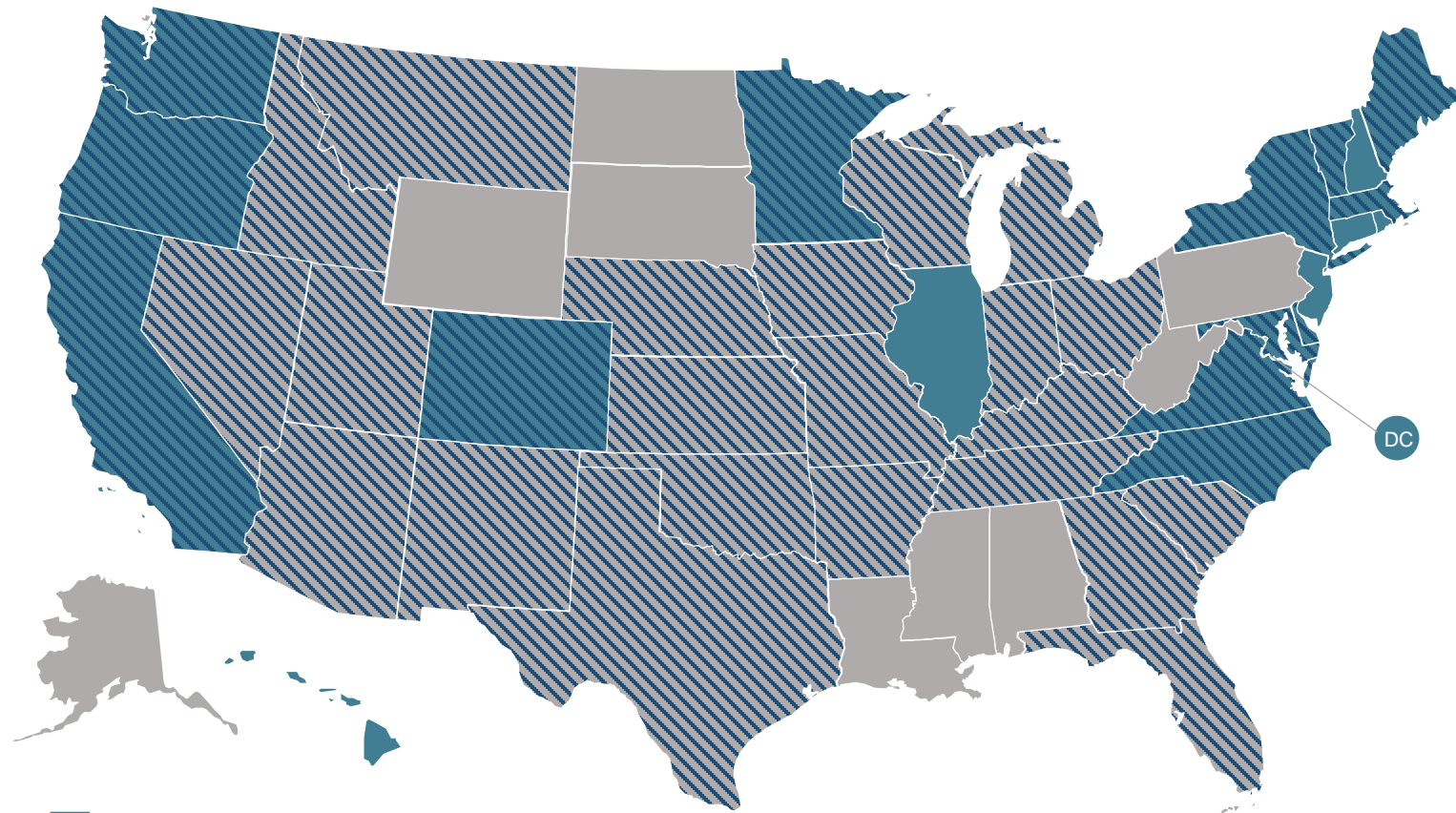


Staff Subcommittee on
Consumers and the Public Interest
joint with
Staff Subcommittee on
Energy Resources and the
Environment

