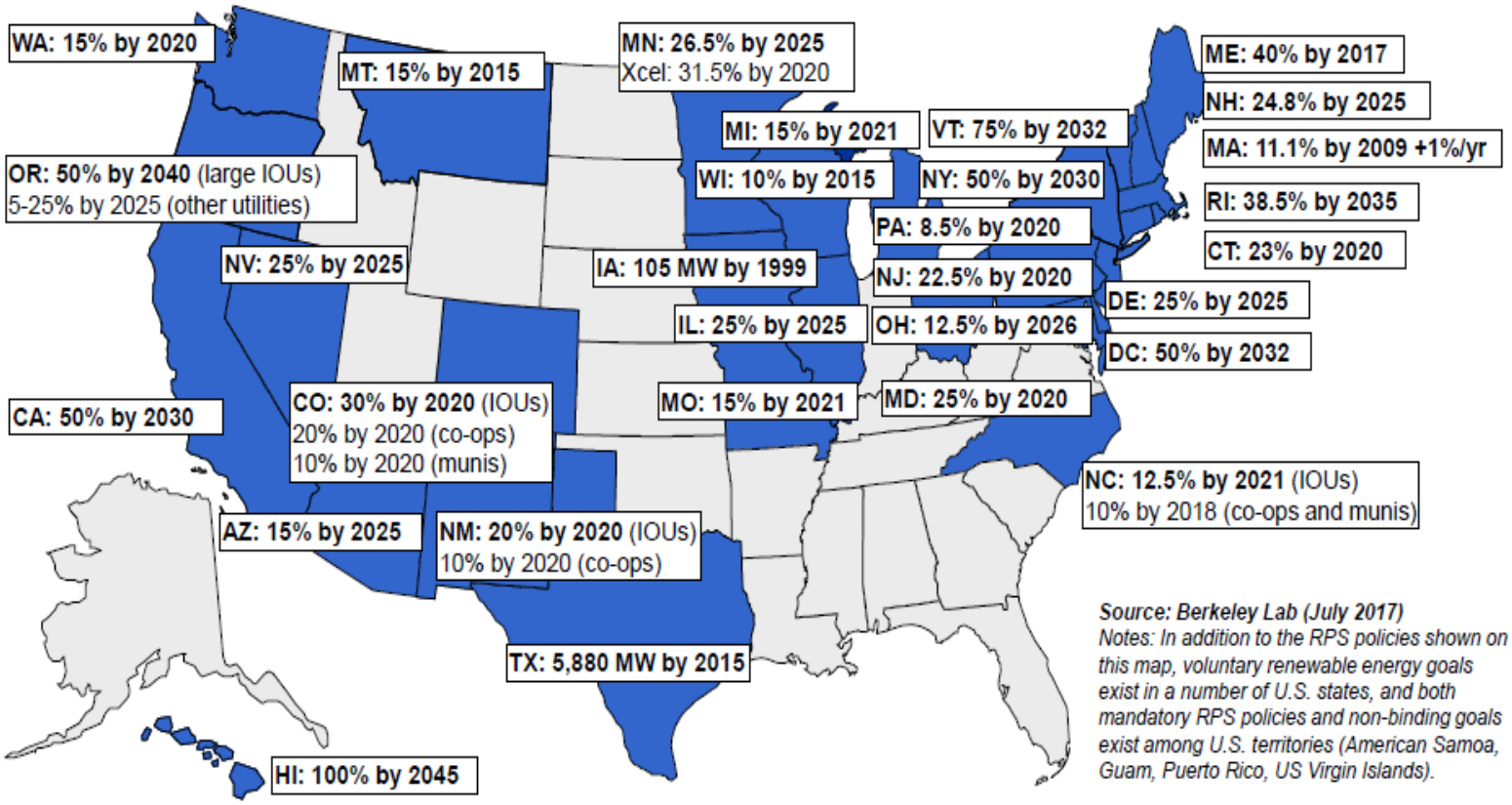
Renewable Standards:
Clean Energy Development & Other Impacts

Amanda Levin
August 9, 2017

Renewable Standards and Clean Energy Development

Status of Standards in U.S.



- 29 states and DC have binding renewable portfolio standards (RPS).
- These binding standards now cover 56% of all electricity sales in the U.S.
- Most RPS have been in place for over a decade, providing analysts and policymakers with robust data and evidence on the customer, economic, and environmental impacts of these policies.

