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Leading on Energy Policy: The Growth of Renewable Portfolio Standards on the State Level

Spencer Borison
University of Colorado, Boulder, spencerborison@yahoo.com

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Thesis Advisor
Srinivas Parinandi, Department of Political Science

Committee Members
E. Scott Adler, Department of Political Science
Laurie Gries, Department of Communication

Table of Contents

I. Introduction

Abstract

The world is warming at unnatural rates. Governments have responded with largely slow or insufficient policy to stop this potentially dangerous change. In the United States, where special interests, notably the oil and gas lobby, have incredible influence over federal policy and fight to maintain the status quo; little has been done to reduce carbon emissions. This lack of policy at the federal level has placed the responsibility on the states to act. Among the main policy actions states have utilized in promoting more renewable energy and reducing greenhouse gas emissions is the Renewable Portfolio Standard (RPS). This standard, which varies by state in its specifics, mandates that a certain percentage, by a predetermined year, of the energy portfolio within a state must come from renewable sources instead of from fossil fuels.

This study tests several variables within two main categories, economic and political, to determine which are most correlated to RPS adoption. To test economic factors, this study examined three variables: state unemployment rate, renewable energy production, and fossil fuels production. First, to test if unemployment levels influence adoption, annual data was collected on state unemployment from the Bureau of Labor Statistics. Second, to test the impact of renewable energy production on adoption, this study used data from the Energy Information Administration. Similar data was used to test the correlation between fossil fuels production in a state and RPS adoption.

On the political side, two variables were tested. First, to test the impact of political ideology on RPS adoption, this study utilized information from the National Council of State Legislatures and the League of Conservation Voters. Second, the impact of state level campaign contributions on adoption was tested using data compiled by the National Institute on Money in State Politics.

Among the variables tested in this study, only high unemployment rates and liberal political ideology were significantly correlated with greater adoption of a Renewable Portfolio Standard. The other factors showed no strong relationship to RPS adoption.

Keywords: State Energy Policy, Renewable Portfolio Standards, Economy, Politics

Initial Thoughts

Explanation of Variables and Experiment

This study focuses on the Renewable Portfolio Standard (RPS), a policy designed to promote renewable energy at a state level. While there is still political disagreement on the validity of human-caused climate change, there is little uncertainty within the scientific community. Recognizing this, many lawmakers have chosen to act to promote more sustainable practices. This does not mean, however, that these actions have always specifically targeted climate change mitigation; in many cases the actions come from an environmental lens, but many other times there is a strong economic incentive driving policy. In effect, there are two potential motivating forces that compel a state to support the promotion of renewable energy policy, political factors and economic factors. These two main influencers of RPS adoption can be further broken down and explained.

For those state-level politicians who see climate change as a serious risk to the world and the people of their state, adoption of renewable energy policy often has political explanations. For some legislators, their constituents or campaign contributors support these actions. In a democratic system where money and public support is vital to win reelection, taking actions that gain their support should enhance one's reelection bid. For this reason, when the major interests in the state support increased adoption of renewable energy policy, one would expect politicians to follow suit. This pattern works both ways; when interests line up

against climate change mitigation or alternative energy promotion, legislators can be expected to oppose action on this issue.

One of the most consistent and reliable ways to measure the attitudes of interest groups towards an issue is to look at financial contributions to campaigns. The industry most concerned, both in support and opposition, with the adoption of a Renewable Portfolio Standard is the Energy and Utilities sector. While other industries may also experience cost increases due to the changes, the Energy and Utilities sector is at the center of the issue. One would expect this industry to most strongly oppose adoption of these standards because the companies will face system overhauls, high costs, and possible penalties for noncompliance. Therefore, when an RPS is brought onto the legislative agenda, it is anticipated that this industry will spend significant money lobbying to block the legislation. In states where a powerful energy lobby exists, it should be unlikely for the legislature to adopt a Renewable Portfolio Standard.

On the other hand, there are states in which major energy companies have gone against conventional wisdom and supported Renewable Portfolio Standards. In states where public opinion is highly supportive of acting to mitigate perceived climate change, certain companies see blocking renewable energy legislation as bad for their public image. In this case, in order to look environmentally conscious and adaptive to the desires of their customers, they might go against their own self-interest and support an RPS. However, this is viewed as an exception; rather it is predicted that the majority of companies within the Energy and Utilities sector will

act in ways that will be most profitable by maintaining the status quo and opposing large, costly changes.

The second variable tested from a political standpoint focuses on political ideology of the state. Legislators, both on a state level and federal level, are elected to act in the best interests of the citizenry when making decisions. While campaign contributions allow for the evaluation of the desires of special interests and wealthy donors, they are not always representative of the overall population. Most voters do not make significant contributions to campaigns and so their only impact over elections is through voting. Therefore, when looking at political variables that cause the adoption of policy, it is important to examine the influence that voting citizens have over policy decisions. As noted above, due to their assumed desire for reelection, politicians must answer to the interests of the people or their current term will be their last. This means that when the public takes a strong stance on an issue, lawmakers generally vote accordingly. This implies that when public opinion shifts towards greater support for increasing renewable energy in a state, like through a Renewable Portfolio Standard, it is expected that the state will soon thereafter respond and adopt this type of policy.

It is difficult to gather consistent public opinion data at the state level on this issue and so an alternative method was deemed necessary to evaluate the level of public support for renewable energy legislation. This study measures public opinion and political ideology in two ways. First, it examines the impact partisan control of state governments has and whether there is a higher likelihood of RPS adoption under a Democratic or Republican-controlled legislature. Second, the

voting records for federal Members of Congress are analyzed to determine if there is any correlation between a party and energy policy. The hypothesis for this variable expects to see a higher positive correlation between the Democratic Party and adoption of a Renewable Portfolio Standard than the Republican Party. This is because the Democratic Party, through rhetoric and policy actions, tends to be more supportive of climate change mitigation policy than the Republican Party. For example, the Democratic Party's platform recognizes the need to address climate change, while the Republican Party's platform does not.

On the other side of this study is the set of Economically driven variables. First, the health of the job market is a driving force behind many important policy decisions. Unemployment rates in a state are critical when discussing adoption of Renewable Portfolio Standard. A large change to the energy sector will cause a shift that will greatly impact the jobs in that sector. There are two possible scenarios that could occur when an RPS is adopted by a state. The first would see increased job growth due to the opening of opportunities within the new sector. Under this view, legislators might perceive the adoption of an RPS as an opportunity to decrease the unemployment rate within a state as more people were hired to power the strengthened alternative energy sector. California is frequently showcased as a model for this theory. As an early adopter of an RPS, it has seen tremendous growth in its renewable energy sector. It has added 75,000 jobs in the solar industry alone, more than all the new jobs in its five largest utilities companies combined. According to Bernadette Del Chiaro, Executive Director for the California Solar Energy Industries Association, "While conventional energy industries are losing

jobs, we are seeing record growth" (Penn, 2016). While California is an exceptionally strong example of the success renewable energy policy can have on job growth within the industry, similar, smaller results are found elsewhere.