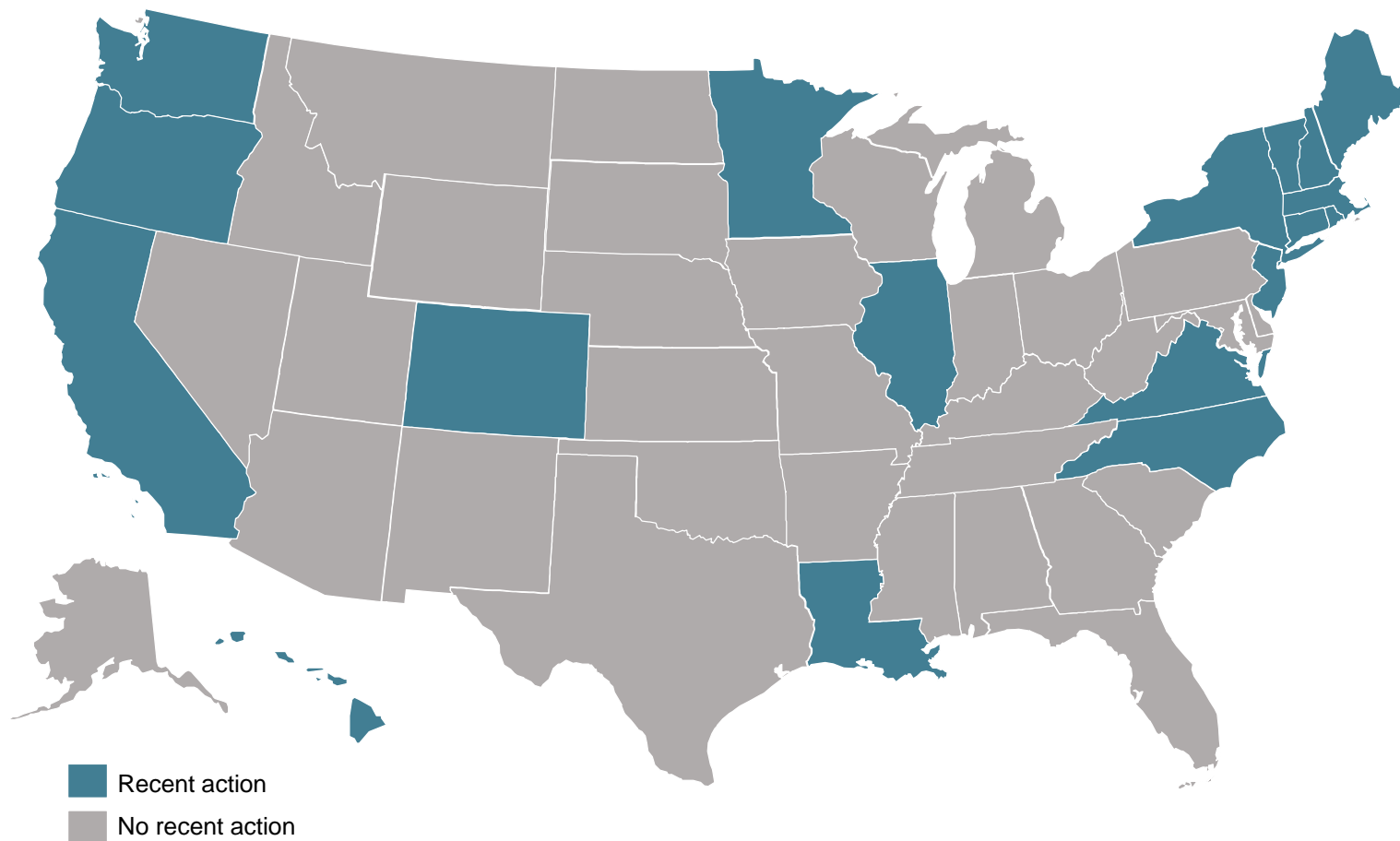
Community Solar Policies and Programs



- Enacted Community Solar Policy
- Active Utility-Involvement Program
- No Policy