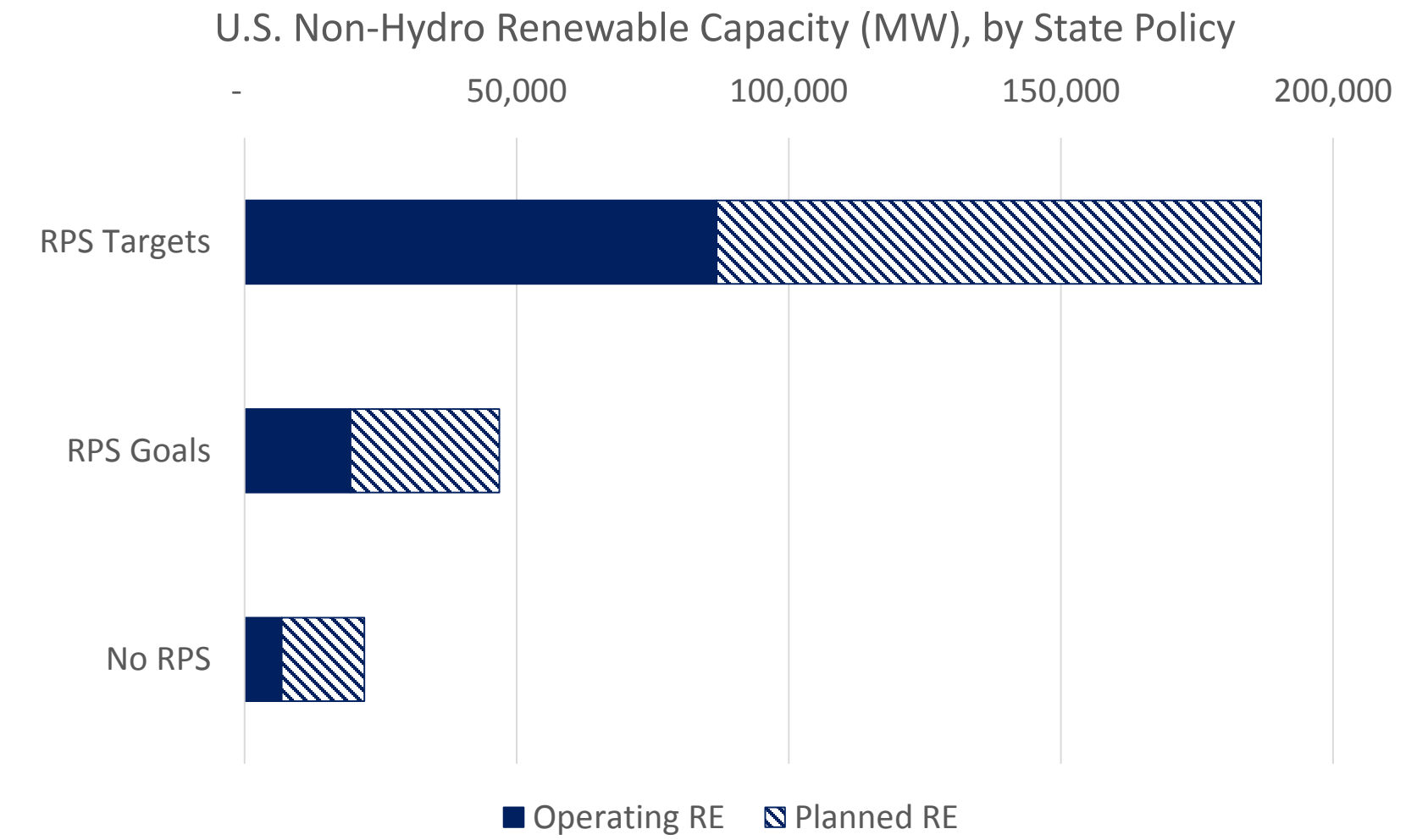
The Basics of RPS

1. A Renewable Portfolio Standard (RPS) is a regulation that requires electricity providers or utilities to generate a portion of electricity supply from renewable energy sources, such as wind, solar, biomass, and geothermal.
2. RPS policies and rules vary across states. State-specific elements include:
    a. Target levels and timeframe;
    b. Entities covered;
    c. Eligible technologies, such as rules related to fuel source, size, operational date, location, and deliverability of the energy;
    d. Use of tiers, carve-outs, or multipliers;
    e. Contracting requirements and procurement planning;
    f. Cost caps, alternative compliance payments

Standards have been a major driver of renewable energy development in U.S. in past

1. More than 50% of all non-hydro renewable power built since 2000 was to meet RPS requirements.
2. The U.S. has added an average of 6 GW of new renewable power annually to meet RPS needs over the past decade.
3. In 2016, renewable portfolio standards required utilities to procure an additional 146 TWh of renewable energy above 2000 levels.
    a. This is enough to power 13.5 million U.S. homes for a whole year.

States with standards have the seen the bulk of U.S. renewable energy development



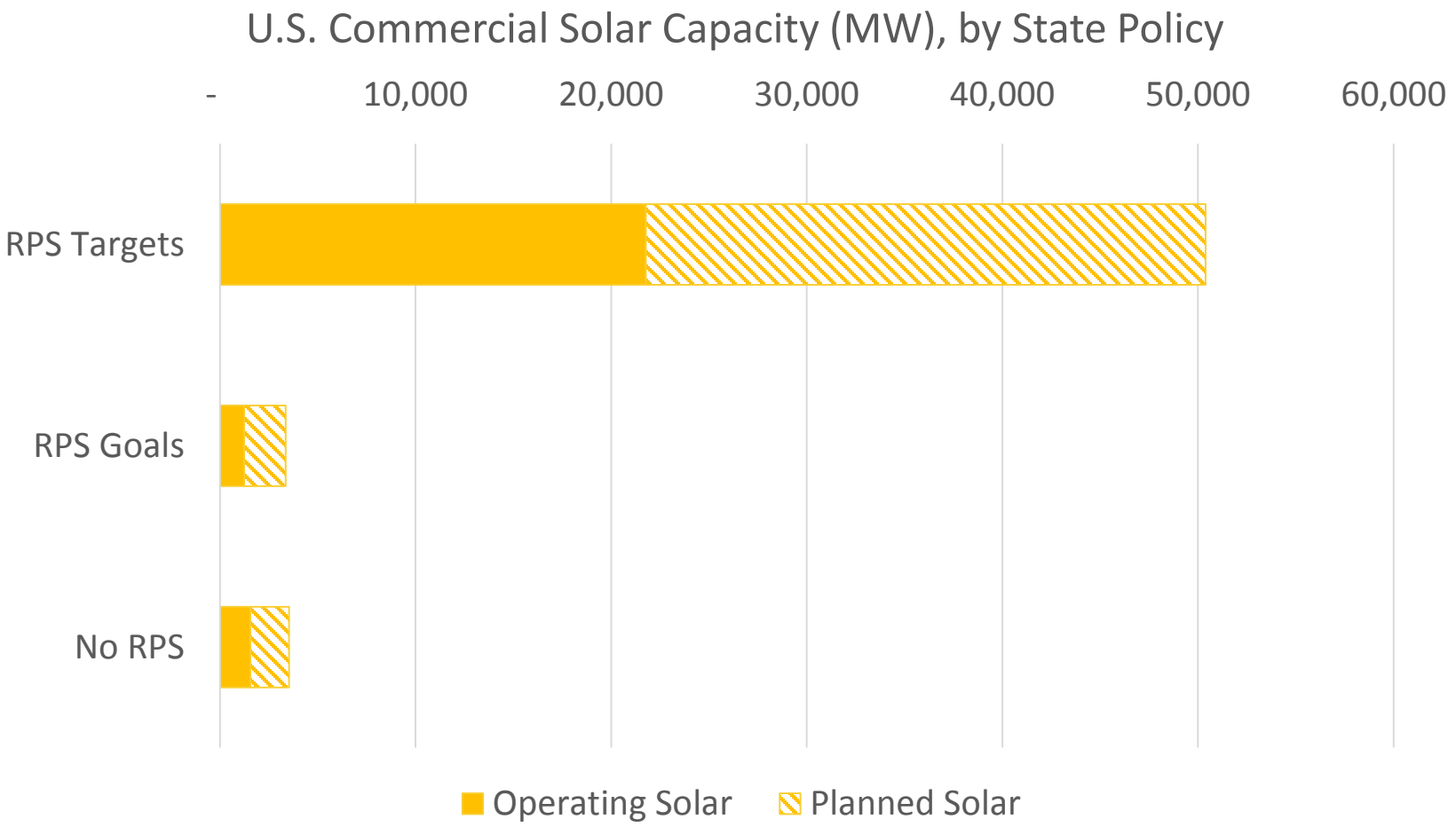
The role of RPS has changed in recent years, in certain regions

