SEIA Solar Energy Industries Association®

Priorities of the Solar Industry

Kevin Lucas
Director of Rate Design

August 4, 2017

Outline

- SEIA Overview
- Solar Market Overview
- Our goals for the solar industry in 2022
- SEIA's Strategic Vision and why States are Critical
- Risks & Opportunities over the next 5 years

ABOUT SEIA

Our Mission: To Build a Strong Solar Industry to Power America

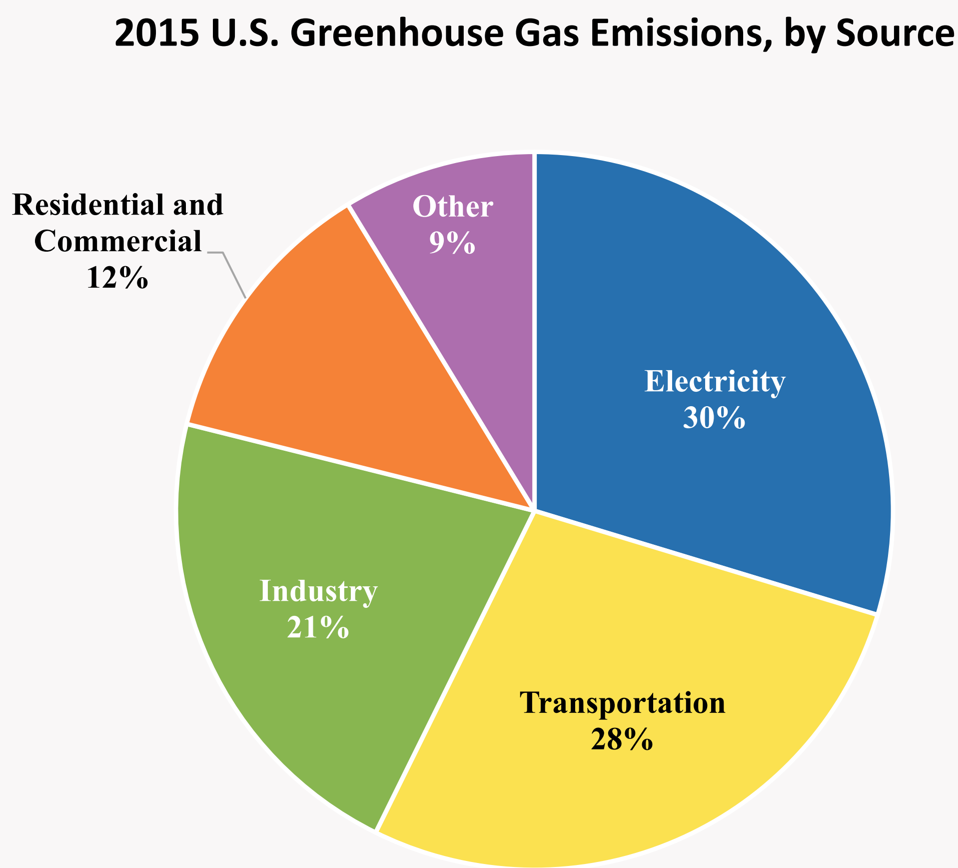
The U.S. National Trade Association for Solar Energy

- Founded in 1974
- 1,000 member companies from all 50 states
- Our Mission: Build a strong solar industry to power America
- Our Goal: 100 gigawatts of solar capacity by 2020

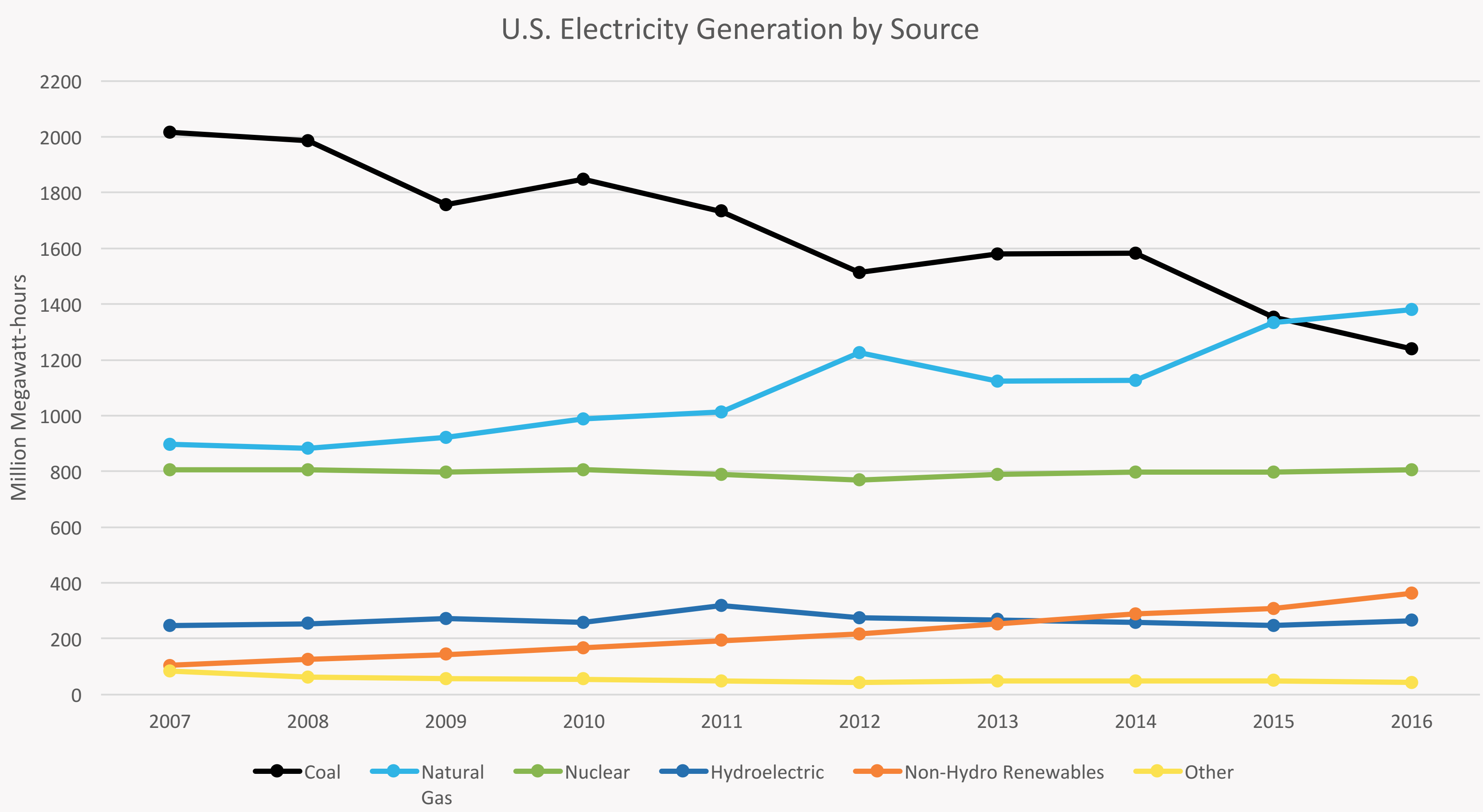
SETTING THE STAGE

Electricity markets, other renewable technologies, and where solar fits in

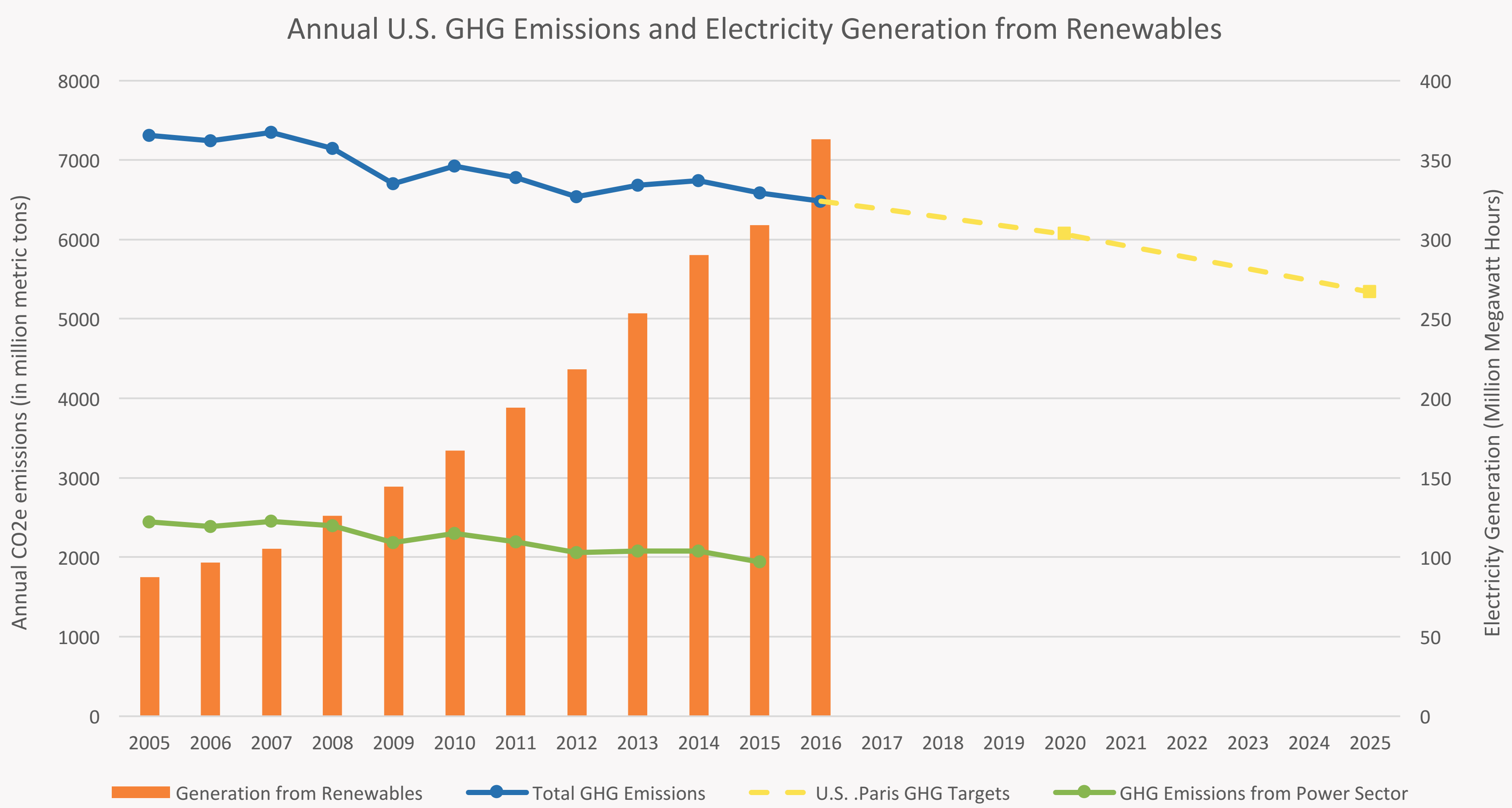
Electricity – Largest Share of CO2 Emissions



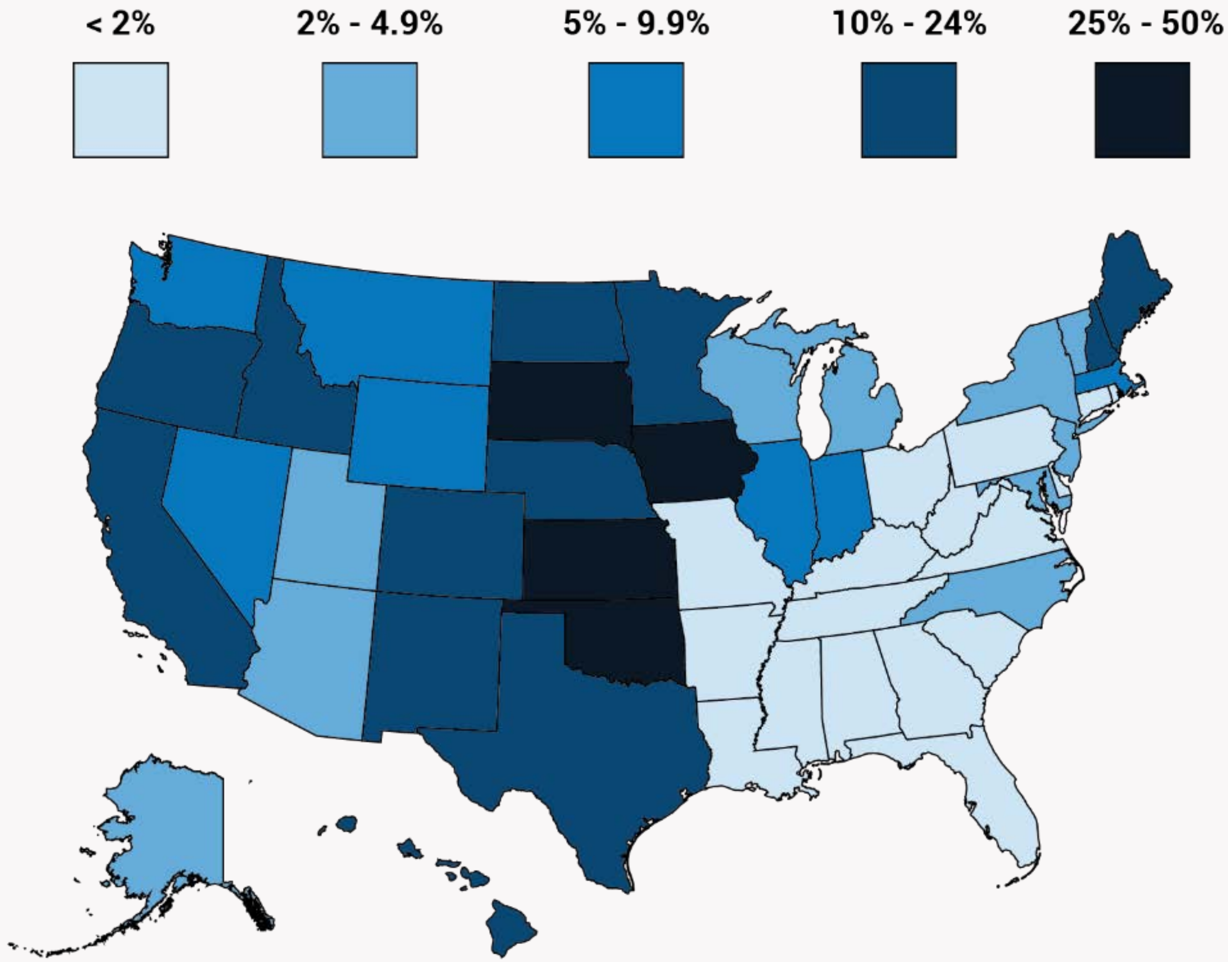
Renewable Generation has more than tripled in 10 years