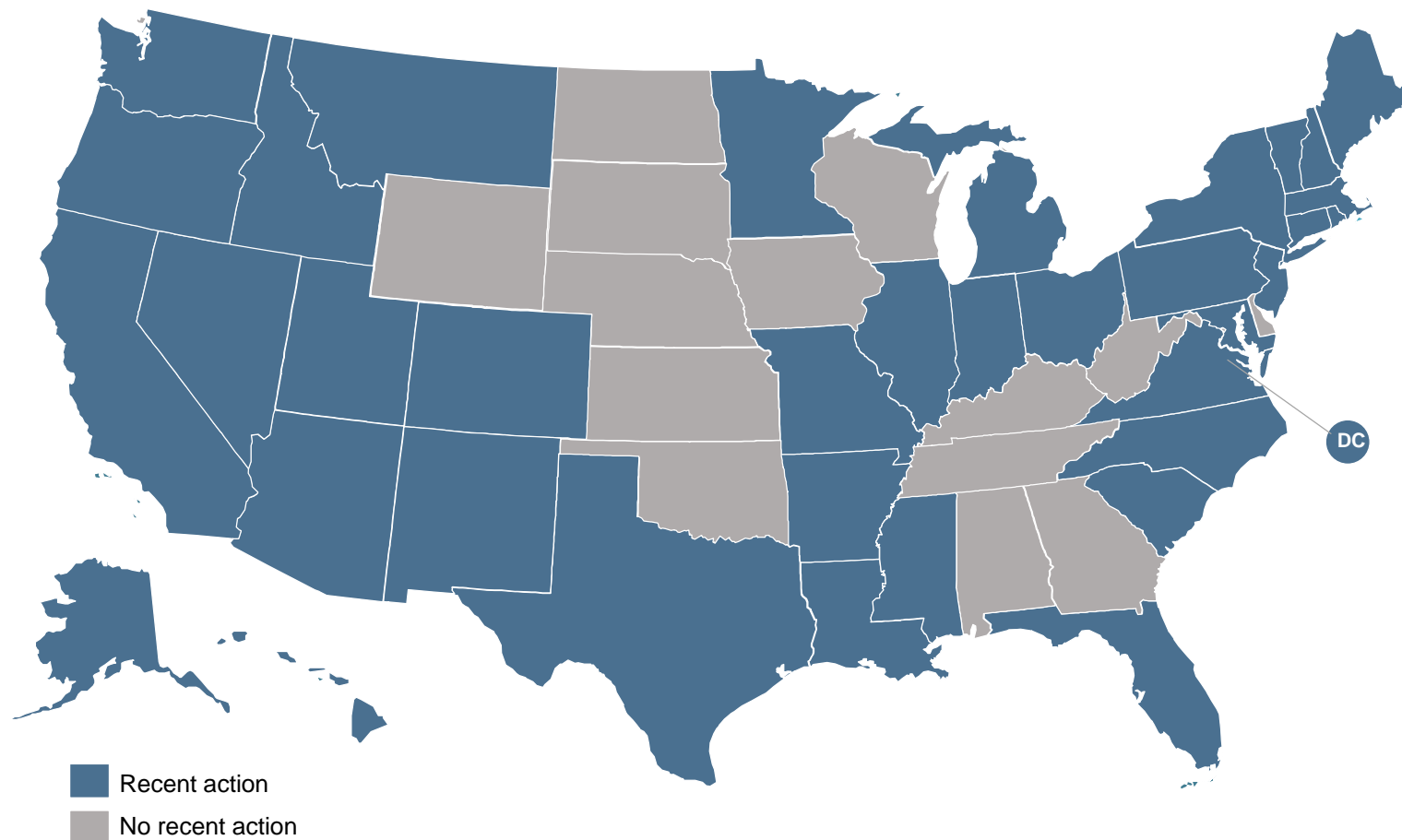
19 States + DC have a statewide community solar policy

Action on Community Solar Policy July 2017 – June 2018



18 States took action on community solar policy during the past year

Action on Energy Storage July 2017 – June 2018



36 States + DC took action on energy storage during the past year

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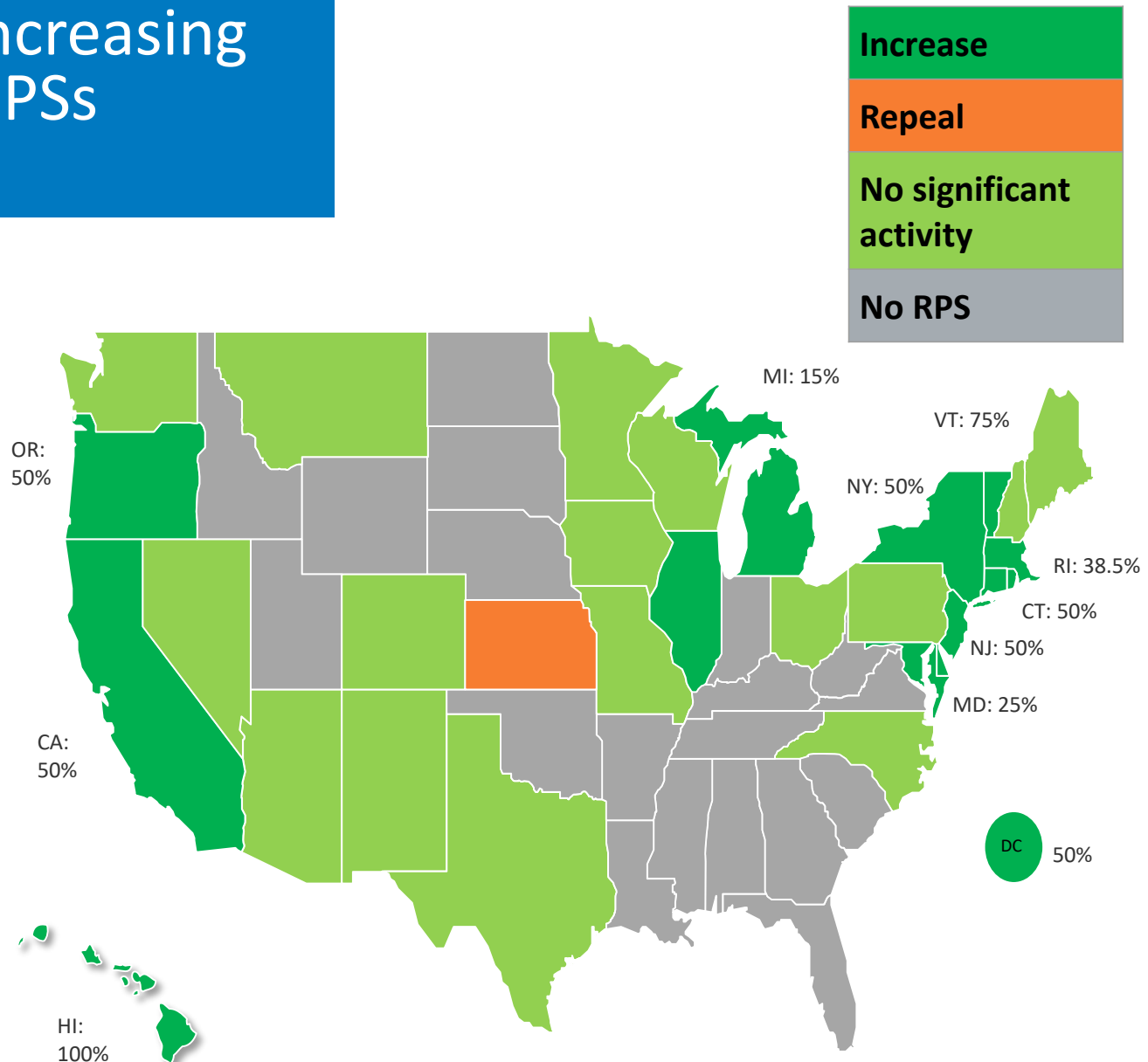