1. Actual renewable growth has outpaced RPS needs in recent years.
    a. This is due mainly to economic, non-RPS wind in the Midwest and Texas. However, in the West, actual RE growth has matched closely with RPS needs.
2. In the last year or two, there as been a significant shift in what resources are built to meet RPS demand.
    a. While wind energy makes up more than half of all RPS capacity built since 2000, solar made up almost 80% of RPS builds in 2016.

Standards will be a driver of renewable growth in the future

1. Existing RPS requirements will still require roughly a 50% increase in U.S. RE generation by 2030.
    a. This is about an additional 55 GW of new wind and solar capacity by 2030.
2. Estimated that Nevada will need to procure enough additional renewable energy to meet another 10% of state electricity sales in 2030.

Solar builds are overwhelmingly located in states with renewable standards.



RPS-driven projects already support a large number of U.S. jobs and economic activity

1. Renewable projects built to meet RPS demand supported 200,000 U.S. jobs in 2013 and contributed around $20 billion to the U.S. economy (GDP) that year.
2. The federal government estimates that meeting existing requirements will support around 134,000 U.S. jobs a year over.
    a. Strengthening these standards nationwide could support over 325,000 U.S. jobs annually.

Rate impacts have been small, and even negative in certain states

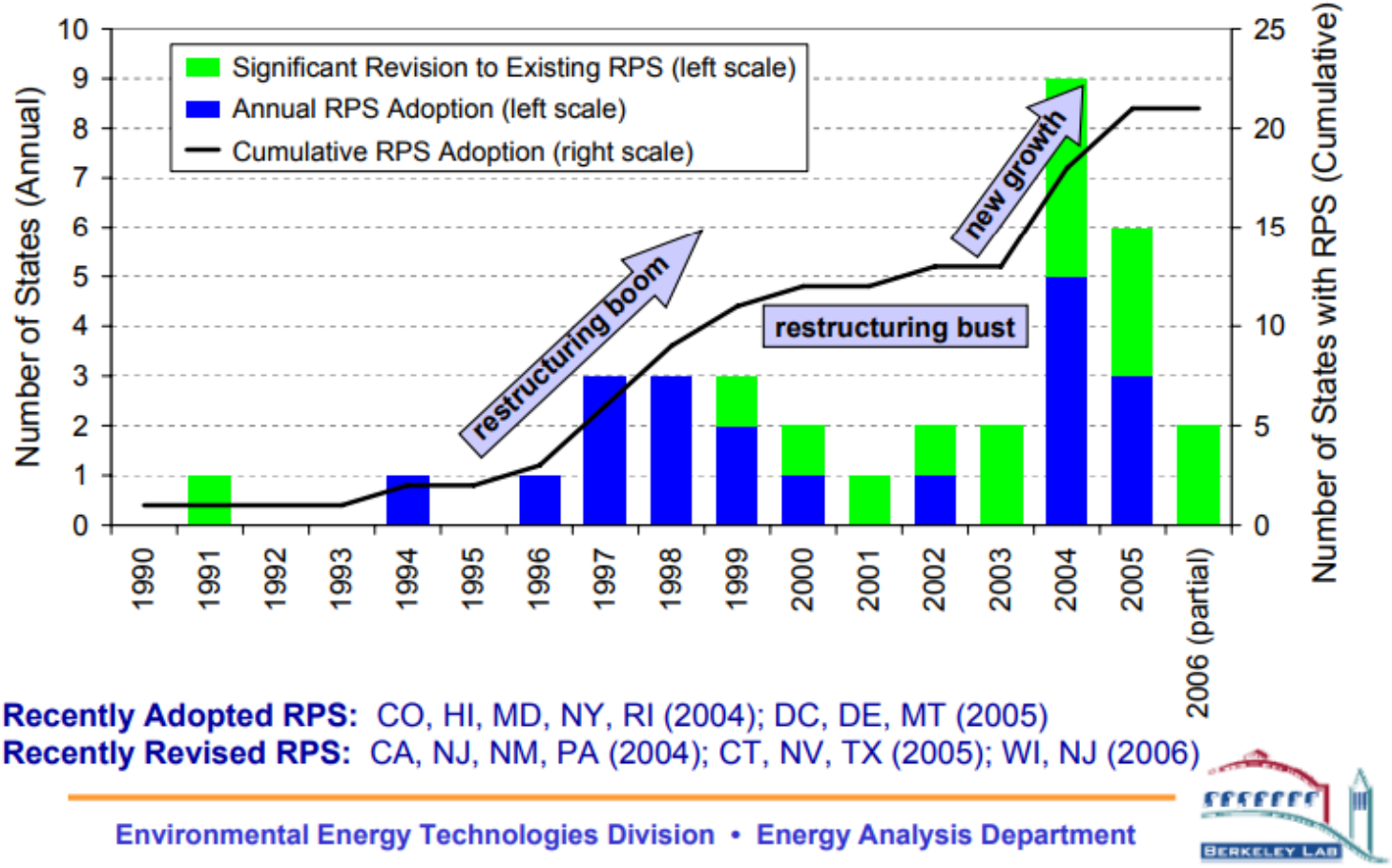
1. Studies of RPS impacts have found compliance costs are small, on average, and can be negative in certain cases
    a. The national labs annually track the costs of RPS compliance. Compliance costs average 1.8% of consumer bills across states with binding targets in 2015.
2. Most studies expect rate impacts will be less than 1% in the final RPS target year (e.g. 2025, 2030). About five states have projected net reductions in rates by the target year.
3. Rate impacts are expected to remain low, even as RPS standards increase, due to falling renewable energy costs.
    a. Wind and solar power purchase agreements (PPAs) are already as cheap or cheaper than the wholesale power prices in parts of the U.S., making these resources a least-cost option.