Much More Needed to Meet GHG Targets



Grid Already Accommodates Large Penetration of Renewables



- 15 U.S. States already see solar & wind penetrations of 10% or above, with no reduction in reliability.
- Nationally, Solar & Wind represented 7% of total generation in 2016

The Grid Has Never Been More Diverse

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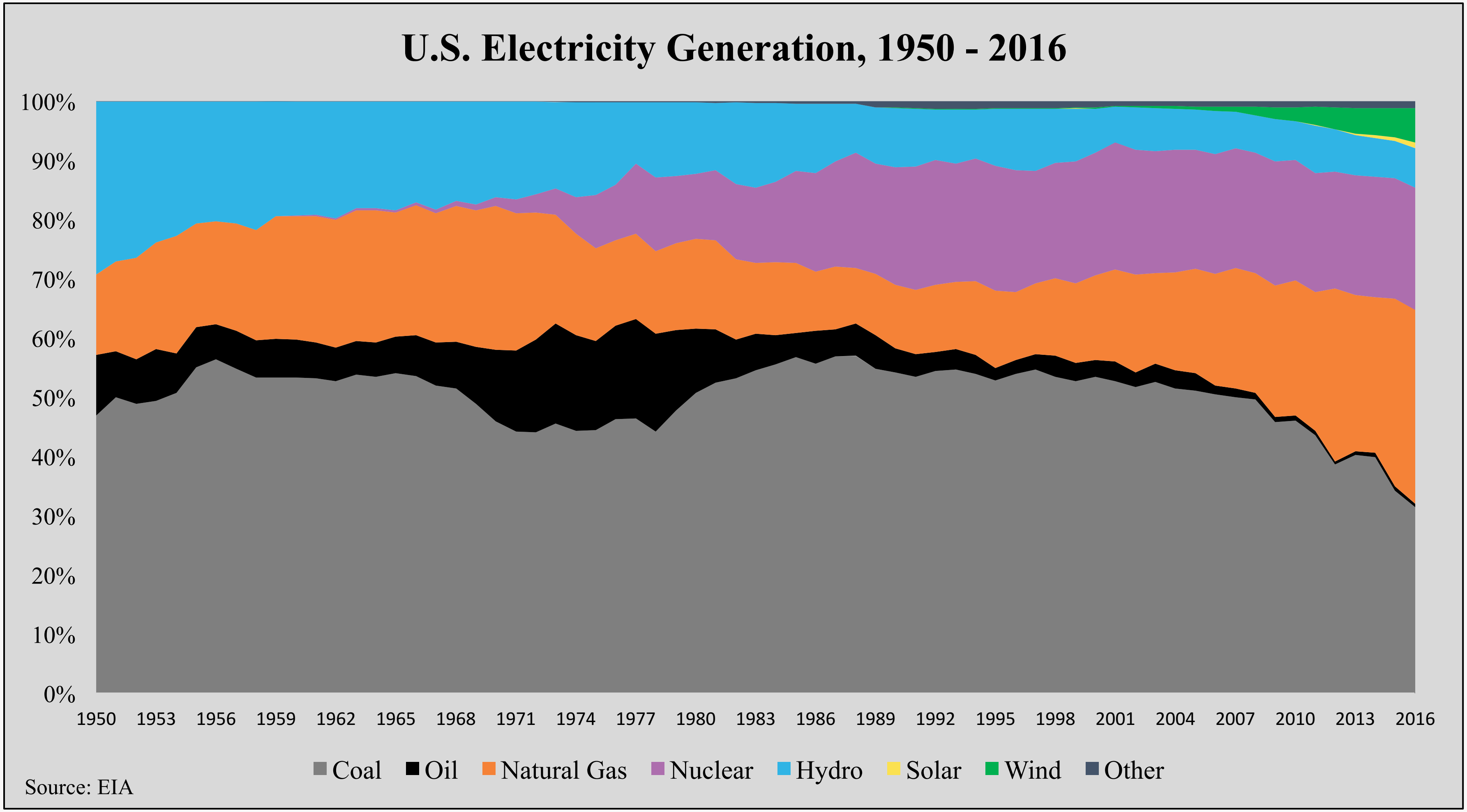
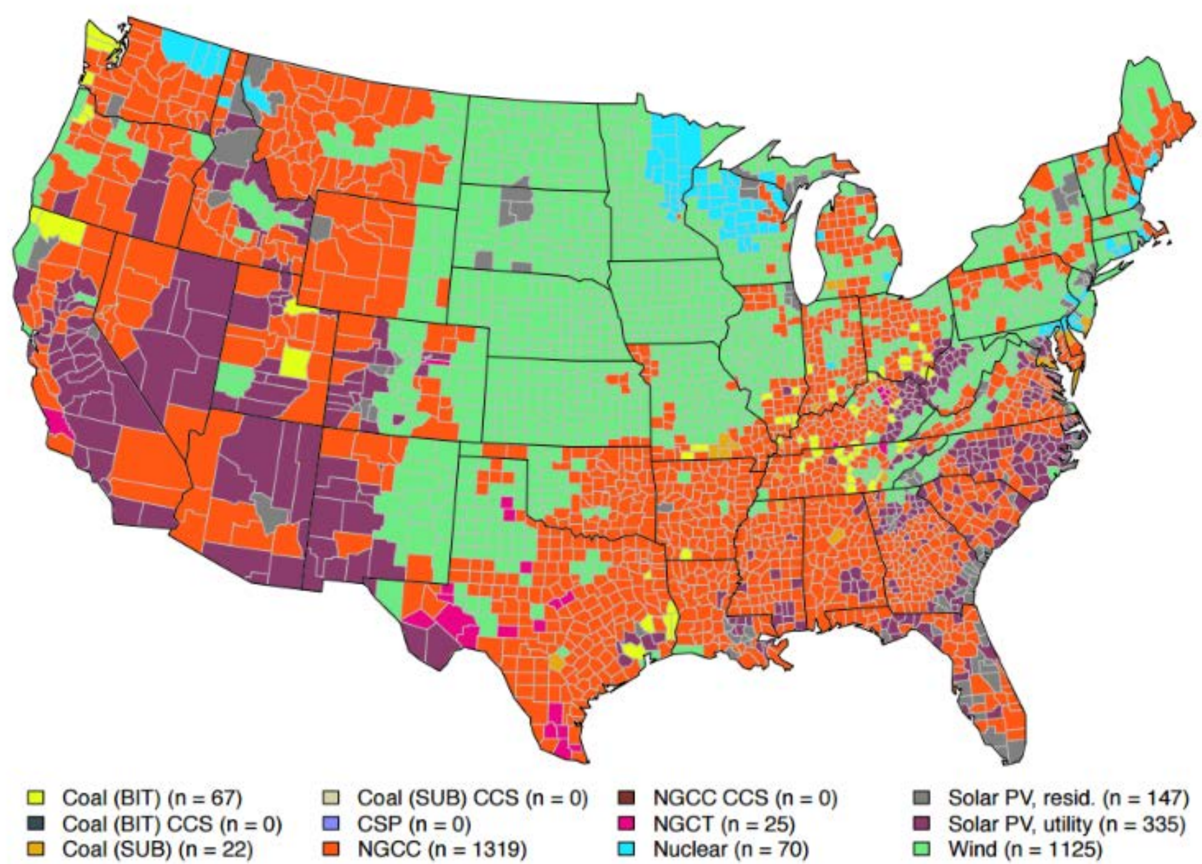


Solar, Wind, Natural Gas are Most Affordable Options

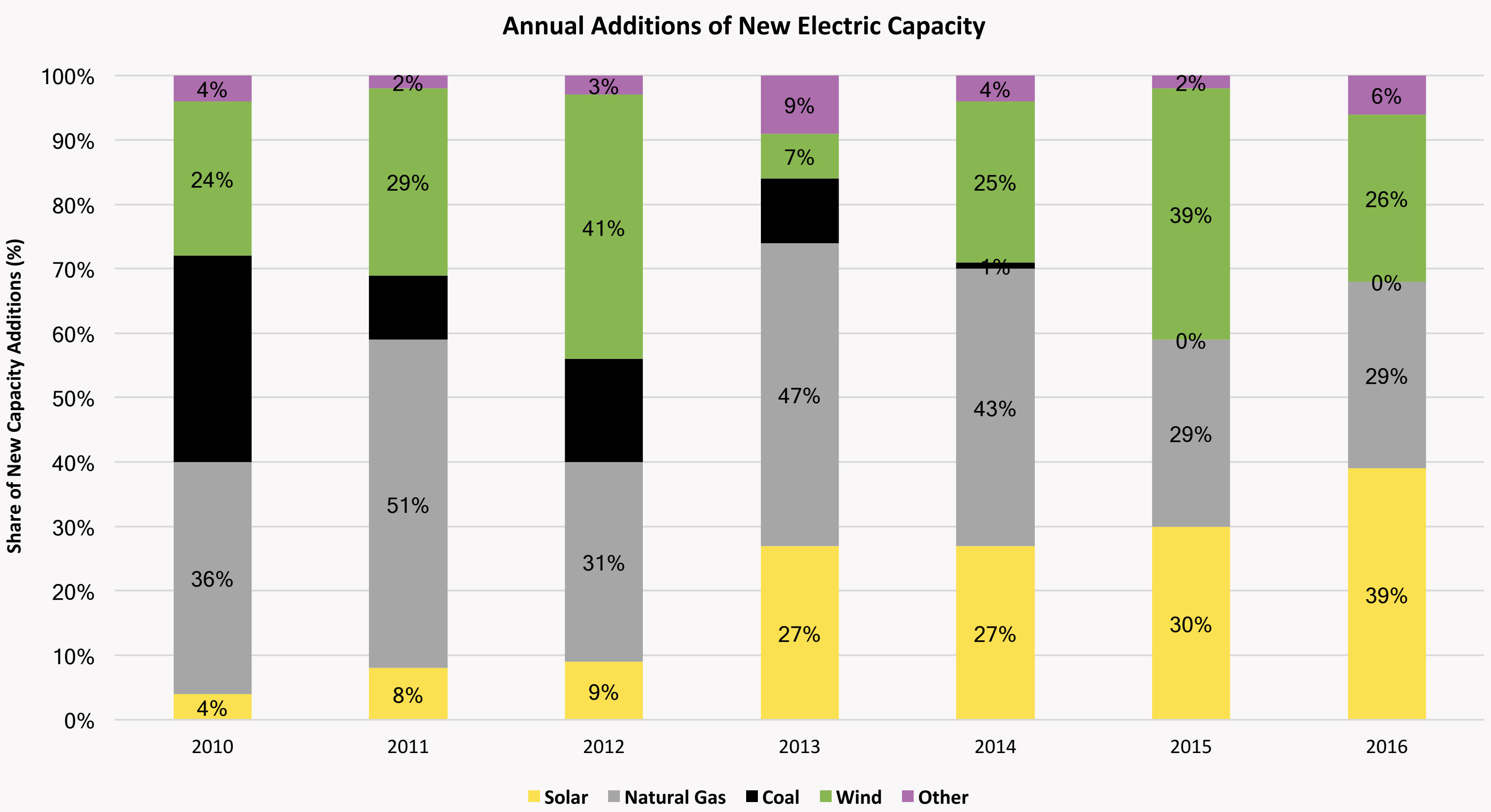
- Chart shows the cheapest electricity technology for each county in the United states.
- Utility-scale solar (shown in purple) is the cheapest source of electricity in large portions of the Southwest, West Coast and Southeast

FIGURE 8

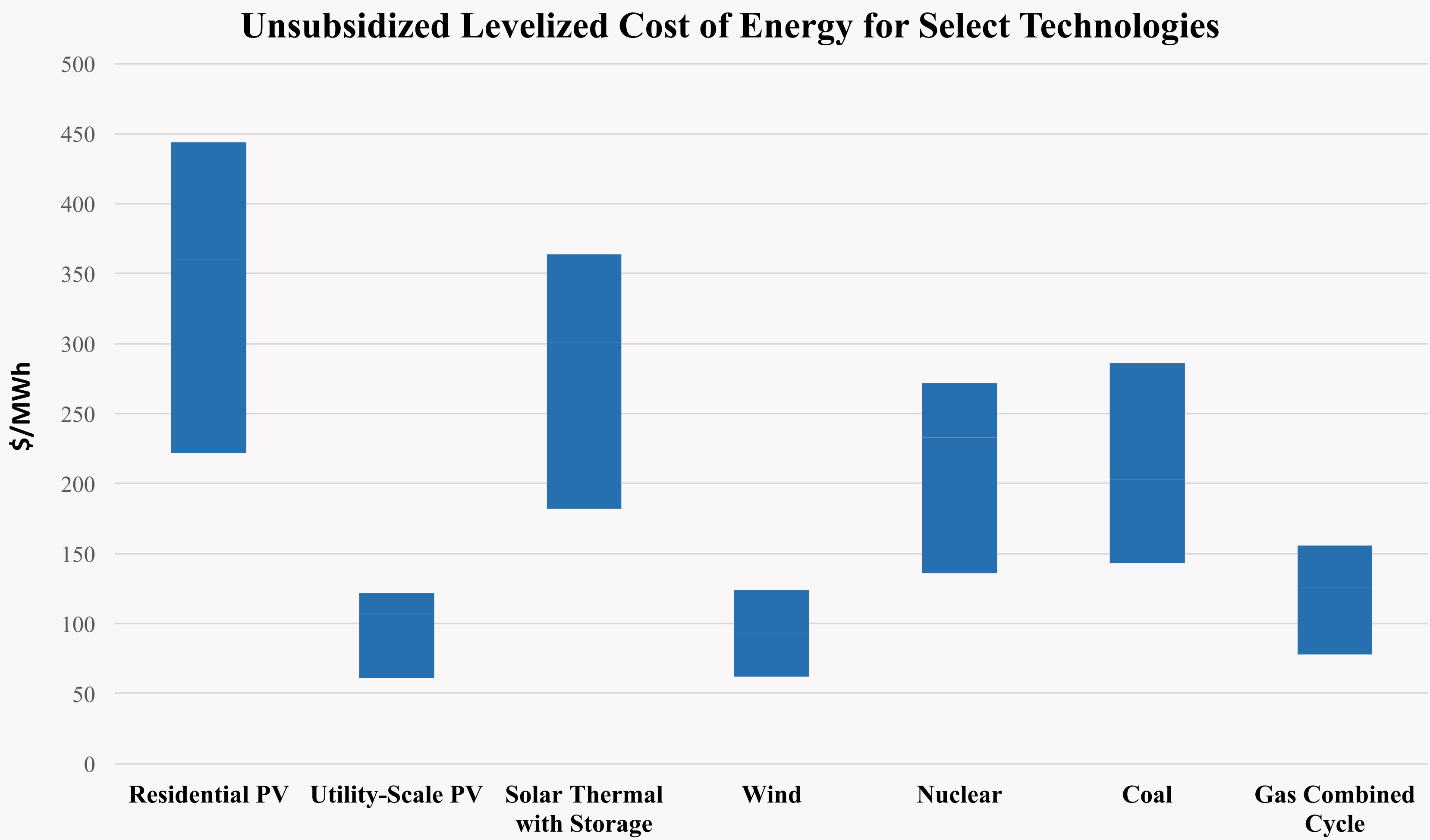
Scenario 4: Minimum cost technology for each county, including availability zones, but not including externalities (Equation 1) with reference case assumptions from Table 1.