Innovations in Renewable Energy Policy

Lori Bird, Principal Energy Analyst
NARUC Summer Policy Summit
July 15, 2018

States are Increasing their RPSs

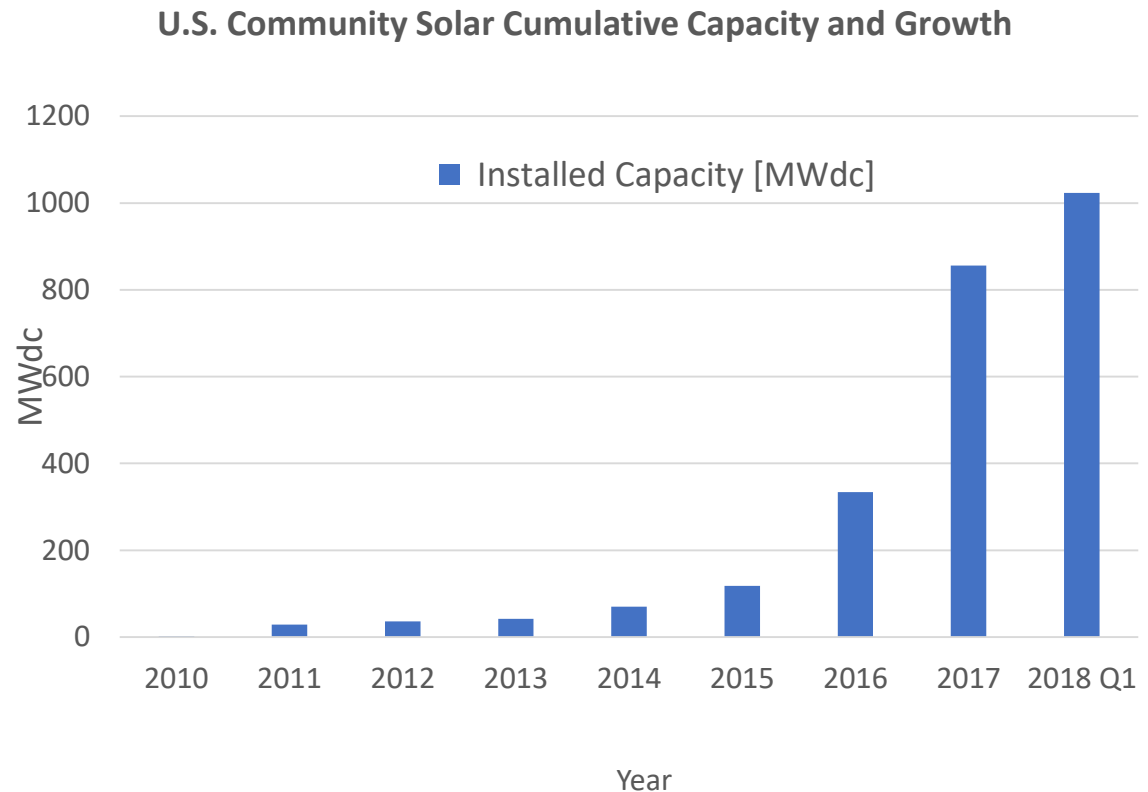
- 29 states + DC have RPSs
- 12 states + DC have expanded their RPS targets; only 1 state has repealed its target
- 7 states + DC have targets at 50% or greater
- Pending actions to increase RPS in multiple states, including Arizona, California, Nevada, and Massachusetts