Standards have helped mitigate wholesale power prices and slow rate growth

1. Once built, renewable projects have minimal costs to run. By adding low-cost energy to the market, it reduces the need to rely on higher-cost resources.
2. Average electricity prices in RPS states have grown at a significantly slower pace than non-RPS states.
3. Renewable energy can also help reduce upward pressure on gas prices, which can result in significant heating cost savings for consumers (up 1.9 ¢/kWh-RE of gas savings)

How have Retail Choice and RPS interacted?

The history of RPS in U.S. is interconnected with history of retail choice



Customer choice will not, and was not intended to, by itself guarantee more clean energy or the resulting economic benefits.

Standards in restructured states

	RE Ranking + Context
CT	**Established in tandem with restructuring (1998),** applies to utilities and retail suppliers; 27% by 2020
DE	Established in 2005, applies to utilities and retail suppliers; 25% by 2025
IL	***Established in "re-regulation" bill*** that created the Illinois Power Agency (IPA) which procures power for default service; 25% by 2025 for both utilities and retail suppliers
ME	**Established as part of restructuring legislation**; 40% by 2017, applied to both utilities and retail suppliers
MD	Established in 2005; 25% by 2020, applied to all utilities and retail suppliers
MA	**Established as part of restructuring legislation**; 15% by 2020, with 1% each year thereafter, applied to both utilities and retail suppliers
NH	Established in 2007; 24.8% by 2025, applied to both utilities and retail suppliers
NJ	**Established in tandem with restructuring (1999);** 20% by 2002 + 4% solar by 2027, applied to both utilities and retail suppliers
NY	Established 2004; revised Dec. 2016 to 50% RE by 2030, applied to all utilities and retail suppliers
OH	***Established in 2008 as part of broad restructuring legislation***; 12.5% by 2026, applied to both utilities and retail suppliers
PA	Established in 2004; 18% alternative energy, applied to both utilities and retail suppliers
RI	Established in 2004; 38.5% by 2035, applied to both utilities and retail suppliers
TX	**Established during restructuring transition (1999);** 10 GW of RE capacity by 2025 (reached in 2009)
DC	Established in 2005; 50% by 2032, applied to both utilities and retail suppliers

A few common elements of RPS in restructured states

1. Most restructured states used RECs (Renewable Energy Credits) and Alternative Compliance Payments (ACP) to meet RPS requirements
    a. RECs are the environmental value of renewable generation and can be bought and sold on a market. RECs do not need to be tied with consumption of the actual renewable generation
    b. ACP is a set $ per MWH penalty for any supplier who does not procure enough RECs. Serves as a backstop if competitive suppliers are coming up short.
2. Requirements cover both utilities and retail suppliers. Utility requirements tend to reflect default or standard-offer load.

Learning Curve: RPS Issues in Restructured States

1. The overwhelming reliance on short-term purchases of RECs created a few main issues:
   a. Without long-term contracts, it can be difficult for developers to get financing for renewable projects.
   b. In addition, the REC market can be volatile, resulting in large variations in RPS compliance costs across years.
   c. Because RECs are not tied to deliverability of the energy, it can slow growth of renewable energy in the state or region where the REC is actually meeting RPS requirements.
   d. Ensuring local energy development to maintain a diverse and reliable system can be a challenge in restructured states.
2. Some restructured states have also come across issues with the collection and use of alternative compliance payments.
   a. Tended to be occur where the ACP was designed as the standard compliance method for retail suppliers, rather than a penalty mechanism.

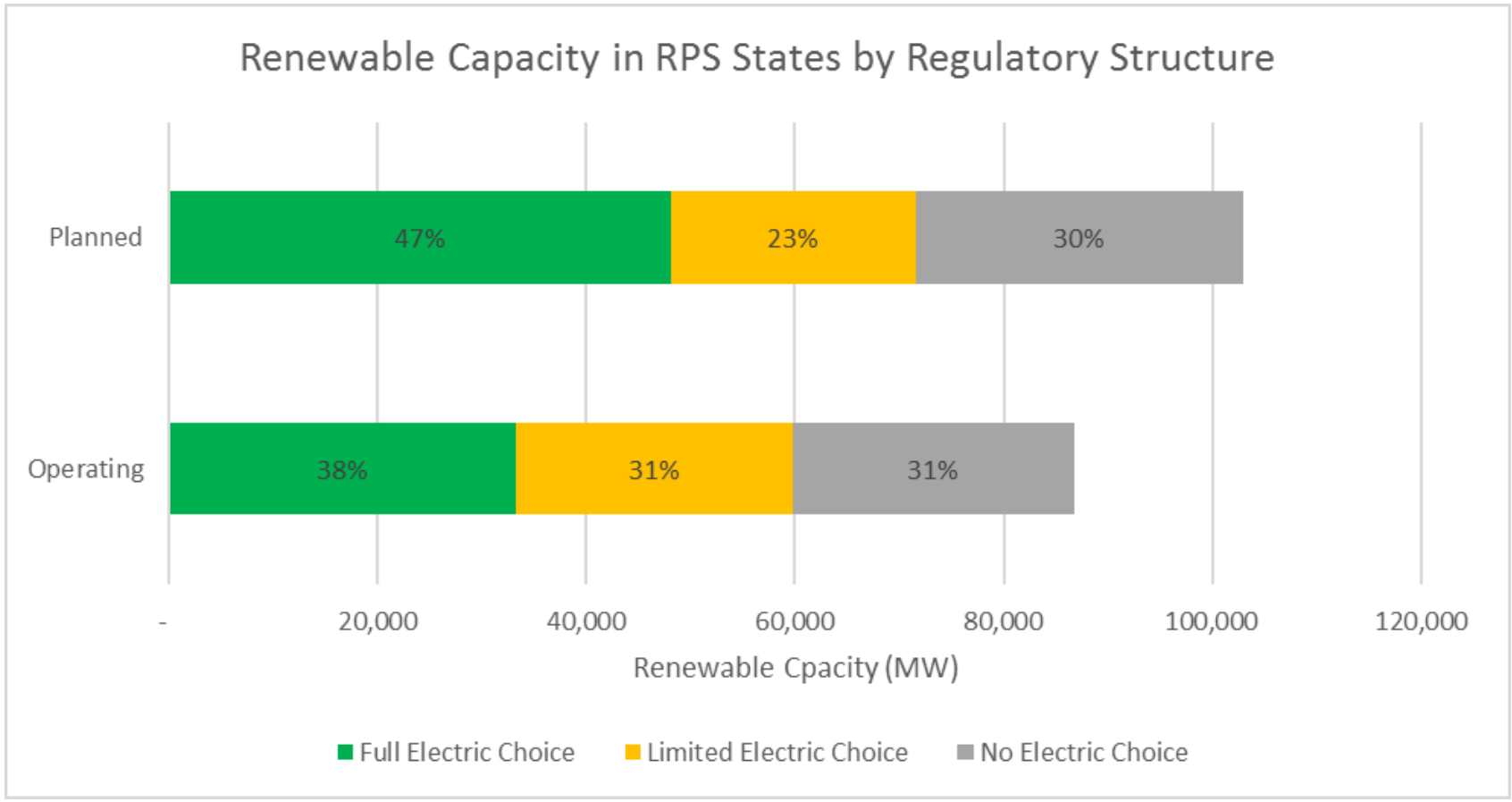
How have standards been modified to address historic issues?