While some states may see employment gains as a result of adopting an RPS, other states are concerned that doing this will result in a loss of jobs. In these states, despite the gains in the renewable sector, the policy might eliminate too many jobs in the fossil fuels sector to result in a net gain in employment. This is because the workers trained in fossil fuels work would not be qualified to transition into these new jobs. However, while the counter argument may seem logical, this study hypothesizes that adopting a Renewable Portfolio Standard would decrease unemployment overall because of the new jobs it would create. Many of the jobs in the energy sector are low skilled positions that require minimal training and so the transition for most workers would be relatively painless and smooth.

The counterargument also assumes that because a Renewable Portfolio Standard requires a certain amount of energy coming from renewable sources, the fossil fuels industry would be laying off massive numbers of workers. This may not be the case at all; it is not a zero sum game. Decreasing production is not a requirement for the fossil fuels sector and the extra fuel produced with lessened demand from the state could be exported for sale to other states or countries. While certain states may face increased unemployment, the majority will benefit and reduce unemployment overall as a result of adopting a RPS. Therefore, the hypothesis expects to see states with high levels of unemployment adopt an RPS because it could help revitalize the state economy.

The second potential factor within the economic hypothesis expects state renewable energy market dominance to be positively correlated with the rate of Renewable Portfolio Standard adoption. By committing to this policy, a state is pledging to focus on creating a robust renewable energy sector. States that already have a more productive renewable energy sector before RPS adoption will have an easier time adapting to the new requirements. The smaller the transformation is, the less the private sector, especially utility companies, will oppose the policy because the burden to them will be reduced. The hypothesis for this factor expects to see states that had higher production of energy from renewable sources in the past to be more likely to adopt an RPS while states with low renewable energy production are expected to have low rates of adoption. While some states have the ability to switch to greater renewable energy generation more easily, others are heavily reliant on fossil fuels and see Renewable Portfolio Standards, or the growth of renewable energy in general, as a direct threat to one of their most profitable and vital industries.

The third economic variable uses the same data set as factor two, but instead focuses on fossil fuels production as a determinant of RPS adoption. Under this hypothesis, the study predicts that states with higher fossil fuels production are more likely to oppose Renewable Portfolio Standards. In the debate over the reality of human-caused climate change, there is a group that argues for actions that benefit the world and the common good; yet defining the greatest common good is not easy.

According to Adam Smith, the father of Capitalism, people ultimately act not for the good of others "but from their regard to their own self-interest" (Smith,

1776). States may have concern for the environmental impacts, but much like a business, the main intent of all actions is to satisfy the shareholders; for states, the shareholders are constituents and actors within the private sector. When a policy is not likely to be profitable, there is little chance it will be adopted into law. In states that rely on fossil fuels for much of their economic gains, taking away a portion of this profit by gambling on a new, unproven, and costly renewable energy sector often doesn't receive much support.

The hypothesis for this factor expects that states with high fossil fuels production will rarely adopt an RPS because it would be against its economic self-interests. The potential counterargument would posit that although a state may rely heavily on one industry for a good portion of its economy, growing another sector could provide it with even greater economic opportunity, as it can increase its exporting abilities to other states or decrease what it must import. However, the study expects to find that the combination of strongly vested interests from the fossil fuels industry, the current infrastructure supporting fossil fuels, and the risk in proposing change on the existing industry would be too great a deterrent to see high rates of RPS adoption.

History Behind Energy Policy in the United States

Each presidential administration since the 1970's has contributed to the current energy environment in the United States. President Nixon faced the first national oil crisis due to an embargo from OPEC countries in the early 1970s. This caused him to shift the country's focus towards domestic energy production in an

effort to make the United States energy secure in the future (Heiman and Solomon, 2004). In the pursuit of energy independence, greater production led to more pollution and questions about its effect on the world's climate. Climate change first became politically salient "in 1976 as the Gerald Ford administration responded to concerns raised by counterparts in the Soviet Union" (Rabe, 2010). President Carter created the Department of Energy (DOE) and the Federal Energy Regulatory Commission (FERC). President Reagan "took a more laissez-faire approach" and "virtually eliminated funding for renewable energy research" (Heiman and Solomon, 2004), (Rabe, 2010). However, Reagan signed the first legislation aimed at preventing the threat of climate change called the Global Climate Protection Act of 1987. This bill did little towards "solving the problem or reversing the threat of climate change but…[it] initiated a process of 'greenhouse governance'" (Rabe, 2010).

It was not until the next administration, under George H.W. Bush, that climate change became a serious political concern, as "a convergence of research findings and steamy summers thrust climate change onto the national political agenda" (Rabe, 2004). This research found that over the past two hundred years, "atmospheric levels of carbon dioxide have increased by at least thirty percent, methane levels have more than doubled, and nitrous oxide levels have climbed by fifteen to twenty percent" (Rabe, 2004). Under Bush, the United States became one of the first of over 170 nations to ratify the 1992 UN Framework Convention on Climate Change, which pledged to reach "stabilization of greenhouse gas concentrations in the atmosphere" (Rabe, 2004). Apart from this, any other

initiatives passed during the Bush Administration "did not reflect a comprehensive strategy and tended to eschew language such as 'greenhouse gases' and 'carbon dioxide'" and relied on "market forces" to bring change (Rabe, 2004), (Heiman and Solomon, 2004). Under Clinton and the beginning of Bush II administrations, there was very little action on climate change, including, most notably, Congress' failure to confirm the Kyoto Protocol domestically. As it became clear the federal government was unlikely to pass meaningful climate change legislation, states began to take it upon themselves to act.

Many early states focused energy policy primarily on chlorofluorocarbons (CFSs) that deplete the ozone. It was not until 1991 that Iowa[1] became the first state to pass a Renewable Portfolio Standard. RPSs mandate that within a state there must be "a designated amount of power from renewable sources as a portion of their overall provision of electricity" (Rabe, 2007). Since then, twenty-eight more states have adopted some version of this policy requirement, with eight others having voluntary standards. The regulations vary greatly from state to state, as does the motivating factors behind their adoption. This study attempts to determine the main factors that impact the adoption or lack thereof of Renewable Portfolio Standards on a state level in the United States.

