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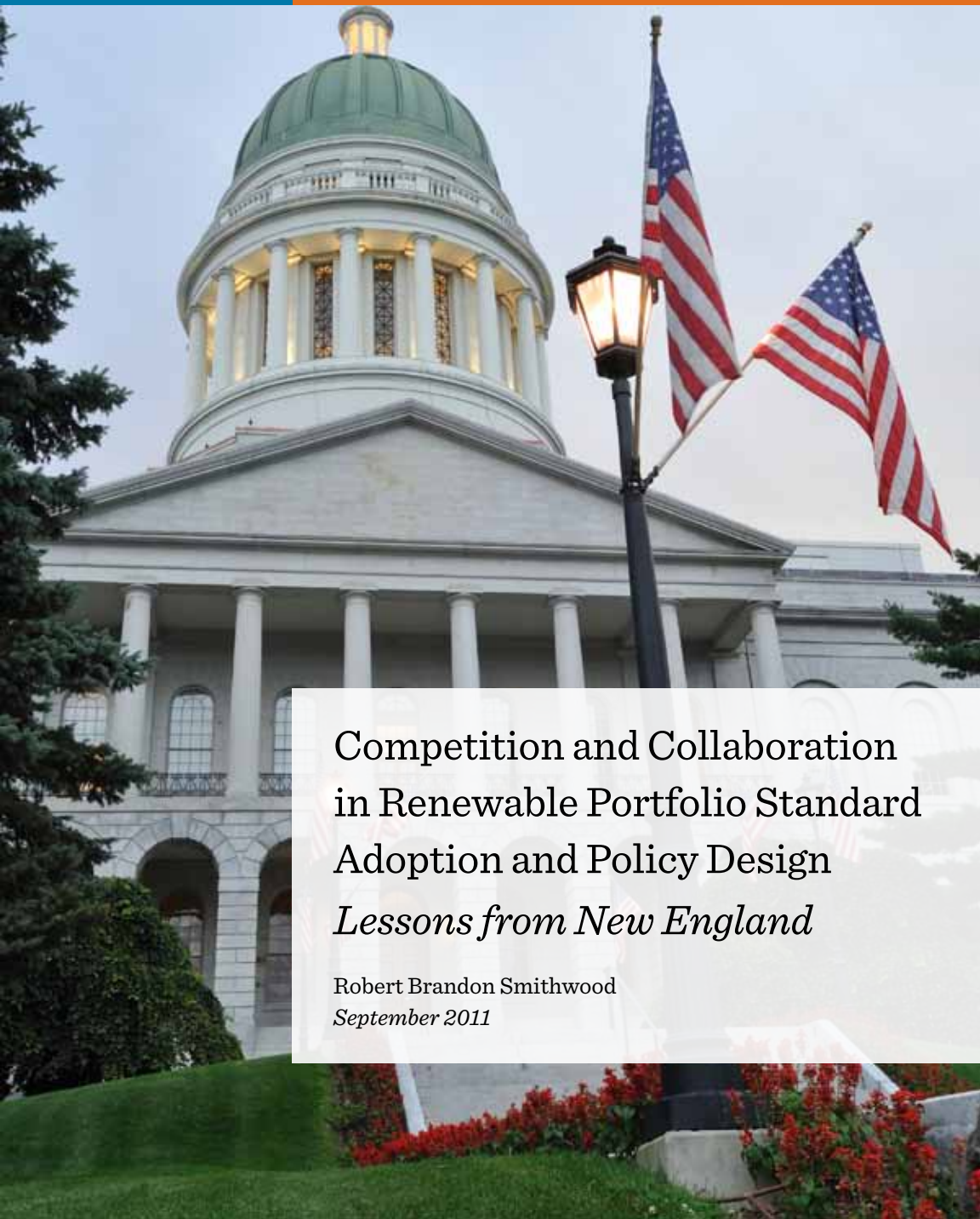

Competition and Collaboration in Renewable Portfolio Standard Adoption and Policy Design