- Requirement to procure long-term contracts with renewable generators
- Geographic restrictions on RECs (such as deliverability requirements, usually set at regional grid level)
- Established rules around use of ACP funds (e.g. in-state community solar, rooftop solar deployment)
- Technology carve-outs (e.g. storage, offshore wind, solar, industrial CHP).
- Tiers that have in-state and/or operational date restrictions.

Recent structural modifications to RPS requirements in restructured states

	Modification
CT	Updated to require utilities enter long-term contracts (15 years) for RE facilities, both small-scale and large-scale. The state environmental agency (DEEP) can solicit proposal, select qualifying proposals, and require distribution companies to enter into long-term contracts. Geographic restrictions on eligible projects. Process upheld by appeals court in June 2017.
NY	Revised to include a “new resource” tier and “maintenance” tier, with geographic restrictions. Long-term contracts done through central procurement process (NYSERDA); new order works to shift RPS obligations from distribution utilities to suppliers. NY structure seeks to promote customer choice and clean energy access for all consumers, with specific measures to support robust voluntary green markets, ESCO and DER markets, and community renewable projects.
IL	Revised to include provisions that set explicit, long-term (15-yr) new build requirements that will ensure that renewable energy credits are supplied by new construction of wind and solar projects in the state, including community solar, low-income solar, brownfield solar, and distributed generation projects. The Illinois Power Agency (IPA) is now tasked with procuring RECs to meet all requirements. Future funding will come through fees on all customer bills and will be held by utilities to be used by IPA. Alternative Compliance Payments will now also be made directly to utilities.
MA	State has passed complementary bills setting specific targets for energy storage, offshore wind, and solar. To be procured through long-term agreements by distribution utilities.

Retail choice states can have robust clean energy development



Challenges of retail choice and the role of standards

1. Customer choice does not, by itself, guarantee more clean energy, full market access, or innovative customer options. Choice should not undermine state policy or economic development objectives, and can complement and enhance policy objectives when done right. Renewable standards can help serve two vital roles:

    1. **Ensuring customer protection**: an RPS can make sure all customers get a minimal amount of RE and help support the state's shift to clean energy without significant price impacts. Renewable funds and carve-outs can also serve to ensure all customer have access to clean energy opportunities.

    2. **Ensuring adequate investment in capital intensive infrastructure**: restructuring can impact many investments including: transmission, metering infrastructure, energy efficiency, generation, and reliability. The state must ensure minimum standards and adequate investment in all of these areas through new rules, robust oversight, and investment frameworks.

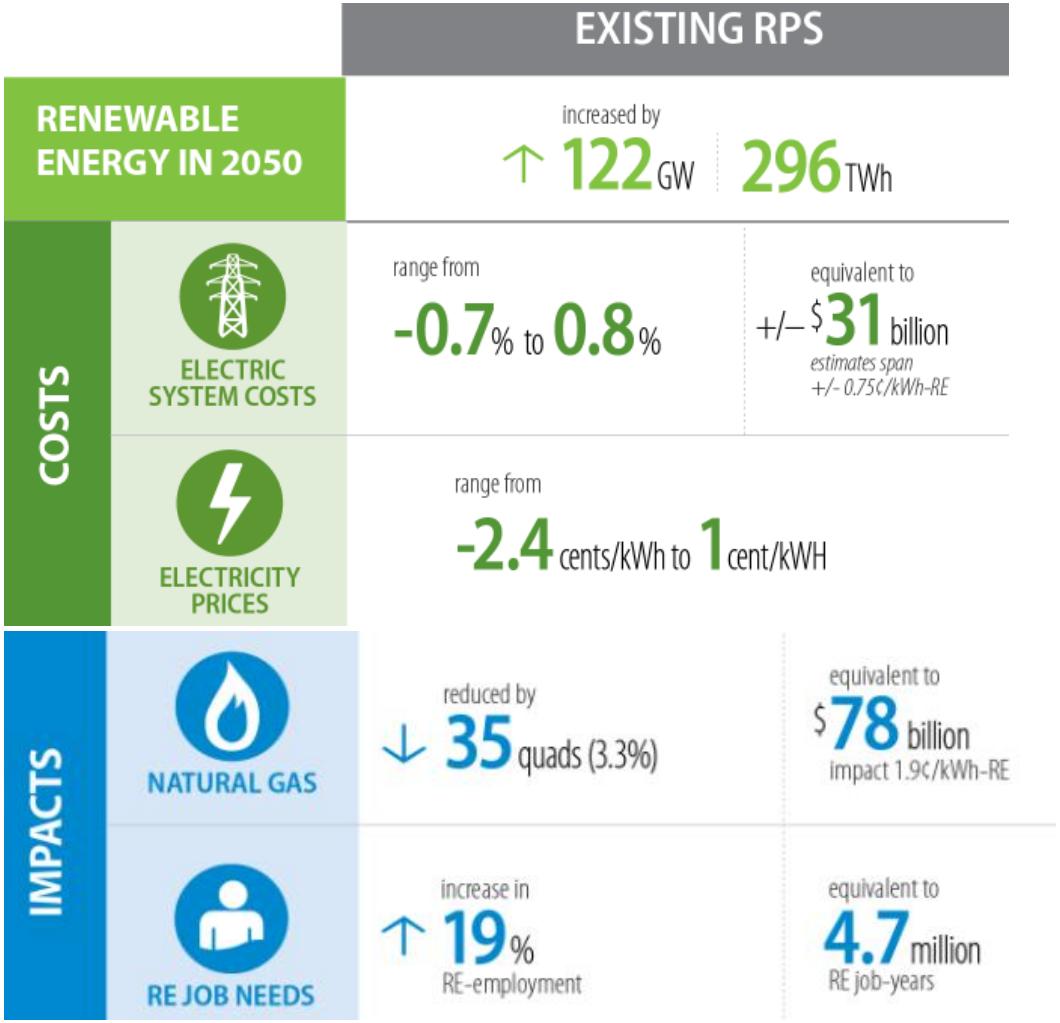
Other mechanisms to encourage clean energy under retail choice