[1] Note that Iowa passed the first Renewable Portfolio Standard in 1983 but due to a challenge in the courts, the standard was not confirmed until 1991. For the purposes of this study, the date of adoption for Iowa will be 1991 because it is the earliest date in which the standard had complete legitimacy in the state.

List of Tables

II. Literature Review

Due to federal inaction on energy reform since the 1990s, states began to realize "that the federal government was unlikely to formulate any serious national strategy to reduce greenhouse gases" (Rabe, 2004). In terms of the ability to pass meaningful energy reform, states are now "the most responsive, innovative, and effective level of government" (Carley, 2009). In 2004, states already played a dominant role in implementing environmental laws; they issued over ninety percent of environmental permits and conducted seventy-five percent of all environmental enforcement actions (Rabe, 2004). There are several suggested reasons for this state prominence on the environmental stage. First, unlike in Washington D.C., debates on a state level are not paralyzed or as polarized politically because of money and special interests and so there are less constraints on the actions of lawmakers (Rabe, 2004). Experts who believe humans are contributing to global warming estimate that at least half of the global energy supply needs to be from renewable energy sources by 2100 to stabilize the warming. States that agree with this thinking view energy reform as an immediate necessity. (Gerlagh, 2006). Second, economic self-interest may drive many states to act. Preventing climate change may protect oceanfront development or the tourism industry in a state, increase agricultural productivity, reduce traffic congestion, or diversify energy

supply; it is these local impacts that may motivate a state legislature to adopt a Renewable Portfolio Standard.

Despite actions on a state level, there are still significant hurdles for Renewable Energy to overcome to be adopted in all fifty states. In 2013, there were 171 gigawatts (GW) of renewable energy capacity in the United States (Esterly and Gelman, 2013). The Union of Concerned Scientists estimated that by 2020, there will need to be 45 GWs more to meet 2007 target goals, with the Global Energy Advisors estimating closer to 52 GW of additional capacity being needed (Wiser, Namovicz, Gielecki and Smith, 2007). The problem is that only around 1.0 billion dollars of the federal budget of 3.8 trillion dollars goes towards all renewable energy research and development (Ellison, 2007).

In addition to limited funding, renewable energy must overcome the following obstacles: price distortions, lack of storage capacity, discriminatory transmission system access, and the end of linked utility rate hikes guaranteed to cover the additional expenses of renewable generation (Heiman and Solomon, 2004). Additionally, there are three main reasons for the discrepancy between the social and economic benefits of renewables and conventional energy sources including: many jurisdictions provide greater subsidies to conventional generation sources than renewable sources, the full costs of pollution are not included in the cost of conventional energy, and renewables are generated using higher cost technologies, despite the decrease in relative costs over time with widespread commercialization because of economies of scale (Berry and Laccard, 2001).

There are numerous ways for the government, be it at the federal or state level, to promote renewable energy growth. A government can support voluntary measures, establish a regulatory energy framework, or provide direct support aiming to regulate price or quantities of a specific energy (Espey, 2001). It can also provide tax incentives, create voluntary green power markets, create state integrated resource plans, or establish a renewable portfolio standard (Wiser, Nomovicz, Gielecki, and Smith, 2007). Finally, a state can increase taxes on polluting sources of energy, provide direct financial support to renewables, assist renewables with commercialization through indirect support, or foster voluntary or mandatory market shares for renewables. (Berry and Laccard, 2001).

As is suggested by the scholars above, mandating that a certain amount of the energy market must be from renewable energy, called a Renewable Portfolio Standard, is a common method for increasing renewable energy production within a state. There are a number of major economic reasons for the growing popularity of the Renewable Portfolio Standard: they maintain continuous incentives for renewable producers to seek cost reductions and make sure the extra costs are passed onto consumers, they ensure the attainment of a specific market share for the renewable energy industry, and they minimize government responsibility relative to other measures by placing the burden for change on the energy sector and the consumers (Berry and Jaccard, 2001). As of 2009, Renewable Portfolio Standards applied to over fifty percent of the total U.S. electricity load (Chen, Wiser, Mills, and Bolinger, 2009). Wind is expected to be the dominant technology utilized by states, contributing sixty percent of new renewable energy in the future, with

geothermal being seventeen percent and hydroelectric and solar each contributing four percent of incremental renewable energy (Chen, Wiser, Mills, and Bolinger, 2009).

There is considerable discussion about how factors surrounding energy production contribute to RPS adoption as well. The factor most frequently discussed in existing literature is current renewable energy capacity and the potential for increased production in the state. In a 2008 study, Lyon and Yin found that high levels of existing renewable development do not make a state more likely to adopt an RPS, while renewable potential does lead to higher adoption rates. They also found this result in a 2007 study. In 2009, Chandler also found that high renewable energy potential led to higher rates of RPS adoption. However, a study in 2006 by Vachon and Menz found there was no correlation between either state coal production or the percent of electricity produced from fossil fuels and the rate of adoption (Vachon and Menz, 2006). In 2007, Huang also found that coal production as a percentage of total generation was not a significant factor in adoption. In 2010, Lyon and Yin found that the level of fossil fuels production doesn't have a major impact on adoption of RPS. However, in 1994, Ringquist found that higher prevalence of the fossil fuels industry had a negative correlation with RPS adoption.

There are a number of political factors that contribute to the adoption, or lack thereof, of RPSs. One major political relationship is the level of liberal ideology or Democratic control in government being positively correlated with adoption of an RPS (Chandler, 2009), (Huang et al, 2007), (Vachon and Menz, 2006), (Lyon and Yin, 2010). A study by Lyon and Yin found that for every 15.79 percent of the total

state legislature seats Democrats held, adoption of Renewable Portfolio Standards increased by three hundred percent.

A second factor that is correlated to adoption of RPS is the level of government or citizenry support for environmental ideology. Several studies used the scoring system on environmental support produced annually by the League of Conservation Voters (LCV) to find this positive correlation (Kalt and Zupan, 1984), (Maxwell, Lon and Hacket, 2000). Carley also found this positive correlation in 2009. By contrast, Lyon and Yin in 2010 determined that this factor has little influence on the adoption of an RPS. Other factors mentioned in the literature that might impact RPS adoption are the number of state employees per capita working in natural resource positions and the presence of an American Solar Energy Society (ASES) chapter (Carley, 2009), (Lyon and Yin, 2010).