MA: offshore wind and PV carve out increase
IL: "Fixed" the RPS structure

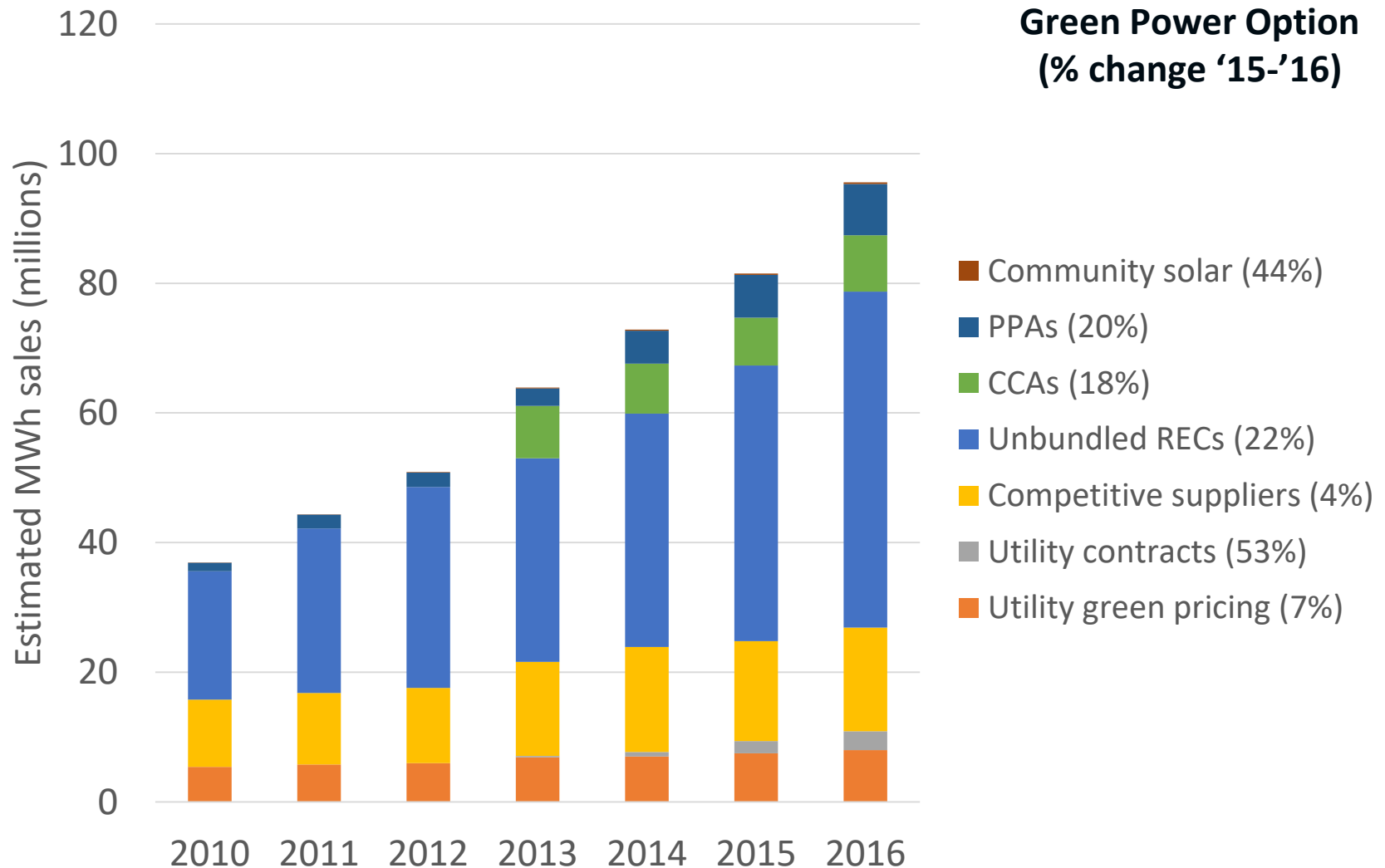
Community Solar Growing Rapidly

- Community solar exists in most states
- Mandates and enabling policies drive deployment (e.g., MN, MA)
- Community solar now represents almost 2% of all deployed solar in the U.S.
- Several states requiring low-income customer participation (e.g., 10%)