1. Some restructured states have required the default provider to offer innovative, regulated rate options for all customer classes.
    a. This includes 100% renewable/green pricing plans and dynamic pricing options (e.g. time-of-use, real time pricing)
2. States are also exploring ways to incentivize customer-sided renewables and efficiency through market-based programs.
    a. This includes rules and assistance for those interested in: solar leasing, community solar, demand response providers (e.g. ESCOs), etc.
    b. Customer protection and data sharing protocols are also essential to ensure that all retail suppliers can provide customers with the full suite of services and rate options, while protecting customers in the marketplace.

Thank you

APPENDIX SLIDES

Expected Benefits of RPS

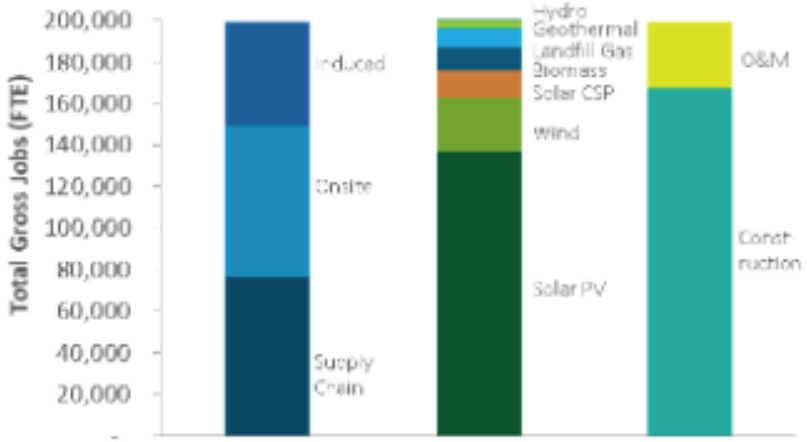


Summary of Key Results: Physical Impacts

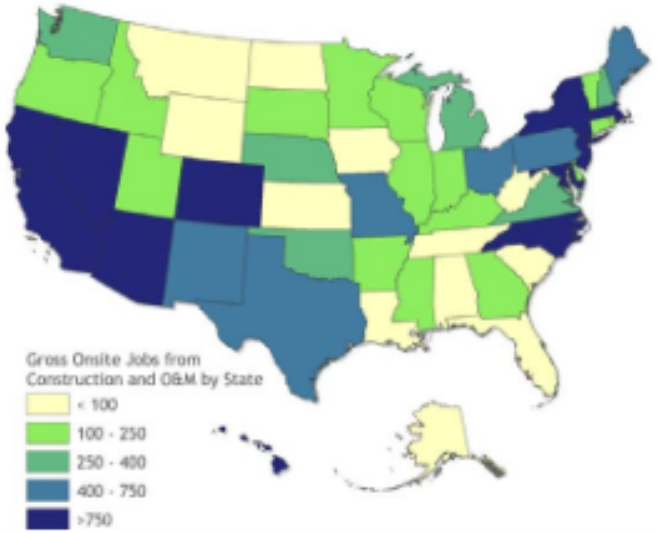
Supported nearly 200,000 gross domestic jobs in 2013, each earning an average annual salary of $60,000, with RE expenditures driving over $20 billion in gross GDP

Location of onsite jobs greatly impacted by new build in 2013-2014 (dominated by PV in California, but including a number of other prominent states noted in map below)

