SunShot
U.S. Department of Energy

SunShot Systems Integration Program Updates

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SunShot Overview

WHAT WE DO: SunShot works to make it *faster*, *easier*, and *more affordable* for Americans to access solar power by making smart R&D investments to *lower costs* so solar electricity is fully *market-competitive* without subsidies.

HOW WE DO IT: SunShot's FY16 budget funds projects across five subprograms.

FY16 Budget Numbers

$53.5M	$48.4M	$52.4M	$34.9M	$43.5M	$9M*
Photovoltaics	Concentrating Solar Power	Systems Integration	Balance of Systems - Soft Costs	Innovations in Manufacturing Competitiveness	

IMPACT:

SunShot has funded work to drive down the cost of solar **90%** toward the 2020 cost target, supporting the **260,000 JOBS** in the solar industry.

FUTURE:

In addition to game-changing, cost-lowering R&D, SunShot will continue to *spur solar development* and *increase grid resiliency* across the country to diversify the U.S. domestic energy supply.

*NREL Site-Wide Facility Support

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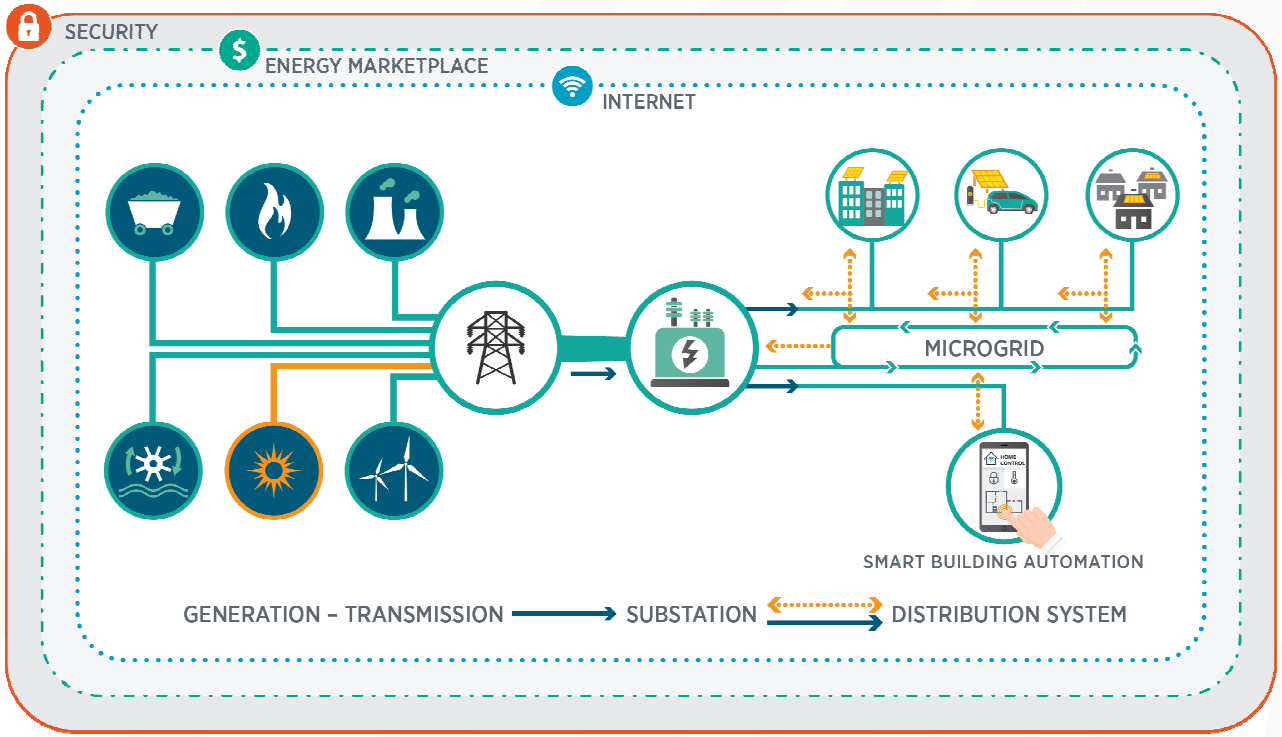
Systems Integration (SI) Subprogram

