

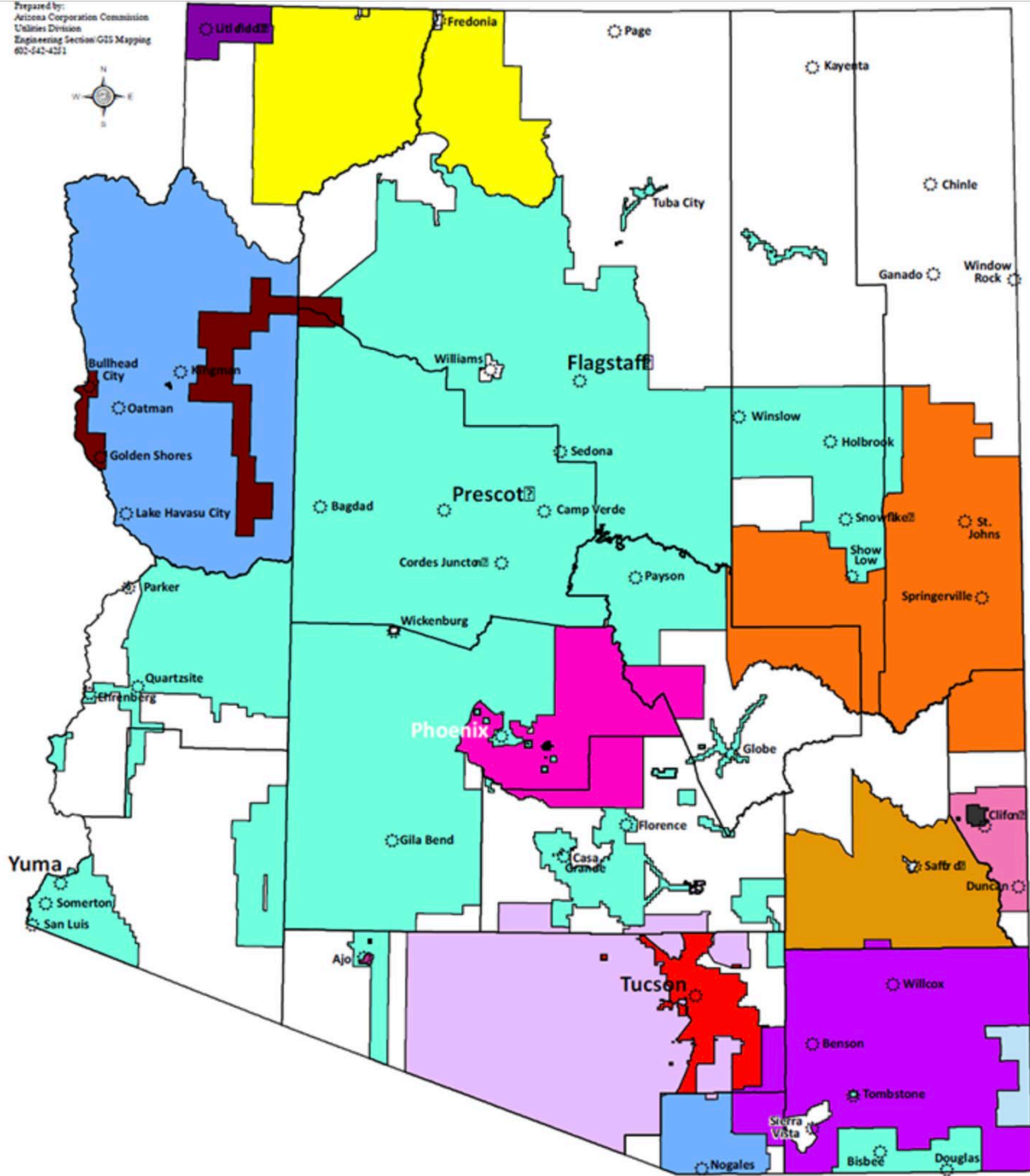
# An Update on Clean Energy Policy in Arizona

*Sustainable Cities Network*

*March 10, 2020*

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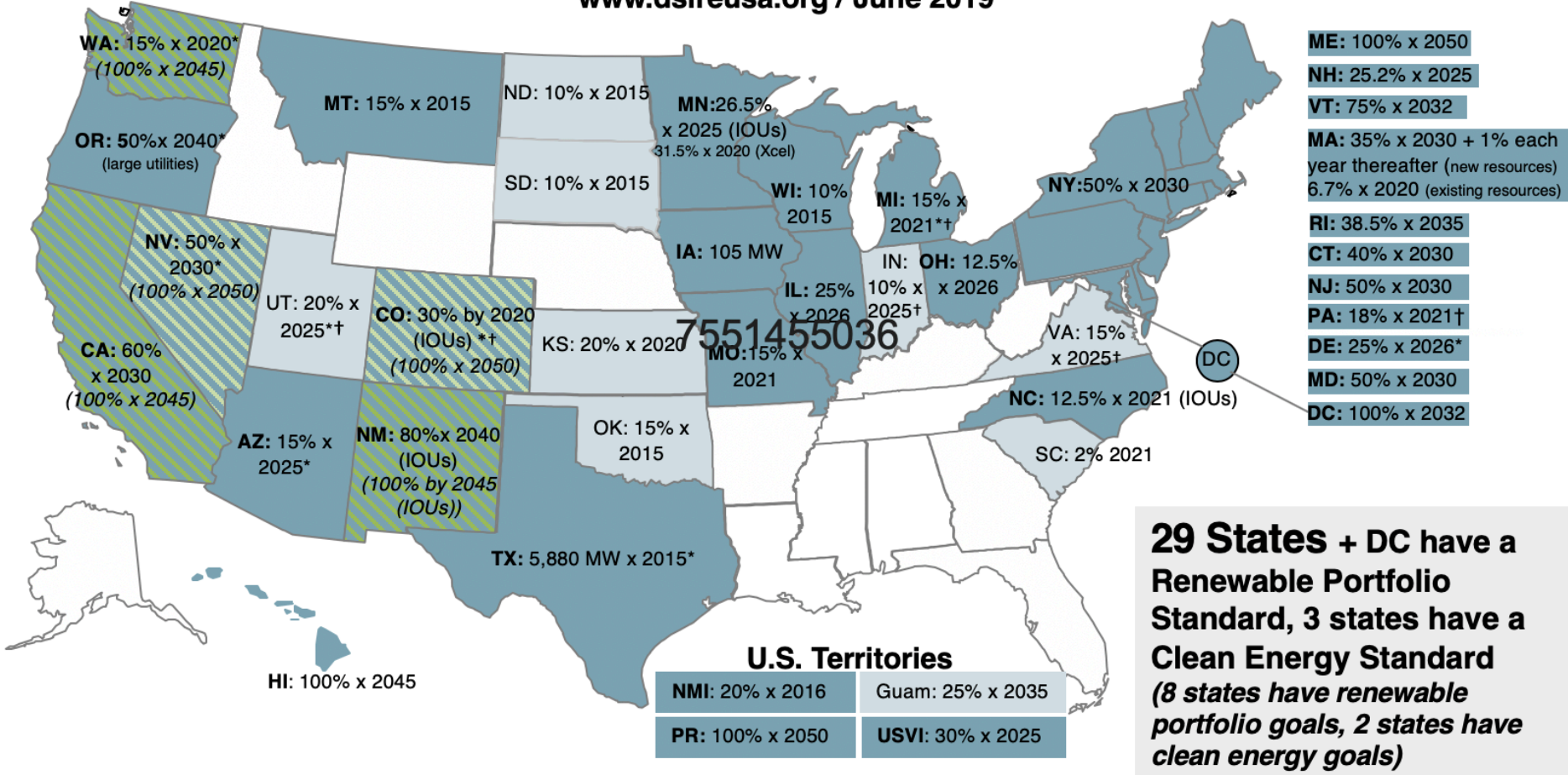


# Foundational Policies Supporting Renewable Energy

- 30% Federal Investment Tax Credit (ITC) (Now expiring)
- Renewable Portfolio Standards (RES)
  - 15% by 2025
  - 30% DG Carve-out
  - Applies to utilities under ACC jurisdiction
  - Largely met, or will be within a few years.
- Net Energy Metering (NEM)/Value of Solar Export Rate
  - Underpins DG value proposition
- PURPA
- Organized Energy Markets (CAISO, MISO, PJM)

