Impacts of Recent State Renewable Policies in the U.S.

December 2019

Key Takeaways

- In the year prior to November 1st 2019, a number of state-level clean electricity policies were promulgated aimed at reducing electric sector CO_2 emissions.
- An EPRI analysis using the US-REGEN model finds that these recent state policies could cause up to 13GW of existing nuclear to retire earlier than otherwise expected.
- Increased renewable generation is offset by lower nuclear generation, resulting in little change in total CO_2 emissions between 2015-2050, while adding 0.6%-0.9% to NPV electric sector costs in the same timeframe.

Many states have implemented clean electricity policies to displace generation from existing fossil-fired units and reduce CO_2 emissions. Updates to renewable portfolio standards (RPS), clean energy standards (CES), and offshore wind mandates, along with federal incentives including the production and investment tax credits, are creating a complex, interrelated policy environment. While renewable mandates create certainty for one piece of the generation capacity mix, they also introduce uncertain ancillary effects across the entire fleet. Recent state policies in the last year provide a case study to understand the effects of this type of policy design.

Using the **U.S. Regional Economy, Greenhouse Gas, and Energy model** (US-REGEN), a dispatch and capacity expansion model of the U.S. electric sector with a focus on accurately representing investments and hourly system operations simultaneously, EPRI analyzed the impacts of recent state policies on electric sector CO_2 emissions and costs, including sensitivities to lower wind costs and higher natural gas prices. EPRI modeled two core scenarios through 2050: a Reference scenario including only state policies on the books by October 31st, 2018, and a Recent Policies scenario that adds additional state policies promulgated after that date, through to October 31st, 2019, per the table below.

State	Reference Scenario*	Recent Policies Scenario
CO	No policies	80% electric sector CO_2 reduction by 2030
CT	No wind mandate	2GW offshore wind by 2030
DC	20% RPS by 2032	100% renewables by 2032; 10% solar by 2041
MA	80% CES by 2050; 1.6GW offshore wind by 2027	80% CES by 2050; 35% RPS by 2030; 3.2GW offshore wind by 2035
MD	20% RPS by 2025	1.2GW offshore wind by 2030; 50% RPS by 2030
ME	No policies	12MW offshore wind by 2022
NM	16% RPS by 2030	100% CES by 2045; 80% CES by 2030
NV	25% RPS by 2030	50% RPS by 2035
NY	2.4GW offshore wind by 2030; 50% RPS by 2030	9GW offshore wind by 2035; 70% RPS by 2030; 100% CES by 2040
WA	15% RPS by 2030	100% CES by 2045

* Both scenarios include all other state RPS and clean energy standards on the books as of October 31st, 2018/
** Excludes 2019 executive orders by the Governors of VA and NJ that would further increase renewable additions

All other assumptions remained fixed between scenarios, including:

- Fuel prices from the AEO2019 High Oil and Gas Recovery case
- Technology costs from EPRI's Generation Options Report; load assumptions based on EPRI's U.S. National Electrification Assessment
- Discount rate set at 5%
- No new production or investment tax credits

Two sensitivity cases were run to explore how the results changed in response to a.) lower future wind turbine costs (from the National Renewable Energy Laboratory's Annual Technology Baseline 'Low' case), and b.) higher future natural gas prices (from the AEO2017 Reference case). A third scenario was run adding current state nuclear subsidies (per EIA bulletin 2019-10-7) to the Recent Policies scenario.