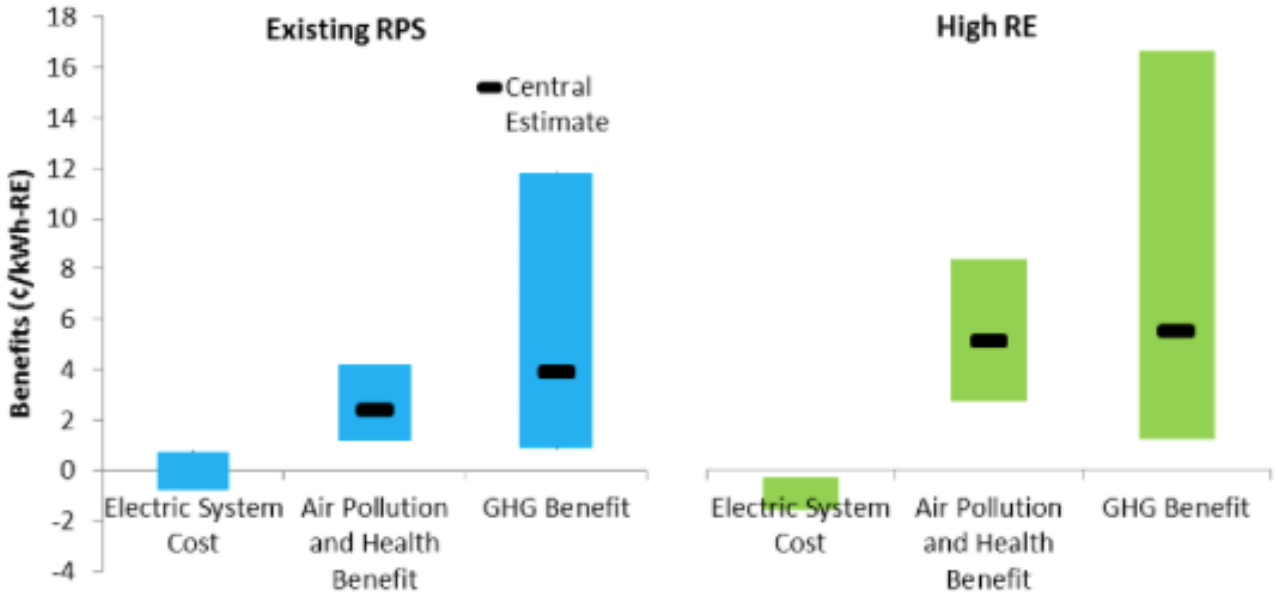
Gross Total Jobs



Gross Onsite Jobs



LNBL Benefit-Cost Analysis of RPS



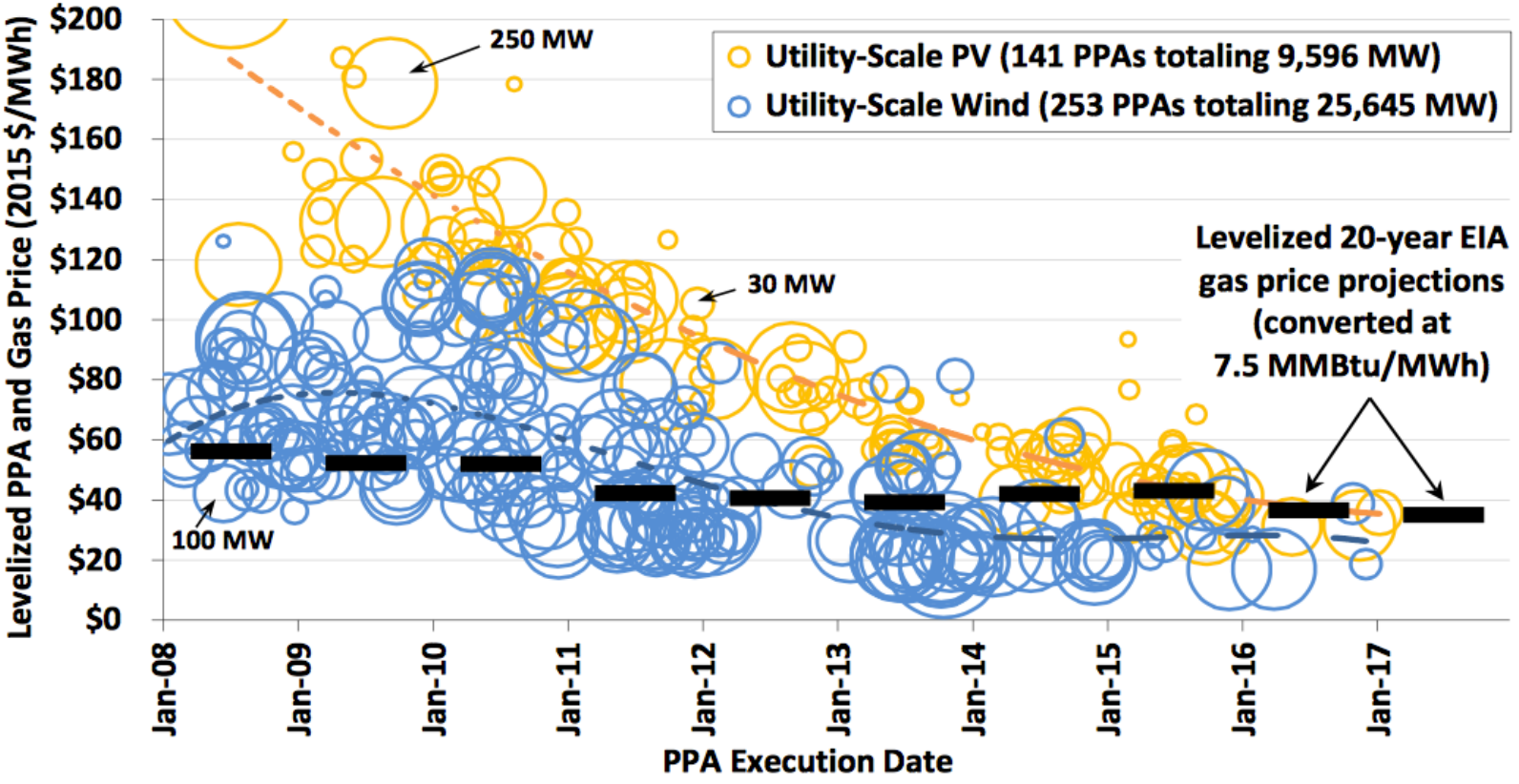
When comparing the costs and monetized benefits, we find that the benefits exceed the costs, even when considering the highest cost and lowest benefit outcomes

- Existing RPS: Costs are <0.75 cents/kWh-RE vs. >1.2 cents/kWh-RE air pollution and >0.9 cents/kWh-RE GHG benefits
- High RE: Costs are <1.5 cents/kWh RE vs. >2.7 cents/kWh-RE air pollution and >1.2 cents/kWh-RE GHG benefits

