Multi-Year Analysis Examines Costs, Benefits, and Impacts of Renewable Portfolio Standards

As states consider revising renewable portfolio standard (RPS) programs or developing new ones, careful assessments of the costs, benefits, and other impacts of existing policies will be critical.

RPS programs currently exist in 29 states and Washington, D.C. Many of these policies, which were enacted largely during the late 1990s and 2000s, will reach their terminal targets by the end of this decade.

The National Renewable Energy Laboratory (NREL) and Lawrence Berkeley National Laboratory (LBNL) are engaged in a multi-year project to examine the costs, benefits, and other impacts of state RPS polices both retrospectively and prospectively.

Heeter et al. (2014), and an update in Barbose et al. (2015), summarized incremental compliance costs of RPS programs over the 2010–2013 period. For states in restructured markets, compliance cost estimates were based primarily on renewable energy certificate (REC) expenditures. For traditionally regulated states, compliance costs were instead based primarily on estimates developed by utilities or state regulatory agencies, representing the net cost of RPS resources compared to non-renewable resources. As shown in Figure 1, net RPS compliance costs in 2012 and 2013 were generally equivalent to less than 2% of average retail electricity rates, though varied substantially across states—reflecting differences in RPS target levels, renewable resource mix, methods used to estimate compliance costs, and other factors.

> In 2013, RPS compliance obligations were met with 98 terawatt-hours (TWh) of "new" renewable electricity generation (from renewable plants built after RPS standards were enacted), representing 2.4% of nationwide electricity generation in that year and resulting in a 3.6% reduction in total fossil fuel generation.

Heeter et al. (2014) also reviewed RPS benefits studies conducted by state regulatory agencies or others. Ultimately, however, the small number of RPS benefits studies and their widely varying methods and scopes limited the ability to compare across states or generalize beyond the specific studies performed. This finding thus prompted the need for a broader analysis of RPS program benefits and other impacts, relying on a standardized methodology and scope.

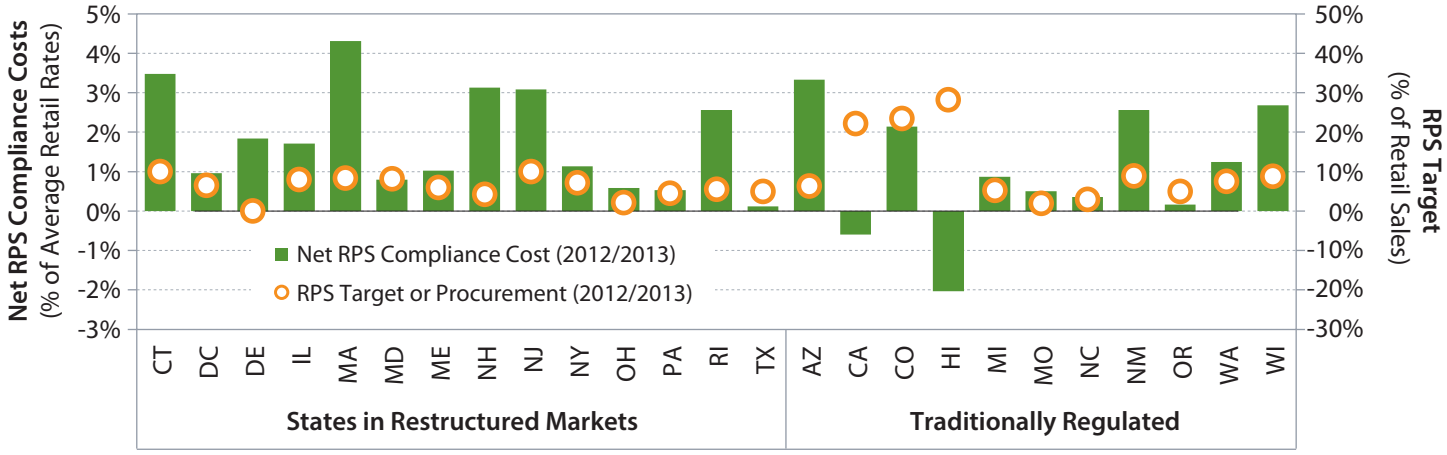

Figure 1. Estimated net RPS compliance costs and targets in 2012/2013*

*2013 data if available.