# Renewable & Clean Energy Standards

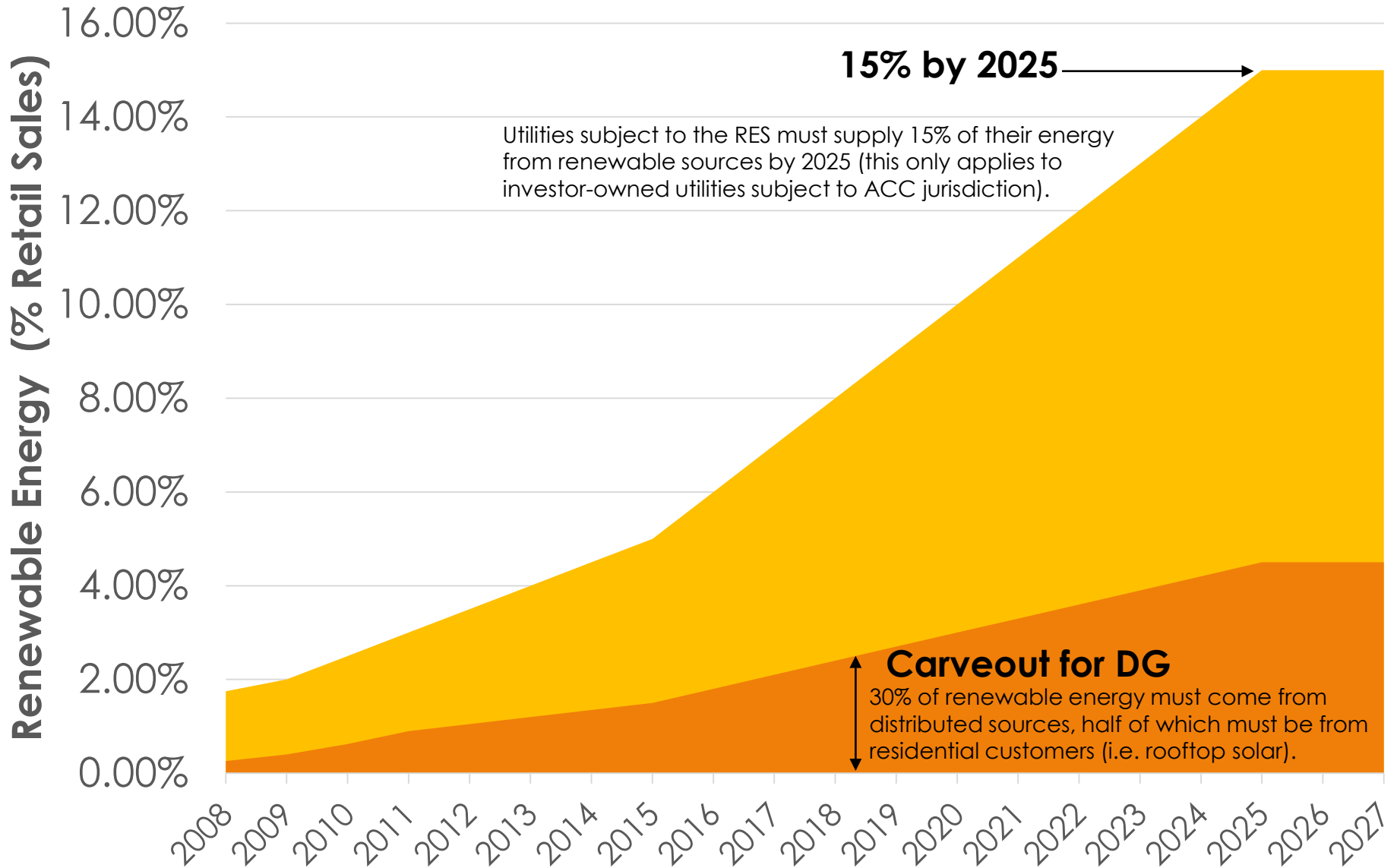
www.dsireusa.org / June 2019



Renewable portfolio standard  
 Clean energy standard  
 Renewable portfolio goal  
 Clean energy goal

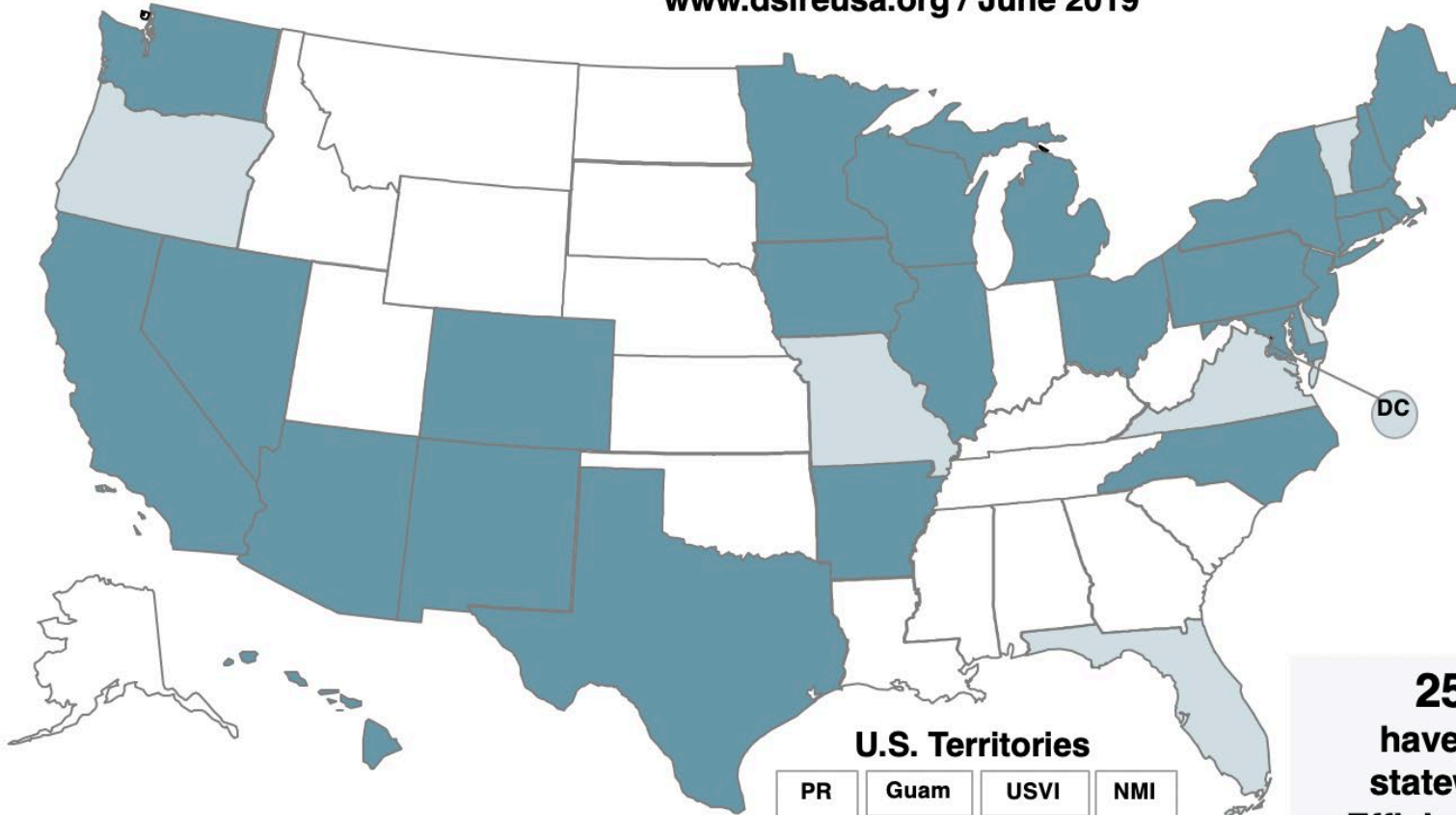
\* Extra credit for solar or customer-sited renewables  
 † Includes non-renewable alternative resources

# Arizona's Renewable Energy Standard



# Energy Efficiency Resource Standards (and Goals)

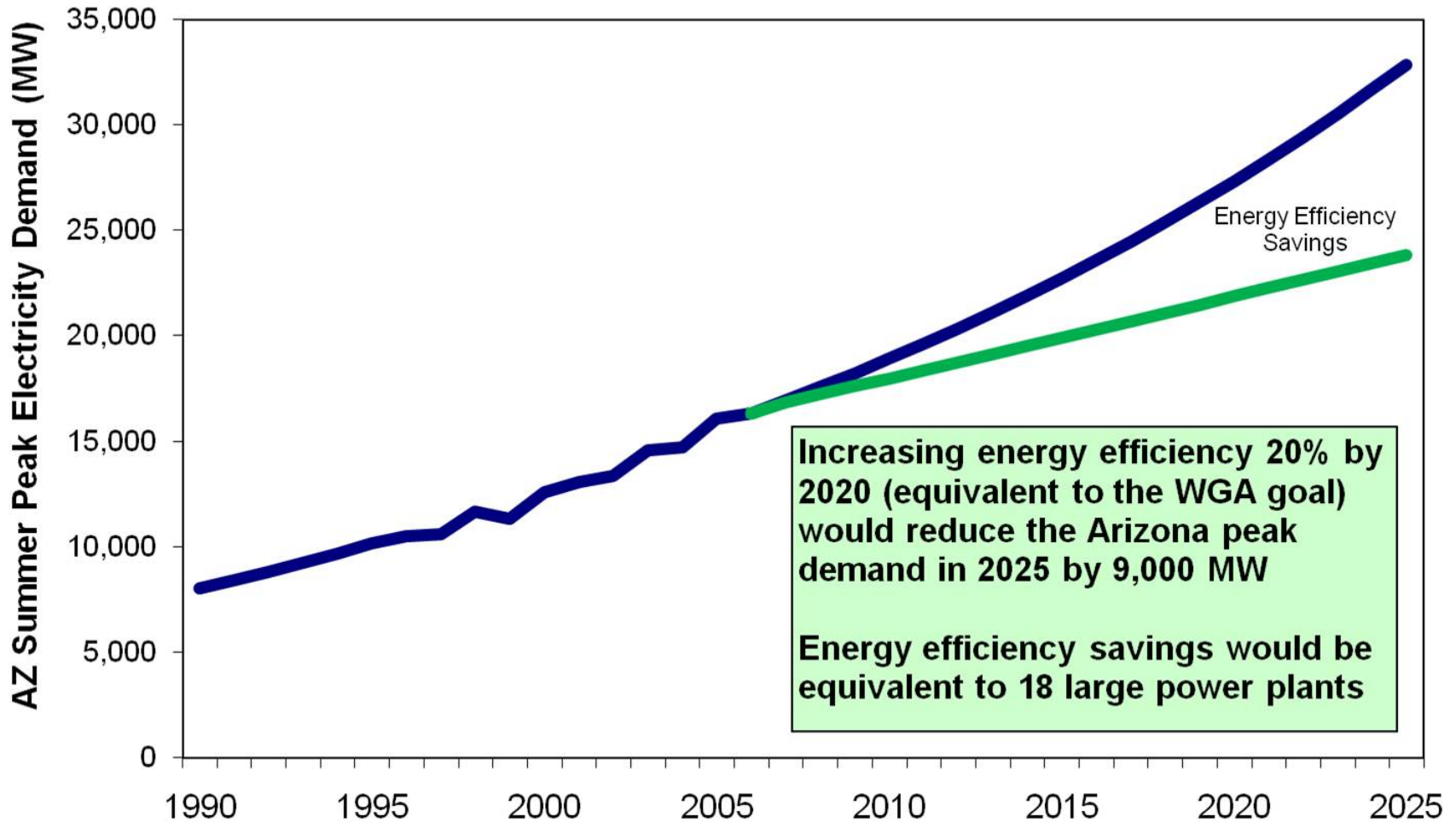
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- States with an Energy Efficiency Resource Standard
- States with an Energy Efficiency Resource Goal
- No State Standard or Goal

**25 States**  
have mandatory  
statewide Energy  
Efficiency Resource  
Standards  
(6 States and D.C. have  
Goals)

# Energy Efficiency Reduces Peak Growth and the Pressure on Infrastructure and Prices



Slide courtesy of SWEEP

# Ceres report on RES benefits

- More than \$2 billion in gross benefits to APS and TEP customers.
- Induced more than \$11 billion in investment by the solar industry
- 3 percent reduction in statewide greenhouse gas emissions
- Savings of 7,000 acre feet of water annually



# Benefits of the 15% Renewable Energy Standard in AZ

- Energy-related CO<sub>2</sub> emissions have declined from about 102 million metric tons in 2008 to 87 MMT in 2016, about a 10% decline.<sup>1</sup>
- The CO<sub>2</sub> benefit from 2008 through 2018 was approximately \$309 million total.