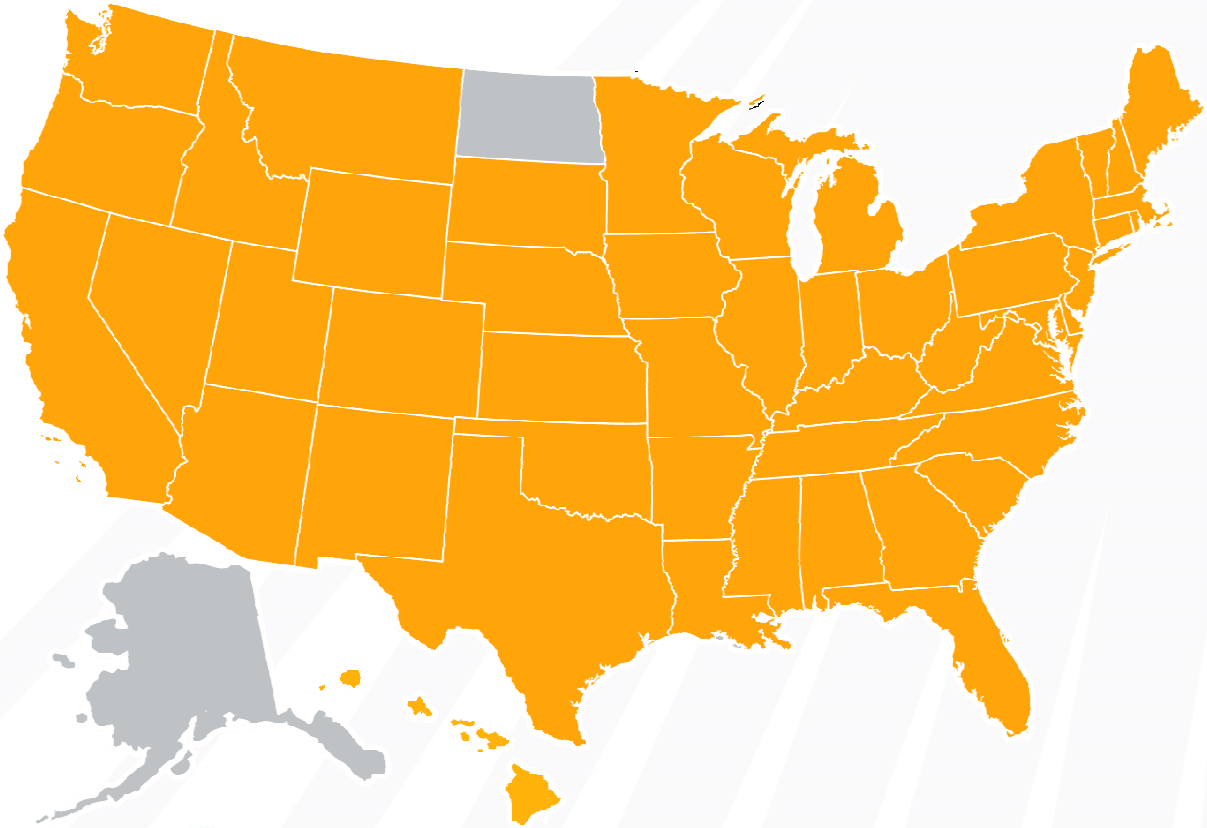
- Funds projects to develop technical solutions that enable large scale deployment of solar power onto a modernized electricity grid with focus on

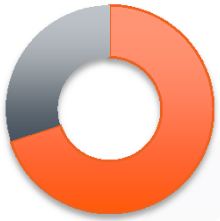
reliability, resilience, and cybersecurity