Renewable Portfolio Standards vary dramatically across states and some are successfully implemented, while others encounter challenges. Those RPSs that are best able to force change and deliver the best results are those that have noncompliance penalties or fines and are designed to account for whether the energy market of the state is competitive or a regulated monopoly (Cory and Swezey, 2007). Several scholars have attempted to explain why certain state models struggle. The studies identify a plethora of reasons. According to Rabe in 2007, challenges to successful RPS implementation include favoring specific renewable energy sources over others and disrupting market competition, limited transmission capabilities, and the skepticism states hold towards federal intervention and assistance. In 2007, Cory and Swezey identified additional

problems RPS may face, including ambiguous RPS regulations, allowing frequent or major rule changes, weak enforcement mechanisms, allowing exemptions or waivers too easily. In 2009, Carley pointed to inadequate policy enforcement, policy duration uncertainty, overly aggressive benchmarks, and too much wiggle room granted to utilities as the source of the problems. Finally, in 2007, Wiser, Nomovicz, Gielecki and Smith identified uncertainty about duration, meaningless goals, unclear enforcement mechanisms, overly aggressive goals, and extensive exemptions as the sources of the problems.

A number of academics support Renewable Portfolio Standards because of their success in increasing renewable energy production. In some studies, the researchers identified a positive correlation between the existence of an RPS and renewable energy development (Menz and Vachon, 2006), (Adelaja and Hailu, 2008), (Press and Arnould, 2009). Other potential benefits of an RPS include: increasing Gross State Product, rising incomes for residents, decreasing emissions, declining water use, decreasing price of natural gas, lessening wholesale electric costs, disproportionately beneficial growth to the renewable energy industry versus the overall energy sector, and improving job markets (Chen, Wiser, Mills, Bolinger, 2009), (Press and Arnould, 2009). On this last impact, unemployment rates, there is considerable debate as to the effect of an RPS. While Chen, Wiser, Mills, Bolinger, Press, and Arnould noted a correlation between higher unemployment rates and adoption of RPS, a study by Lyon and Yin in 2010 found no correlation. This disagreement among current literature makes testing this variable especially important as more research is needed to progress towards academic consensus.

In addition to those in support, there are many scholars who oppose or see no impact from Renewable Portfolio Standards. First, a number of scholars question the effectiveness of RPSs in accelerating renewable energy production and many see the standards as merely "symbolic unless they facilitate change beyond their local regions" (Yin and Powers, 2010), (Michaels, 2007), (Bushnell et al, 2007), (Kneifel, 2008). Others claim that an RPS is a weak policy and is unwise (Apt et al, 2008), (Morrison, 2006), (Horiuchi, 2007). In 2008, Fischer and Newell stated that an RPS is not optimal whether the goal is to reduce greenhouse gases or to promote renewable technologies. Others argue that the cost effectiveness, versus other policy options, is low and that the rise in electricity to consumers is great (Press and Arnould, 2009), (Mueller, 2006).

Contribution to Literature

This study will focus on trying to bridge the gap between political and economic factors and avoid singular focus on one or the other. This is crucial because unlike many studies in the past, this study acknowledges the likely possibility that both factors influence the adoption or lack of adoption of Renewable Portfolio Standards. The variables tested in this study are supported by scholarly literature as potential determinants of adoption rate and there is additional value in testing the factors together, rather than individuality or with a singular focus on political or economic drivers. Additionally, much literature is outdated, as the majority of studies in this realm occurred before all twenty-nine states that currently have an RPS had passed the legislation. This study should prove more

accurate in describing the current situation because of the inclusion of all relevant states in each test. Findings should contribute to the overall understanding of Renewable Portfolio Standards and the factors that impact their adoption.

III. Methodology and Approach

Methods

This study focuses on factors that impact the adoption, or lack thereof, of a Renewable Portfolio Standard policy on the state level. There are many different policies that can help expand the renewable energy sector, but an RPS was chosen specifically for a number of reasons. First, this policy option is a clear and public statement that the state is committed to moving away from fossil fuels by helping the renewable energy sector gain market share and private sector investment. Second, an RPS mandates a certain level of change in production and punishes noncompliance. It alleviates ambiguity and helps make the energy sector accountable for the change. Third, it is both a politically and economically significant policy that impacts the public and private sector. The Renewable Portfolio Standard was selected as the focus of this study because although the implementation of this policy is not always perfect, an RPS represents a state-level shift towards greater renewable energy production.

The first step in this study was identifying the current situation, the base, which exists in the United States as it pertains to the prevalence of RPS. Data collected came from the National Conference of State Legislatures and provided information on the states with an RPS and the specifics of each policy. After the base was established, the study began reviewing academic literature to determine a grouping of potentially significant independent variables for testing. This process yielded five variables and hypotheses were generated about each. The two Political variables are political ideology and campaign contributions and the three Economic

variables are unemployment rate, renewable energy production, and fossil fuels production. In order to test for the level of correlation between the five independent variables and the dependent variable, adoption of a Renewable Portfolio Standard, data collection was necessary.

The economic variables were all tested using the data from two federal government departments: the Energy Information Administration (EIA), an agency of the Department of Energy, and the Bureau of Labor Statistics (BLS), an agency of the Department of Labor.

Data collected to test the impact the unemployment rate has on state adoption of an RPS came from the Bureau of Labor Statistics "Local Area Unemployment Statistics." This information came in the form of the monthly joblessness rate in each state dating back to 1990. In order to keep the data consistent with other factors, the annual unemployment rate was calculated from the monthly totals and this information was entered into the main data sheet.

Values for the two Economic variables pertaining to energy production, the current renewable energy production and the level of reliance on fossil fuels were determined by using the "Selected States Comparison" tool on the EIA online database and including data from all fifty states. A variety of information was compiled from the data sheet on production by sector at the state level. Because of its overall smaller market size, all forms of renewable energy were classified by the EIA into a single energy source. Consequently, this study will group the sources of renewable energy into one. By contrast, fossil fuels production was broken into the

following resources: coal, petroleum, and natural gas. Nuclear energy was also reported to complete each energy supply breakdown but was not analyzed.

The energy data was tested in a regression model in two forms. To start, for each state, total units produced of each type of energy were tested to allow for the magnitude of the production volumes to impact the results. In the second set of tests, overall quantities for each energy type were replaced by the percentage of the state's overall energy production those same energy sources each contribute. This helped remove the influence of outliers in terms of total units of production, such as Texas, by comparing states on proportionality of different energy sources instead of quantity.

The political variables, political ideology and campaign contributions, utilized data from a number of sources including: the National Conference of State Legislatures (NCSL), the League of Conservation Voters (LCV), and the National Institute on Money in State Politics (NIMSP). First, in order to test the impact campaign contributions have on adoption of an RPS, industry-specific information was collected from NIMSP. Using the database search, contribution data was included from the following sectors within the Energy and Natural Resources industry: Electric Utilities, Oil and Gas, Mining, Miscellaneous Energy, and Miscellaneous Energy & Natural Resources. This data was then limited to state contributions only as far back as 1990. It must be noted, that as opposed to all other data sets in this model, the data available for campaign contributions is seriously limited before 1998. This issue was dealt with during testing and will be explained later in the Methods section.