# Benefits of the 15% Renewable Energy Standard in AZ

- Reductions in criteria pollutant emissions (SO<sub>x</sub>, NO<sub>x</sub> and PM<sub>2.5</sub>) have yielded approximately \$185 million in cumulative benefits for APS and \$61 million in benefits for TEP.
- 47% of installed solar and wind capacity is in rural areas of AZ. From 2001 and 2017, solar and wind development activity in rural Arizona generated \$9.4 billion in direct and indirect benefits.<sup>2</sup>

# Benefits of the 15% Renewable Energy Standard in AZ

- Generally, REST surcharges have typically remained within the \$3-4/month range for APS and \$3-5/month range for TEP. Individual customer bill impacts have also been limited due to a monthly REST surcharge cap that was approved by the ACC.

# Benefits of the 15% Renewable Energy Standard in AZ

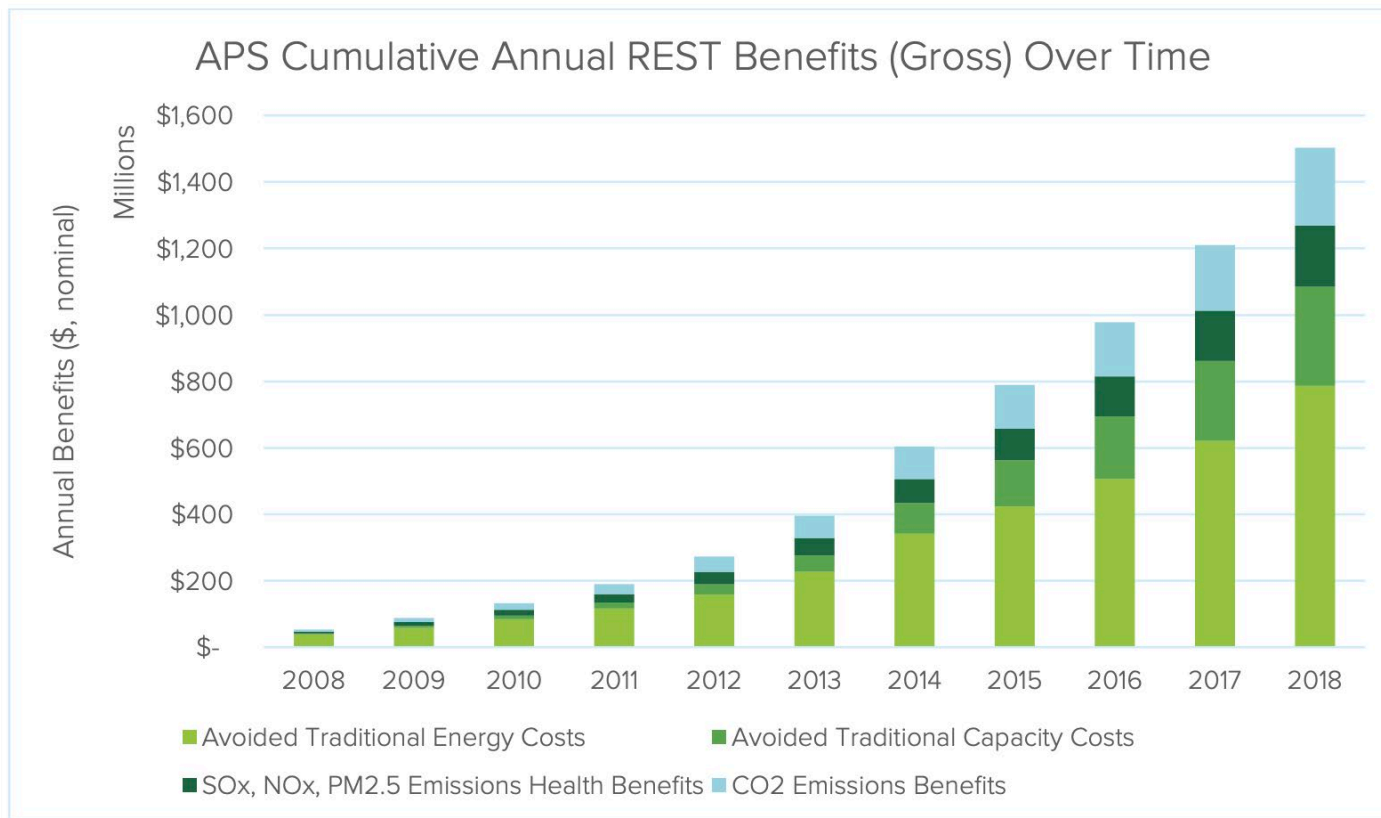


Figure 6. Cumulative Annual REST Benefits for APS (2008 through 2018) from Arizona Public Service generation.<sup>22</sup>

# Benefits of the 15% Renewable Energy Standard in AZ

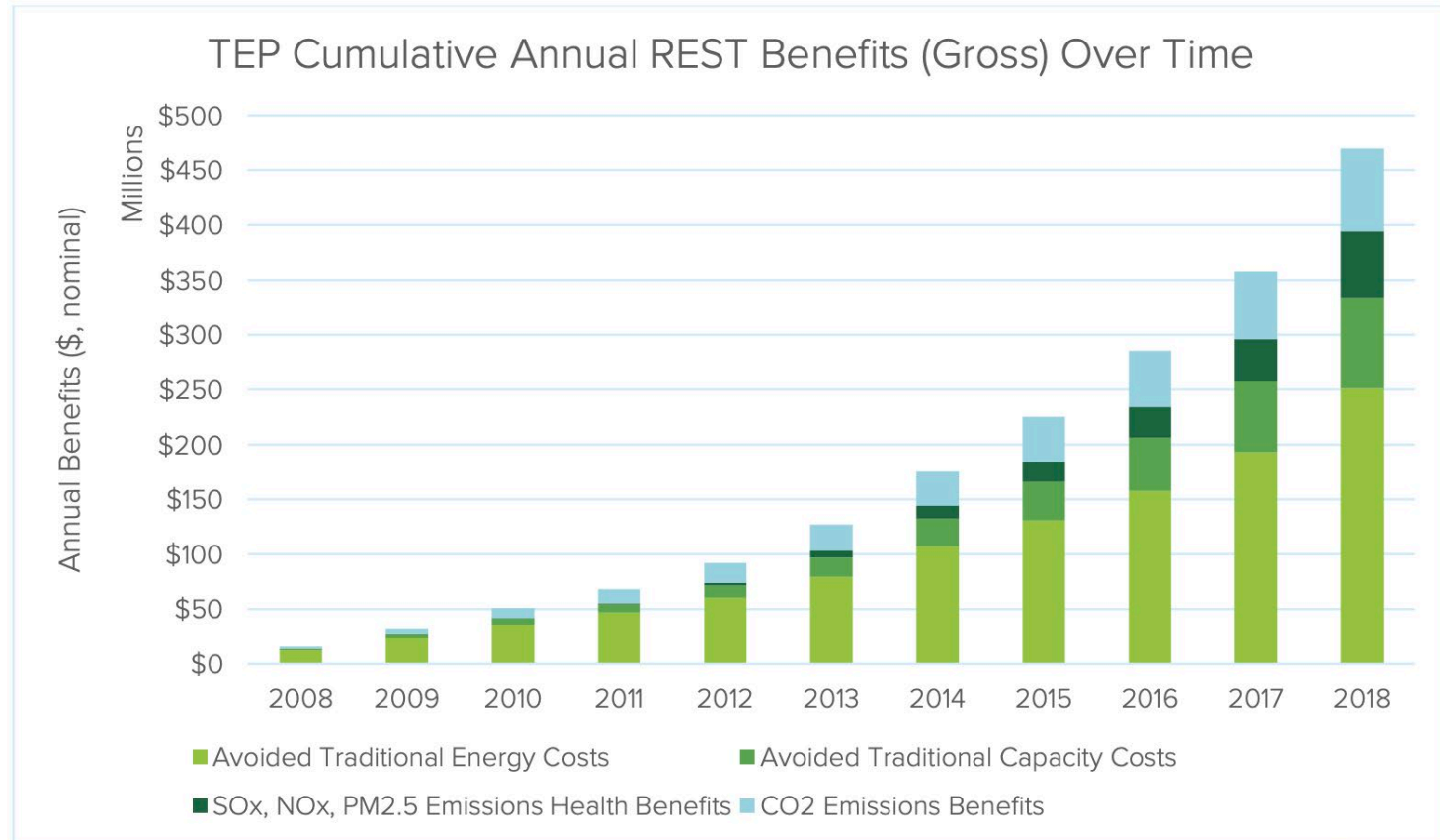


Figure 7. Cumulative Annual REST Benefits (2008 through 2018) from Tucson Electric Power generation.<sup>23</sup>