Lessons from New England

Robert Brandon Smithwood

September 2011

Abstract

States across the United States are adopting policies aimed at mitigating climate change. One of the most popular, the renewable portfolio standard (RPS), has been adopted in thirty-three states. This study looks at RPS adoption and design and the interstate influences on- and affects of- this policy. In order to explore this topic, forty-five legislators, environmentalists, regulators and other stakeholders in the six New England states were interviewed. The interviews revealed that RPS adoption and design are in part functions of interstate relations. However, these interstate relations both promote and inhibit interstate collaboration. As diffusion theory suggests, states in the New England region take cues from their neighbors and are motivated to adopt an RPS in part because their neighbors have adopted them. There is also a process of learning occurring where states share lessons in policy design and coordinate policies. At the same time, however, competitive behavior does exist. Some of this competition fosters collaborative behavior through a race to have better policy and renewable energy generation to export. Other behavior is parochially-motivated and intended to exclude renewable energy generation from out of state. The findings provide a foundation for future research into an area of legal and political significance while addressing recurrent weaknesses in the existing literature on the subject.

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The Energy, Climate, and Innovation Program (ECI) advances policy-relevant knowledge to address energy-related challenges and opportunities, especially pertaining to climate change. ECI focuses particularly on how energy-technology innovation can be better harnessed to improve human-well being, and the role of policy in the innovation process. Although ECI's outlook is global, we concentrate mainly on energy and climate policy within, and between, the United States and China. We also focus on how these countries influence the international negotiations on climate change, and the role of technology in the negotiations.

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Introduction

As the U.S. Federal Government has made several failed attempts to pass climate legislation, state-level policy has remained the leading edge of policy in greenhouse gas mitigation. This continued leadership will only be sustainable if the patchwork of policies does not result in interstate conflict. Indeed, not only will balkanized policies inhibit renewable energy deployment, they may very well fall to a challenge of their constitutionality under the U.S. Constitution's Commerce Clause[1]. Recent lawsuits filed against renewable portfolio standards in Massachusetts and Colorado suggests that this friction is already present. Collaboration among states on climate policy is thus a topic of importance to the current policy efforts in the United States.

While the question of whether interstate collaboration on state climate policy will happen is open, experience suggests that it is at least possible. Barry Rabe (2009) notes that collaboration on this policy is possible, saying:

As state climate policies proliferate and diffuse, ***it is entirely possible that certain clusters of states may become, in practice, regions even in the absence of formal agreements****. All Southwestern states between California and Texas, for example, have an RPS program. It is increasingly possible to envision inter-state trading of renewable energy credits and other forms of cooperation that link these state boundaries and programs. But more* ***formal regional arrangements*** *are also under consideration, perhaps most notable among Northeastern states, where relatively small physical size and heavy population densities foster considerable economic and environmental interdependence. (Emphasis added)*

Collaboration can thus occur either because of decisive action ("formal regional arrangements") or as more "organic" processes of proliferation and diffusion.

There is an ample literature on formal regional arrangements amongst states to address common problems (Derthick 1975; Zimmerman 2002). A number of authors, including Byrne et. al (2007), Lutsey and Sperling (2008), and Engel (2005), have done an excellent job reviewing the formal collaborative efforts on climate change in the U.S. regions, including the Northeast's Regional Greenhouse Gas Initiative, the West Coast Governor's Global Warming Initiative, and others. Selin and VanDeveer (2005) have

[1]Article 1, Section 8 of the United States Constitution grants Congress the power to "regulate Commerce with foreign Nations, and among the several States, and with the Indian Tribes". This positive affirmation of federal power (known as the Commerce Clause) has been interpreted by the federal courts to have a restraining (negative) affect on the power of the states. Indeed, the Clause has been interpreted to restrict states from inhibiting interstate commerce. This restriction, known as the "Dormant" Commerce Clause, has a well-developed case law. Should a state explicitly restrict interstate commerce or be shown to intend to, the law is near certain to be struck down in federal court. These explicit restrictions may, for example, be an exclusion of electric generators outside of the state from access to the state's electricity market. Unintended restrictions on interstate commerce are subject to what has come to be known as the Pike balancing test which weighs the costs to interstate commerce against the benefits of the legislation.

explored in depth the collaboration occurring as part of the New England Governors and Eastern Canadian Premiers' Climate Change Action Plan. Lutsey and Sperling have aggregated the expected impacts of the numerous state and local policies and find that they could together stabilize emissions at 2010 levels by 2020. Formal climate change policy arrangements and state policy activity are thus common among the states and their potential is profound. Yet, while there are cases of states collaborating formally, what evidence do we have that the numerous policies being adopted will result in a national climate policy environment that is at least equal to the sum of its parts?