Second, a combination of data from two sources helped test the correlation between RPS adoption and political ideology. The first set was from the National Conference on State Legislatures; this provided biennial, election year information for each state on partisan control of the state legislature. Possible values were Republican, split, or Democratic control; these answers were coded when entered into the main data set for the experiment so that Republican control was a zero, split control a one, and Democratic control a two. The value of this data is that it gives a feel for the ideology of the citizens in each state, as the state level government is assumed to be representative of their interests because it is closer to the people.

The second source used for the political ideology variable was the annual "National Environmental Scorecard" scores from the League of Conservation Voters. This groups all the federal level House of Representatives members from each state into a single score so that there are fifty state scores for the House. The same is done for the Senate to create two scores for the level of environmentalism for each state. The scores are determined by looking at the number of bills in the legislative session pertaining to environmental issues and then determining what percentage of those bills were supported by each Member of Congress or Senator. For this reason, the possible scores are zero through one hundred percent. Both scores for all fifty states were entered into the dataset for this study.

The value of having federal Members of Congress in this state-level study is two-fold. First, as opposed to state level districts that are very small, the districts in the House, and even more so in the Senate, combine various groups and communities and can lead to a different result than an isolated state-level district

with homogenous beliefs. Second, voter turnout is higher in federal elections on average and so the beliefs of more citizens are represented on the federal level than the state.

Research Question and Hypotheses

Research Question

Which political and economic factors most impact the adoption of Renewable Portfolio Standards (RPS) at a state level?

Hypotheses

There are two hypotheses this study will be testing.

First, if a state has more to gain economically from growing its renewable energy production, then it will be more likely to have a strong RPS. Economic gains will be measured in several ways including: the level of unemployment in the state, the state's ability to produce renewable energy affordably, and the current level of fossil fuels production in the state.

Second, if a state has (or had at the time of adoption of the RPS) a more pervasive ideologically liberal political climate, then it should lead to higher rates of adoption of a Renewable Portfolio Standard. This political climate will be measured in a variety of ways including: Democratic Party control of the state government, the level of environmentalism among Members of Congress on a federal level, and the power of state lobbying groups representing the Energy and Utilities industry.

Independent Variables

This study tests five independent variables:

1. State Unemployment Rates
2. Renewable Energy Production
3. Fossil Fuels Production
4. Political Ideology
5. Campaign Contributions

Dependent Variable

This study has a single bivariate dependent variable, adoption or lack of adoption of a Renewable Portfolio Standard on a state level.

Experimental Design

As is evident in Appendix I, there is incredible diversity among states in both date adopted and more importantly, in the specifics of each Renewable Portfolio Standard. For simplicity and clarity, this study will treat all states with an RPS as the same and will not consider the stringency of each standard or the progress each state has made towards reaching its mandated goal during testing and data analysis. To test the bivariate dependent variable, all data was compiled into a single spreadsheet that included data from 1990 to 2013 for each state. The reason to begin in 1990 was due to the first Renewable Portfolio Standard being confirmed in 1991 in Iowa. The year 1990 was included to account for any irregularities in the year 1991. The data was tested using Stata statistical modeling software. A total of

eight models were run through this software using variations upon two baseline models. The first baseline model (Model 1A) used all available data and tested the energy production variables using total units of energy by source, rather than percentage of overall production by source. Models 1B, 1C, and 1D operated under the baseline established in Model 1A. Model 1B tested for state fixed effects, Model 1C tested Model 1A without the campaign contributions variable, and Model 1D tested Model 1A with clustered standard errors by state. The second set of models used a second baseline (Model 2A) that again used all data but included percentages of total state production by energy source instead of total units of production by source. Model 2B removed campaign contributions from Model 2A, Model 2C included campaign contributions and tested for state fixed effects; and Model 2D tested Model 2A with clustered standard errors by state.

For clarity, there are two models in each baseline that require brief explanations. First, the concept of State Fixed Effects testing means that the model is "controlling for unobserved heterogeneity when this heterogeneity is constant over time…the fixed effect assumption is that the individual specific effect is correlated with the independent variables" (Gardiner, 2009). In essence, the study is attempting to remove the effect the state innately has on the results. This can be thought of as trying to eliminate the influence of "state-ness" and looking at each observation, or value, as completely independent of the state from which it comes.

Second, clustering standard errors helps with the problem of non-independence within the sample. When there is a statistical test, there is a resulting set of standard errors, which shows how spread out the values in the data are.

However, a data set can misrepresent the data by assuming that every data point contributes new data, when there is the possibility that some do not. By clustering standard errors, the test is removing some of the non-independence and giving a more accurate standard error for the data.

Next, the statistical procedure for determining the value of the variables is explained. First, the coefficient tells how much the dependent variable will decrease, if the coefficient is negative, or increase, if it is positive. In Table 1 and Table 2, the data is reported so that the coefficient is first in each cell and the standard error is second in parentheses. The percentage of impact the independent variable has on the dependent variable is found by dividing the coefficient by four and then multiplying by one hundred. This percent of impact means that the dependent variable is that much more likely to occur for every one-unit change in the value of the independent variable.

Second, the asterisks indicate the level of significance of the correlation between the independent variable and the dependent variable, as determined by P values. The P value tells one how confident one can be that each independent variable is correlated with the dependent variable. The number of asterisks shows the percentage likelihood that the independent variable is correlated with the dependent variable, rather than the relationship being random. A single asterisk indicates the study is between ninety and ninety-five percent confident in this correlation, a P value between <0.1 and 0.05. Two asterisks indicate ninety-five to ninety-nine percent confidence in this correlation, a P value between <0.05 and 0.01. Three asterisks indicate above ninety-nine percent confidence in this

correlation, a P value score <0.01. In order from one to three asterisks, the strength of significance is "significance," "moderate significance," and "strong significance."

Finally, it is important to note three data limitations that exist in this study. First, although twenty-nine states have adopted a Renewable Portfolio Standard as of 2016, only twenty-eight were counted as states with a standard in this study. Vermont adopted a mandatory standard in 2015. As a result, it appears not to have adopted a standard in the dataset because it is too recent to be included. Second, data on campaign contributions was very limited on a state level before 1998. This is why there was a model tested for each baseline that omitted this variable from the analysis. The Stata software used omits all relevant data for every variable when any data is missing and so by conducting one test without campaign contributions, data from 1990-1997 for the other variables could be included in the results. Third, data was unavailable for the party composition of the Nebraska state legislature because it is unicameral. The following section will discuss the findings from this testing.