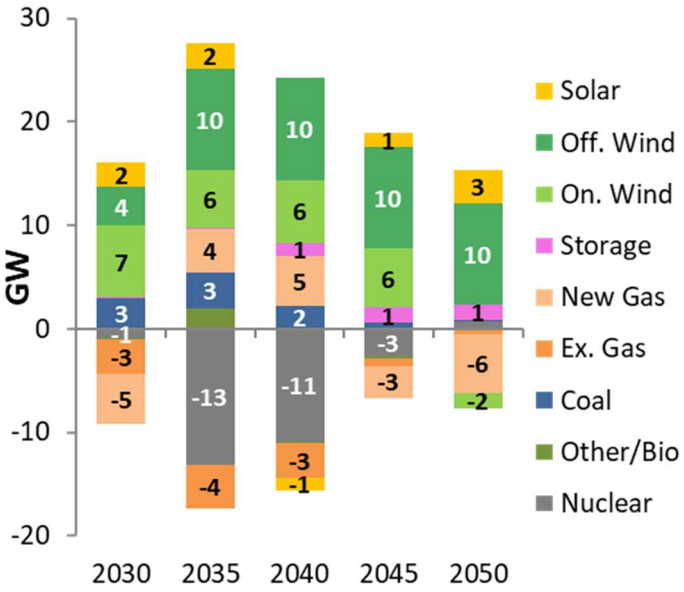

Figure 1: *Projected change in U.S. generation capacity for each given year due to recent state policies.*

Recent state polices are effective at spurring the growth of new wind capacity (>15GW) and new solar (>2.5GW) versus the Reference, but Figure 1 also indicates some **existing coal units are delaying retirement**, while **existing nuclear units are retiring earlier**, notably in the Northeast, where many of the recent renewable policies were promulgated.

The retention of existing coal units is a response to the variability of renewable resources in the Northeast, whereas the early retirement of existing nuclear units is a market response. Renewable mandates place implicit subsidies on the dispatch of renewable units through REC payments in addition to any payments from the Federal Production Tax Credit. These subsidies serve to depress wholesale prices in regions with high mandated renewable penetration. Existing nuclear units, which depend primarily on energy revenues and have higher fixed operating costs than other thermal units, may choose to retire earlier to avoid future costs exceeding future revenues. Figure 2 illustrates these price changes in New England, which sees the greatest increase in renewable generation share due to recent policies.

Some states have recently subsidized existing nuclear units to avoid such retirements. EPRI modeled a third scenario adding known subsidies to the Recent Policies Scenario, finding that these subsidies barely impact nuclear retirements, as all current subsidies are planned to expire before 2030.

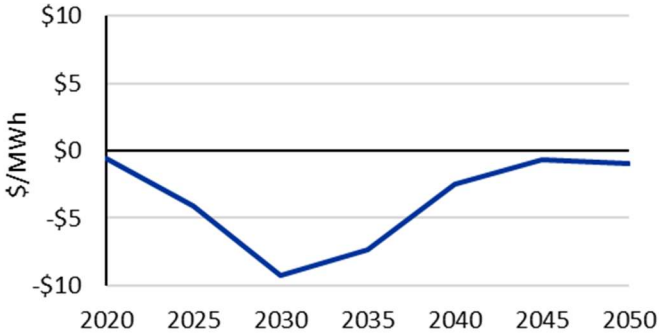

Figure 2: *Change in projected average wholesale electricity prices in New England due to recent state policies.*

The combination of additional renewable generation and lower nuclear generation largely cancel each other out over time; the *total* projected change in CO_2 emissions between 2015-2050 due to recent state policies lies between -70 and +200 million short tons, or -0.13%-0.4% of total emissions. NPV electric sector costs (2015-2050) rise by $14-$19 billion dollars, or 0.6%-0.8%, with new costs concentrated in the Northeast. There are no early nuclear retirements in the high natural gas price sensitivity, as higher gas prices translate to significantly higher wholesale prices.

Observations

It is well-known that an RPS is unlikely to achieve the least-cost path to reducing CO_2; such a path typically includes a mix of low-emitting technologies. [See EPRI's Back Pocket Insight on the *Value and Costs of State RPS* at http://eea.epri.com/]. The stated goal of most recent state policies is to reduce CO_2 emissions from the electric sector, but this analysis suggests that the form of current policies leads to complex interactions that simultaneously incentivize early nuclear retirements, thus **substituting a new zero-CO_2 technology for an existing one, resulting in minimal impacts on projected CO_2 emissions.**

Contact Information

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