Source: GTM Research 2018

Many Options for Renewable Purchasing Exist; All Grew in 2016



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Environment

The Future of Arizona Sustainability and Changing Grid Conditions

Kent Walter
July 15, 2018





1.6
GIGAWATTS

**TOTAL
RENEWABLE
CAPACITY**



~80,000

**INTERCONNECTED
DG SYSTEMS**

~50%



**CLEAN
ENERGY
RESOURCES**

1.3
GIGAWATTS



**TOTAL SOLAR
CAPACITY**



**INNOVATIVE
UTILITY-OWNED
DG PILOTS**

**10 MEGAWATT
STUDY
OF SYSTEM
BENEFITS**

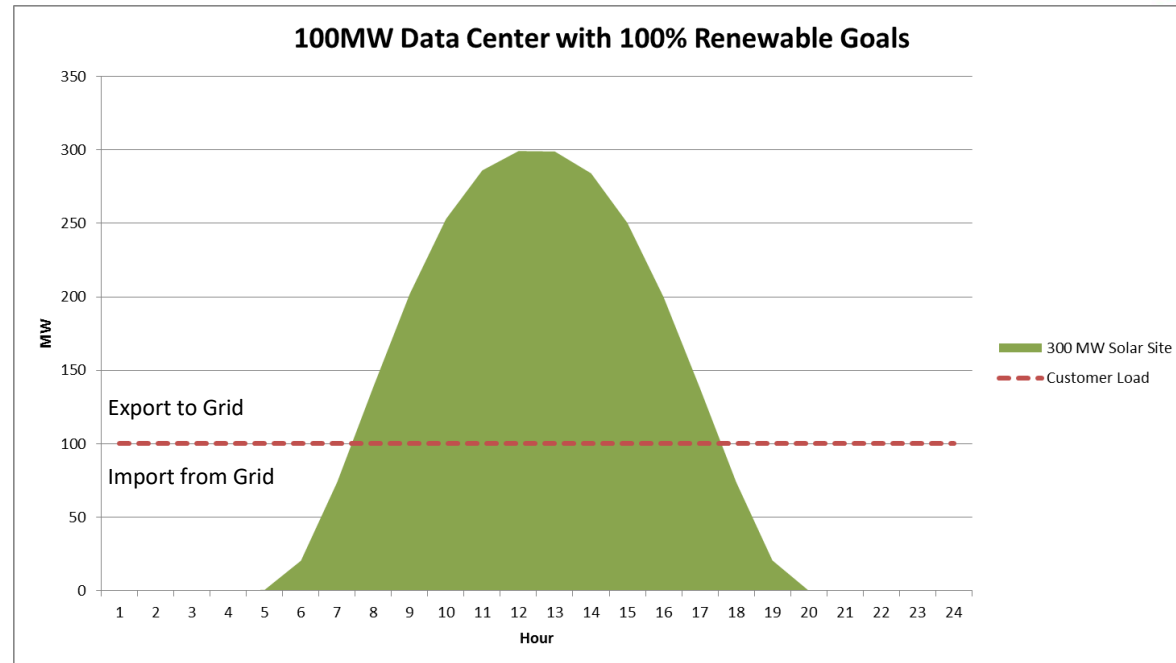


**NATIONALLY
RECOGNIZED
ADVANCED
RESEARCH**

**SOLAR R&D
GRID
MODERNIZATION
STORAGE
INTEGRATION**

Renewable Generation

- **Grid** used to manage import & export energy flow
- Utility must **balance** the grid to maintain reliability
- Typical DG **customer uses less than half the production** produced onsite



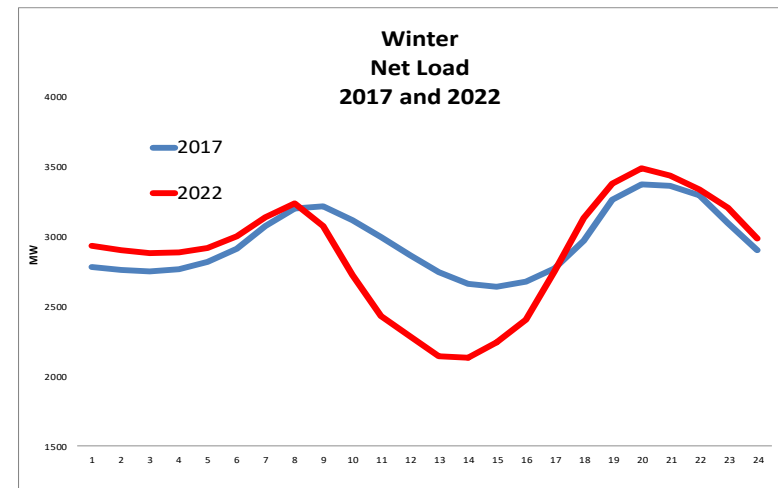
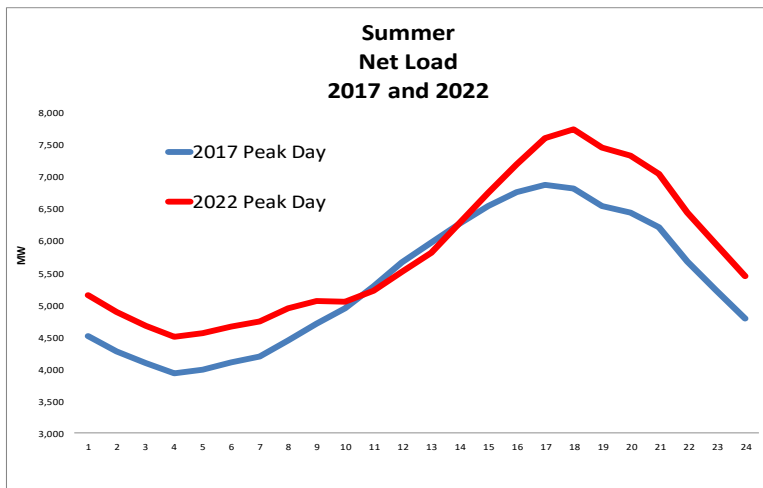
Solar Generation

- Renewable goal increases mid-day production in excess of customer load
- Use of grid during all hours – for load service or export

