



**SOLAR ENERGY
TECHNOLOGIES OFFICE**
U.S. Department Of Energy

PORTFOLIO REVIEW

2018



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2018 SETO Portfolio Review

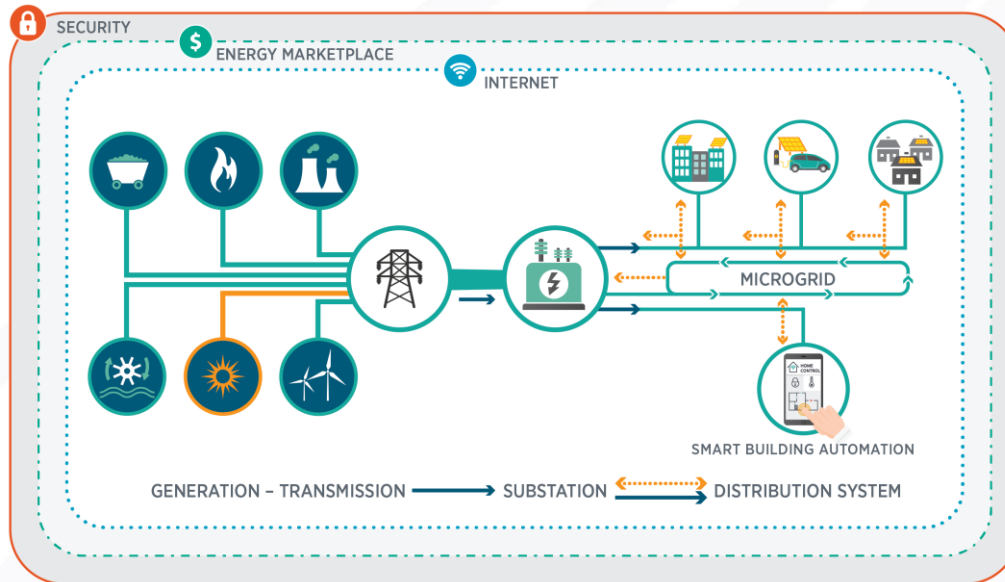
Systems Integration Subprogram

SETO Portfolio Review
February, 2018

Dr. Guohui Yuan, Program Manager

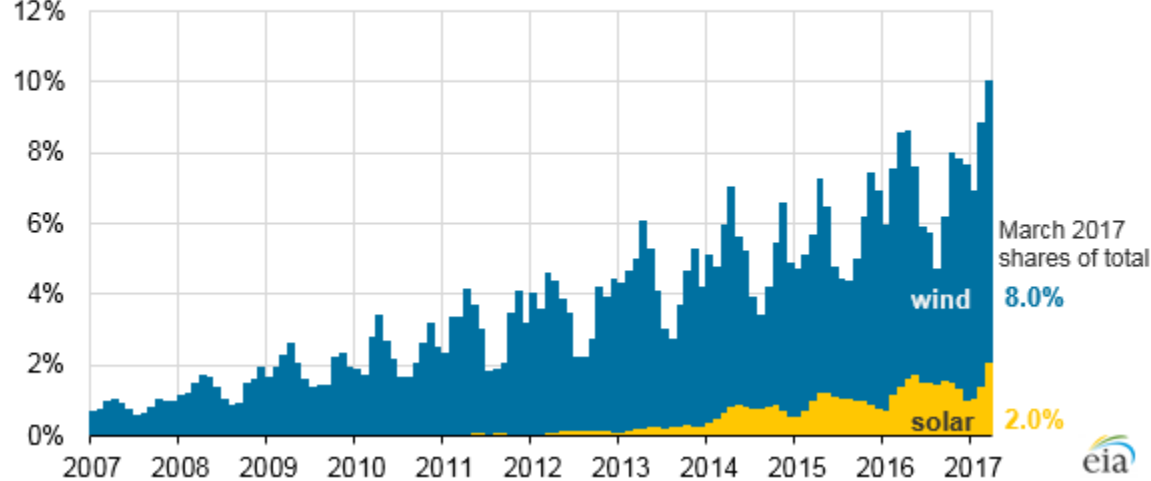
EIA: Wind and Solar Generate 10% Of Monthly Electricity in U.S.