# Benefits of the 15% Renewable Energy Standard in AZ

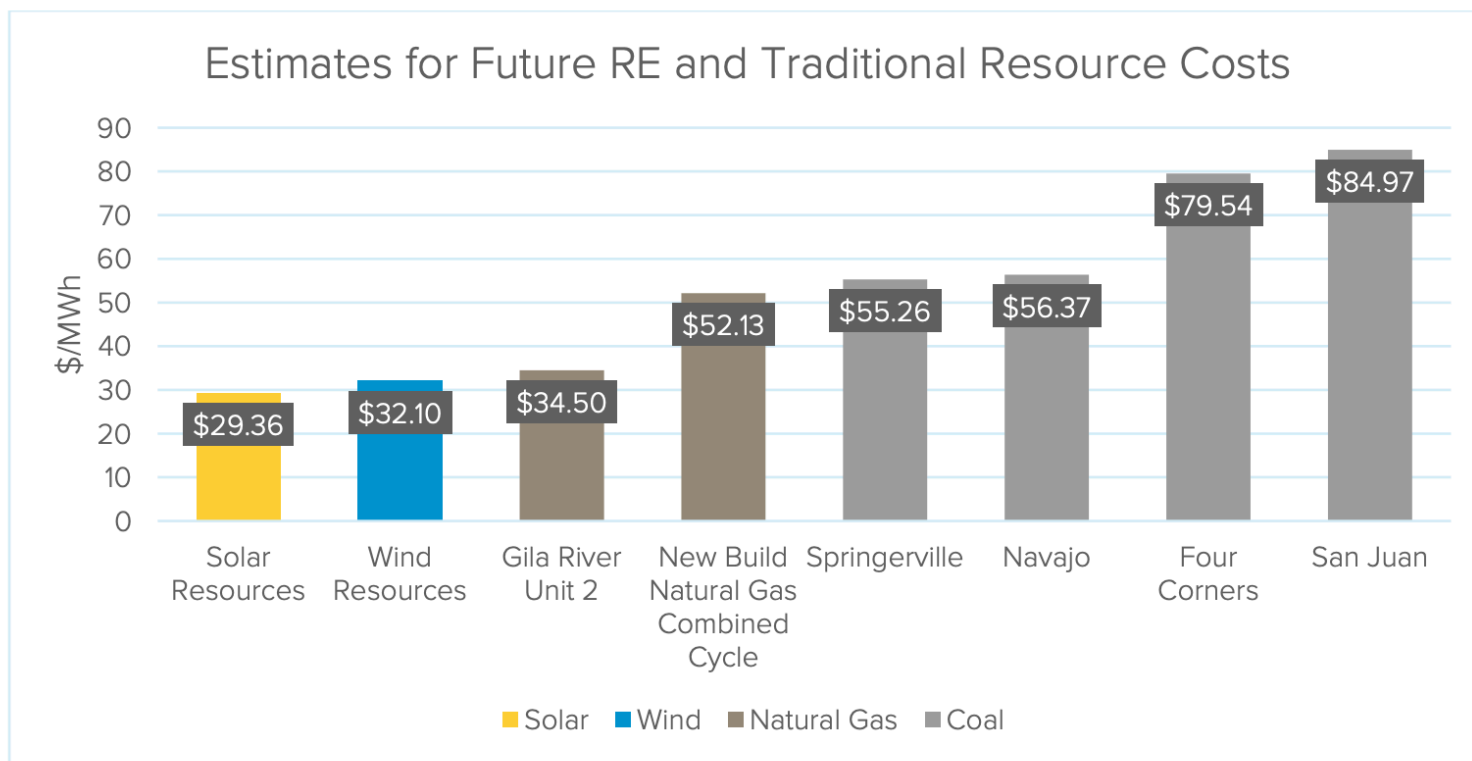


Figure 27. Cost Comparison Chart from TEP's Response to a Notice of Inquiry<sup>60</sup>. Cost comparisons based on TEP's price projections for its coal facilities. Renewable cost estimates are based on data from TEP's competitive bidding processes and recent requests for proposals.