Solar's Share of New Capacity Has Grown



Solar is Price Competitive With All Other Technologies



SOLAR MARKET OVERVIEW

Our vision is of a transformed energy supply and delivery system, such that solar technologies, in collaboration with other clean, reliable, affordable renewable resources and storage, fuel this country's economy.

The Solar Industry Today

44.7 GW of solar installed through the end of 2016

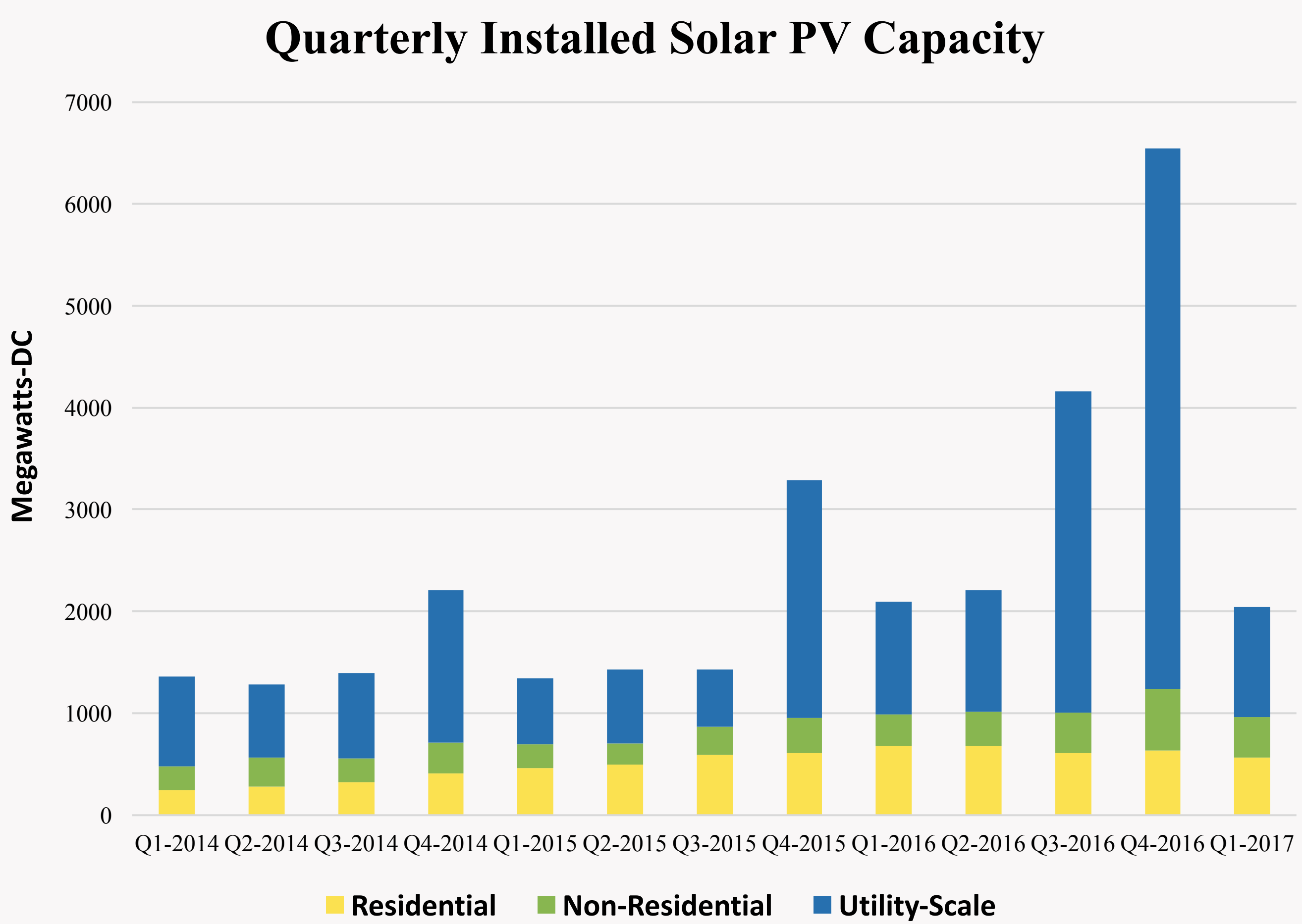
Enough to power **8.7 million** American homes

68% 10-year average annual growth rate

Workers employed in the solar industry: **260,000**

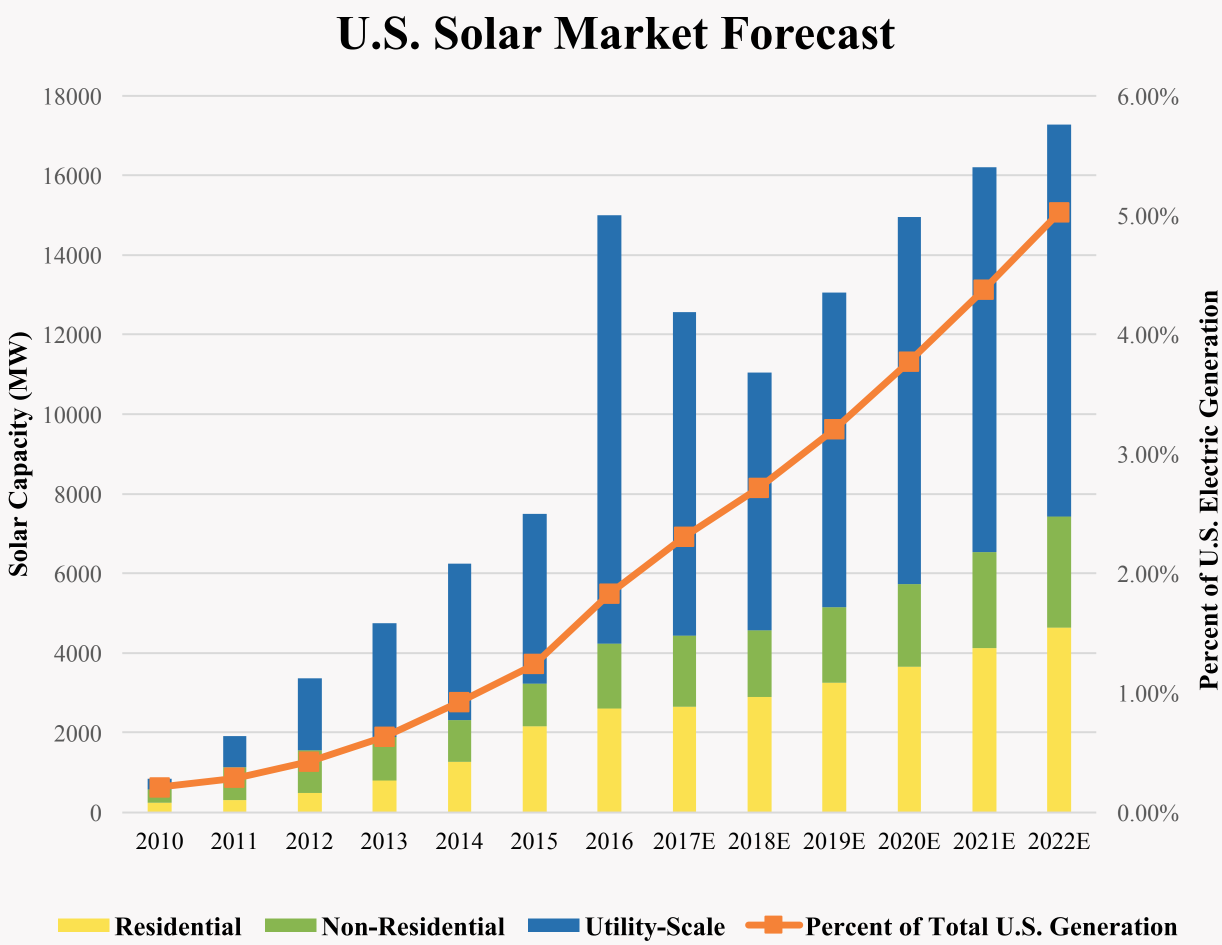
1.4 million individual installations nationwide

Q1 2017 Results



- Customer acquisition issues in mature markets leads to flat growth in residential; partially offset by opening of new markets
- Community Solar, Large C&I pushes non-residential to 29% y/y growth
- Utility projects in 2017 primarily pushed from 2016. Procurement ramping for projects with 2019 – 2021 completion dates

Deployment Forecast

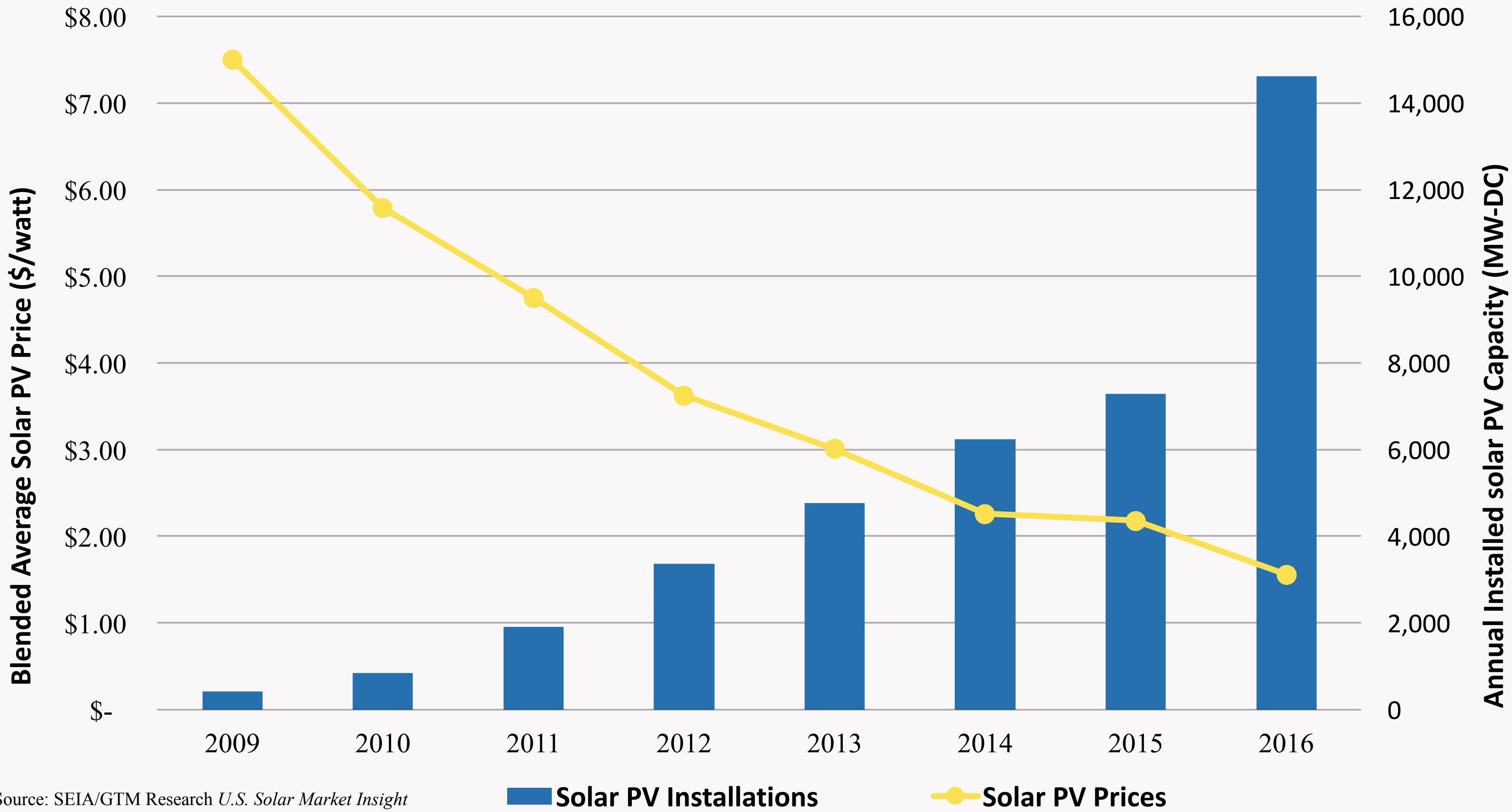


- By 2021, over 100 GW installed in the U.S., enough to power 19 million homes
- Represent 5% of America's annual electricity generation by 2022, up from 0.2% in 2010
- Installed on over 4 million rooftops nationwide by 2022
- Nearly $20 billion in annual economic activity by 2022