IV. Results and Discussion

Data

Table 1

	Model 1A Baseline I	**Model 1B** State Fixed Effects	**Model 1C** Campaign Contributions Omitted	**Model 1D** Standard Errors Clustered
Coal Production	-3.47e-07 (1.41e-07)**	-0.0000135 (3.78e-06)***	-3.16e-07 (1.12e-07)***	-3.47e-07 (2.24e-07)
Natural Gas Production	6.12e-07 (1.143e-07)***	4.85e-06 (2.32e-06)***	4.71e-07 (1.01e-07)***	6.12e-07 (2.52e-07)
Nuclear Production	-3.18e-07 (4.45e-07)	0.0000391 (8e-06)***	2.46e-07 (3.79e-07)	-3.18e-07 (9.36e-07)
Petroleum Production	-3.43e-07 (2.93e-07)	-0.0000105 (2.71e-06)***	-2.71e-07 (2.16e-07)	-3.43e-07 (4.24e-07)
Renewable Energy Production	-8.79e-07 (5.38e-07)	0.0000333 (5.84e-06)***	-7.72e-07 (4.20e-07)	-8.79e-07 (1.01e-06)
League of Conservation Voters House Scores	0.0349 (0.0037)***	0.0772 (0.0139)***	0.032516 (0.0031)	0.0349 (0.0069)***
League of Conservation Voters Senate Scores	0.0047 (0.0033)	0.104115 (0.0219)***	0.004502 (0.0026)*	0.0047 (0.0060)
State Legislature Party Composition	0.3133 (0.1161)***	0.92842 (0.3875)**	0.01682 (0.098)	0.3133 (0.2248)
Campaign Contributions	8.42e-08 (6.31e-08)	1.33e-07 (8.08e-08)	Omitted	8.42e-08 (6.05-e-08)
Unemployment Rate	0.2878 (0.0494)***	0.70846 (0.1522)***	0.20941 (0.0409)***	0.2878 (0.0789)***
Constant	-4.494 (0.4025)		-4.3767 (0.3266)***	-4.494 (0.7789)***
N	744	436	1176	744

Table 2

	Model 2A Baseline II	**Model 2B** Campaign Contributions Omitted	**Model 2C** State Fixed Effects	**Model 2D** Standard Errors Clustered
Coal Production as Percent of Total	-7.194 (19.2696)	-1.831 (16.5367)	-36.182 (37.0173)	-7.19404 (22.079)
Natural Gas Production as Percent of Total	-7.1836 (19.269)	-1.8145 (16.5365)	-35.5234 (37.0068)	-7.183663 (22.0719)
Nuclear Production as Percent of Total	-7.188 (19.2696)	-1.8223 (16.537)	-35.4717 (37.0097)	-7.188154 (22.0777)
Petroleum Production as Percent of Total	-7.193 (19.2696)	-1.829 (16.537)	-36.0973 (36.992)	-7.192955 (22.077)
Renewable Energy Production as Percent of Total	-7.1797 (19.2695)	-1.8173 (16.536)	-35.3764 (37.0063)	-7.179708 (22.0772)
League of Conservation Voters House Scores	0.0274 (0.0034)***	0.02794 (0.0029)	0.064428 (0.1216)***	0.0274314 (0.0062)***
League of Conservation Voters Senate Scores	0.00323 (0.0029)	0.00253 (0.0027)	0.057085 (0.0172)***	0.0032278 (0.0044)
State Legislature Party Composition	0.3145 (0.1156)***	0.0215 (0.0978)	0.55968 (0.3496)	0.3144855 (0.2358)
Campaign Contributions	2.05e-07 (6.30e-08)***	Omitted	1.15e-07 (9.11e-08)	2.05e-07 (8.91e-08)**
Unemployment Rate	0.2576 (0.0469)	0.22001 (0.0393)	0.78388 (0.1636)***	0.2576276 (0.0678)***
Constant	714.574 (1926.927)	178.1422 (1653.651)		714.5738 (2207.88)
N	744	1176	436	744

Analysis

Economic Factors as Drivers of Renewable Portfolio Standards

State Unemployment Rates

In order to test this variable within the economic hypothesis, unemployment data was collected from the Bureau of Labor Statistics for each state dating back to 1990. The data range allows for analysis of the unemployment data before and after

an RPS was adopted, as well as an overall comparison between the unemployment rates of states with an RPS versus those without a mandatory standard. The hypothesis predicts to see states with higher levels of unemployment be more likely to adopt an RPS. The rationale is that there is job growth opportunity in developing the renewable energy sector and so states with the most need economically should be more motivated to consider this option.

The testing shows strong support for this hypothesis. In six out of eight models, strong significance was found for the unemployment variable. Under Baseline One, all models found the strongest level of significance. Under Baseline Two, the unemployment rate was found to be of strong significance when tested with Models 2C and 2D, but was not significant for Models 2A and 2B. The next consideration in determining how impactful this variable is on the dependent variable is through looking at the Coefficient values. In Logit regression models, the correlational strength can be found by dividing the Coefficient by four and then multiplying by one hundred to arrive at a percentage of impact. The percentage of impact in the six models in which unemployment rate was a significant variable was the following in order: 7.195%, 17.713%, 5.235%, 7.195%, 19.598%, and 6.44%. To reach a number that can be compared against other variables, an average will be used, which for unemployment rate is 10.561%. This means that for the six models in which this variable was seen to be significant, seventy-five percent of the models tested, with every one percent rise in unemployment in a state, there was a 10.561% greater chance that an RPS would be adopted. The results are significant because they show a correlation between adoption of a RPS and unemployment.

Current Reliance on Renewable Energy and Future Capacity

Using information from the Energy Information Administration, the percentage of each energy source as a total of each states' energy portfolio was obtained. There are considerable variations across the country in how energy is produced but one thing is true across the vast majority of states, with or without a Renewable Portfolio Standard: forty-one states produce the majority of their energy from fossil fuels. The economic hypothesis for this variable would predict to see states with higher reliance on renewable energy be more likely to have a Renewable Portfolio Standard. States with higher capacity, whether it is because of natural occurring resources or better transmission abilities are expected to be more likely to have an RPS because it is easier for these states to adapt to the mandated renewable energy production.

The results of this test do not support the hypothesis, as only one of eight models showed any correlation between this independent variable and the dependent variable. The one test with significance was Model 1B, state fixed effects testing, with the highest level of significance. However, when calculating the percentage of impact on adoption of an RPS, the variable has very little effect; the level of significance is only 0.0008325%. This means that even when there was observed correlation, the impact renewable energy production had on adoption of an RPS was nearly irrelevant.