One policy which provides a rich dataset from which to draw insight is the renewable portfolio standard. Currently a majority of states (thirty-three, to be exact) have adopted renewable portfolio standards. These policies share a common policy construct but exhibit much diversity in their specific designs. In addition to being diverse, RPSs are in flux. Of the thirty-three states that have adopted renewable portfolio standards, 19 have revised their standards and many of them have done so several times. Altogether, 53 major revisions have been made to renewable portfolio standards in the last decade.[2] The frequent instances of adoption and revision provide discrete moments in which states can act cooperatively or parochially. Together these moments tell a story about the interstate relations involved in climate change policy design. These moments also provide an interesting dataset for research, since these opportunities for interstate collaboration have yet to be analyzed.

Beyond anecdotes, the literature on renewable portfolio standards provides no analysis which shows that individual efforts of states have led to policies which foster collaboration or competition. Rabe, Roman, and Dobelis (2005), however, did suggest that it is unlikely the policies will result in organically collaborative behavior. Indeed, the authors find that the incentives states face to keep benefits of such policies within their borders should lead to competitive rather than collaborative behavior. The authors do not, however, explore whether these incentives are driving actual state behavior, leaving their theoretical findings untested. Testing this belief is the aim of this paper. However, before one can begin to understand how states develop their renewable portfolio standards it is important to understand why they adopt them.

[2]Ryan Wiser and Galen Barbose at the Lawrence Berkeley National Laboratory maintain a timeline of RPS adoptions and major revisions. These numbers were derived from that timeline. The most recent version is available as part of a presentation to the Clean Energy States Alliance, which is referenced in the list of works cited at the end of this paper.

Why States Adopt Renewable Portfolio Standards

There is a rich, albeit inconclusive, literature on why states adopt renewable portfolio standards with literature supporting two competing theories of state policy innovation. Diffusion theory (Berry, 1994; Berry & Berry, 1990; Canon & Baum, 1981; Mintrom, 1997; Walker, 1969) suggests that states learn from their neighbors, adopting policy based on their observations of other states. This theory has been applied to state energy policy in numerous contexts. Through surveys, Freeman (1985) provided an early study of state energy policy diffusion. Freeman studied the behavior of state legislators following the energy crises of the 1970s. She found that legislators took cues from other states, though they often had little concrete knowledge of the actual content of those other states' policies. She also found that states were most likely to look to their neighbors and a handful of leading states such as California, Massachusetts, and Wisconsin. Nearly fifteen years after Freeman, Chandler (2009) tested diffusion theory in the context of renewable portfolio standards and came to similar conclusions: there is evidence that states adopt renewable portfolio standards in part because their neighbors have, but the actions of states outside of the region does not have an effect on their decision to adopt an RPS. Just as Rabe (2007) suggested in "Race to the Top," Chandler argues that competition explains why diffusion is occurring.

Diffusion theory, however, is not without critics. Matisoff (2008) found that internal factors are stronger predictors of state climate policies (renewable energy policy included) than are factors of diffusion. Indeed, he concludes that "these results demonstrate that state characteristics drive climate change policies, rather than regional diffusion, and suggest that the regional diffusion hypothesis ought to be reexamined." Mooney (2001) also notes that the regional diffusion literature is also prone to methodological problems. Indeed, he notes that the event history analysis that is typical of these studies is not able to determine causality.

While diffusion theory argues that states are outward looking, internal determinants theory argues that they are inward looking. Internal determinants theory posits that state policy innovation is determined by social, economic, natural, and political characteristics (Canon & Baum, 1981; Glick, 1981; Gray, 1973; Regans, 1980; Walker, 1969). In the area of state energy policy, numerous internal factors have been tested for their effect on energy policy adoption and the results have been various. James Regans (1980) was an early writer on energy policy innovation at the state level. Regans tested a number of socioeconomic variables on the adoption of several policies including: state-sponsored demonstration projects, the development of comprehensive energy resource development plans, tax incentives, forecasting/modeling, interstate cooperative agreements, and the funding of state R&D projects. He found that affluence, innovativeness, and meteorological climate (amongst others) were the key internal factors that determined if a state would adopt one or more of the energy policies he

studied. Two decades later, econometric studies of state renewable energy policy adoption re-emerged to study the blossoming of various policies among the states. Table 1 reviews this literature and its findings.