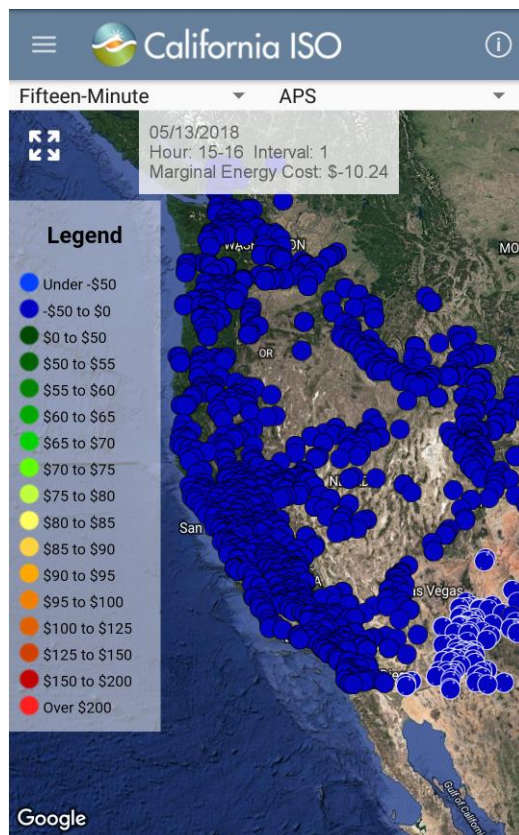
Arizona Resource Needs are Changing

Long-term resource needs are changing

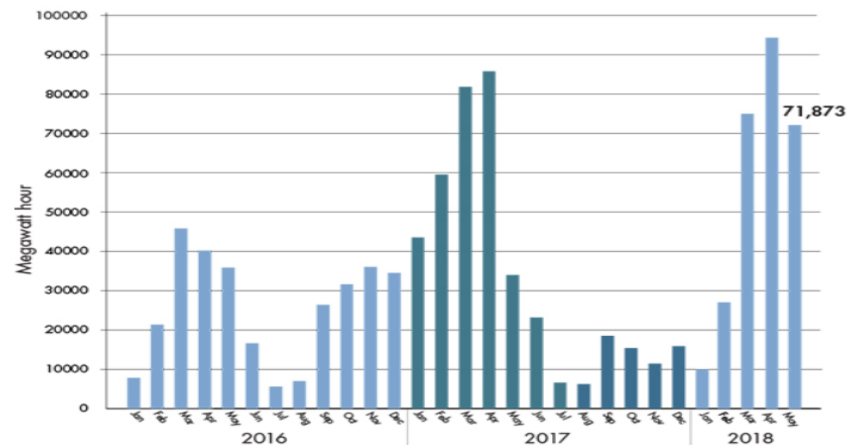
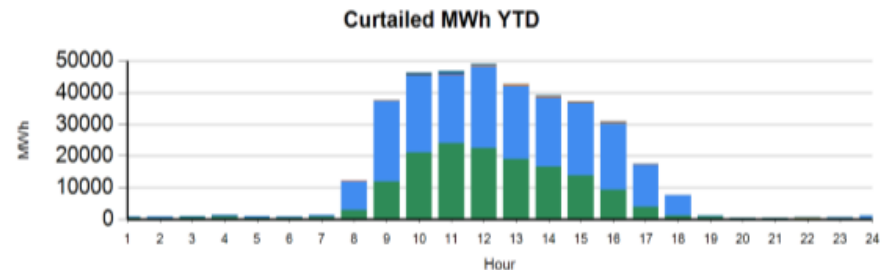
- Significant seasonal variations of resource need
 - Continued evening growth during high load, summer periods
 - Continued reduction in net load during the daytime, non-summer seasons
- Energy value differences throughout day
 - Low or negatively priced energy during mid-day with expensive prices during ramp periods



Low Demand for Electricity During the Day Can Result in Solar Curtailment



The following charts show hourly year to date wind and solar curtailment by category, if any.



Modern Rates Benefit Customers

- Modern rates provide customer value for use that aligns to low cost time-periods of service
 - Demand** components
 - On-Peak** time periods – high price energy time periods
 - Off-Peak** time periods - lower price energy time periods
 - Super Off-Peak** time periods – super low price energy time periods
- Modern rates support the integration of existing otherwise curtailed renewable energy
 - Lower energy prices encourage customer shifting demand
 - Smarter use of energy to integrate more renewable resources
- Provides opportunity for customer value using technology, behavioral modifications, and/or smarter use of energy while better integrated solar resources

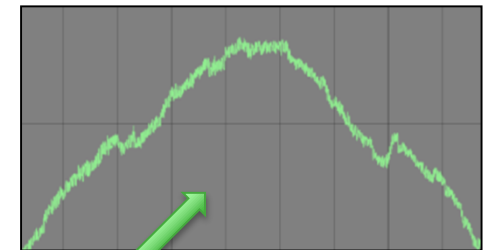
APS Rate Periods	Super Off-Peak
	Off-Peak
	On-Peak