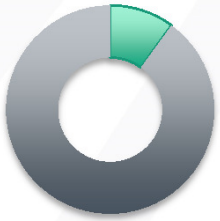
SunShot Funds 250+ Active Projects

Projects and partners in
48 **states** plus the
District of Columbia

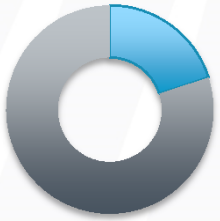




70% of projects
at **national labs**
& universities



10% of projects
with **non-profits***



20% of projects
with **companies**

Note: SETO has funded past projects in North Dakota and Alaska.
*1% of state and local government
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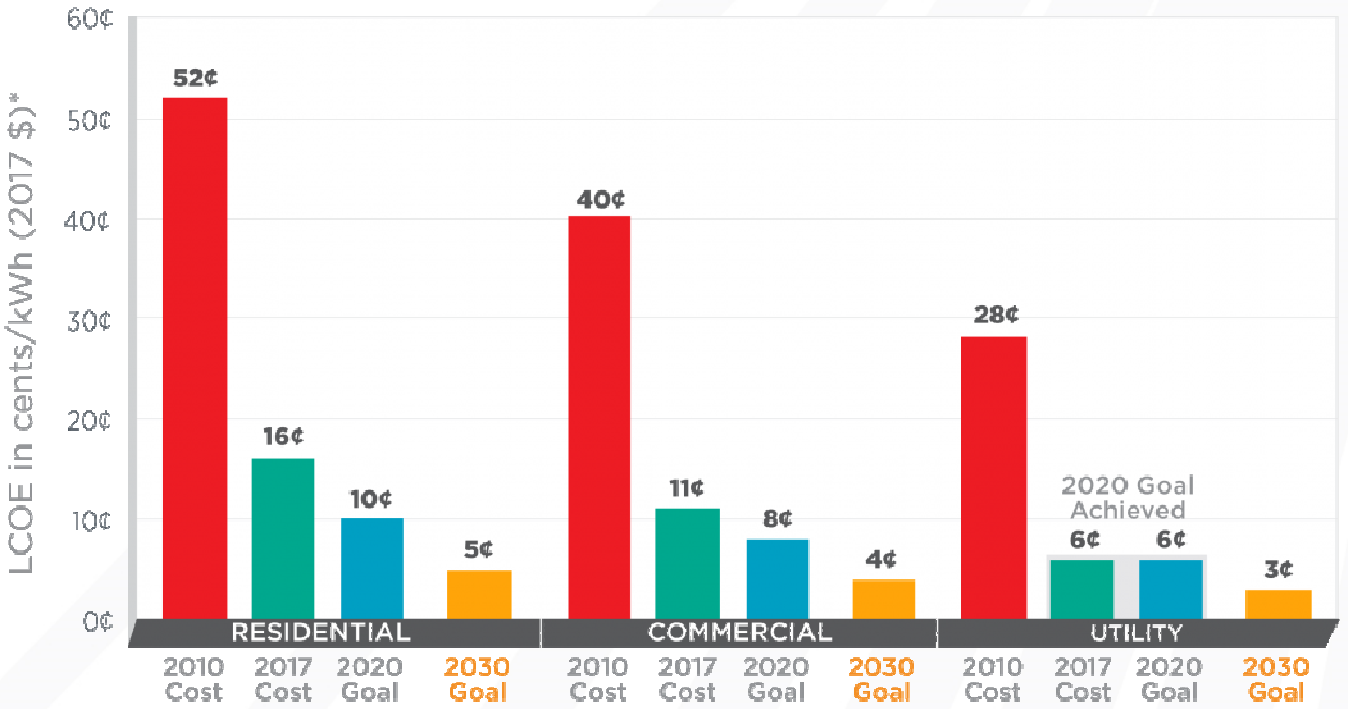
SunShot Progress and Goals