- Fund research projects to develop innovative technical solutions that enable large scale deployment of solar power onto a modernized electricity grid focusing on **reliability, resilience, and cybersecurity**
- Part of DOE Grid Modernization Initiative (GMI) and collaborate closely with national labs through Grid Modernization Laboratory Consortium (GMLC)



Systems Integration (SI) Subprogram

Monthly net electricity generation from selected fuels (Jan 2007 - Mar 2017)
share of total electricity generation



- In March 2017, for the first time monthly electricity generation from wind and solar (including utility-scale plants and small-scale systems) exceeded 10% of total electricity generation in the United States,
- On an annual basis, wind and solar made up 7% of total U.S. electric generation in 2016.
- On an annual basis, solar made up nearly 2% of total U.S. electric generation in 2017.

Systems Integration Research Areas

- Planning and operation
- Solar + X
 - Integration of PV, storage, and other DERs
- Enabling technologies
 - Power electronics
 - Sensors and communication
- Codes and standards
- Studies and analysis

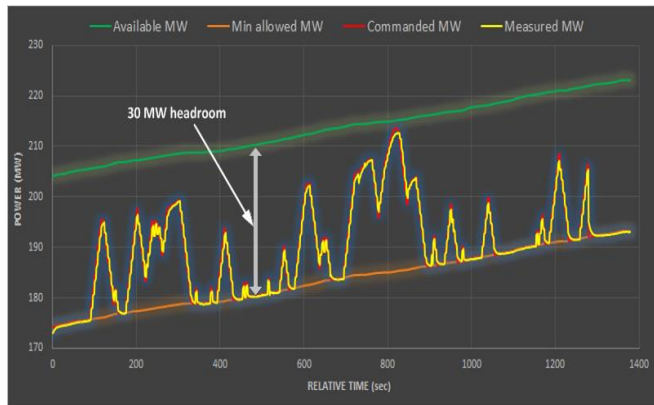
Systems Integration R&D Portfolio

Funding Initiative	Performance Periods	DOE Funds	Status, # of Projects
SHINES	2016-2018	\$18M	Active, 6
SuNLAMP – Systems Integration	2016-2018	\$49M	Active, 16
GMLC Foundational Projects *	2016-2018	\$11M	Active, 10
ENERGISE	2017-2020	\$25M	Active, 11
GMLC Resilient Distribution Systems *	2017-2020	\$10M	Active, 5
Solar Forecasting II **	2018-2021	\$12M	In negotiation, 8
Power Electronics **	2018-2021	\$20M (estimated)	Pending, 10-15

* co-funded by other DOE offices; posters only
 ** not part of SETO 2018 portfolio review

Industry Partnership: Solar PV Plant Providing Essential Reliability Services

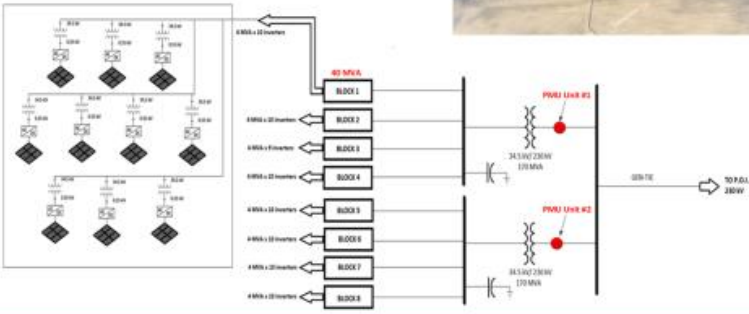

- CAISO/First Solar 300-MW PV System Commissioning Test
- Winner of NARUC Innovation Award in 2017



- 4-sec AGC signal provided to PPC
- 30 MW headroom
- Tests were conducted for 30 minutes at:
 - Sunrise
 - Middle of the day
 - Sunset
- 1-sec data collected by plant PPC

Breaking new barriers: Testing of 300 MW PV plant

- Thin-film Cd-Te PV modules
- 4 MVA PV inverters (GE)
- 9 x 40 MVA blocks
- 34.5 kV collector system
- Two 34.5/340 kV 170 MVA transformers
- Tie with 230 kV transmission line
- PMUs collecting data on 230 kV side



NATIONAL RENEWABLE ENERGY LABORATORY 10

Courtesy: NREL, Vahan Gevorgian

<http://www.nrel.gov/docs/fy17osti/67799.pdf>