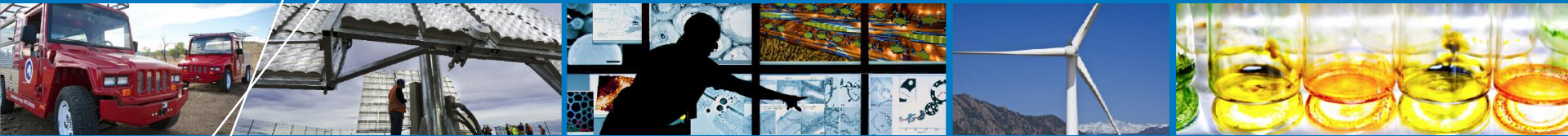


Solar Energy: Core Trends



David Feldman

National Renewable Energy Laboratory

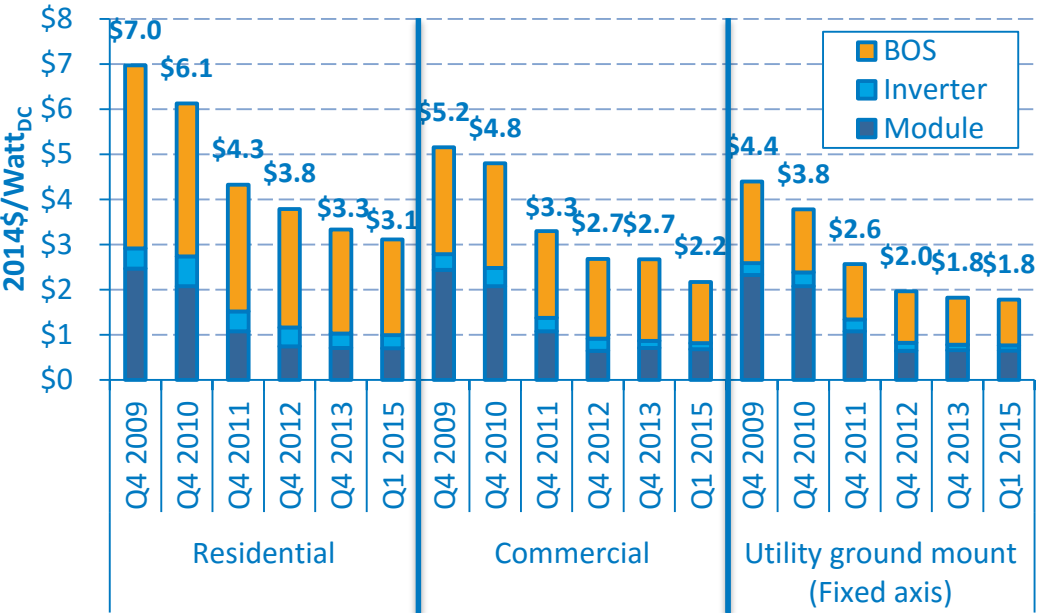
National Summit on RPS

Arlington, Virginia

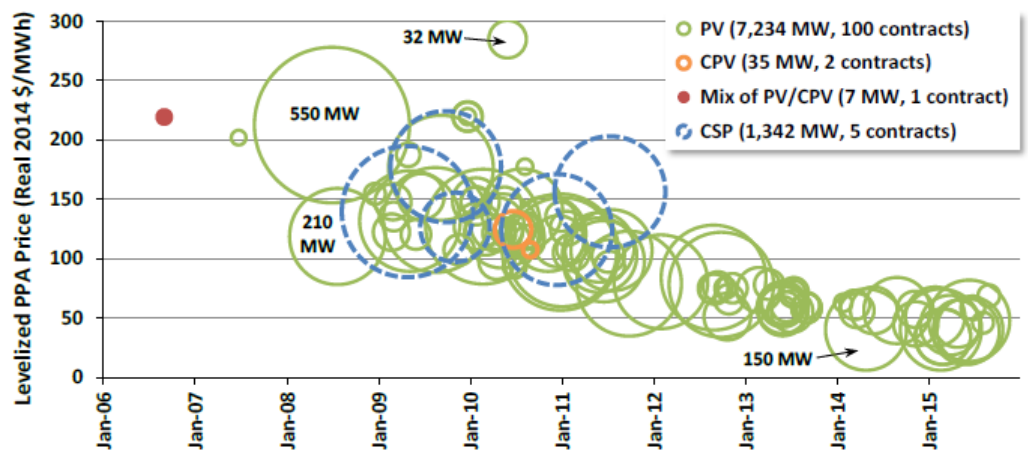
November 2015

Rapid Reduction in Price of Solar in Past 5 Years

Modeled System Price Across Markets



Levelized PPA Price (Utility-scale)