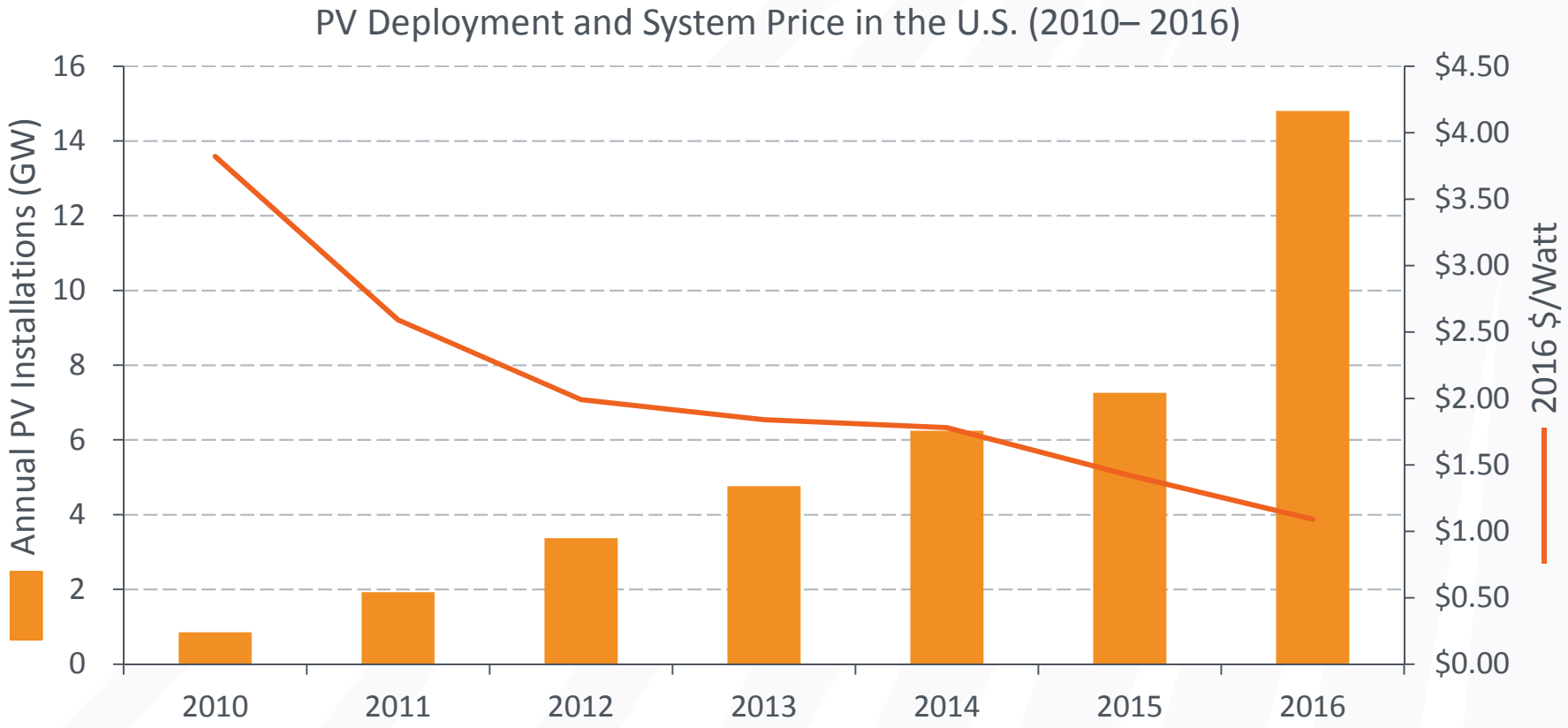
At the 2017 SPI conference, **SunShot announced that the solar industry had achieved the $1/W goal three years ahead of schedule**. In the meantime, SunShot announced the 2030 goal to further cut costs by 50% to make solar the least expensive source of energy.



*Levelized cost of electricity (LCOE) progress and targets are calculated based on average U.S. climate and without the ITC or state/local incentives. The residential and commercial goals have been adjusted for inflation from 2010-17.