Continuing to Create Jobs

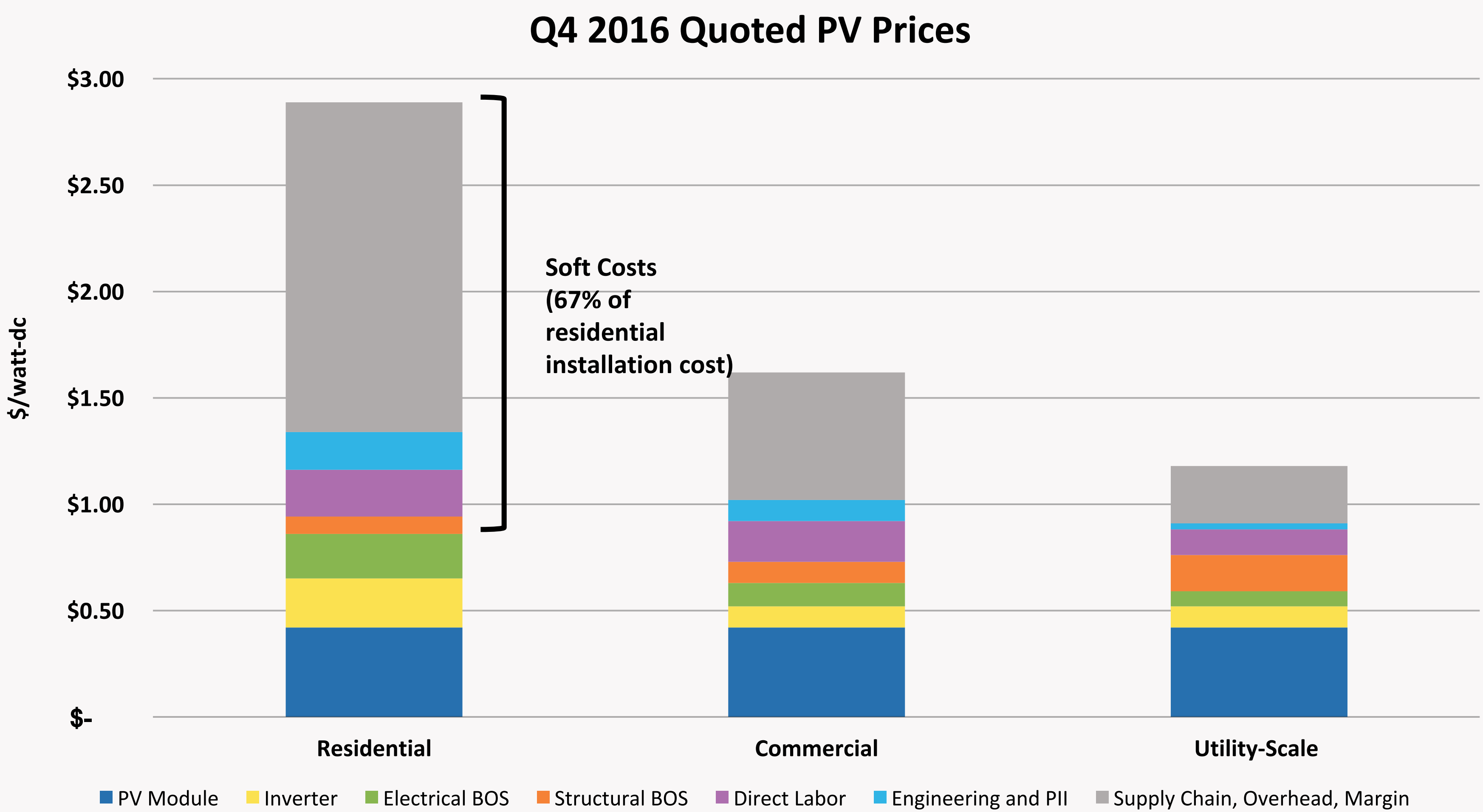
- Hundreds of thousands of American families depend on the industry
- The solar workforce must better reflect American diversity

Growth in Solar Led by Falling Prices



Source: SEIA/GTM Research *U.S. Solar Market Insight*
Lawrence Berkeley National Laboratory, *Tracking the Sun*

Solar PV Price Breakdown

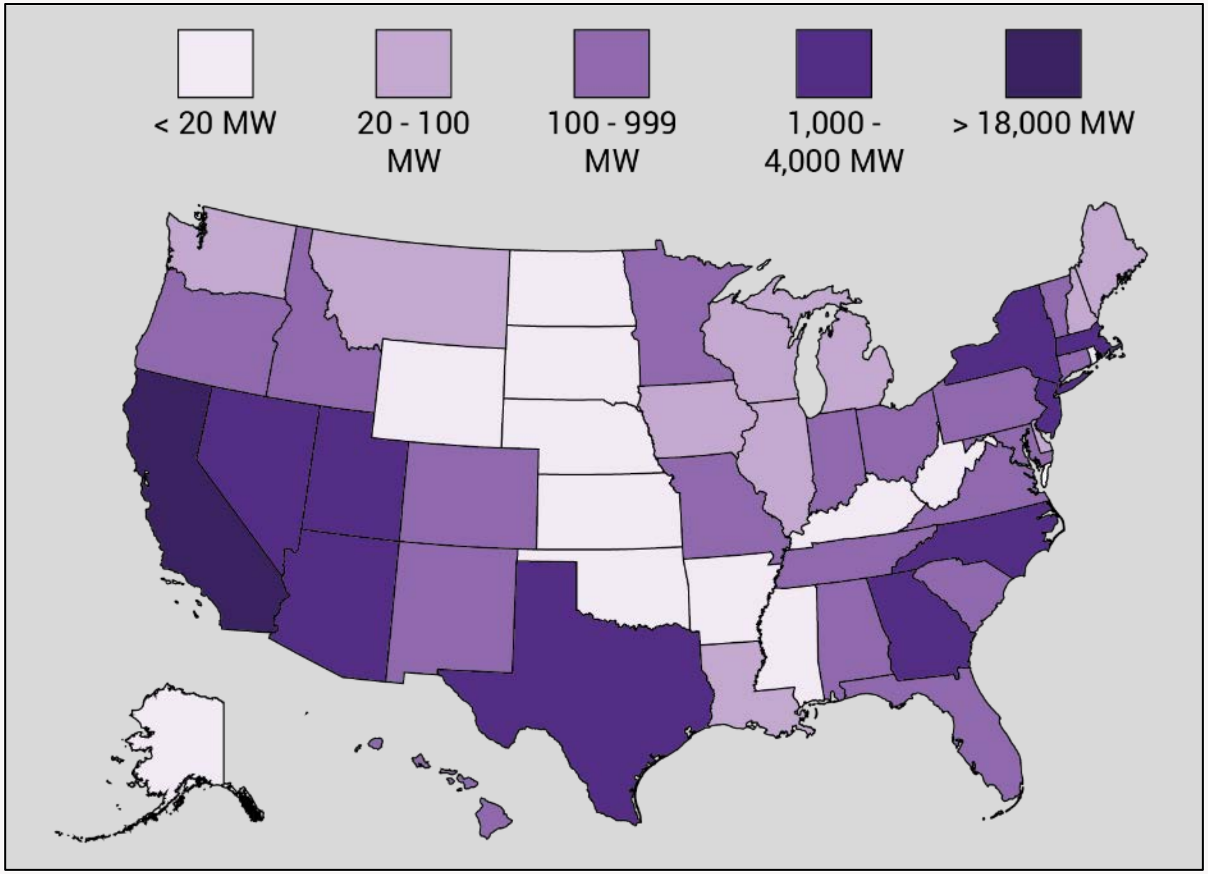


Solar Growth Coast to Coast

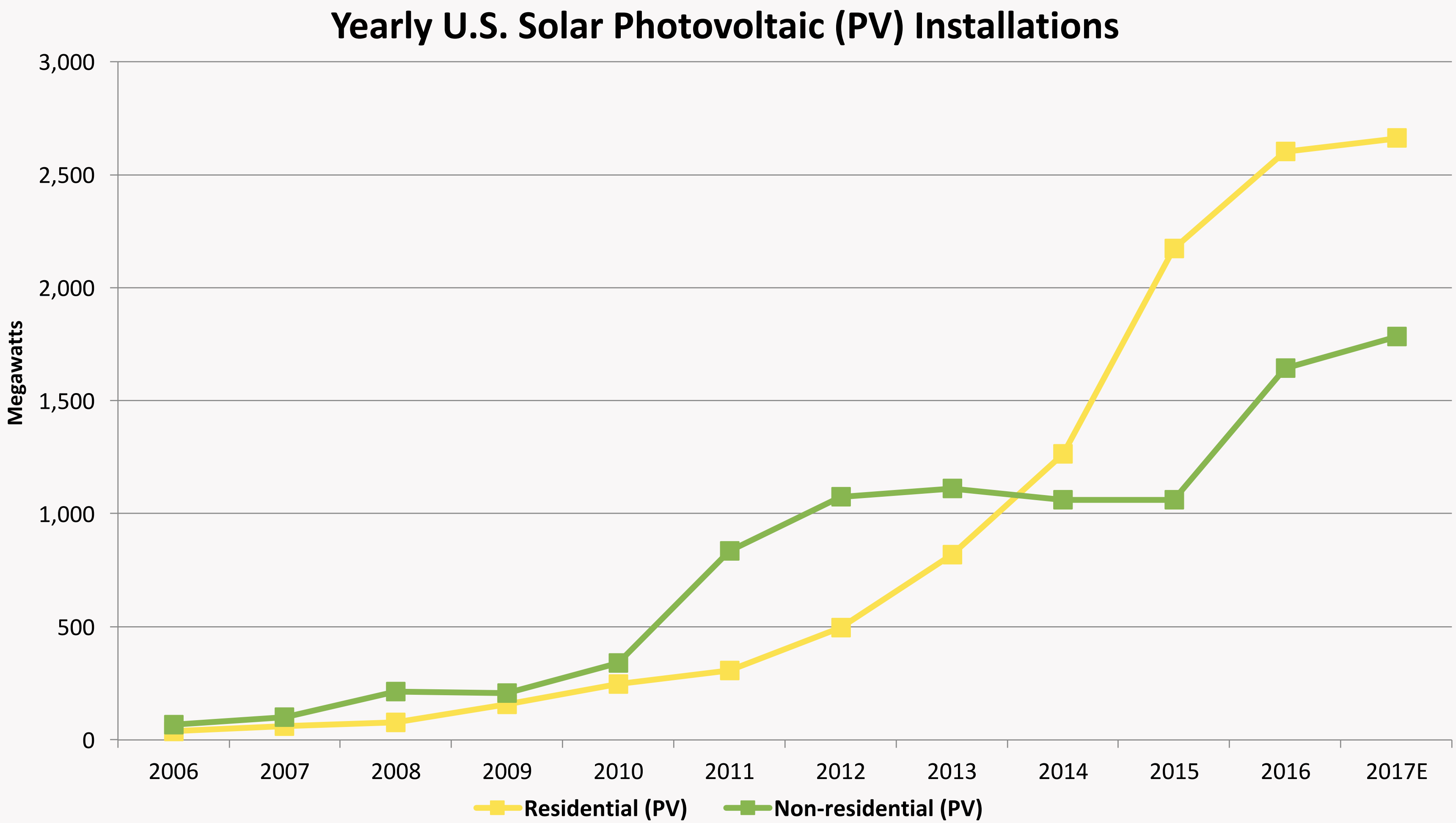
Top 10 States

1. CA: 18,963 MW
2. NC: 3,288 MW
3. AZ: 3,151 MW
4. NV: 2,269 MW
5. NJ: 2,114 MW
6. MA: 1,592 MW
7. UT: 1,527 MW
8. GA: 1,478 MW
9. TX: 1,228 MW
10. NY: 1,012 MW

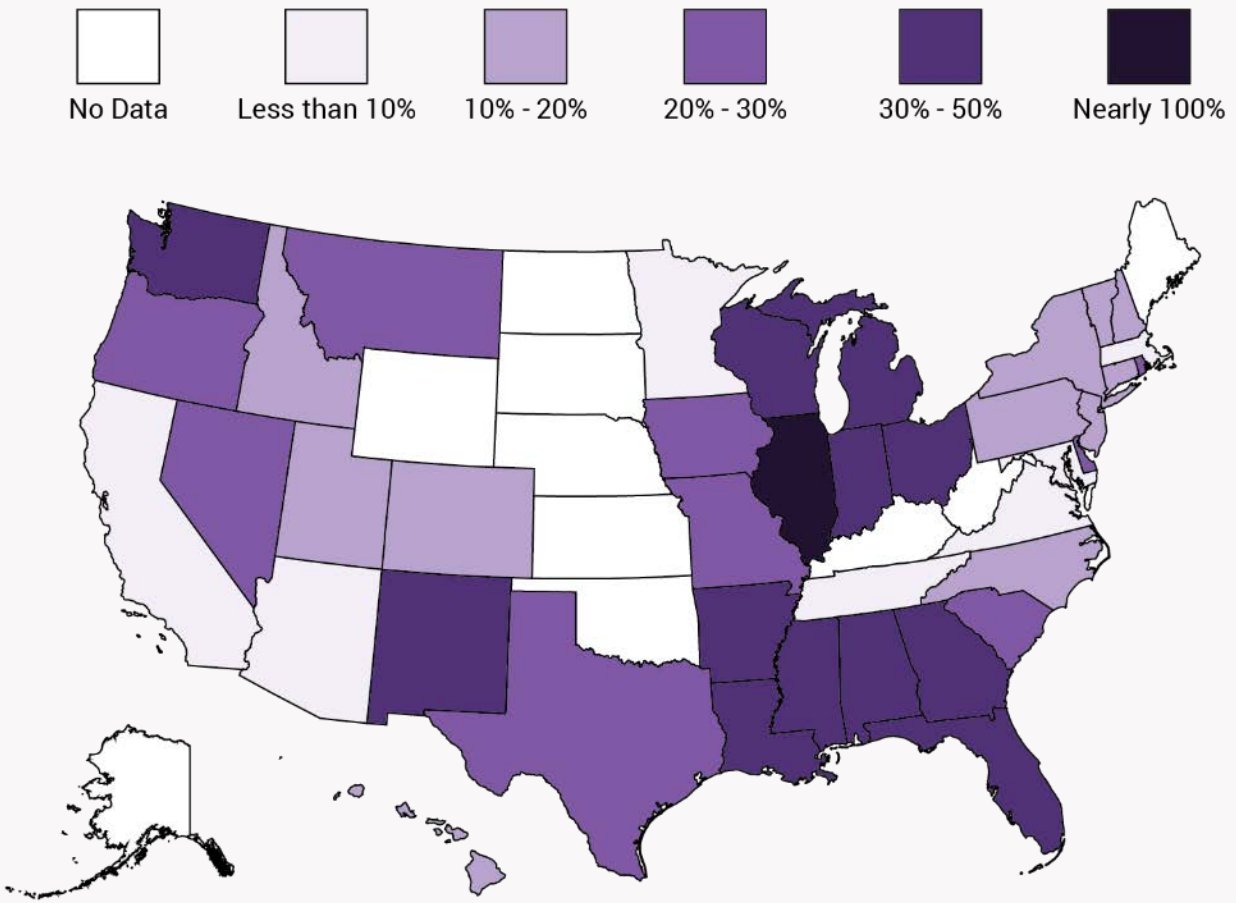
Cumulative Solar Capacity by State, Q1 2017