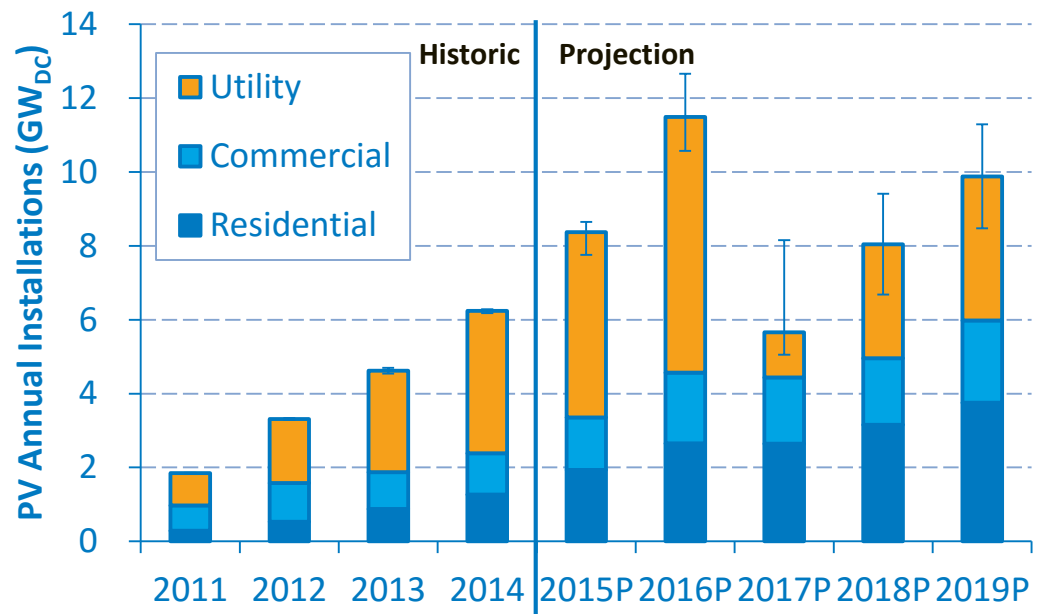


- Since Q4 2009, modeled system prices fell between 15% – 17% per year
 - 45% - 65% of reduction attributed to decreases in module price
 - Analysts expect further price reductions to come from lower non-hardware cost
- Reductions in cost and improved financing have allowed solar to lower PPA prices by \$25/MWh per year, from 2006-2013
- Some PV Plants in Southwest have PPA prices comparable to the *fuel cost* of natural gas plants.

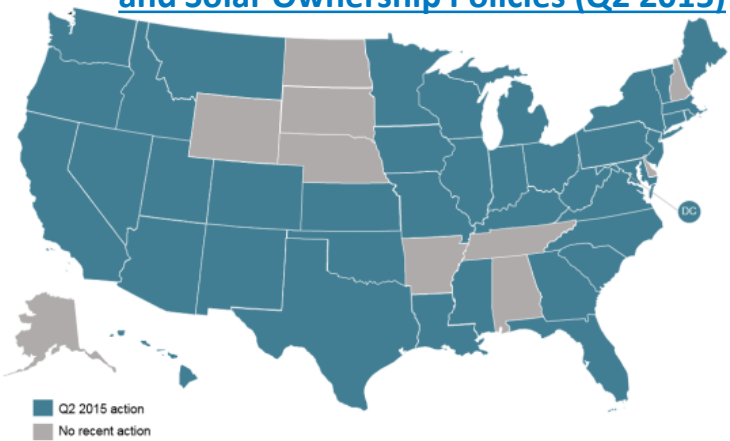
Sources: Bolinger, M.; Seel, J. (2015). *Utility-Scale Solar 2014*. Lawrence Berkeley National Laboratory. Feldman et al. (2015). *Photovoltaic System Pricing Trends: 2015 Edition*. NREL/LBNL.

U.S. PV Racing Towards New Environment

U.S. Annual Installations by Market



Recent Action on Net Metering, Rate Design, and Solar Ownership Policies (Q2 2015)



- In 2015-2016 U.S. PV deployment is projected to expand greatly to take advantage of 30% ITC, which expires in 2017
 - For businesses it reverts to 10%, for homeowners it goes away
- **Utility-scale PV estimated to be impacted much more than distributed PV market**
 - Tighter margins / many utilities already have contracts to fulfill RPS requirements
- **Distributed market will still make economic sense in a lot of markets due to net-metering /rate design**
 - Most states are considering revising how distributed PV is compensated
 - New technologies are gaining attention to manage changes and provide more value to grid (e.g. storage).

Sources: installation data displayed represents the median figures from the following sources: BNEF (07/16/15), Cowen & Co. (07/16/15), GTM/SEIA SMI (Q1 '15). "The 50 States Of Solar. Q2 2015." NC Clean Energy Center & Meister Consultants Group.