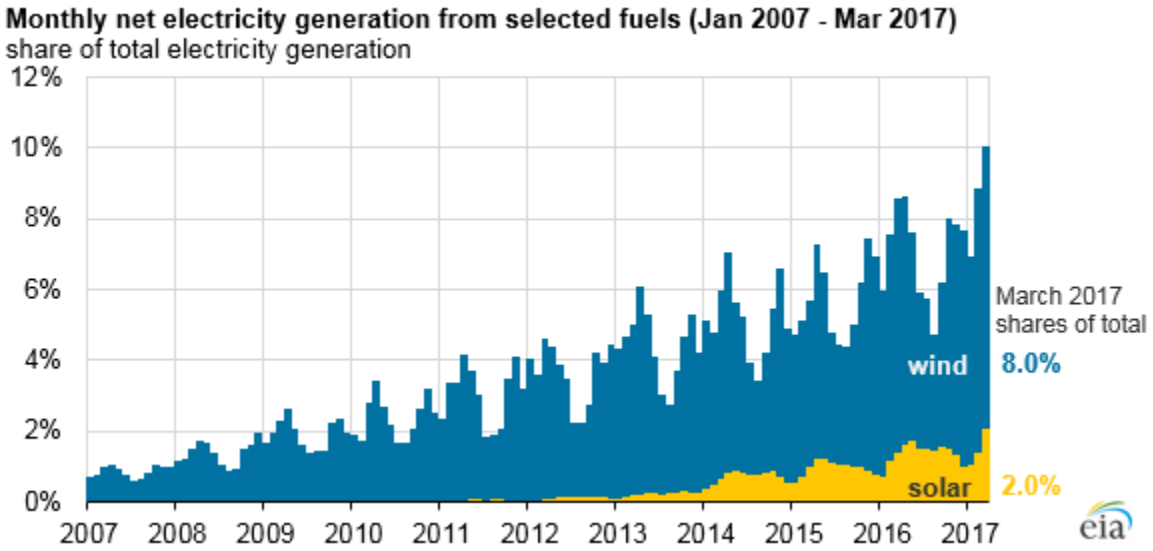
U.S. Solar: Falling Costs, Rising Deployment

The solar energy industry is one of the fastest growing industries in the U.S. Driven by falling costs, total solar installed capacity reached **42.4 gigawatts in 2016** with more than **one million solar projects** operating across the country. *(Update: 47.1MW in Q2, 2017)*



Sources: National Renewable Energy Laboratory, "U.S. Solar Photovoltaic System Cost Benchmark: Q1 2016"; GTM Research and SEIA, "U.S. Solar Market Insight Report: 2016 YIR."

Wind and solar in March accounted for 10% of U.S. electricity generation for first time

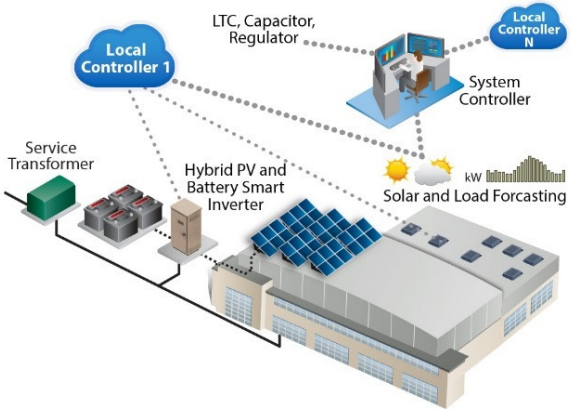


For the first time, monthly electricity generation from wind and solar (including utility-scale plants and small-scale systems) exceeded 10% of total electricity generation in the United States, based on March data in EIA's *Electric Power Monthly*. Electricity generation from both of these energy sources has grown with increases in wind and solar generating capacity. On an annual basis, wind and solar made up 7% of total U.S. electric generation in 2016.