Growth: Distributed Generation

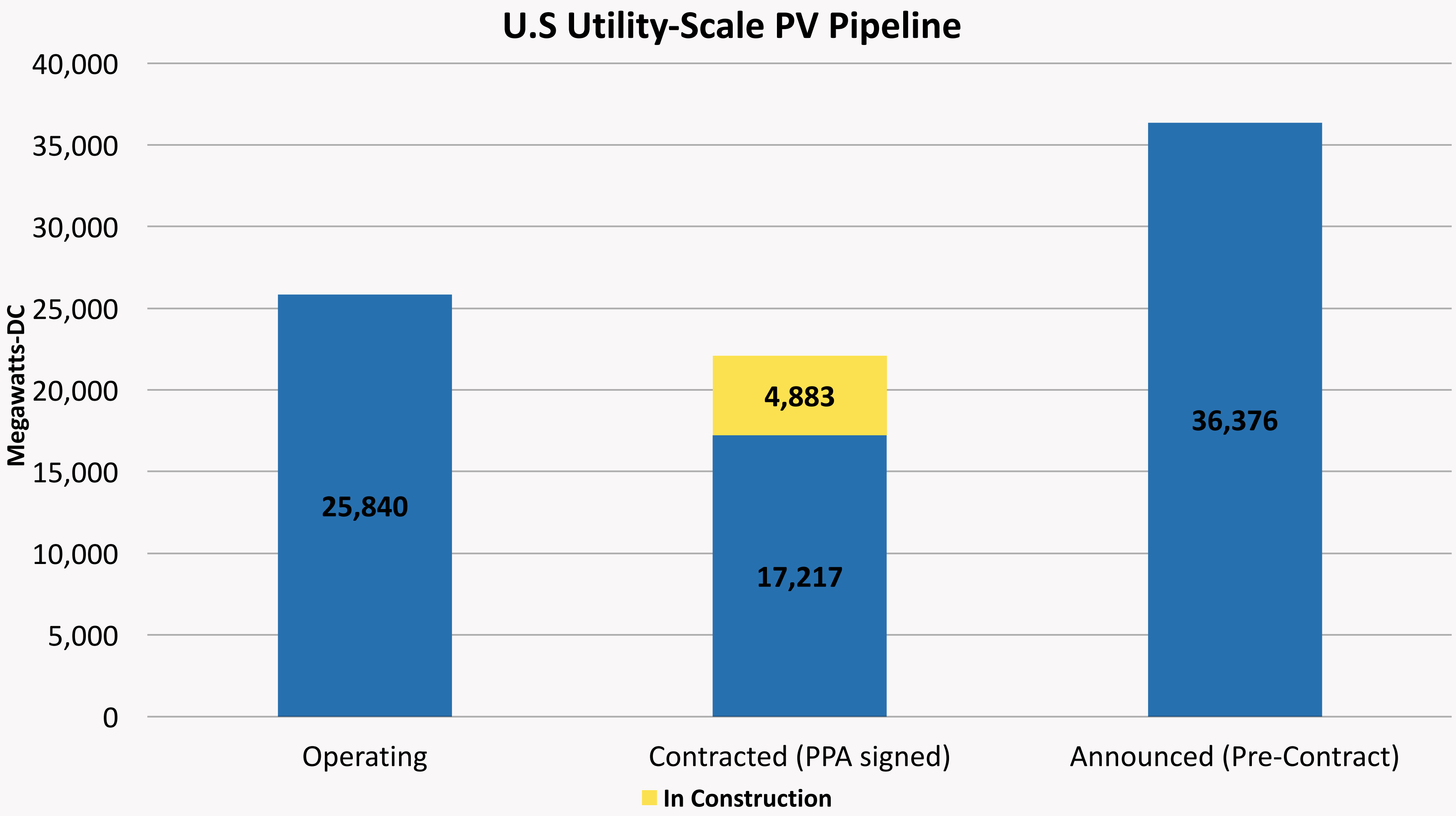


Where the Growth is Happening: Distributed Generation



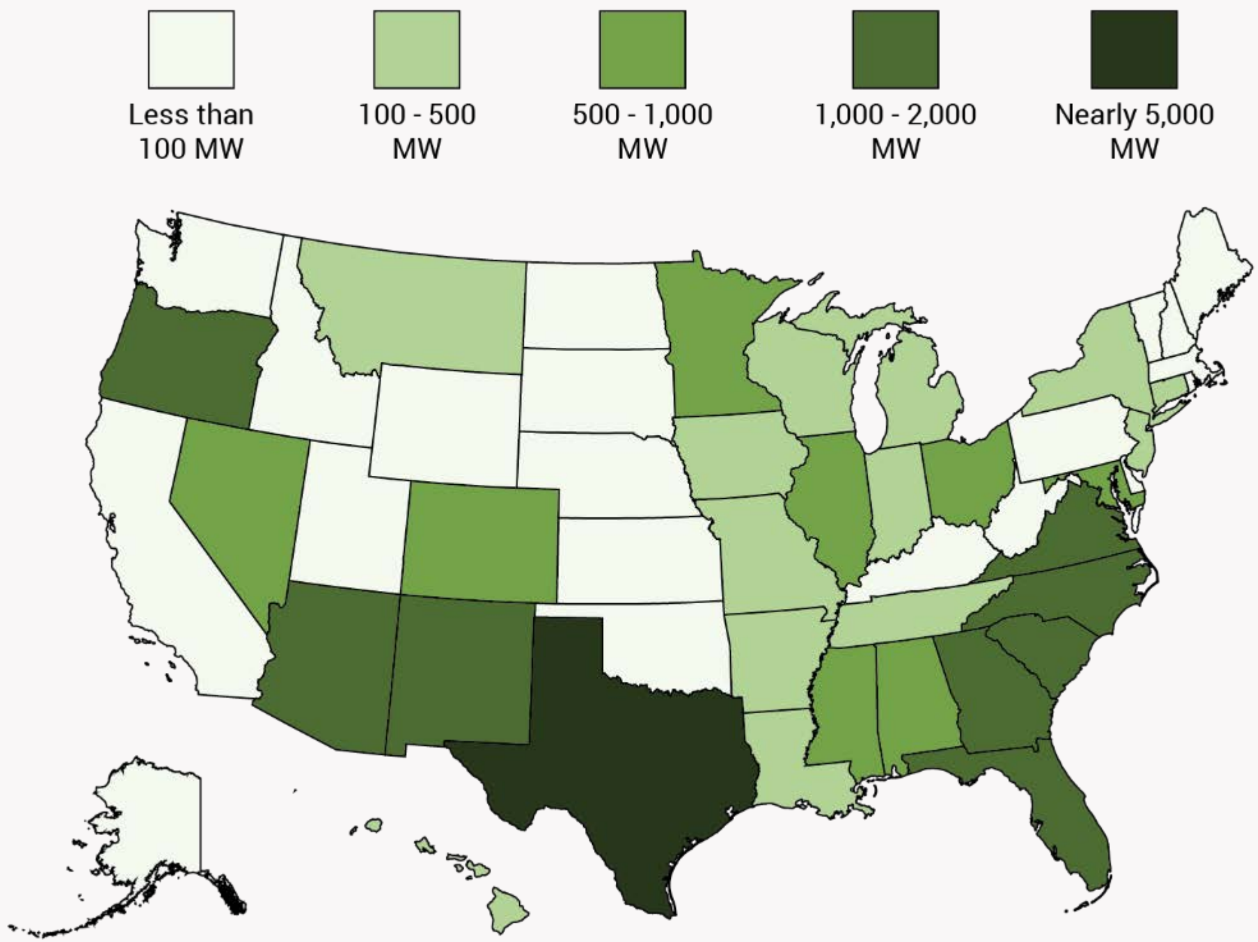
Average Annual Growth of Distributed Generation Solar Markets, 2017- 2022

Growth: Utility-Scale



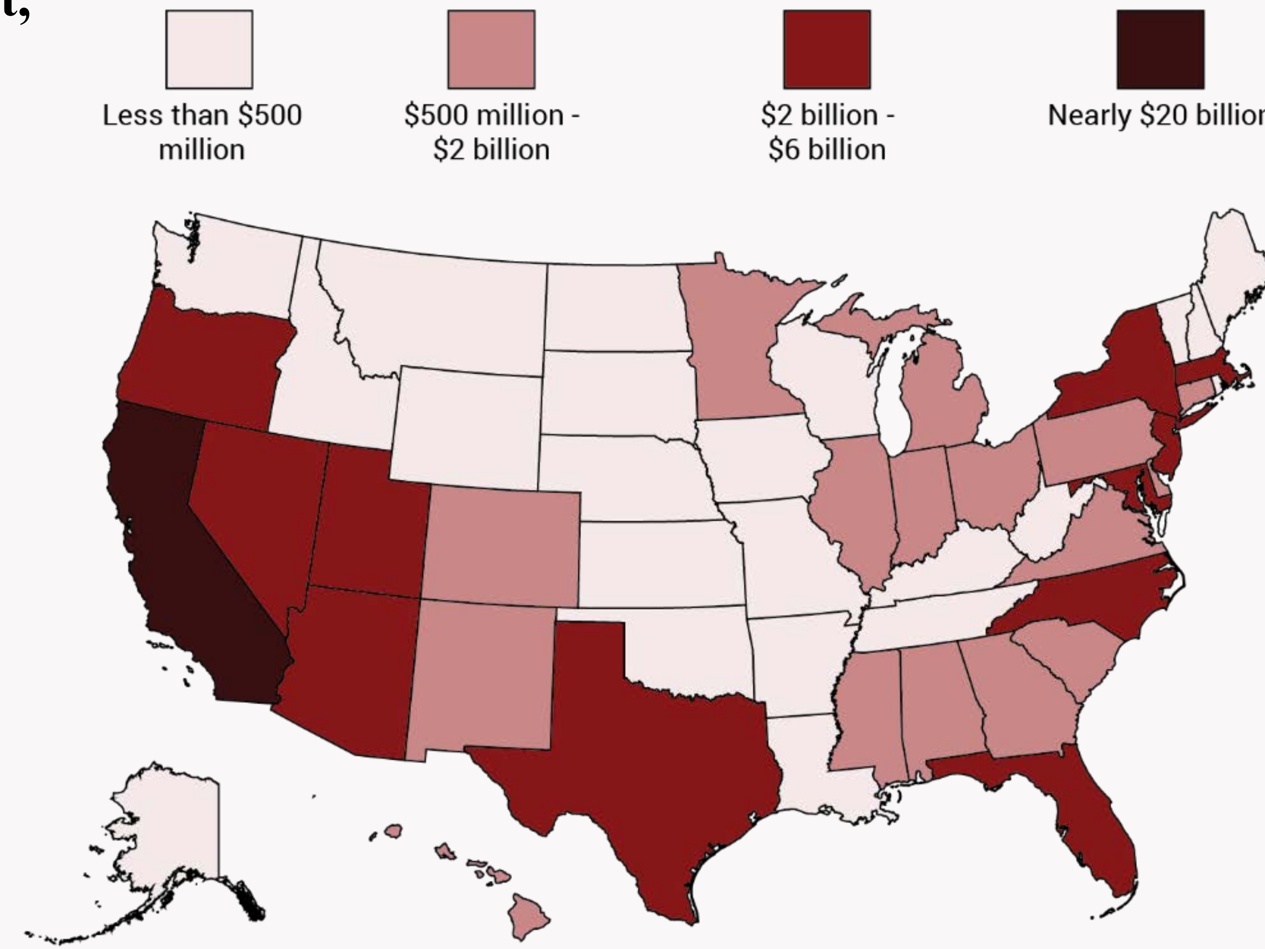
Where the Growth is Happening: Utility Scale

