program at the California Institute for Energy and Environment (<http://uc-ciee.org>). Her research focuses on power distribution systems, Smart Grid issues, and the integration of distributed and intermittent generation. Until 2011, she was professor of energy management & design in the department of environmental studies and planning at Sonoma State University ([www.sonoma.edu/ensp](http://www.sonoma.edu/ensp)), where she developed and taught a curriculum centering on energy efficiency and renewable resources. Her past research includes studies of cultural factors in technology adoption, operation of nuclear power plants, and management of nuclear materials. Sascha received a B.A. in physics and a Ph.D. in Energy and Resources from UC Berkeley. She is author of the textbook, *Electric Power Systems: A Conceptual Introduction* (IEEE-Wiley, 2006). Recent publications include “Plausible Grid Futures” (*Public Utilities Fortnightly*, April 2011, with M Brown and L Cibulka) and “Integration of Renewable Generation in California: Coordination Challenges in Time and Space” (IEEE Electric Power Quality and Utilization Conference, October 2011; available at <http://uc-ciee.org/all-documents/a/557/113/nested>), in addition to white papers for the California Energy Commission. An award-winning educator with an inter-disciplinary perspective, Dr. von Meier aims to engage audiences in different ways of thinking about complex and interesting problems.