Table 1: Internal Determinants Literature Review

Author(s)	Issue tested	Insignificant variables	Significant variables (i.e., more likely to adopt)
Huang et al (2007)	Adoption of RPS	Share of coal in electrical generation, high expenditures on natural resources	Higher levels of education, democratic majorities, high growth rate, high gross state product
Lyon and Yin (2010)	Adoption of RPS	Medium wind potential, medium solar potential, biomass potential, oil and natural gas influence, existing renewable energy capacity, coal industry influence, agriculture industry interests, Republican governorship, electricity price	More democrats in legislature, presence of renewable energy industry, lower unemployment, restructured electric sector, large wind potential, large solar potential
Matisoff (2008)	Adoption of renewable energy and efficiency policies, including RPS	Wind energy potential	Liberal citizenry, high per-capita gross state product, lack of carbon-intensive industry, other environmental concerns, high solar potential
Chandler (2009)	Adoption of renewable portfolio standards	Population growth, renewable energy potential, presence of electricity-intense industry	High per-capita disposable income, more liberal government
Vachon and Menz (2006)	Adoption of renewable energy polices (RPS, net metering, public benefit funds, and generation disclosure rules)	Production of coal, renewable energy potential, presence of industries likely to be effected by environmental regulations	Higher level of personal income, higher level of education, greater participation in environmental organizations
Stouten-bourough and Beverlin (2008)	Adoption of net-metering policies	More professional legislatures	More liberal legislatures, more average wind, greater "green conditions," larger electric energy consumption, few nuclear plants, more public utility commission employees

As Table 1 shows, the effects of a number of potential internal determinants have been examined and the findings have not been uniform. Clearly wealth and liberal political attitudes make a state a prime candidate for the adoption of renewable energy and other climate policies like renewable portfolio standards. However, the effect of other factors, such as a state's endowment of indigenous renewable energy resources, is far more ambiguous. Indeed, one of the odd findings in many models is that a state's renewable energy resources are not predictive of adoption.

Like diffusion theory, internal determinants theory has its critics. Sawyer (1984) provided an early survey of the literature on state energy policy adoption and found that "energy activities at the state level have been...at best only modestly related to state energy conditions." Glenna and Thomas (2010) find that resource dependence (which is a subset of internal determinants) does not explain the adoption of an alternative energy portfolio standard in Pennsylvania. At the same time, Matisoff (2008) has noted that the diversity of policies is not adequately addressed by the internal determinants theory.

Berry and Berry (1990) observe that policy adoption is rarely fully explained by internal determinants or diffusion. Weiner and Koontz (2010) find that Berry and Berry's observation is true for renewable portfolio standards. The researchers show that internal determinants theory and diffusion theory both have some explanatory power in explaining renewable energy policy adoption. The researchers agreed with Matisoff (2008) that internal factors best explain renewable energy policy adoption, but argue that "elements of regional diffusion theory are evident as well." Just as Chandler (2009) suggested, competition was an important determinant of adoption in the states studied by Weiner and Koontz. Indeed, amongst two of their three cases (Oregon and Ohio) interstate competition was important in driving the adoption of policy.

Despite the diversity among the research findings on RPS adoption and the ongoing debate between internal determinants theory and diffusion theory, it is clear that state renewable portfolio standards are not developed in isolation. Other states in the region have an impact on a state's propensity to adopt. The theory on RPS adoption thus provides insights on one potential dimension of informal ("organic") interstate collaboration. The evidence that policy diffusion partly explains renewable portfolio standard adoption suggests that states are at least collaborating through observation. As legislators and stakeholders observe other states in their region adopting RPS policies, they are more likely themselves to adopt RPS, meaning that one state's policy may be part of inspiring another. However, what remains unanswered is how this collaborative dynamic manifests itself in the RPS, legislation and regulations themselves. In other words, while states may be inspired by others to adopt an RPS is the design of that RPS policy also influenced by other states?

Renewable Portfolio Standard Policy Design

The literature has shown that the adoption of policies by other states in the region may increase a state's propensity to adopt the policy. It is not clear if other states affect the design of the policy that a state ultimately adopts. For example, are the types of generation that are eligible and the targets that are set influenced by other states? Do states take successful policy design elements from other states? Do states design their policies to aid in-state actors at the expense of those in other states? In order to analyze interstate impacts on policy design, it is important to understand the typical components of these policies. While each RPS is unique, there are elements that are shared across most of the thirty-three RPS policies in the United States.