Growth of Utility-Scale Solar from 2017-2022, as compared to 2011-2016



Mature Markets Still Booming

Total Solar Investment, 2017 - 2021

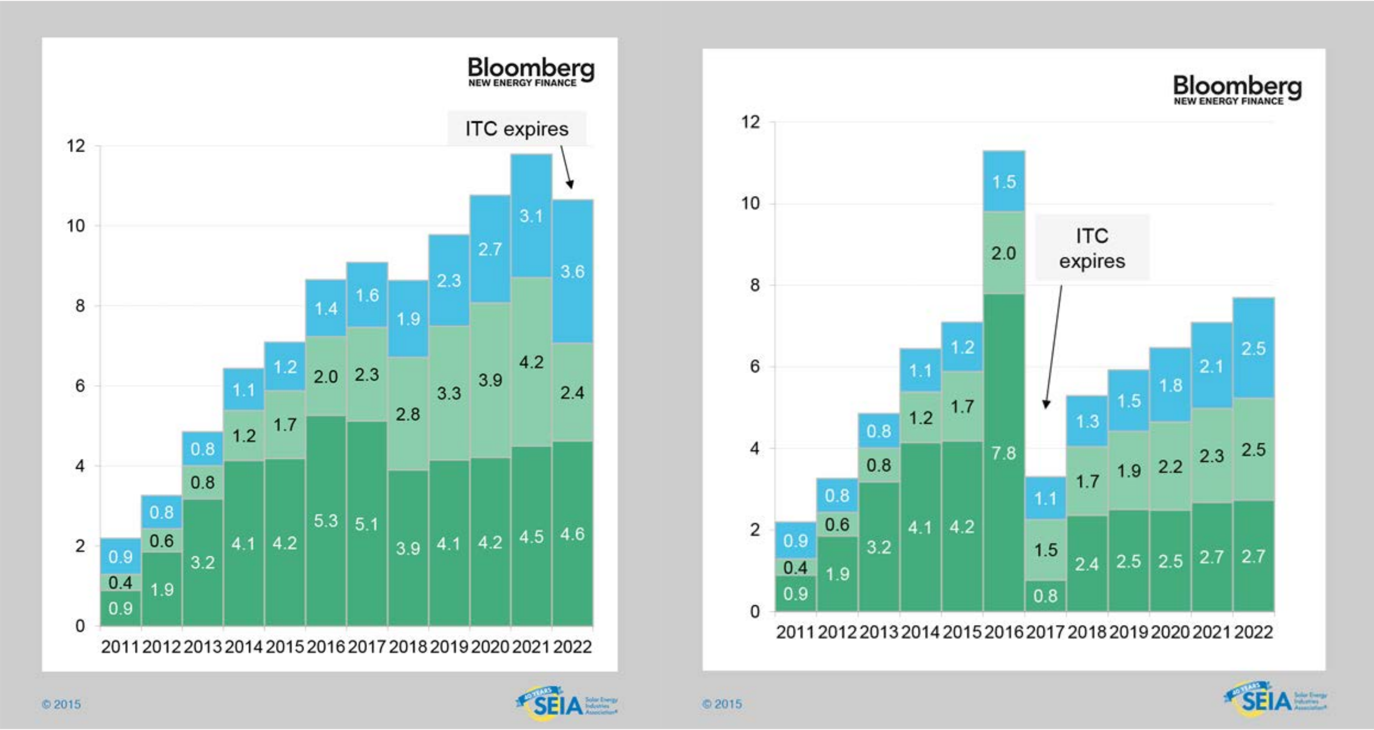


OUR STRATEGIC VISION FOR THE FUTURE

Ensure that Existing Solar Markets Remain Open and Robust: Federal

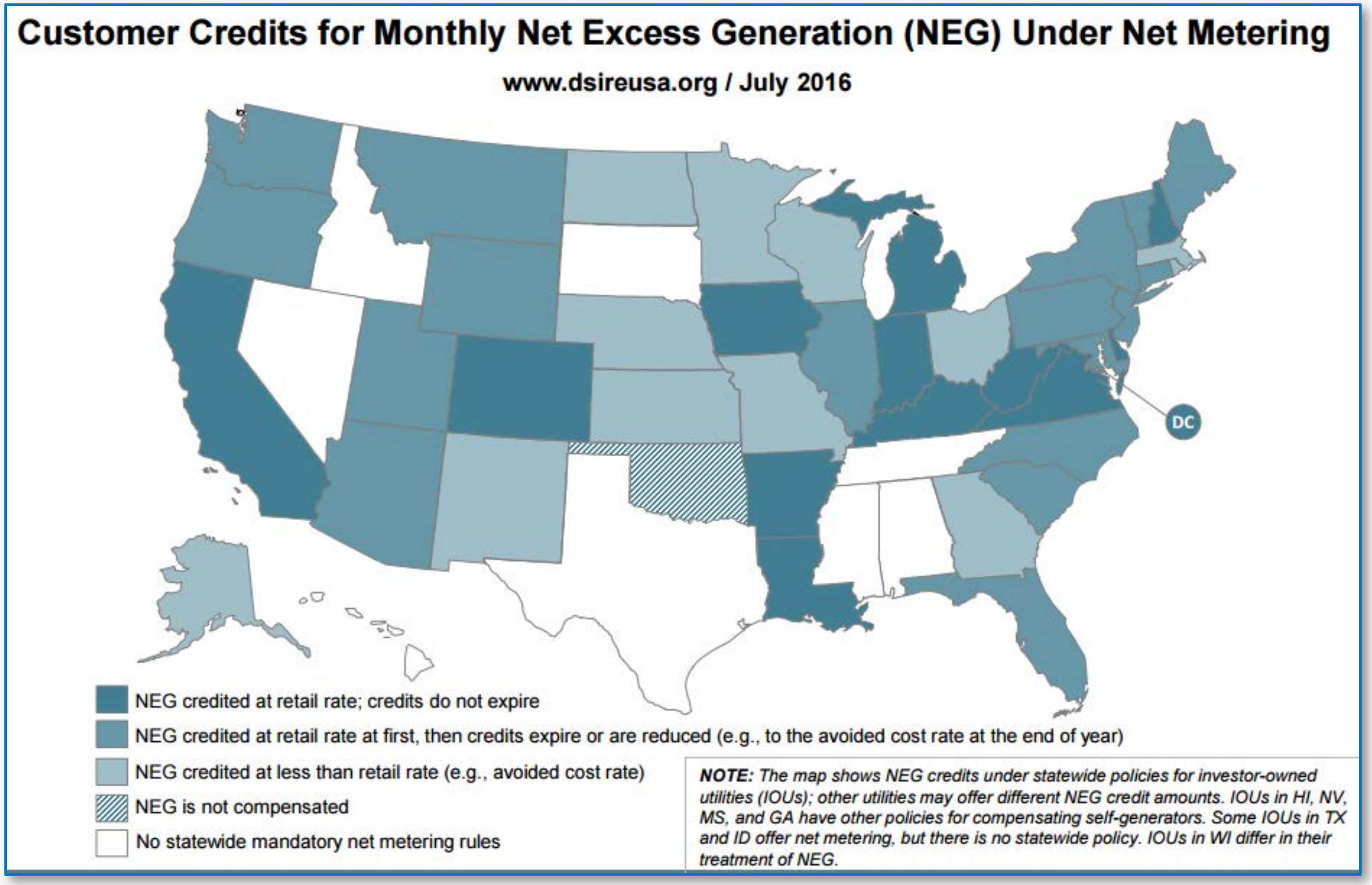
- Defending the Investment Tax Credit: can't allow early expiration to set back the industry
- Other federal issues: ensuring viable PURPA statute, solar access on public lands, supportive IRS policy, defending against overreach on permitting

This analysis from SEIA & BNEF during the last ITC extension demonstrate the potential impact of a tax credit expiration

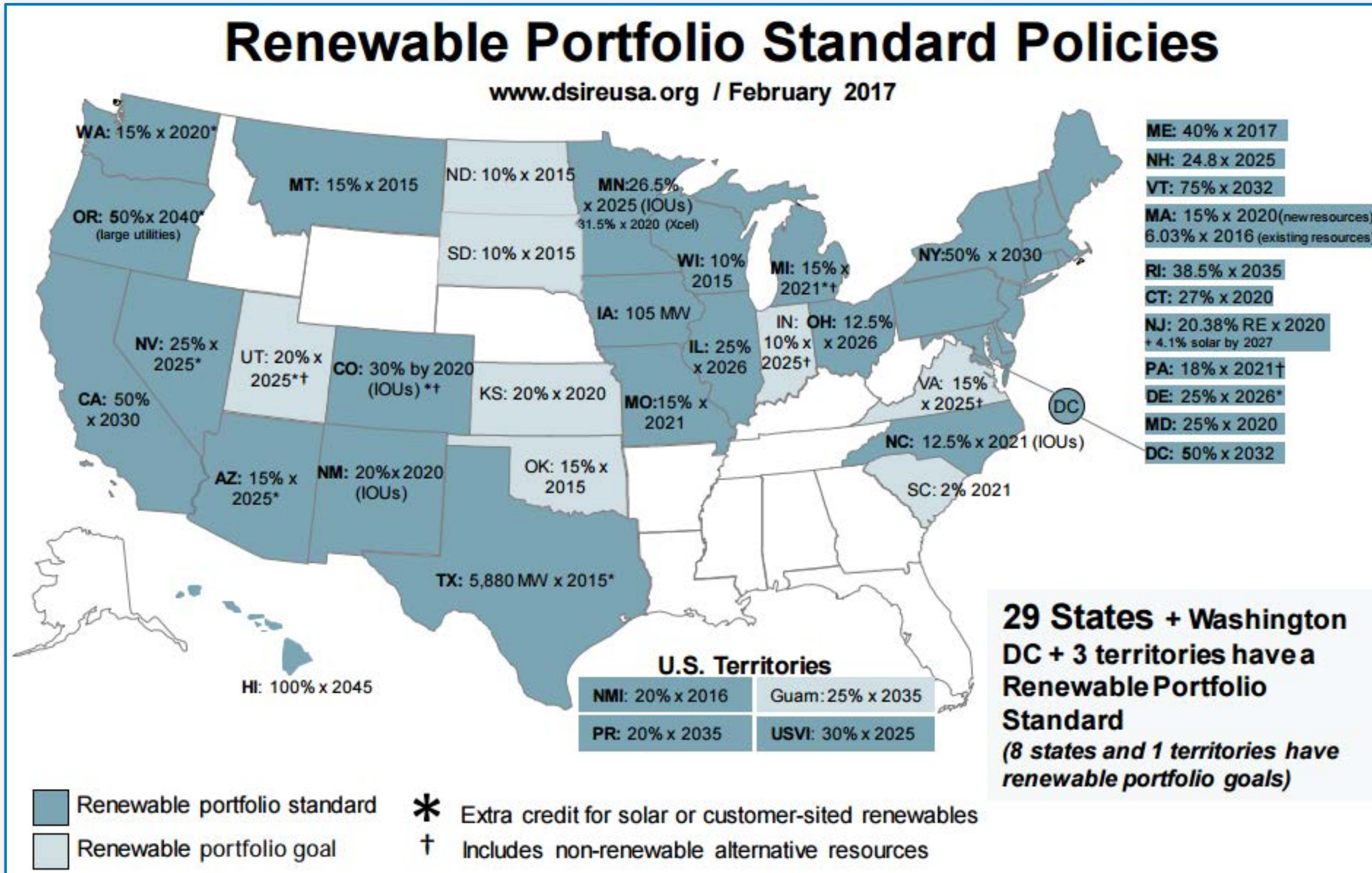


Ensure that Existing Solar Markets Remain Open and Robust: States

- At end of 2017, 36 states will be at grid parity for rooftop solar. If Net Metering export rate compensation is cut in half, only a handful will remain at grid parity

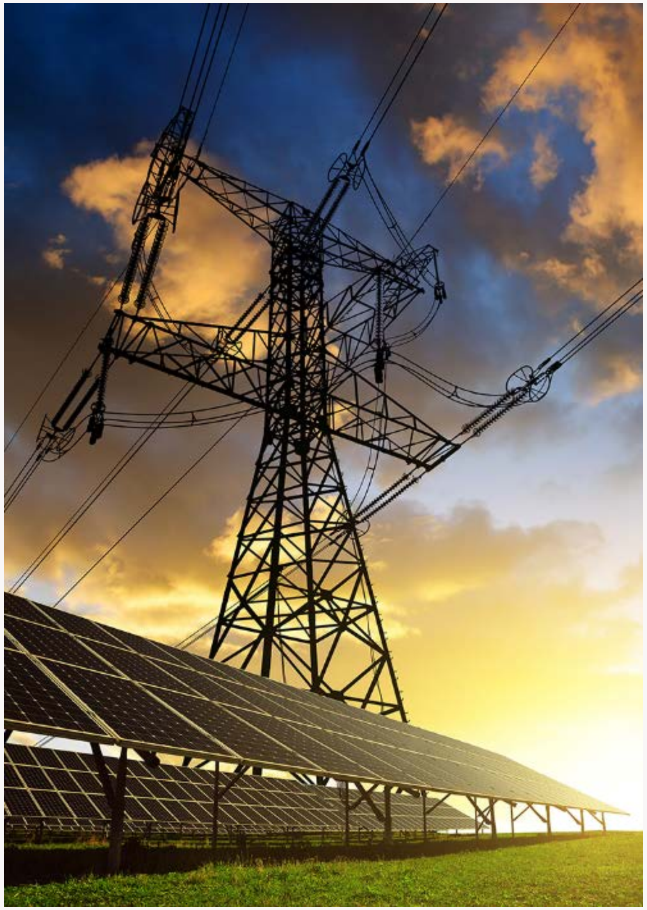


Ensure that Existing Solar Markets Remain Open and Robust: States

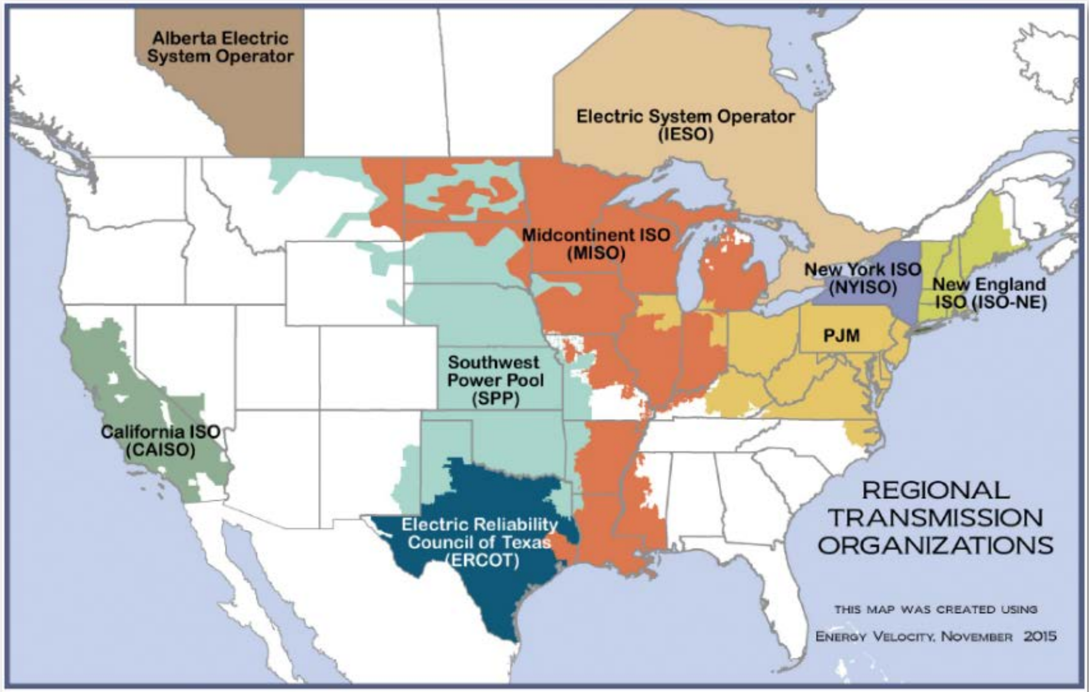


- While RPS will continue to be important in many markets, PURPA now drives more utility-scale procurement.
- Defending PURPA at the state level and ensuring level playing fields in wholesale markets will be priorities moving forward