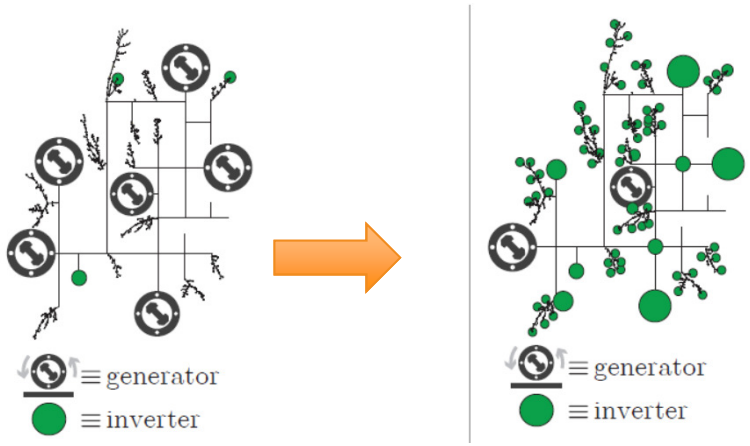
Source: EIA Today in Energy

SunShot Systems Integration Funding Programs

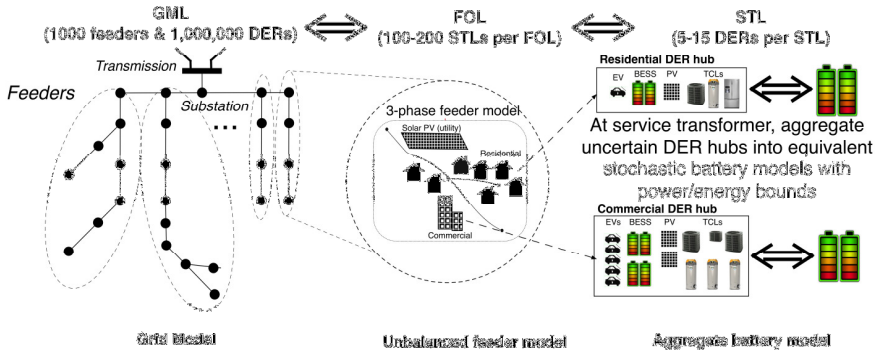
SHINES (2016-2018, $18M, 6 projects)



Solar Forecasting II (2017-2019, $10M)

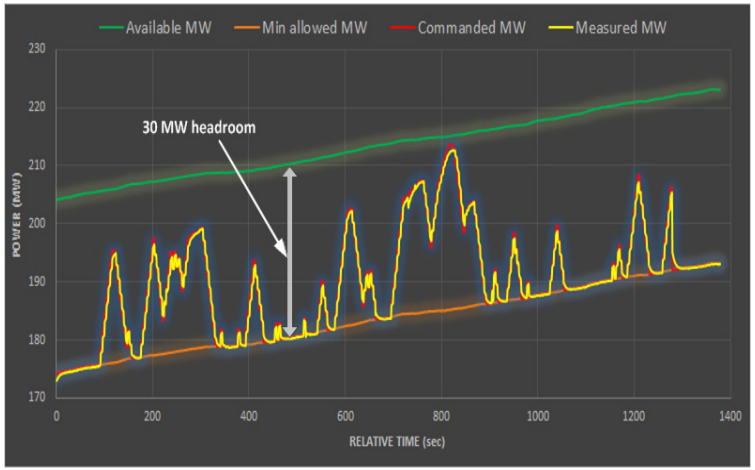


SuNLaMP (2016-2018, $48M, 16 projects)

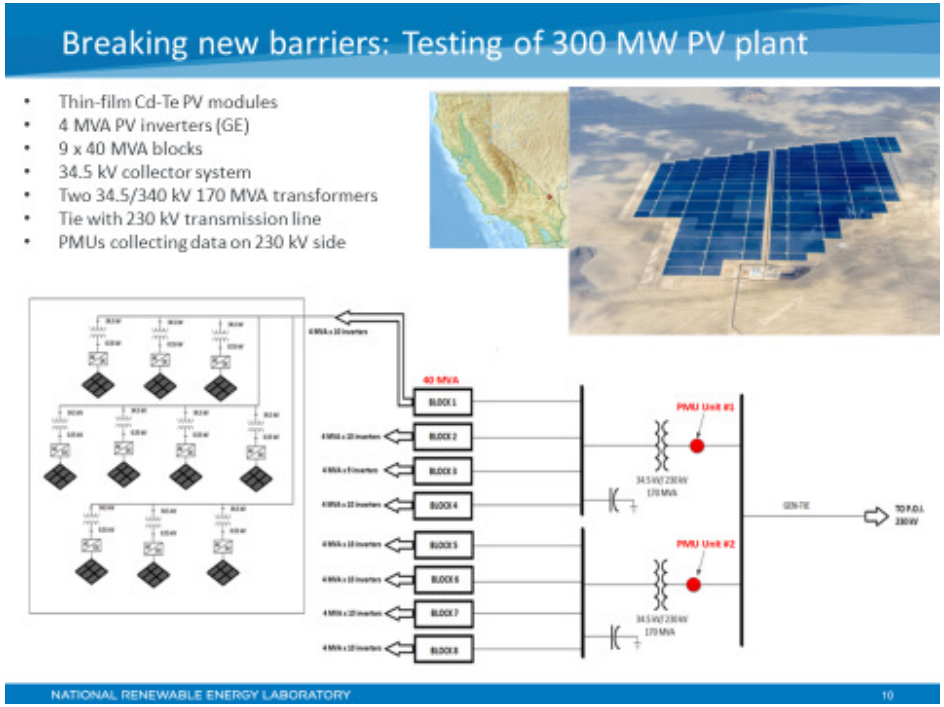


ENERGISE (2017-2019, $30M, 13 projects)