CORE RENEWABLE PORTFOLIO STANDARD POLICY DESIGN ELEMENTS

One core feature of a renewable portfolio standard is the measurement of the standard itself. The target set by an RPS is typically a requirement that utilities meet a percentage of load (megawatt-hour consumed) with renewable energy generation (megawatt-hour produced) in a certain year. Most often this generation is tracked through renewable energy credits (RECs). Each REC represents a set amount of generation (i.e., kilowatt-hour or megawatt-hour). In the New England states, a REC represents a megawatt-hour (MWh) of generation. RECs may simply be a form of accounting, however, in many states they can be traded amongst utilities and across state lines. Often a trade-able REC is registered on an attribute tracking system where each MWh is given a serial number and is retired upon use, preventing the same REC from being used twice. RECs are intended to reduce the cost of meeting renewable energy goals by allowing utilities with obligations to meet their requirements without having to build- or contract with- generators in their service area, but rather getting the credits from the least-expensive eligible source.

Renewable portfolio standards define a specific set of renewable energy technologies which are eligible to qualify. Well-known renewable energy technologies such as wind, solar, and biomass are often included. However, diversity exists here too. Pennsylvania, for example, includes waste coal in its eligible resources while Connecticut includes fuel cells powered by natural gas.

A relatively recent development in states' definitions of eligible resources is the creation of "tiers" within their RPSs. These tiers may also be called "classes" or may come in the form of separate "alternative portfolio standards," which support energy technologies that are preferable to traditional generation sources but are not renewable. In Maine, for example, existing renewable energy resources (those built before 2005)

are considered class II resources while those built after 2005 are considered class I. In Connecticut there is a class for new renewable energy (class I), one for existing waste-to-energy plants (class II) and one for combined heat and power (class III). Tiers create what are essentially separate markets for RECs from different resources. As in Maine, tiers often serve to segregate "new" and existing renewable resource REC markets. Typically a first tier resource must be "new," which is typically defined as having begun construction after the date that legislation was passed. In addition to discriminating amongst generation sources based on type and age, renewable portfolio standards often set limits on size. Capacity limits specify the size (in terms of megawatts of capacity) a generator must be in order to qualify for the RPS.

"Carve-outs" and "multipliers" are two ways in which states help incentivize renewable resources which might not otherwise be competitive in an RPS. A "carve-out" is a requirement that a certain amount of generation within a class comes from a specific technology. New Jersey has one of the best known carve-outs, which requires that a fraction of a percentage point of the state's electricity load be met with electricity from solar-photovoltaic units. The RECs for these solar units trade at a significant premium, often near $600 in New Jersey, which is many times the $5 to $25 that "regular" RECs fetch. Recently a number of states have been adopting solar carve-outs.

Unlike a carve-out, which requires a certain amount of generation from a certain resource, a "multiplier" grants certain resources additional RECs (or fractions of RECs) for each MWh of generation. Multipliers often grant additional RECs based on geographic location, technology, or other characteristic of the unit. In Maine, for example, community renewable energy projects are eligible for 1.5 RECs for each megawatt hour of generation, while non-community wind projects and other resources only receive 1 REC for each megawatt-hour of generation.

If a utility within a state cannot or will not purchase enough RECs to match their annual consumption, they can typically pay a fee in lieu of securing those RECs. A state normally specifies an alternative compliance payment (ACP) which be paid in lieu of the retirement of a REC. ACP payments often go into state administered funds which support the development of renewable energy. Ideally, ACP payments are set just above the cost of procuring RECs from the least expensive eligible resource and thus different ACP payment levels are set for different tiers within an RPS and for carve-outs.

POLICY DESIGN'S IMPLICATIONS FOR INTERSTATE COLLABORATION

As mentioned previously, Rabe (2009) hypothesizes that states acting independently on their renewable portfolio standards could yield *de facto* ("organic") collaborative RPS regimes. At the same time, in an earlier paper, he and his colleagues determined that the incentives present were unlikely to yield collaborative behavior (Rabe, Roman, and Dobelis 2005). Casual observation will reveal that some individual states have clearly

chosen to act in a non-collaborative manner by adopting provisions which require that generation come from within the state's borders, or which give incentives that reward in-state generators. However, can research take us beyond these anecdotes?