Coordination with Utilities & Grid Operators



- Engagement with grid operators is critical
- Communicate that industry is ready to contribute positively to an efficient, reliable, and secure grid



Industry Leadership: Codes & Standards

- National Electric Code – 2020 revision happening now with major implications for solar
- Installer safety, fire safety will always be important issues – we must *lead* on them

Industry Leadership: Consumer Protection

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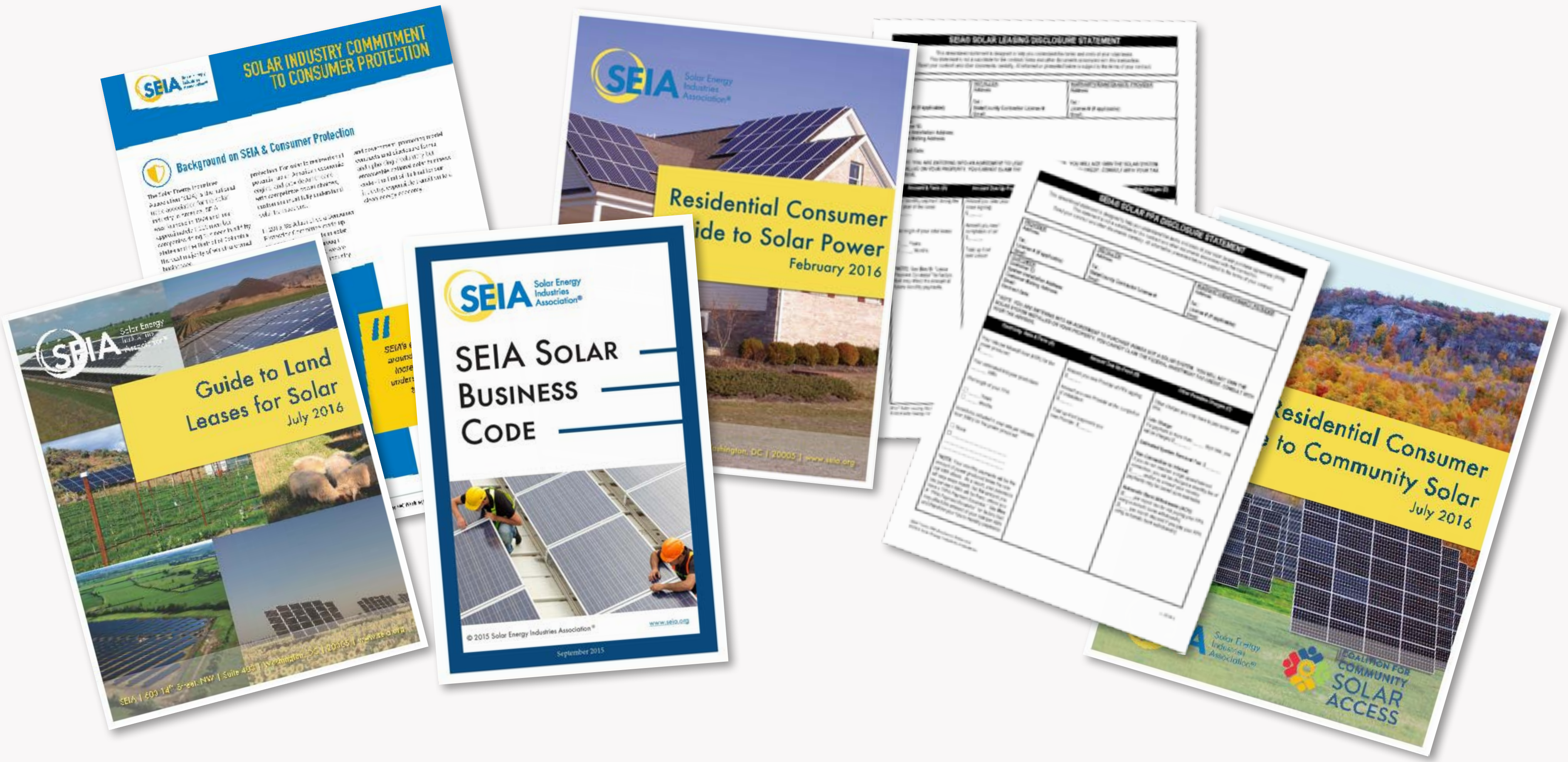
- Attacks on industry around consumer protection undermine all of the work we do
- Must continue to develop and promote our many resources around this issue:



Reforming State Electricity Markets

TX: Advocate against demand charges and interconnection fees in the El Paso Electric rate case, and efforts at the PUCT and ERCOT to maintain fair treatment of USP.

MA: Fighting to get the NEM caps raised once again in the Commonwealth to align with the new incentive program.

NV: Just enacted new NEM policies that will reopen the state’s residential market. But, challenges remain: Gov. Sandoval vetoed important community solar and RPS bills

NC: Second largest solar state is jeopardized by harmful PURPA proposals, rooftop solar will continue to face strong headwinds

CA: Working toward sensible next-generation solar policies in the nation’s leading solar market.

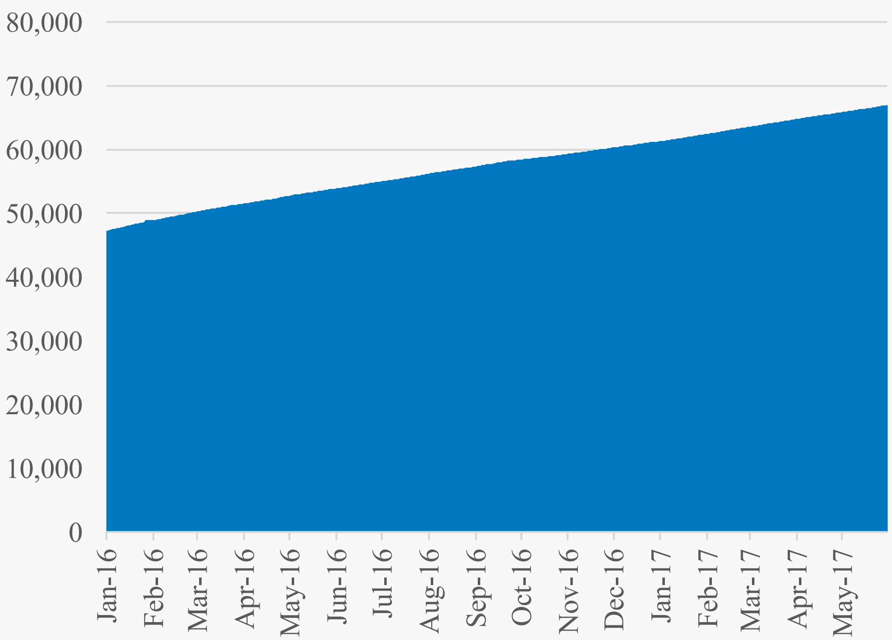
NY: Continuing to engage with REV process to maintain solar support and develop successor tariffs for net metering

FL: Looking ahead to 2018 now that legislation has opened up the market

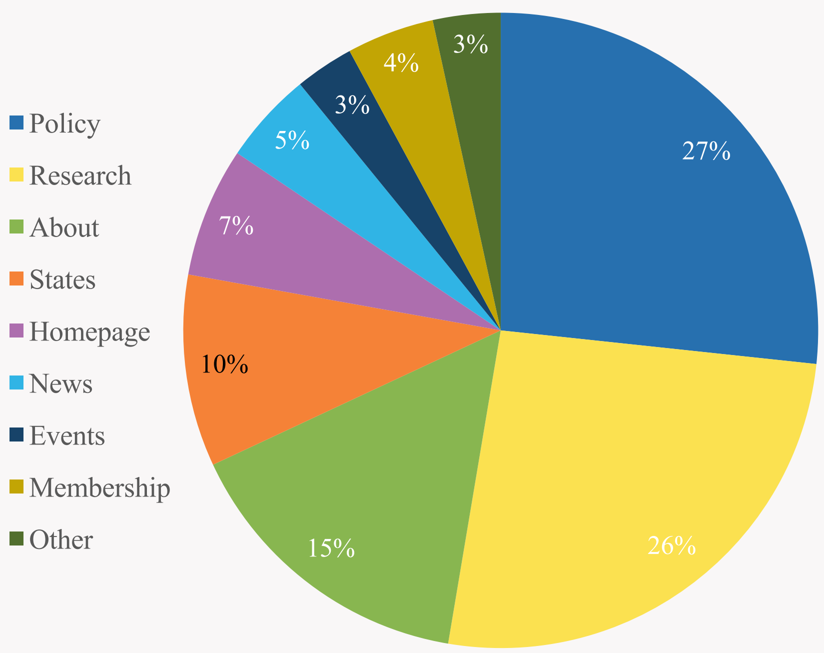
Represent Solar Nationally, Including as the Voice of and Research Center for the Industry

- Play to our strengths: people are hungry for industry data and policy updates
- Social media's importance cannot be understated – keep investing

SEIA Twitter Followers: January 2016-Present



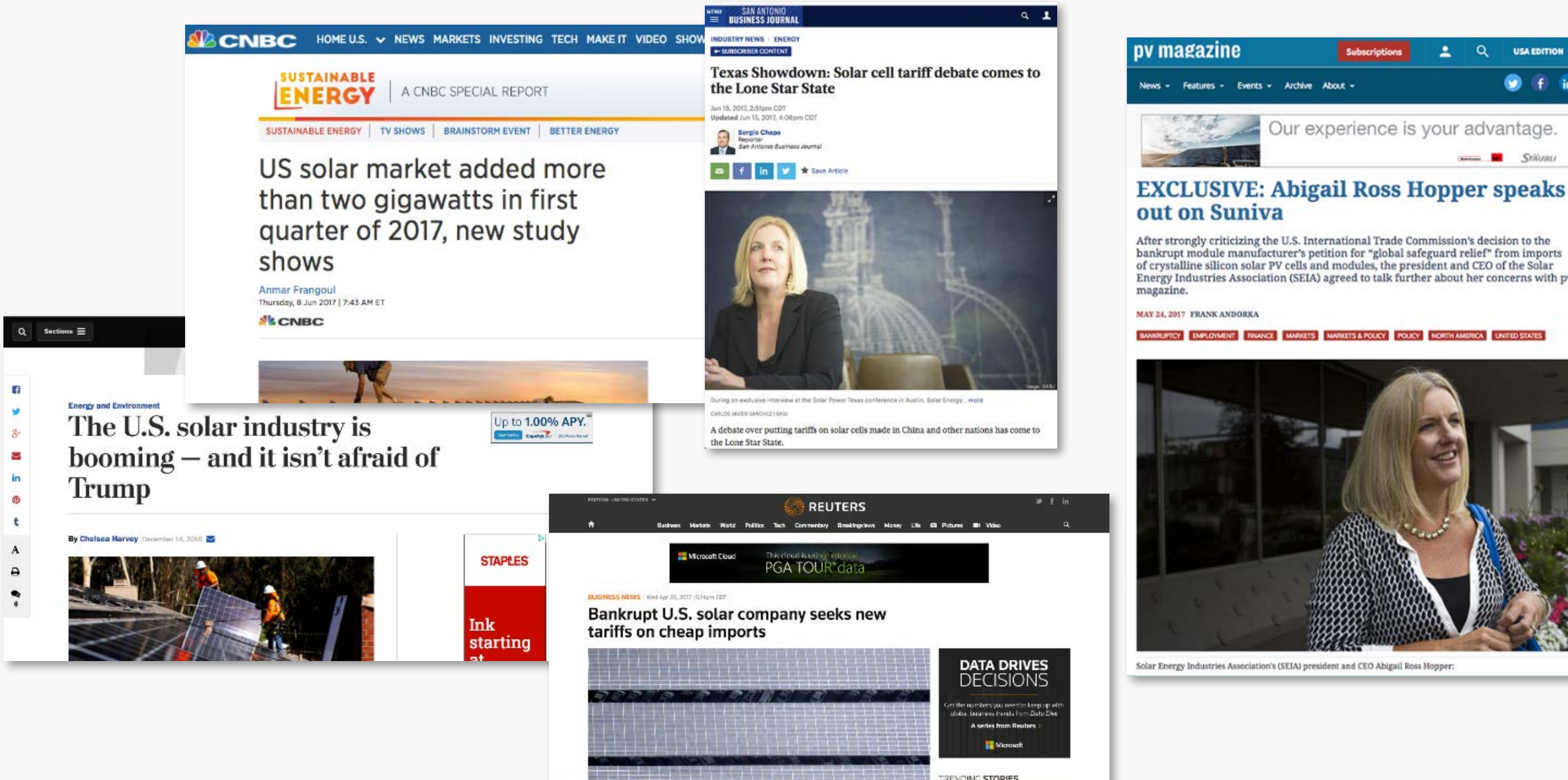
SEIA Website Views by Section: Q1-Q2 2017



Represent Solar Nationally, Including as the Voice of and Research Center for the Industry