Current Fossil Fuels Production

The United States produces some amount of Fossil Fuels in all fifty states for a total of 77,528 trillion Btu's of energy each year. Three sources of energy: crude oil, natural gas, and coal, will be considered Fossil Fuels for this study. The economic hypothesis expects to see an inverse relationship between fossil fuels production and the likelihood of RPS adoption. This is explained because states with more reliance on the fossil fuels industry to power the economy should be less likely to support policy that initiates a shift away from fossil fuels.

To determine the significance of this variable on adoption, data was used from the three sources of energy considered fossil fuels. The results of this testing does not strongly support the hypothesis, although there is moderate or strong significance between the variable and adoption in certain models. Both coal and natural gas production were found to be strongly significant in Models 1A, 1B, and 1C. Petroleum was only significant in Model 1B. The percentages of impact however, across the board for every significant variable test, were so small that the variables have almost no influence on the dependent variable. The highest of these, coal production in Model 1B, only yields an impact of 0.00000338%, with all other tests being even less. The results of the testing for the relationship between fossil fuels production and the adoption of a Renewable Portfolio Standard showed that while the variable may be significant in certain cases, the level of impact fossil fuels production has on RPS adoption is extremely low. These results begin to explain why states with more to lose economically from energy reform tend to avoid it.

Political Factors as drivers of Renewable Portfolio Standards

Democratic Party Control as a Reflection of Public Opinion

For this factor of the political hypothesis, two data sets were utilized to determine Democratic Party control and the level of support for environmental policy. The first came from the National Conference of State Legislatures that measured which party controlled each state legislature: Democrats, Republicans, or a split in the bicameral system. The second data source was the annual Environmental Scorecard published by the League of Conservation Voters; this provided a way to compare the level of environmental concern of federal-level Members of Congress. The hypothesis for this variable predicts to see a positive relationship between Democratic or liberal control and the rate of adoption of a Renewable Portfolio Standard.

Overall, the results of this test support the hypothesis, with some exceptions. Three factors were tested to determine the significance of this factor including: State Legislature Party Composition and the League of Conservation Voters' environmental scores for both the House of Representatives and the Senate. The House of Representatives scores were found to be the most significant, followed by the party composition, and then the Senate scores.

First, of the eight models against which it was tested, the House scores were found to be strongly significant six times; significance was found in Models 1A, 1B, 1D, 2A, 2C, and 2D. As opposed to many other variables with significance, the Coefficients for this variable were higher and so the level of impact on adoption was higher. Of the six instances in which House scores were significant, the average

Coefficient is 0.0444, meaning the average percentage of impact was 1.11%. This means that for every point increase in the environmental score, there was a 1.11% increase in likelihood of RPS adoption.

Second, the Party Composition showed significance to the dependent variable in three of the eight models, Models 1A, 1B, and 2A. This factor has a higher Coefficient value for the models in which there were significance than the other two in this variable. The average Coefficient for the three significant models is 0.51874 and the impact is 12.97%. This means that for every time a legislature increased one coded point, from either Republican control to split control, or from split control to Democratic control, there was a 12.97% increase in likelihood of RPS adoption. This level of impact shows that although the state legislature's composition is not always significant, but when it is, it has a tremendous positive impact on RPS adoption.

Third, the Senate scores showed significance in three of the eight tests, Models 1B, 1C, and 2C. This variable has an average Coefficient of 0.552 and a 1.38% impact on the rate of adoption. This means that for every point increase in the environmental score, there was a 1.38% increase in likelihood of RPS adoption.

Campaign Contributions

While money has always played a role in influencing policy adoption, contributions, which are increasing rapidly, now play an even larger role in determining how government officials act. Since 2010, when Citizens United v. FEC decided, "corporate funding of independent political broadcasts in candidate

elections cannot be limited," the amount of money in politics has grown exponentially (Citizens United v. Federal Election Commission, Oyez). Between the 2008 and 2012 elections, total campaign contributions increased by 307 percent from 2.3 billion dollars to 7.04 billion dollars in four years (National Institute on Money in State Politics (NIMSP)). Additionally, over two years, between 2008 and 2010, the energy and utilities industry increased contributions by 33 percent (NIMSP). This influx of money has increased the influence of special interests in politics and has blocked nearly all state adoption of Renewable Portfolio Standards; there has been only one state, Vermont, to adopt a mandatory standard since the Citizen's United ruling nearly six years ago.

This study focuses on campaign contributions and how they have impacted the adoption or lack of adoption of Renewable Portfolio Standards. The political hypothesis would expect to see an inverse relationship between the amount of campaign contributions from the Energy and Utility sector and the rate of RPS adoption. The reasoning behind this thinking is that it is expected that this industry will devote increased resources towards blocking the passage of the standard because energy companies have vested interests in maintaining the status quo that an RPS would disrupt.

The testing in this hypothesis did not strongly support the hypothesis. This variable was tested with only six models after one intentional omission per baseline model. Of the six models in which it was included, only two, Model 2B and Model 2D, showed any level of significance. While there may be moderate to strong significance in these two models, the percentage of impact is extremely low after

considering the coefficients. The percentage of impact was 5.01e-08% for both models, a number so small that the true effect of the variable on influencing adoption of an RPS is negligible.

V. Conclusion

Future Implications

This study tested two broad hypotheses, each with a series of variables, for a total of five independent variables. Of these five, two variables, unemployment rate and political ideology are significantly correlated to the adoption of Renewable Portfolio Standards. The results show that high unemployment rate correlates strongly with RPS adoption and that more liberal and environmentally concerned legislators, both on state and federal levels, are correlated with higher adoption as well. There still remain twenty-one states without a mandatory Renewable Portfolio Standard, leaving the question: which states are most likely to adopt this policy next? Given that high unemployment and Democratic ideology are the most correlated with adoption, by looking at states that currently have high unemployment levels or Democratic state legislatures, a prediction can be made.

First, the three states without an RPS that have the highest unemployment rates, all above six percent, are Alabama at 6.2 percent, Alaska at 6.6 percent and Mississippi at 6.7 percent unemployment (Unemployment Rates for States, 2016). Given the strong evidence that adoption of an RPS is correlated to high unemployment rates, it is reasonable to assume that theses states have a higher likelihood than others to pursue the RPS. Furthermore, in 2009, Alaska enacted House Bill 306, which set a goal that "the state receive 50 percent of its electrical generation from renewable sources by 2025" (Durkay, 2015). While this is not a

mandatory standard, it signals a desire of the people of Alaska to change the energy infrastructure of the state.