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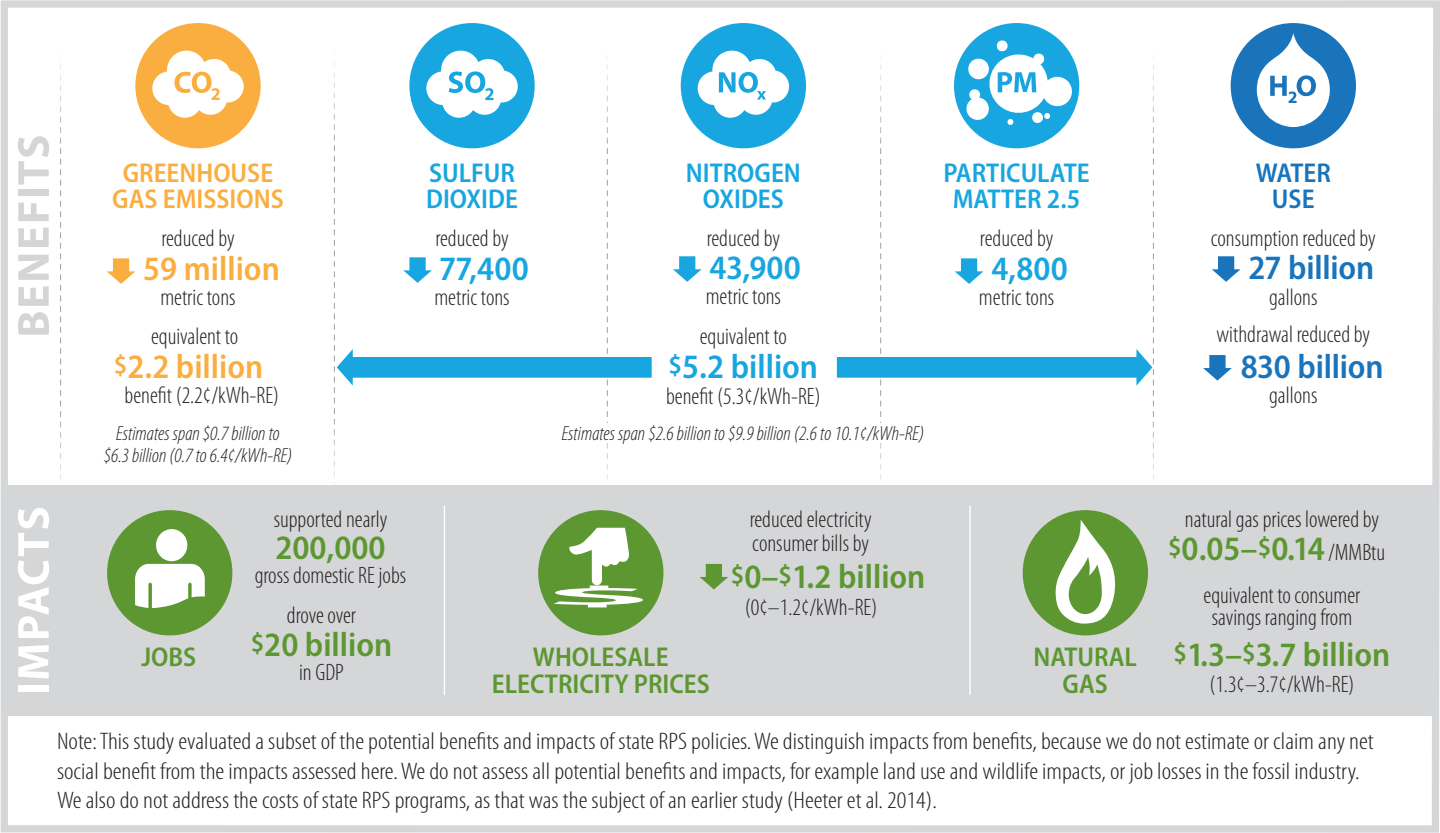

Figure 2. Benefits and impacts of new RE used to meet 2013 RPS compliance

Note: ¢/kWh-RE is the cents per kilowatt-hour of renewable energy.

Responding to that need, Wiser et al. (2015) focused on the societal benefits and a number of other impacts from state RPS policies, focusing retrospectively on the year 2013. The study uses an established, uniform set of methodologies and data sets to assess potential societal benefits of new renewable energy resources used to meet RPS compliance obligations in 2013 (Figure 2). Greenhouse gas emissions were reduced by 59 million metric tons, emissions of sulfur dioxide (SO_2), nitrogen oxides (NO_x), and particulate matter 2.5 ($PM_{2.5}$) were reduced by 77,400, 43,900, and 4,800 metric tons, respectively. Water withdrawals and consumption were reduced by 830 billion gallons and 27 billion gallons in 2013, respectively. Figure 2 also shows gross renewable jobs, wholesale electricity price, and natural gas price impacts of RE resources used to meet 2013 RPS obligations; these impacts are best characterized as resource transfers as opposed to societal benefits as the direction of impact (positive or negative) differs by market participant.

Renewable energy serving RPS policies can have other important impacts that are not evaluated in either analysis, including impacts on wildlife, material extraction, land use, and grid integration. Furthermore, some caution is warranted in making direct comparisons between Wiser et al. (2015) and the earlier analyses of RPS compliance costs because the two do not rely on a perfectly consistent set of underlying methods and assumptions.

LBNL and NREL are planning a follow-up analysis in 2016–2017 that will examine the future costs, benefits, and other impacts of RPS policies.

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Funding support was provided by the U.S. Department of Energy's (DOE) Office of Energy Efficiency and Renewable Energy's (EERE) Strategic Programs Office.

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NREL/FS-6A20-65409 • January 2016
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