# Benefits of the 15% Renewable Energy Standard in AZ

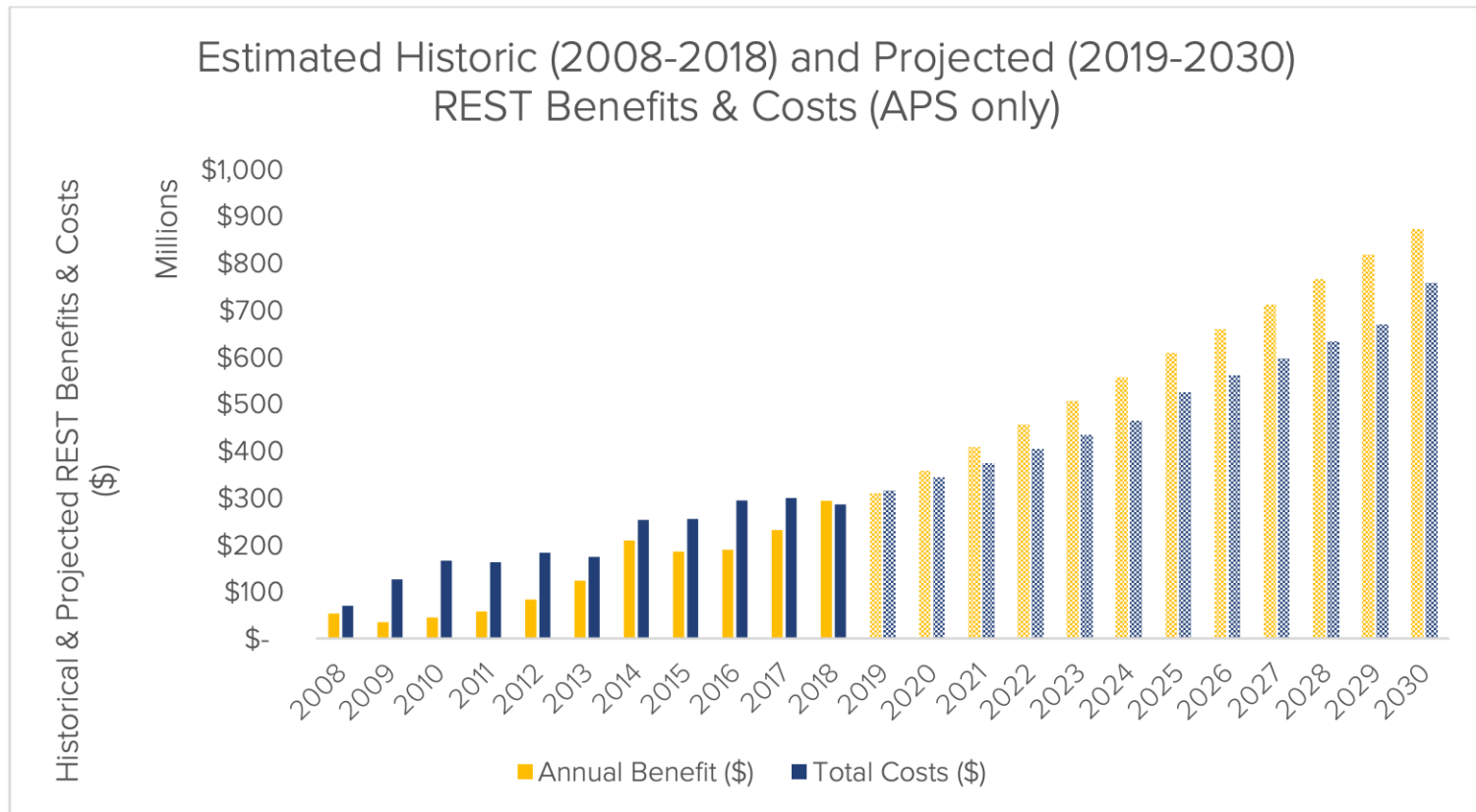


Figure 28. Historical and Projected REST Benefits and Costs

# ASU Campuses: >40 MW PV Installed



ASU Utility of the Future Center

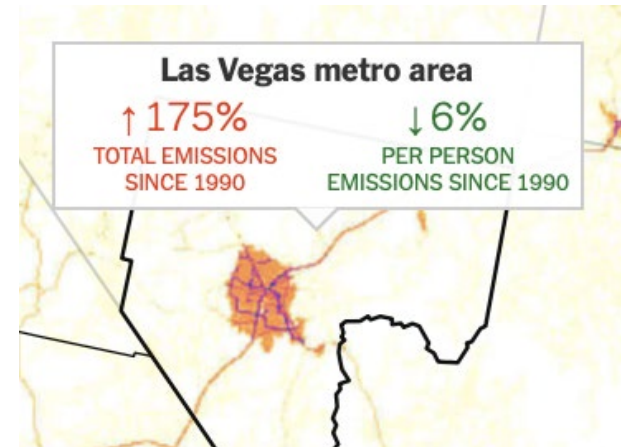
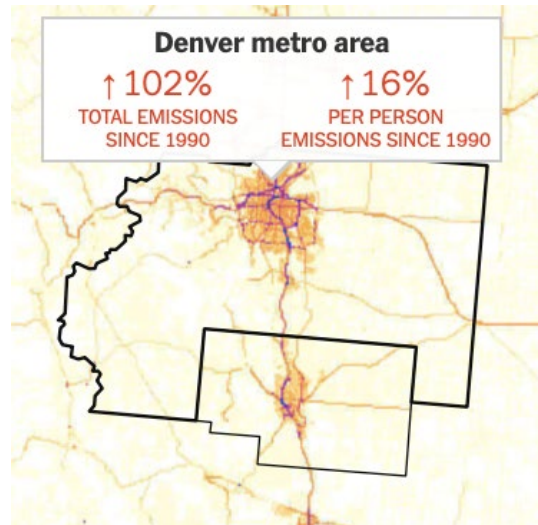
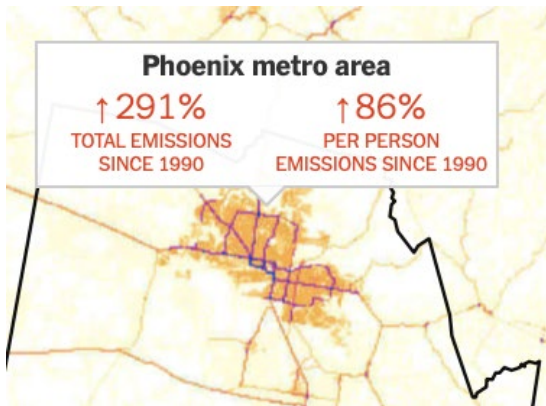
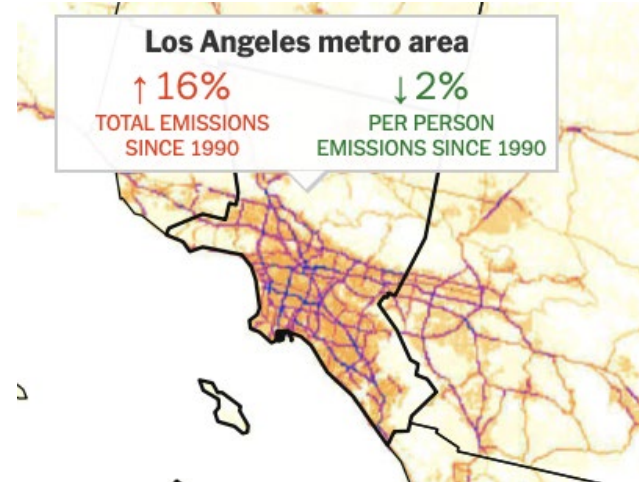
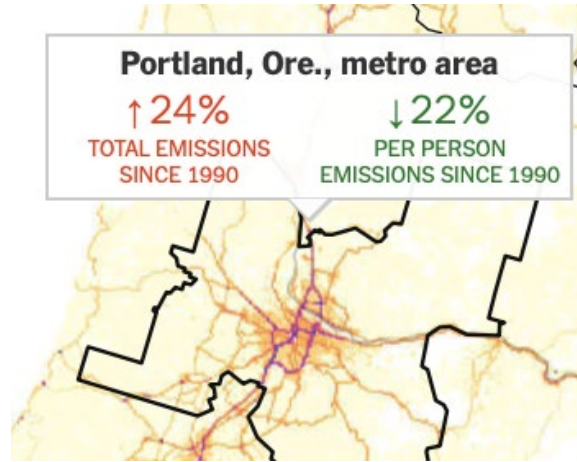
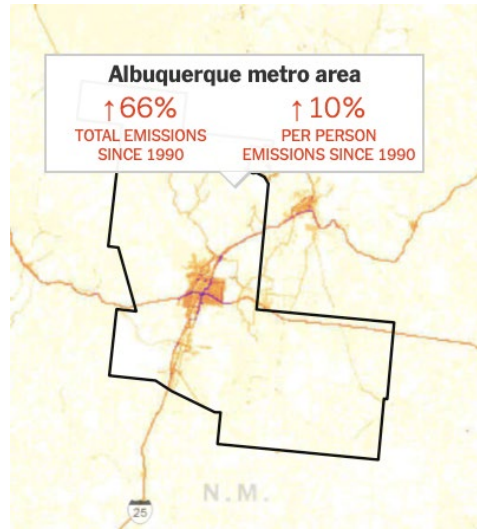


# Solana (Abengoa): 280 MW CSP with 6hr Thermal Storage

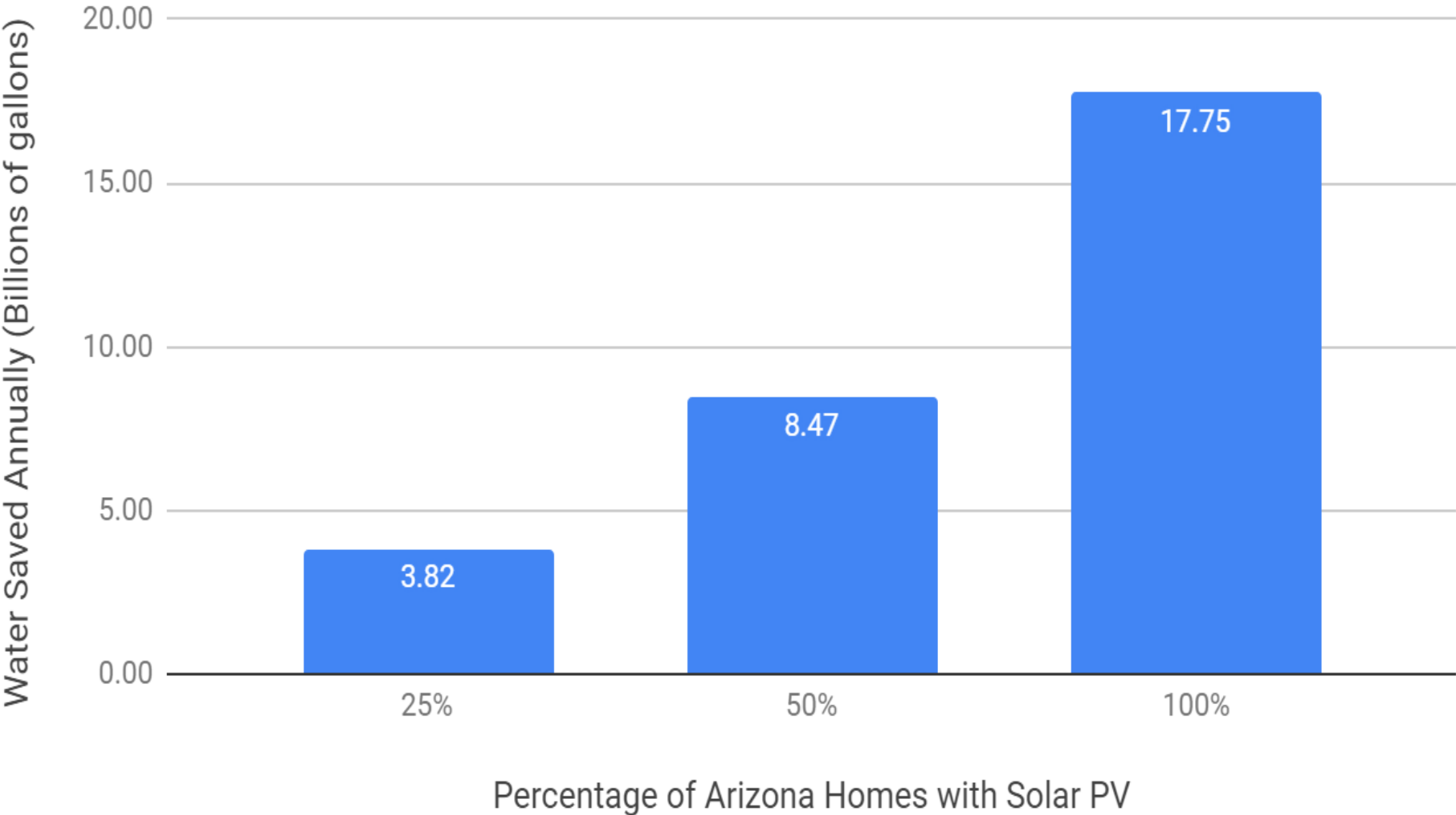


# Electric Vehicles in AZ

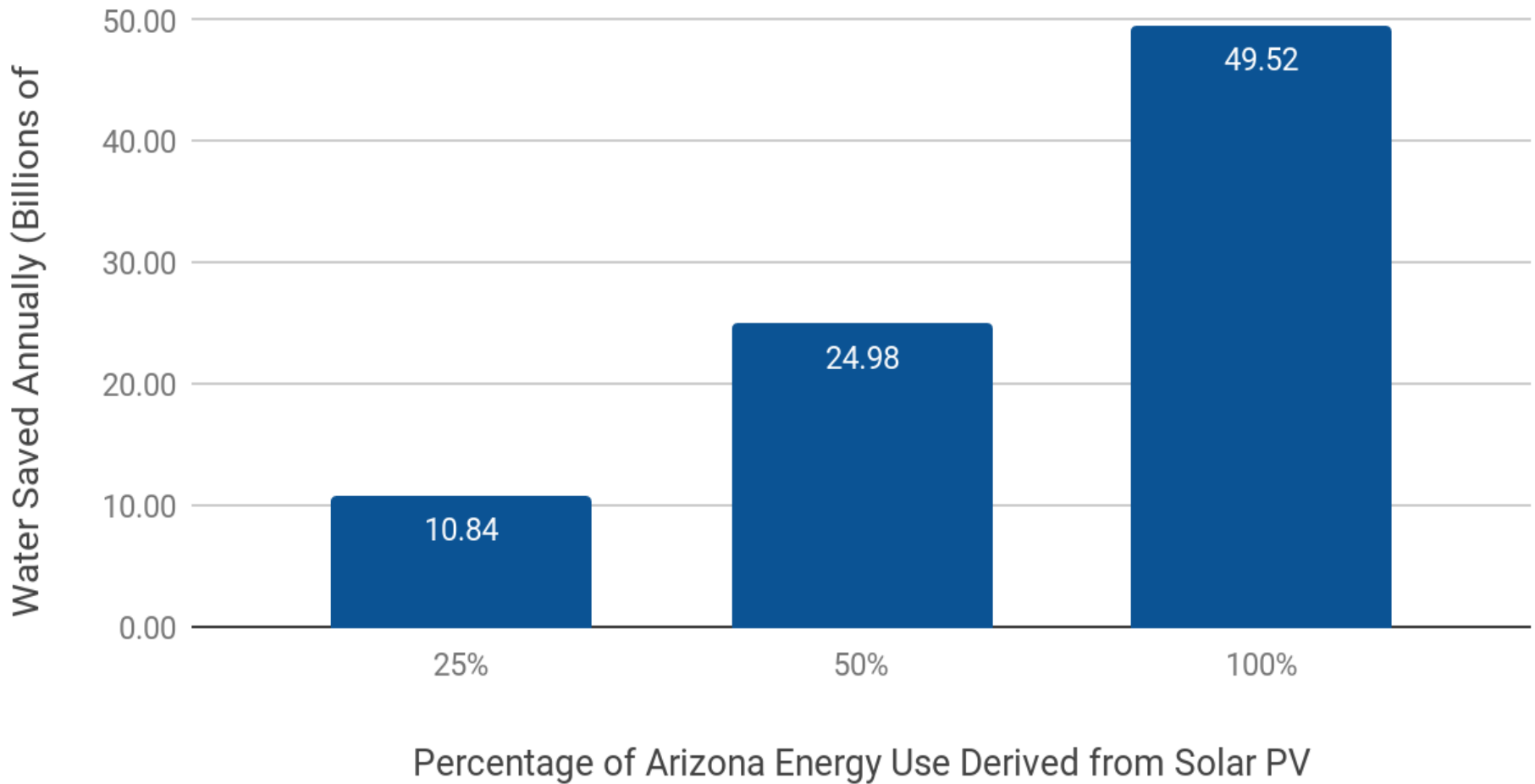
- ACC recently adopted an EV Roadmap to encourage utilities to invest in electric vehicle infrastructure.
  - EV charging infrastructure to eliminate range anxiety; pilot rates to encourage off-peak charging; education and outreach.
  - Average customer savings = \$176 per year by 2050, due to an estimated 5.5 percent reduction in rates.
- Who should build EV charging stations/infrastructure?
- SRP's sustainability goals call for 500,000 EVs on the roads.