CAISO/First Solar Inverter Testing



- 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

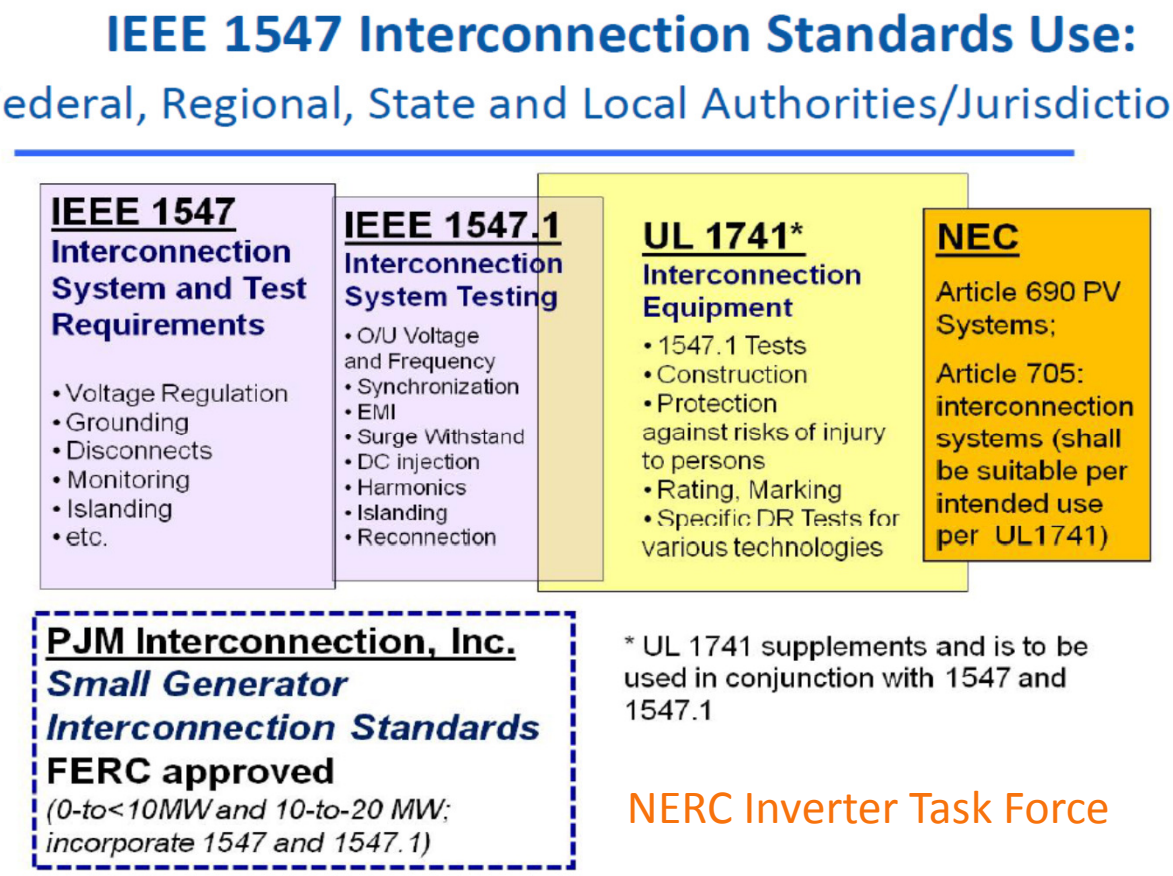


Courtesy: NREL, Vahan Gevorgian

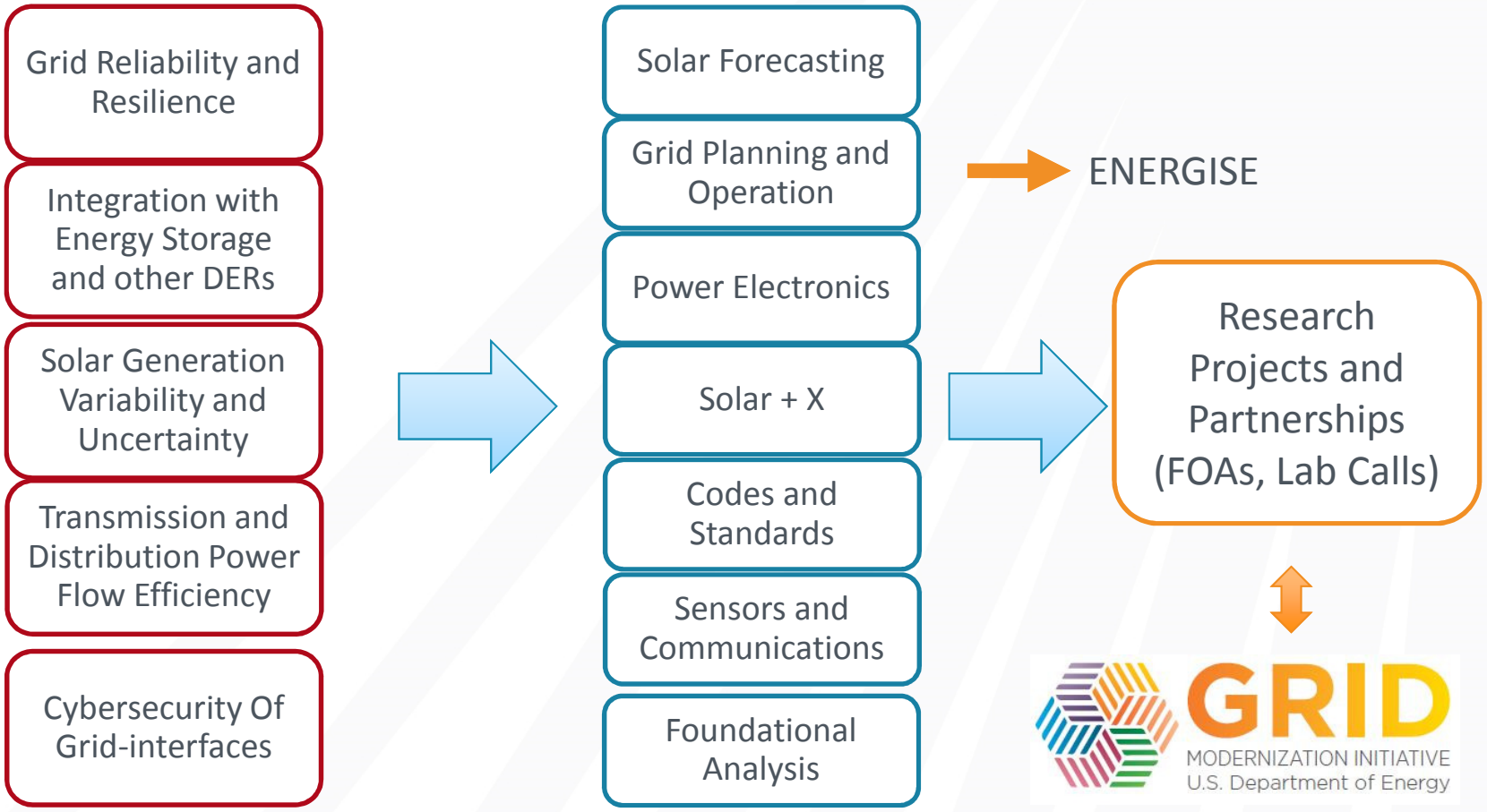
http://www.nrel.gov/docs/fy17osti/67799.pdf

DOE's Leadership in Codes and Standards

- **NREL and SNL are leading the IEEE 1547/1547.1 standard full revisions**
  - **First 1547 ballot passed in June 2017**



SI Research Activities



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ENERGISE Program At A Glance

- Announced at DistribuTech in January, 2017
- $30M federal fund + 50% cost share
- 13 projects selected (6 TA1, 7 TA2)

Topic Area 1 (Near-term, field demonstration)	Topic Area 2 (long-term, early-stage technologies)
SCE	NREL
PPL	UC Berkeley
Sandia National Lab	Univ. of Vermont
UC Riverside	Univ. of Central Florida
AMS	Northeastern University
NREL	USC
	Quanta Technologies

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Thank You!

& Let's work together!

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