Lyon and Yin (2010) identify policies aimed at giving preferential treatment to in-state generators (see Table 2) and use an econometric model to test what might drive states to adopt them. Their model is based on internal factors and their results do little to suggest that these internal factors are why states adopt these policies. Indeed, among potential factors, Lyon and Yin test air quality, unemployment, existing in-state capacity, agricultural interests, dependency on natural gas, industry lobbies, and whether a state's electricity sector has been restructured (deregulated). Of these numerous variables, only two variables are statistically significant: 1) a state having a restructured electric sector is less likely to have in-state requirements, and 2) states with limited existing generation are more likely to have in-state requirements.

Table 2: Explicit In-State Requirements

State	In-State Requirements
Arizona	Extra credit for in-state renewable generation (1.5 times)
Colorado	Extra credit for in-state renewable generation (1.25 times)
Delaware	Extra credit for in-state renewable generation (1.5 times for wind turbines sited in Delaware)
Hawaii	Do not allow credit trading
Illinois	Do not allow credit trading
Minnesota	Only in-state generation can be used for compliance
Missouri	The PSC is authorized to create a weighted scale to encourage certain renewable-energy resources and /or in-state generation
Montana	Utilities must purchase RECs from community renewable-energy projects that total at least 75 MW in nameplate capacity
Nevada	Out-of-state generation is only eligible provided that it is tied to a dedicated transmission or distribution line that connects with a facility or system owned, operated or controlled by an in-state provider
New York	2% of total incremental RPS requirement (7.71%) is set aside for Customer-Sited tier
North Carolina	Utilities are allowed to use unbundled RECs from out -of-state renewable energy facilities to meet up to 25% of the portfolio standard
Texas	Output of the facility must be readily capable of being physically metered and verified in Texas by the program administrator
Vermont	Do not allow credit trading
Virginia	Electricity must be generated or purchased in Virginia or in the interconnection region of the regional transmission entity
Wisconsin	Only in-state generation can be used for compliance

Source: Lyon and Yin (2010)

The literature is thus inconclusive in one respect: its explanation of why states adopt in-state provisions. This literature is also not clear in another respect: whether or not the actions of states are non-collaborative only through the adoption of explicit restrictions like those explored by Lyon and Yin. Given the constitutional limitations placed on state-legislated impediments to interstate commerce, states may seek indirect ways to incentivize their own renewable energy generation over generation from other states. Corey and Sweezy (2007) have observed that states use supplemental policies such as rebates, tax incentives, public benefit funds, and net-metering to achieve more in-state generation capacity. Corey and Sweezy also find that REC trading platforms (such as New England's NEPOOL GIS – New England Power Pool) have requirements which help exclude out-of-region generation. Wiser, Barbose, and Holt (in press) recently completed a paper on solar electricity generation in renewable portfolio standards and found several ways in which states were retaining the benefits inside the state. These policies include: 1) requiring that distributed resources be connected to the distribution network of the complying utility, 2) multipliers, and 3) requirements that a minimum amount of solar RECS come from within the state before out-of-state RECs are used.

Beyond how states discriminate amongst resources there is also the question of their intentions. The paper by Corey and Sweezy and the recent work by Wiser, Barbose and Holt do not show whether the organic interstate dynamic created by policy formation in the individual states yields these un-collaborative policies as part of a conscious effort. For example, is incentivizing residentially-sited solar energy intended to support the development of a renewable energy resource that is promising but currently more expensive, or is it driven by a desire to support development within the state over the use of resources which are likely to come from out of the state? Are limits to the size of eligible power plants (capacity limits) the result of environmental considerations or an effort to get more generation in-state? Are the eligible generation technologies (solar, wind, biomass, etc.) included in a RPS because: other states included them in their RPS, they are a reflection of the most abundant resources in the state, or something else? Through interviews with New England legislators, environmentalists, renewable energy project developers and others, this study has answered these questions and taken the literature on renewable portfolio standards and state climate change mitigation one step further.

A Case Study: The New England Region

New England is an ideal place to examine given this study's focus on interstate collaboration. The numerous small states, shared electrical system, and history of collaboration on energy and environmental issues make it a place both where collaboration has occurred and where it is necessary.

The region's history of collaboration on energy issues goes back decades. During the first half of the twentieth century, utilities in New England managed their own generation, transmission, and distribution. Following the Great Northeast Blackout of 1965, utilities realized they needed better coordination and subsequently the New England Power Pool (NEPOOL) was created to manage dispatch across the region (now the New England Independent System Operator). When the New England states restructured their electric sectors NEPOOL became the market manager for the new wholesale electricity markets that were created. Thus NEPOOL became the forum for intraregional collaboration. In addition to their duties of dispatch and market management, the ISO also conducts regional planning for the reliability of the grid.