# Water Saved Annually for a Given Percentage of Arizona Homes with Solar PV



## Water Saved Annually for a Given Percentage of Arizona Electricity Generation Derived from Solar PV



# A 50 Percent RPS?

- ACC has an ongoing rulemaking docket to explore expansion of the RES and EERS.
- A group of 27 NGO's has proposed boosting AZ's RPS to 50 percent by 2035.
  - 10 percent DG by 2030.
  - 35 percent Energy Efficiency by 2030
  - 100 percent clean energy by 2045

# Recent AZ Utility Decarbonization Goals

- SRP: 90 percent CO<sub>2</sub> reductions (per megawatt hour) by 2050; 500,000 electric vehicles on the road; 1000 MWs of solar energy
- APS: 65 percent clean energy by 2030, 100 percent carbon free energy by 2050, 45 percent RE BY 2030.
- TEP: 30 percent renewables by 2030

# Recent AZ Utility Decarbonization Goals

- APS:
  - 65 percent clean energy by 2030, with 45 percent coming from RE
  - 100 percent clean, carbon free electricity by 2050
  - End of all coal-fired generation by 2031



# Recent AZ Utility Decarbonization Goals

- Things to note from APS' 2020 announcement:
  - Strong commitment to continue Palo Verde operation
  - Commitment to continued natural gas generation
  - Preference for broadly defined policies over a renewable portfolio standard

# Recent AZ Utility Decarbonization Goals

- Things to note from APS' 2020 announcement:
  - Encourages in-home technology like rooftop solar, LED lighting, and smart thermostats
  - Encourages Evs
  - APS is saying specific details to come in its April IRP filing.

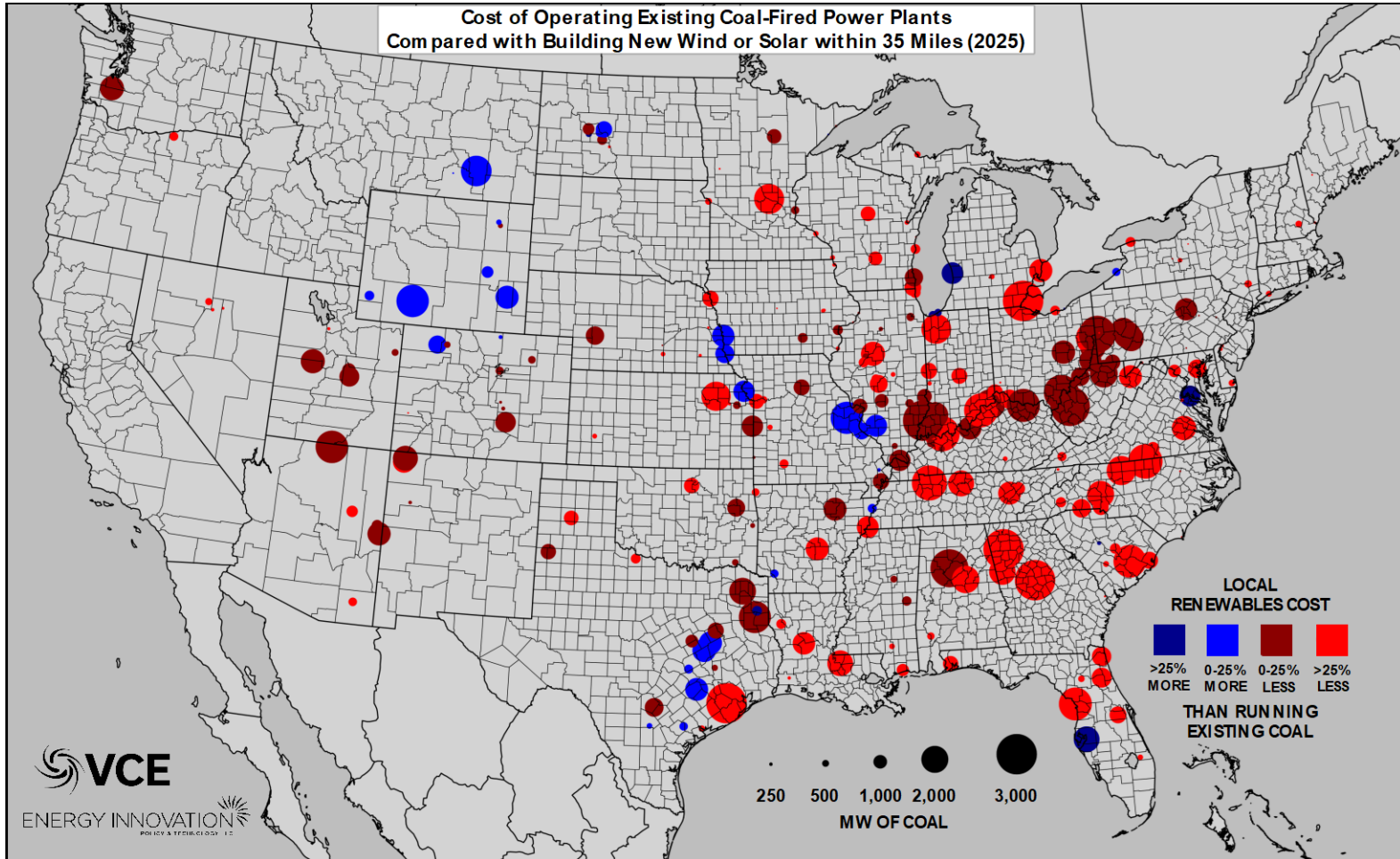
# Recent AZ Utility Decarbonization Goals

- Things to note from APS' 2020 announcement:
  - Interest in modern nuclear reactor designs
  - Interest in hydrogen
  - Interest in energy storage, carbon capture and storage

# Getting to 100 Percent: The Biggest Challenge Ahead

- Utilities are confident of how to get to 80 percent; do not know how to get the last 20 percent.
- Development of new technologies and pathways for clean energy growth will be key.
  - Will it be hydrogen?
  - Synthetic fuels?
- Do we know how to turn the natural gas system down?
  - I.e. what happens when gas plants are shut down and flows on gas pipelines are turned significantly down?
- Carbon capture will be critical

# Coal Plants Now Uneconomic Across the U.S.



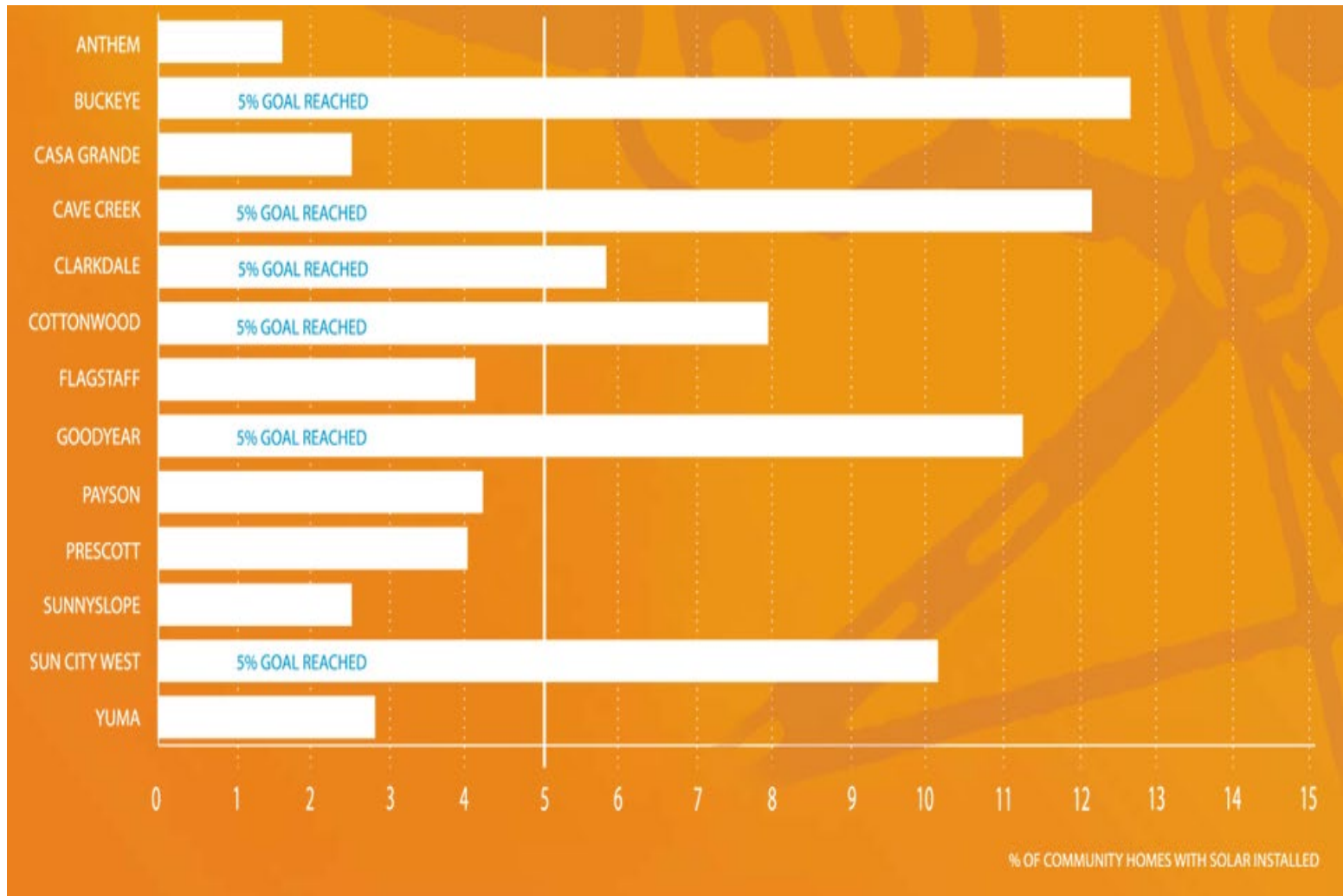
# What Do AZ Customers Want?