Hour Beginning	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
12 AM												
1 AM												
2 AM												
3 AM												
4 AM												
5 AM												
6 AM												
7 AM												
8 AM												
9 AM												
10 AM												
11 AM												
12 PM												
1 PM												
2 PM												
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4 PM												
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11 PM												

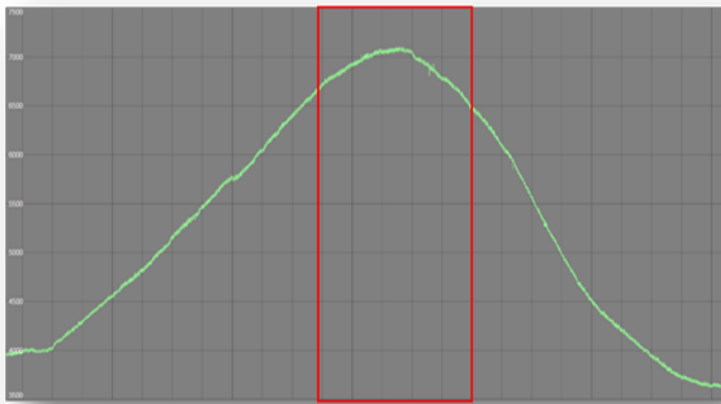
Customers usage responding positively to new rates

- Residential rate migration completed April 2018
- Hopeful to see continued response during non-summer periods to better integrate renewables

Response at system load level in less than two months after rate migration

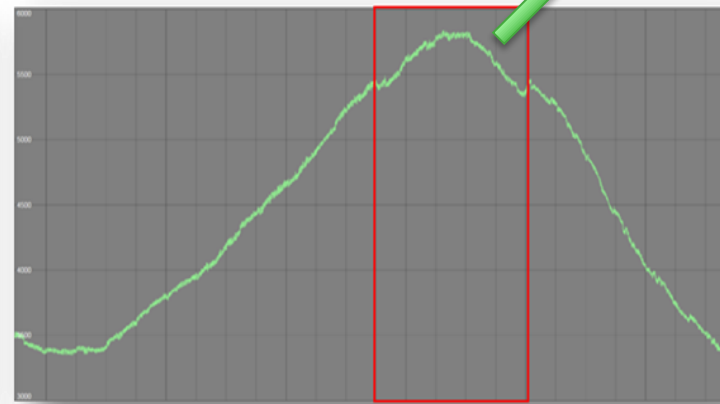


Load – 6/26/2017



3PM - 8PM

Load – 6/29/2018

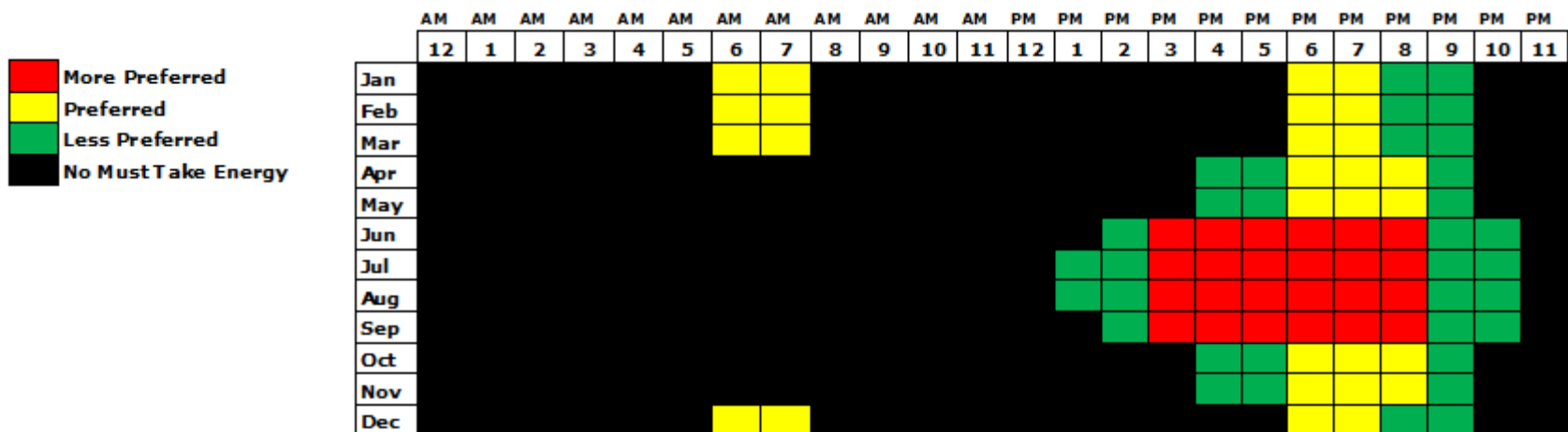


3PM - 8PM

Developing Partners for a Sustainable Future

- Working to align customer resource preferences to system needs
 - Continued resource needs create opportunities for adding clean resource
 - Customers can influence resource by partnering for new resources

Time of Day Relative Net Load Heat Map



Questions?