Beyond a shared electric grid, New England states have collaborated formally through numerous forums. NESCAUM (Northeast States for Coordinated Air Use Management) has provided a forum for collaborative regulation of the region's air quality, while NECPUC (New England Conference of Public Utilities Commissioners) has provided a forum for collaboration amongst northeastern regulators. New England governors have been particularly collaborative. Most notable among their collaborative efforts has been the Regional Greenhouse Gas Initiative (RGGI), which is an effort originally initiated by New York's Governor George Pataki that has evolved into a cap-and-trade system for greenhouse gases which includes all New England states, New York, and several Mid-Atlantic states as participants. Most recently, the New England governors created NESCOE — the New England States Committee on Electricity — to "represent the collective interest of the region on electricity matters." Beyond being a region ripe for interstate collaboration, New England is also home to varied state RPS policies and histories. Temporally, the region includes states which were among some of the earliest adopters (Connecticut, Maine, and Massachusetts in the late 1990s) and most recent adopters (Rhode Island in 2004 and New Hampshire in 2007) as well as Vermont, which chose not to pursue a RPS at all. Four of the states have restructured their electric sectors, while one (New Hampshire) has done so only partly, and another (Vermont) has remained vertically-integrated.

The region also has considerable diversity in terms of the factors the internal determinants literature suggests drives states to adopt renewable energy policy. Table 3 provides data for some of the common variables tested in the internal determinants literature. These data show that in many ways the experience of the New England states does not conform to what the internal determinants literature would predict. The earliest adopters in the region (which were also some of the earliest adopters in the

country) have some of the poorest renewable energy resources in the country. Likewise, while rich states like Connecticut and Massachusetts adopted policies early on as would be expected, so did the relatively poor state of Maine. Early adopters included states without substantial existing renewable generation (Massachusetts and Connecticut) as well as a state with most of its generation coming from renewable energy (Maine).

Table 3: Internal Determinants in the New England States

	Renewable Energy Potential Ranking† (1 is most potential)	**Per Capita Income‡ (1 is highest)**	**Liberalness of state legislature* (Average % democrat)**	**Fossil Fuel Generation (1998)****	**Nuclear Gen. (1998)****	**Hydro and Wood Biomass Gen. (1998)****
Connecticut	43	1	64%	71%	16%	2%
Rhode Island	47	16	85%	98%	0%	0.1%
Massachusetts	31	3	83%	82%	12%	2.5%
Vermont	17	24	54%	1%	68%	31%
New Hampshire	23	10	37%	31%	52%	15%
Maine	18	30	55%	34%	0%	59%

Sources:
†Deyette et al (2003), Appendix A, ranking of states by renewable energy potential
‡Ranking of US States by Personal Income Per Capita in Current Dollars. From 2008 Statistical Abstract of the United States, US Census Bureau
*Measured as average percentage of the lower legislative chamber occupied by democrats from 1990 to 2010 using data from the National Conference of State Legislatures
**Department of Energy's Energy Information Administration's Electric Power Annual 2009, "1990 – 2009 Net Generation by State by Type of Producer by Energy Source (EIA-906, EIA-920, and EIA-923)"

METHODS

The New England states are in a region known for interstate collaboration, but they have not behaved as the literature on adoption would suggest. In addition to providing insights on the dynamics of state policy adoption and policy design, this study assesses why this deviation has taken place and provides some guidance for how future econometric research might incorporate different variables and models when testing regional diffusion and internal determinants theories.

In order to explore this study's questions, forty-five interviews were conducted. Initial interviewees were identified through internet searches as members of the relevant legislative committees in the state or key stakeholders in private and non-profit organizations. From these initial interviews, additional stakeholders were identified for interviews using a snowball sampling method, which concluded when interviews ceased to yield new information or perspectives. All interviewees were offered anonymity and are referenced in this study via a reference to their state and a number randomly assigned to their interview. For example, CT-3 represents the third interviewee from the state of Connecticut.