Second, there are only three states that have not adopted an RPS that do not currently have Republican controlled Congresses: Kentucky and Virginia are split and West Virginia is Democrat controlled (2014 Legislative Partisan Composition, 2014). It is reasonable to assume that these states may be more likely to adopt an RPS in the near future. However, West Virginia presents an interesting potential exception because it is the one state to have adopted an RPS, in 2009, and have it repealed, in 2015. The fact that the standard was just eliminated may reduce the chance of its reinstatement in the near future. Looking ahead, there are many states in which a Renewable Portfolio Standard is a possible policy but most that have not already adopted one are not expected to do so in the near future because they do not possess the variables found in the study to be correlated with adoption.

Limitations to the Study

This study was as thorough as possible given time and resources, but there are many things it did not cover. First, there are two ways in which the dependent variable was simplified that altered the analysis. Renewable Portfolio Standards were all treated as equal as long as they set a mandatory renewable energy requirement by a set year. This choice was intentional because it maintained consistency among the standards and increased clarity in comparing them. However, it prevented the tests from accounting for the stringency of each standard or the progress each state has made towards the goal. For example, Washington,

which mandates that fifteen percent of its energy come from renewable sources by 2020 was treated as being equal to Hawaii, which mandates having thirty percent renewable energy by the same year. In addition to the stringency being treated equally, progress towards satisfying the RPS was not measured. These two factors were excluded because creating a system to score these factors would be very difficult and confusing. The system seems easy enough when looking at stringency or progress singularly, but combining them into a single scoring scale is difficult. For example, should a state with an ambitious goal but slow progress be given a higher or lower score than a state with a conservative goal but more steady progress? These questions became too difficult for this study and so the bivariate dependent variable was utilized.

In addition to difficulties with the dependent variable, there were imperfections in how certain independent variables were measured. While data for some variables, like unemployment rate, renewable energy production, and fossil fuels production, was fully available, political ideology and campaign contributions were not. Political ideology is difficult to measure perfectly because there is not a magical number that tells the whole story for every person in each state. The study used legislators, both on the state and federal levels, to represent the views of the greater constituency. However, while the people elect these representatives, their actions do not perfectly align with the beliefs of all their constituents. This strategy also excludes the influence the Executive Branch, like the President or Governor, has on policy decisions and voting. The ideal information to test this variable would be a survey of as many people in each state as possible with questions aimed at

identifying how each respondent views environmental policy and whether they more closely align with liberal or conservative beliefs.

The second data set that was not fully sufficient was the information for campaign contributions. This data was limited for two reasons: the preciseness of the data sought and the timeline needed. Campaign contribution information is most available on the federal level and is much more limited on the state level. Additionally, this study only wanted data on contributions from the Energy and Utilities industry, further limiting the results. Unfortunately, this level of specificity was not reliable or available before 1998, leaving the eight years from 1990 to 1998 without statistics. This constrained the regression model because it left around one-third of the years in the model without complete data for all variables, effectively removing them from most of the models tested.

This study was not perfect for a number of reasons. It did not test all aspects of the dependent variable, nor was it able to obtain perfect statistical data for all of the independent variables it sought to test. However, this experiment was still successful in testing the variables it set out to test with the most accuracy possible and the results should still be considered valid within the intended scope.

Final Thoughts

Government action on climate change began in the 1970s but it was not until the 1990s that states acted, independent of the federal government to combat the perceived warming of the planet. While there are many policy options for a state in controlling greenhouse gas emissions, one that has become increasingly popular is

the Renewable Portfolio Standard. An RPS is a requirement for a set percentage of a state's energy portfolio to be produced from renewable sources by a specified date. There is significant debate over the effectiveness of these standards but what is important is what they represent: the increasing concern and action being taken at the state level to overcome federal inaction in addressing this issue. States from all over the country are adopting these standards despite both political and economic obstacles. This study attempted to determine which variables most impact state adoption of a Renewable Portfolio Standard. Among the variables tested in this study, those that were correlated to greater adoption of an RPS are: state unemployment rate and political ideology. The other factors tested, renewable energy production, fossil fuels production and campaign contributions did not yield significant correlations to adoption. Although twenty-nine states have a Renewable Portfolio Standard, there is still much more to be done in the future to both improve existing policies and to see more states, or even the federal government, adopt this type of policy.

VI. Appendix

I

States that currently have mandated Renewable Portfolio Standards (and the year of adoption and level of renewable energy mandated by a certain year in the standard)

Arizona; 2006; 15% by 2025, California; 2002; 33% by 2020, 40% by 2024, 45% by 2027, 50% by 2030, Colorado; 2004; 30% by 2020 for Investor-Owned Utilities (IOUs), 10%-20% for municipalities and electric cooperatives, depending on size, Connecticut; 1998; 27% by 2020, Delaware; 2005; 25% by 2025-2026, Hawaii; 2001; 30% by 2020, 40% by 2030, 70% by 2040, 100% by 2045, Illinois; 2007; 25% by 2015-2016, Iowa; 1983; 105 MW of generating capacity for IOUs, Maine; 1999; 40% by 2017, Maryland; 2004; 20% by 2022, Massachusetts; 1997; Class I: 15% by 2020 and an additional 1% each year after, Class II: 7.1% by 2009, Michigan; 2008; 10% by 2015, Minnesota; 2007; 26.5% by 2025 (IOUs), 25% by 2025 (other utilities), Missouri; 2007; 15% by 2021 (IOUs), Montana; 2005; 15% by 2015, Nevada; 1997; 25% by 2025, New Hampshire; 2007; 24.8% by 2025, New Jersey; 1999; 24.5% by 2020, New Mexico; 2002; 20% by 2020 (IOUs), 10% by 2020 (co-ops), New York; 2004; 29% by 2015, 50% by 2030, North Carolina; 2007; 12.5% by 2021 (IOUs), 10% by 2018 (municipalities and coops), Ohio; 2008; 25% by 2024, Oregon; 2007; 25% by 2025 (utilities with 3% or more of the state's load), 10% by 2025 (utilities with 1.5% - 3% of the state's load), 5% by 2025 (utilities with less than 1.5% of the state's load), Pennsylvania; 2004; 18% by 2020-2021, Rhode Island; 2004; 16% by 2019, Texas; 1999; 5,880 MW by 2015, 10,000 MW by 2025,

Vermont; 2015; 55% by 2017, 75% by 2032, Washington; 2006; 9% by 2016, 15% by 2020, and Wisconsin; 1998; 10% by 2015.

States with voluntary RPS include:

Indiana, Kansas, North Dakota, Oklahoma, South Carolina, South Dakota, Utah, and Virginia. For the purposes of this study, these states, due to them being without a mandatory standard, will be grouped with states in which Renewable Portfolio Standards are absent.

States without an RPS include:

Alaska, Alabama, Arkansas, Florida, Georgia, Idaho, Kentucky, Louisiana, Mississippi, Nebraska, Tennessee, West Virginia, and Wyoming.

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