Solar Energy Industries Association®

- We have to take part in the conversation, but more importantly drive it



THE NEXT 5 YEARS: RISKS & OPPORTUNITIES

Challenges & Opportunities

New Regional Market Opportunities

Trade Barriers

Transmission & Grid Modernization

Tax Reform

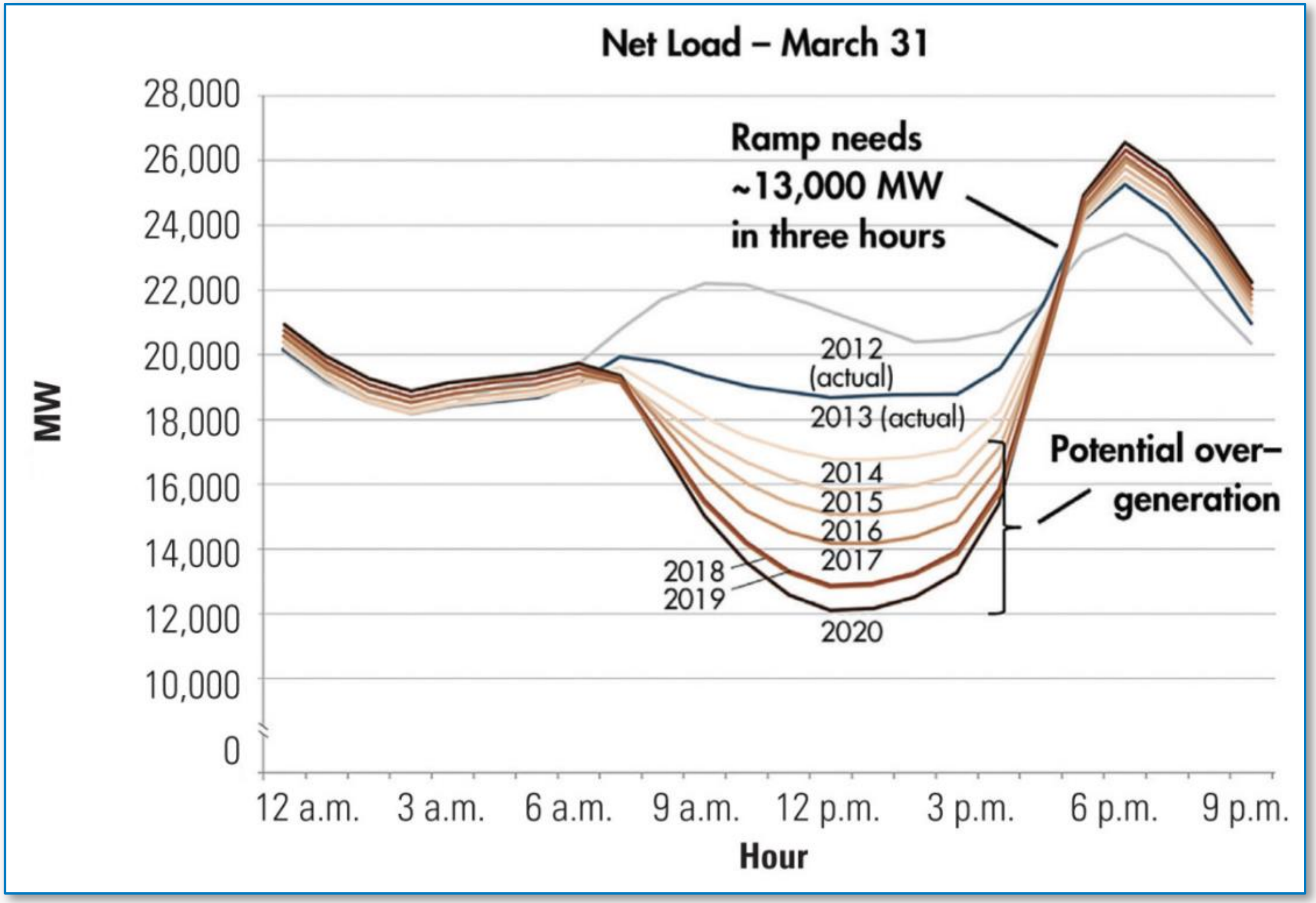
Energy Storage

NEM 3.0

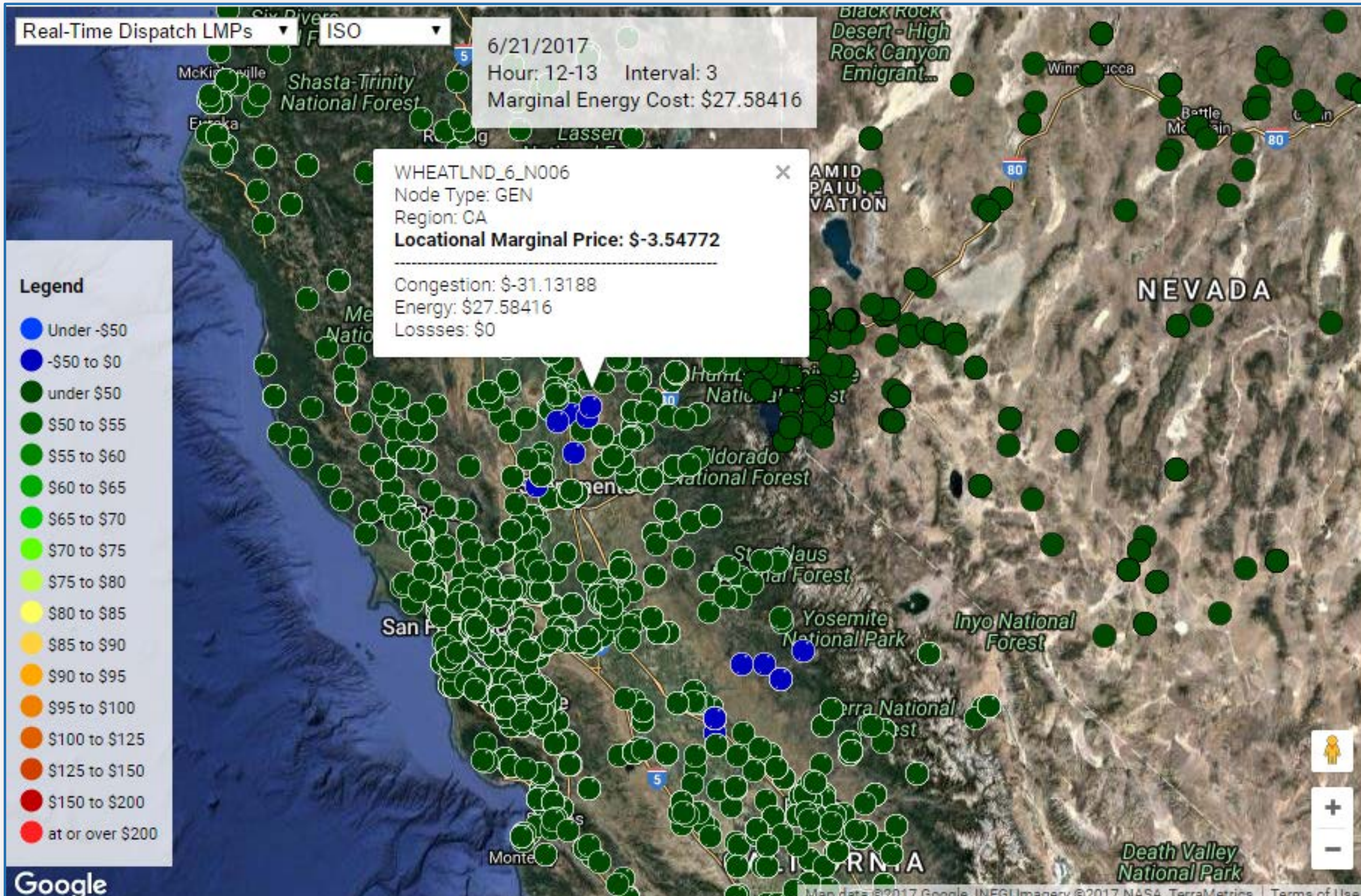
Solar + Storage

- Storage-friendly language being included in various state NEM/rate design legislation
- Many new utility-scale solar projects are incorporating storage
- What policy mechanisms are needed to advance solar + storage?

Transmission & Grid Modernization



Solar Price Congestion



- Map shows Locational Marginal Electricity Prices (LMPs) in the California ISO Real-Time Market
- Blue dots represent nodes with negative LMPs caused by grid congestion
- Solar can both cause and alleviate grid congestion
- Investment in grid infrastructure, including storage also can play role

Coordination with other Renewables

- For communication and advocacy with DOE, we need a broad coalition

A SHARED VISION OF THE 21ST CENTURY GRID

As organizations that jointly represent thousands of businesses and hundreds of thousands of U.S. jobs in diverse renewable energy technologies, we share an affirmative agenda for the nation's power grid, which is changing as new and existing technologies provide more choices for consumers and society.

To facilitate the ongoing transition to a new power supply paradigm, we jointly call for a sustained, positive effort to build a 21st century grid infrastructure that takes full advantage of technology available today to increase the efficiency and reliability of the grid. Those technologies include demand response, energy storage, and the broad portfolio of grid-scale and distributed renewable generation technologies available today. These renewable technologies include hydro, biomass, geothermal, biogas, waste-to-energy, fuel cells, and combined heat and power as well as wind and solar power.

In order to promote achievement of such a grid, we support:

- Market structures that appropriately value new and existing technologies for the attributes they bring to the grid, including energy, capacity, flexibility, dispatchability, and other essential reliability services.
- Tax reform that protects the current incentives for renewable energy, includes extension of the renewable tax credits that have already expired, and levels the long-term playing field to support investment in the electric power infrastructure.
- Expansion and modernization of the power grid to support the operation and integration of renewables and a more dynamic system of meeting reliability needs, including expanded transmission and greater connectivity between balancing areas, distributed generation, more responsive load, and community power systems.

Our vision of the future power grid promises economic savings, improved reliability, greater access to electric power, environmental improvement, and more diverse choices for consumers and producers of electric power.

Signed:

Gregory Wetstone
President & CEO
American Council on Renewable Energy

Bob Cleaves
President & CEO
Biomass Power Association

Linda Church Ciocci
Executive Director
National Hydro Power Association

Patrick Serfass
Executive Director
American Biogas Council

Ted Michaels
President
Energy Recovery Council

Abigail Hopper
Executive Director
Solar Energy Industries Association

Tom Kiernan
CEO
American Wind Energy Association

Karl Gawell
Executive Director
Geothermal Energy Association

— June 19, 2017 —

Secretary Rick Perry
U.S. Department of Energy
1000 Independence Ave. SW
Washington, D.C. 20585

April 28, 2017

Dear Secretary Perry,

We are writing in response to your April 14, 2017, memorandum directing the Department of Energy to conduct a Study Examining Electricity Markets and Reliability.

We agree that the nation is indeed "blessed . . . to have an abundance of domestic energy resources" that provide a stable, reliable and resilient grid. As trade associations that jointly represent thousands of businesses across industries that support more than 3 million U.S. jobs in solar and wind power, energy efficiency, energy storage, and advanced grid technologies, we note that these homegrown energy resources are proven technologies that help support grid reliability. These energy resources have already been integrated smoothly into the electric power system in large and increasing amounts, as demonstrated in countless studies and, more importantly, in real world experience across the U.S., including in Texas. Furthermore, we note that policies supporting the deployment of these technologies are not playing an important role in the decline of coal and nuclear plants. Numerous studies have conclusively demonstrated that low natural gas prices and stagnant load growth are the principal factors behind the retirements in coal and nuclear plants.

In light of the importance of this inquiry, we encourage you to follow standard practice and conduct the study in an open and transparent manner. When agencies prepare reports with policy recommendations that could affect entire industries and the millions of employees that work in them, such as the proposed one, it is customary for them to seek comments on a draft prior to the study being finalized. For technical studies like the one proposed here, a technical advisory committee of affected stakeholders to vet study assumptions, scenarios, etc. is also an option.

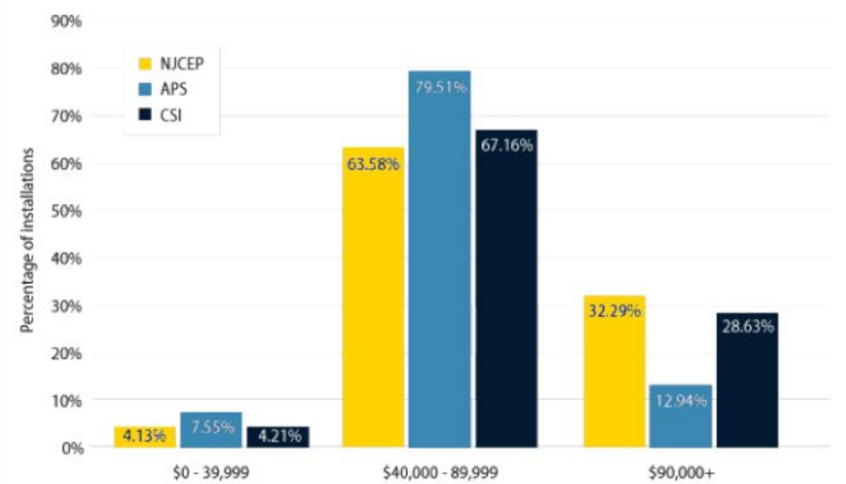
Public input, including from energy market participants, grid operators, and regulators, would help ensure that any resulting recommendations from the study are based on the best available information. In particular, this inquiry would benefit from our associations providing the Department with the latest information

Consumer Choice & Expanding Access

- Prices have dropped by more than 60% over the last 5 years
- Solar is an affordable energy option for many Americans
  - 2013 study found majority of customers in CA, NJ and AZ had a median household income between $40,000 - $90,000
- Community solar opens up a market for those who don’t own their homes or don’t have an optimal roof for solar
- Brookings Institute Study, May 2016: Based on a wide review of net metering analysis, solar has a net benefit on the distribution grid, helping reduce costs for non-solar customers

FIGURE 1

Percentage of installations by dataset and income range



Sources: Arizona Goes Solar, "Arizona Public Service (APS): Installations," available at http://arizonagoessolar.org/UtilityIncentives/ArizonaPublicService.aspx (last accessed August 2013); Go Solar California, "Download Current CSI Data," available at http://www.californiasolarstatistics.ca.gov/current_data_files/ (last accessed August 2013); New Jersey's Clean Energy Program, "New Jersey Solar Installation Update," available at http://www.njcleanenergy.com/renewable-energy/project-activity-reports/installation-summary-by-technology/solar-installation-projects (last accessed September 2013); U.S. Census Bureau, "American FactFinder: Advanced Search," available at http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t (last accessed September 2013).

Where to Find Us

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THANK YOU