- 62% of voters say that solar is the first energy source they would encourage AZ to use more of.
- 60% of Republican primary voters said they would be less likely to vote for a candidate who voted to end solar programs.
- Nearly 90% of customers support a state renewable energy standard.

Sources:

- 2013 Colorado College "Conservation in the West Poll" conducted by Fairbank, Maslin, Maullin, Metz & Assoc. and Public Opinion Strategies:
- 2013 Public Opinion Strategies Poll.
- 2011 APS/Morrison Institute Informed Perception Project Report:

# Arizona Solar Hotspots







# Renewables Costs Declining Everywhere

- Bloomberg New Energy Finance released estimates recently that two thirds of the \$7.7 trillion to be spent on energy projects between now and 2030 will go toward renewable energy projects, the result of declining costs.
- In Colorado, Xcel Energy recently announced that wind energy bid in to an RFP at below its system costs.
- Mid-American in Iowa, plans to spend \$1.3 billion on 1,000MWs of wind, for largely economic reasons.
- Utility scale solar bids are coming in @ 2 cents a kw → far lower than just a decade ago.

# 100 Cities, 10 Counties, 2 States Commit to 100% Clean Energy



# 190 Fortune 500 Companies Save \$3.7 Billion/year with Renewable Energy



# Changing the central focus:

FROM:

Did customers pay the correct amount for what they got?

TO:

*Are customers getting what they want?*



*Utility and  
Regulatory Models  
for the Modern Era*

by Ron Lehr

# Cost of service ratemaking: why would utilities fight rooftop solar energy?

- The rate formula:

- $R=O + (V-d)r$

R=the Company's revenue requirement

O=the Company's operating expenses

V=the gross value of the Company's capital investment

D= the Company's accrued depreciation

(V-d)= the Company's rate base

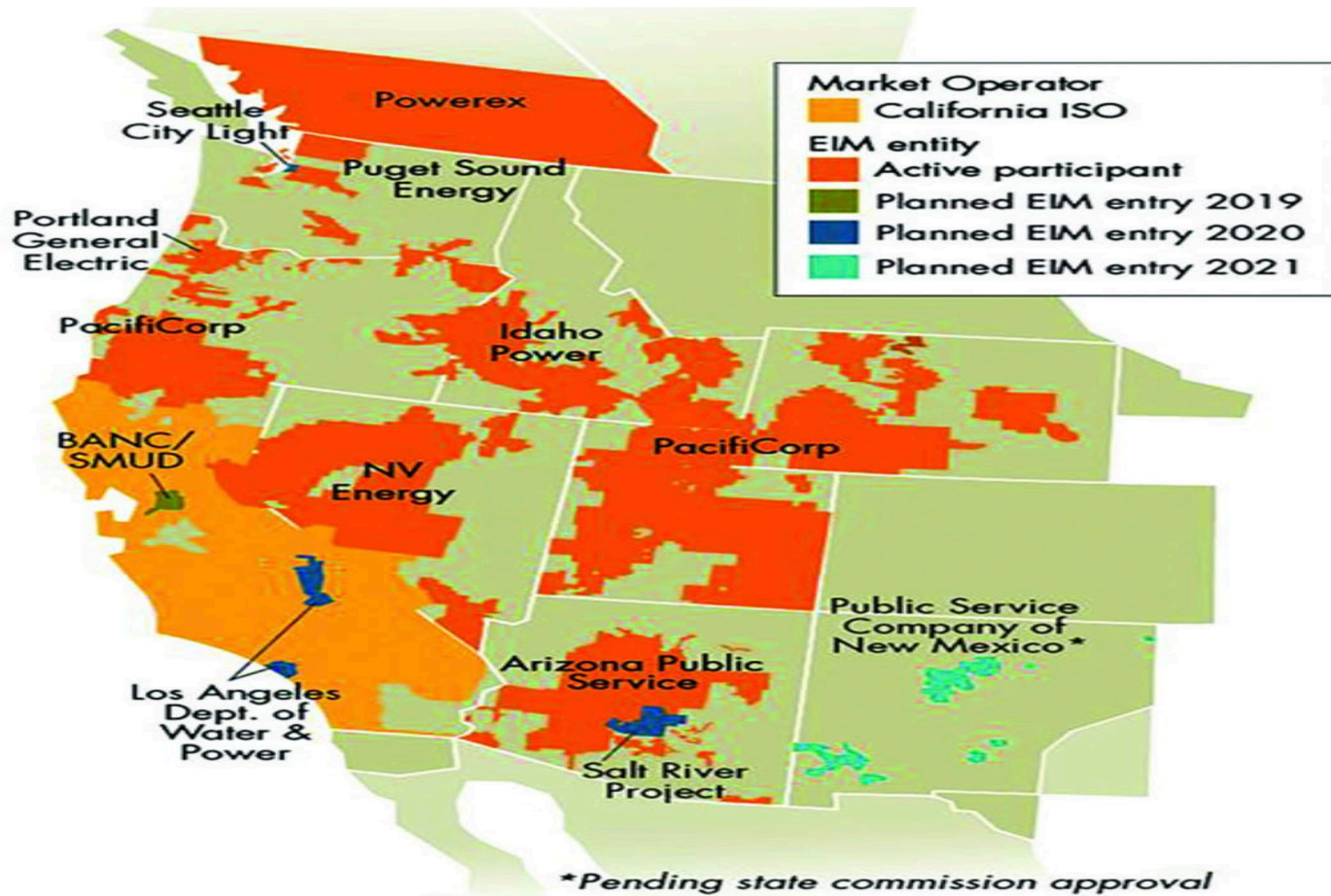
r= the rate of return established by the regulatory commission for the company to earn on its capital investment or rate base.

# The Fight over Net Metering



**What policies are needed to further support and integrate renewables in the U.S.?**

# Energy Imbalance Market (EIM)





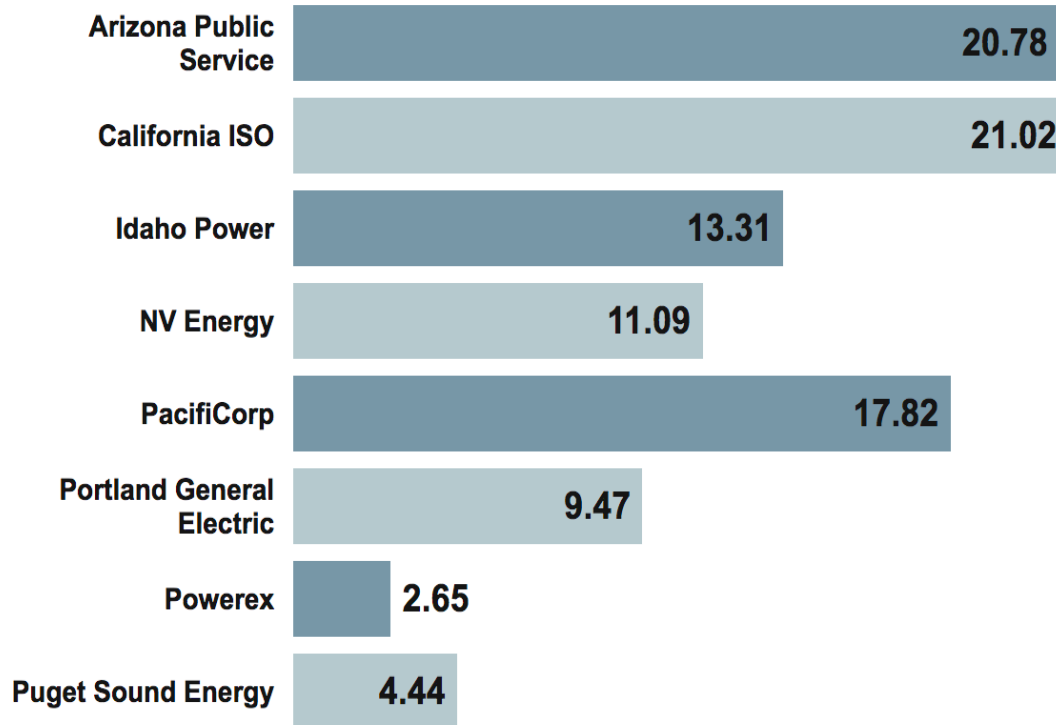
# Energy Imbalance Market (EIM)

**\$100.58m savings in Q3 2018**

[Read full report >>](#) [Read news release >>](#)

(millions \$)

