

# An Assessment of the Effectiveness of Renewable Portfolio Standards in the United States

*Quantitative analysis of an original data set suggests that RPS reduce state CO<sub>2</sub> emissions, improve state air quality levels, and increase state renewable energy production. Though far from definitive, this study is intended to get the ball rolling on much-needed examination of RPS effectiveness.*

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## I. Introduction

Within the last few decades, renewable portfolio standards (RPS) have become one of the most commonly adopted climate change policy tools among the states. It is for this reason that numerous scholars have begun to conduct in-depth analyses of RPS (Berry, 1994; Mintrom, 1997; Matisoff, 2008; Wiser and Barbose, 2008; Yi and Feiock, 2012; Carley and Miller, 2012;

Heeter and Bird, 2013).

However, because of a lack of outcome data on RPS goal completion thus far, there has been no substantial assessment of the overall effectiveness of RPS to date (Carley, 2011; Rabe, 2006, 2008; Yin and Powers, 2010). How to effectively measure the success of a relatively new policy such as RPS is a difficult task, and the research described here will attempt to partially fill this gap.

One previous attempt at measuring the effectiveness of RPS came from Bushnell et al., who analyzed applicable climate change policies for the state of California (2007). Following their analysis they concluded that, "...RPS may be one of the less efficient means of achieving greenhouse gas emission reductions...it does not reward generation from non-renewable sources of low carbon power, and rewards energy conservation only weakly (Bushnell et al., 2007, p. 3)."

Although Bushnell et al. do not believe that RPS can lower overall greenhouse gas (GHG) emissions, this research intends on testing this prospect to see whether this assertion has any validity. In addition to examining GHG emissions, I will also measure the effectiveness of RPS to increase state renewable energy production, and improve the quality of the air, as suggested by Matisoff (2008).

As mentioned previously, there is well-established extant research on RPS. However, this is one of the first studies to examine the specific outcomes of RPS relative to state GHG emissions, renewable energy production, and air quality. This research intends to provide an assessment of the current progress of RPS states in relation both to one another and to states that have yet to adopt a RPS. More specifically, this study aims to aid both practitioners and

scholars in that it will provide a new RPS measurement that will hopefully pinpoint the utility of RPS and whether they should be considered as a viable climate change mitigation policy tool.

In the first section I will analyze the most seminal RPS research to date, with specific consideration of research that has attempted to provide a model of evaluating RPS effectiveness. The following section will present several

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hypotheses that will evaluate the current direction of RPS states. Next I will review the original dataset and quantitative methodologies employed in this research, and explain the purpose of applying this particular collection of data to RPS research. The fourth section will dictate whether or not state RPS, (1) effectively reduce greenhouse gas emissions, (2) have a "positive" impact on state air quality, and (3) increase renewable energy generation. In the final section I will explore the implications that this research has on the future of RPS adoption.

## II. Renewable Portfolio Standards

As described by Rowlands (2010, p. 184), an RPS is created to "reserve a portion of the broader electricity market for renewable resources by obliging market participants to ensure that a predetermined share of their total electricity supply is provided by renewable electricity facilities." In other words, RPS are state regulations that call for electric utilities to ensure that a specific percentage of all produced electricity must come from renewable resources. The first RPS was ratified in Iowa in 1983, under a slightly different name, but with the same basic construction. The 1990s really sparked the adoption of RPS, as seven more states enacted RPS of similar variety. Currently there are 30 states, along with the District of Columbia, that have adopted some form of an RPS policy. RPS allow for ample state flexibility including a variation of different target goals and deadlines, market trading mechanisms, and renewable energy types used to comply with the RPS policy. This flexibility makes this particular policy tool especially popular, as evident by the recent exponential increase in RPS adoption. Even though the adoption of RPS is becoming rather common, this policy tool is still relatively new, with few scholarly attempts at ascertaining the results of its implementation. However, there

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