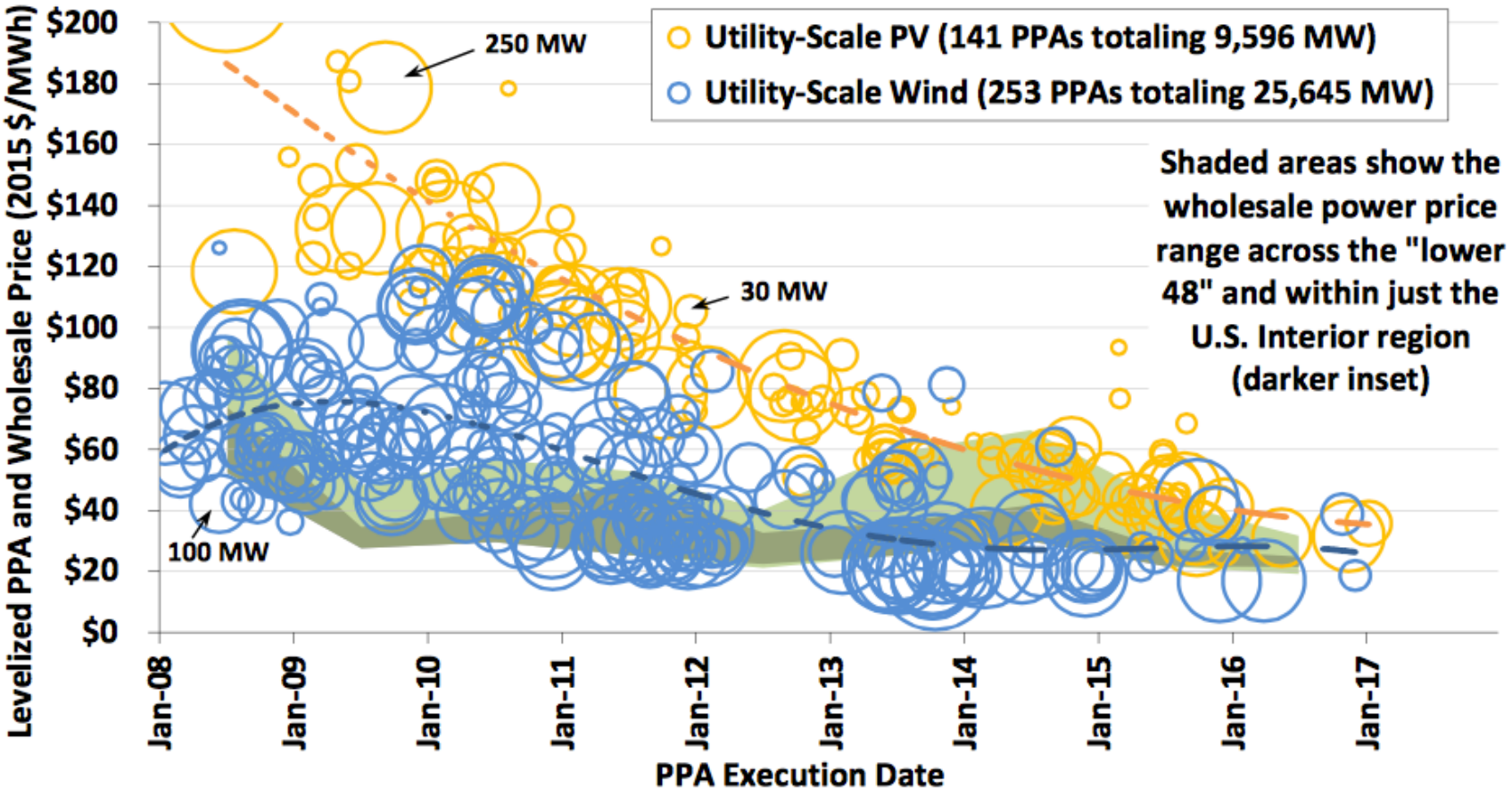
Additional benefits occur from water savings, which could not be readily monetized; other impacts associated with gross RE workforce needs and natural gas consumers are also quantified

Important to recognize that RPS policies may not be the least-cost means of achieving these benefits; see "limitations" noted earlier and described in full report

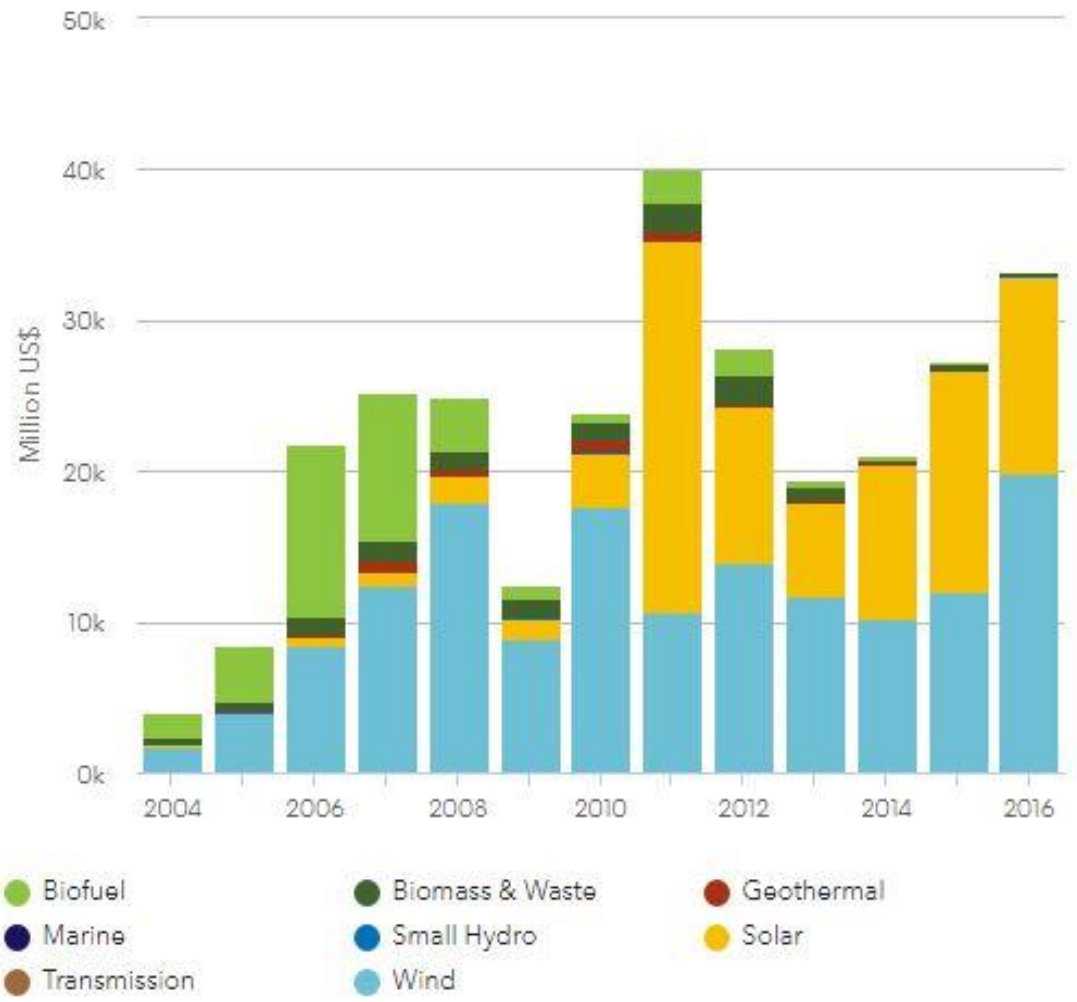
Most Recent PPA Prices



Most Recent PPA Prices



Annual U.S. Investments in Clean Energy



Expected, Economic Renewable Growth