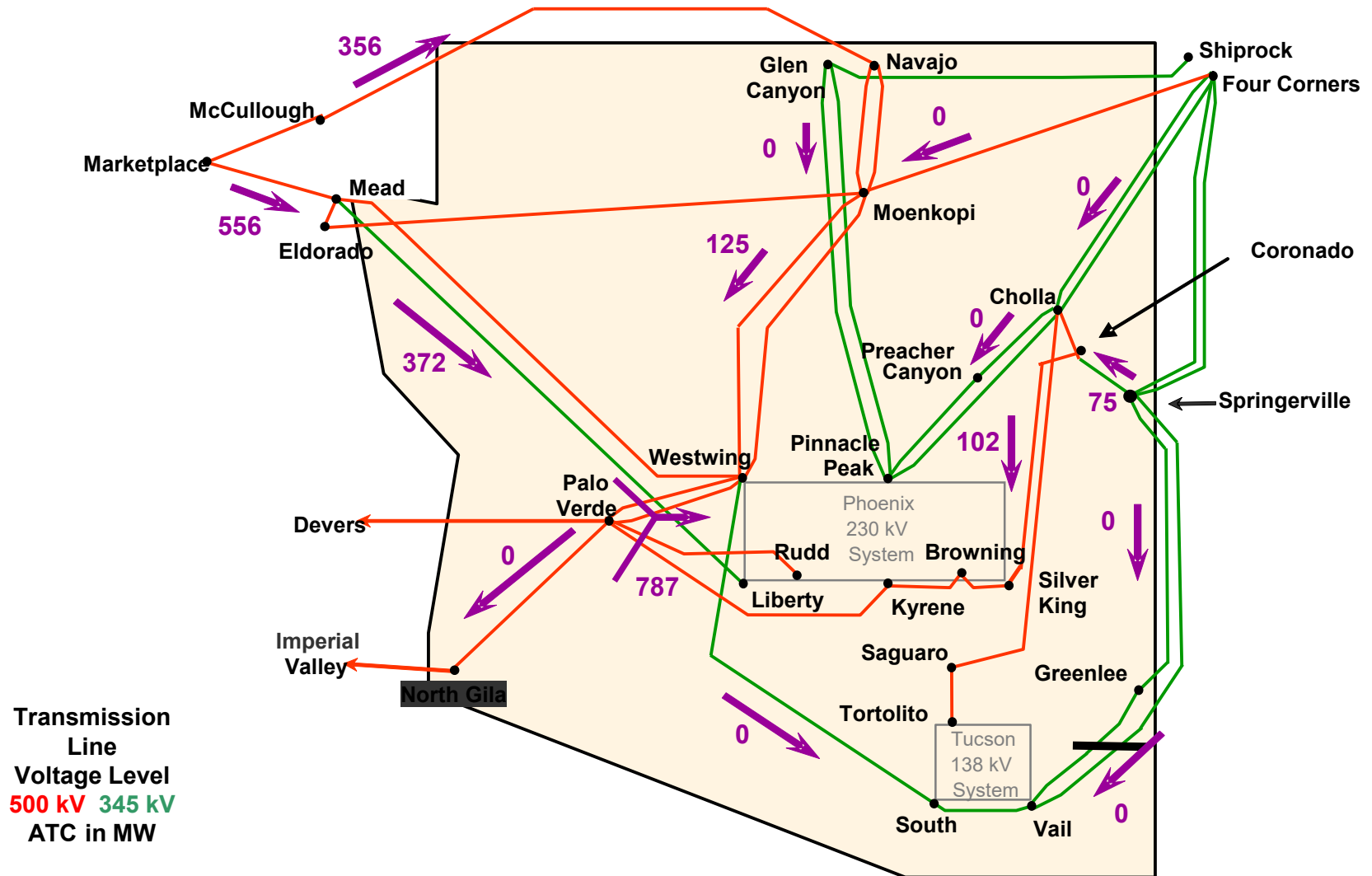
**TOTAL \$502.31m**  
gross benefits since Nov 2014



# Western Energy Day Ahead Market? The New Frontier

- CAISO is exploring the creation of a day ahead market that would allow resources outside of CA to bid into CAISO's day ahead market.
- Could we see heightened levels of aggregated demand response, aggregated solar?
- Would further enhance the ability to integrate utility scale renewables, as well.

# Arizona EHV Transmission Available Transmission Capacity (ATC)



# Solar and Wind Interconnection Requests

## Arizona Renewable Generation Interconnection Requests

### APS

Solar 7102MW  
 Wind 3348MW  
 Biomass 22MW

### SRP

Solar 2762MW  
 Wind 1350MW

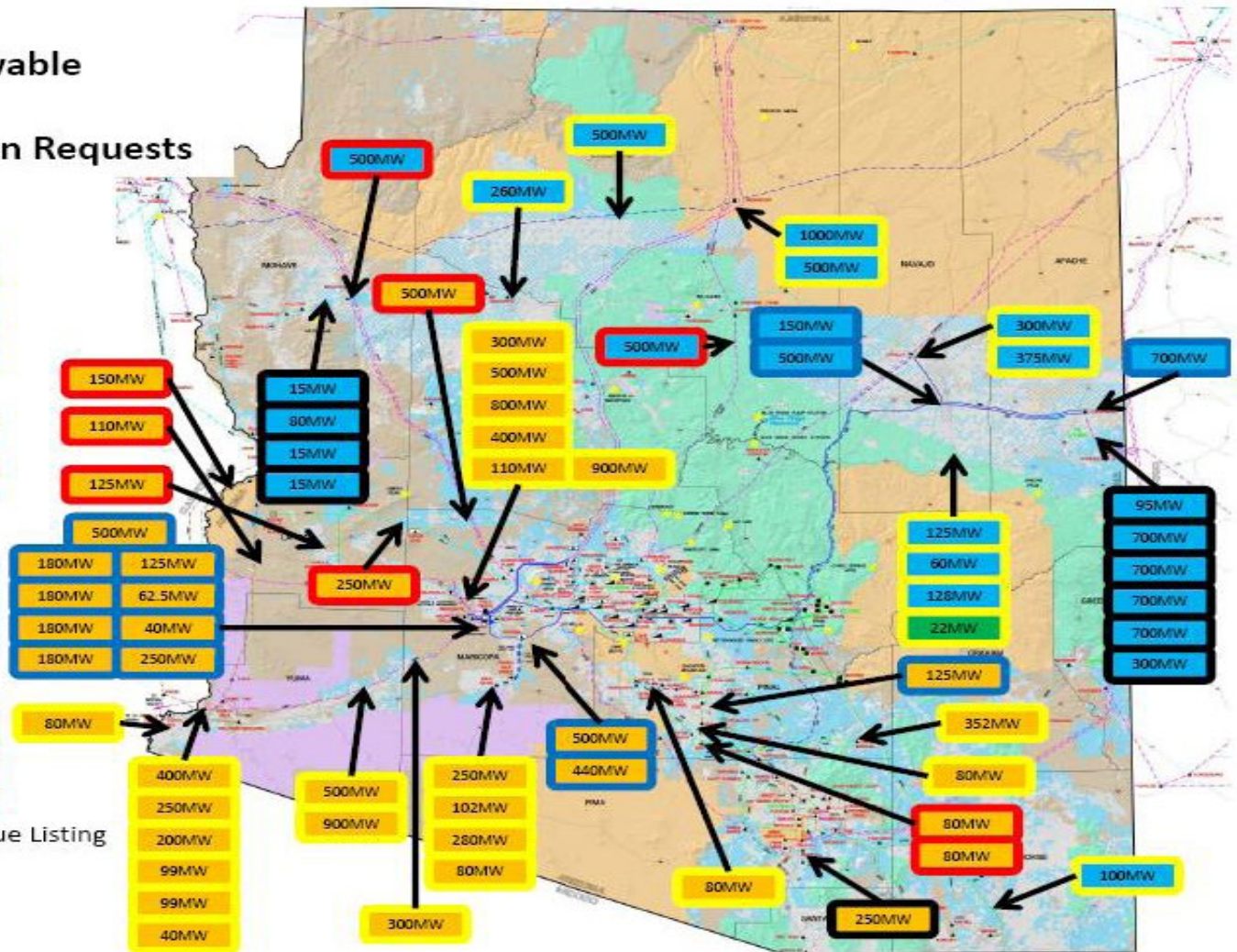
### TEP

Solar 250MW  
 Wind 3320MW

### WAPA

Solar 1295MW  
 Wind 1000MW

Interconnection Queue Listing  
 As of 3/2/09



# Vehicles for Facilitating Grid Mod in the Vertical State

- **Integrated Resource Planning for the Distribution System**
  - State PUC can require utilities to file two year plans, looking forward 10 years, for generation and transmission.
  - Plans state how the utility plans to provide energy to its customers, and why it made those choices, i.e. why renewables over coal or gas over renewables, etc.
  - Plans allow PUC members to ask questions and provide input and guidance to the utility.
  - Some states are launching integrated **distribution** planning (Hawaii, NY, E-21, MN)

# NY's Reforming the Energy Vision (REV)

- **Scorecard Metrics to increase transparency and allow consumers to see the process of implementation of PBR.**
- Introduction of competition into the energy market with a focus on meeting customer needs, ensuring reliability/resiliency, and emissions reductions.
- **Earnings Adjustment Mechanisms (EAMs) introduced to allow utilities to earn regulated rate of return for meeting goals on customer engagement, energy efficiency, and DER interconnection.**
  - National Grid: Received 4 EAMs/8 total metrics in latest rate case; could earn up to \$68 million over three years if it meets the targets set out. Pre-tax revenue adjustment would be made.
  - Co. will track and report on a yearly basis. Began Jan 1, 2018.
- **Platform Service Revenues introduced to compensate utilities for services such as bundled communication offerings, partnering with third parties to finance home energy technologies, etc. (Operating the state's emerging distribution markets)**
- Likely the most ambitious PBR framework in the US currently.

# Hawaii Performance Based Regulation

- Hawaii PUC in the midst of a PBR process that is designing the nation's first comprehensive PBR Framework.
- Considering incentives, rate mechanisms that encourage utilities to meet the state's energy objectives, including 100 percent RPS, and avoid cap ex bias.
- Looking at the platform services model.

# Deer Valley High School