Sets of five to seven broad questions, based on the gaps and ambiguities in the aforementioned literature, were developed for each state. Most of the questions focused on the composition of the renewable portfolio standards (or, in the case of Vermont, the Sustainably Priced Energy Development goals), including:

Adoption: why did the state adopt (or not adopt) a renewable portfolio standard;

Resource eligibility criteria: how was the list of eligible resources determined;

Goals: why and how was the percentage (overall and for each tier) determined; and,

Rationale: What was behind policies that seemed to require or incentivize in-state generation over out-of-state generation[3]?

At the end of the interview, interviewees were asked if and how other states impacted their state's renewable portfolio standard. By holding this question till the end it was hoped that unvarnished observations of the process of policy design development would be exposed and include references to interstate dynamics. Indeed, this was the case with most interviewees discussing other states before being asked about them specifically.

Additional questions sought to capture whether stakeholders observed broad trends over time in the perception and rhetoric about the renewable portfolio standard. All questions on RPS composition and timing were sent via an e-mail to interviewees one day prior to their interview. The e-mail, however, did not mention the intent of the study to discuss the interstate dynamics of renewable portfolio standards and excluded the question of how other states had impacted the state's policy design and adoption. With the interviews completed, interview transcripts were coded and analyzed to develop findings.

[3]These potentially exclusionary design elements are discussed in the next section.

RENEWABLE PORTFOLIO STANDARD DESIGN IN THE NEW ENGLAND STATES

ELIGIBLE RESOURCES

While each state has its own unique set of eligible technologies (see Table 4) many of the same resources are eligible across the region. Likewise, all states use ISO New England's Generation Information System to manage RECs and (with the exception of Vermont) allow for RECs to come from resources outside of the state. What is not understood is how states derive these lists of eligible resources. Are these lists a product of internal factors, other states' influence, or both? The factors that influence the process for determining eligible resources should in turn influence collaboration amongst states' policies. Eligible resource definitions strongly shaped by the practices of other states would suggest that states may end up drawing from others and forming similar renewable portfolio standards which would open more markets to generators. At the same time, diffusion may have competitive outcomes: a state may consider the actions of other states and try to take advantage of their efforts through free-riding. Should the process of determining eligible resources be largely based on internal determinants, a state may be driven to create a policy that is unintentionally exclusionary because its eligible resources are a reflection of the state's indigenous resources.

Table 4: Eligible Technologies in the New England RPSs

	Resources Eligible
Connecticut	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Low E Renewables, Tidal Energy, Wave Energy, Ocean Thermal
Rhode Island	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Anaerobic Digestion, Tidal Energy, Wave Energy, Ocean Thermal, Biodiesel, Fuel Cells using Renewable Fuels
Massachusetts	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, (Cleanwood biomass technologies temporarily suspended under the MA RPS), Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Wave Energy, Ocean Thermal, Renewable Fuels, Fuel Cells using Renewable Fuels
New Hampshire	Solar Water Heat, Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Geothermal Electric, Hydrogen, Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Wave Energy, Ocean Thermal, Ethanol, Biodiesel.
Vermont	Solar Water Heat, Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Anaerobic Digestion, Fuel Cells using Renewable Fuels, CHP (design system efficiency at least 65%)
Maine	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/ Cogeneration, Tidal Energy, Other Distributed Generation Technologies

Source: www.dsireusa.org

POTENTIAL PREFERENTIAL TREATMENT OF IN-STATE RESOURCES

In addition to an RPS's eligible resources, other policy design considerations have implications for interstate relations. Several design elements that were relevant to the New England states were solar carve-outs, tiers, multipliers, and long-term contracting requirements. The motivations behind- and history of- these design elements was addressed in interviews.

One recent design element which may have implications for interstate relations is the solar energy "carve-out". Solar has technical attributes which make it attractive: it produces electricity during the day when prices are at their highest; it can be built on rooftops, which eases siting issues; and, it can be deployed as a distributed resource, preventing need for more transmission development. However, solar may also be attractive as a way to encourage in-state investment. Since solar can be sited on buildings and, in general, in states that are otherwise renewable-resource poor, it would seem that supporting solar energy would be a way to spur development within the state. Both Massachusetts and New Hampshire have carve-outs for solar. In Massachusetts, units up to 6MW are eligible as part of a carve-out in the first-tier resources. The RPS supports solar up to 400MW, after which further capacity will simply be eligible for class I. In New Hampshire, solar has its own tier.

Other resource eligibility requirements that seem to have the potential to favor in-state resources include Connecticut's class III and Maine's multiplier for community wind projects. In Connecticut, a class was created just for combined heat and power (CHP) projects within the state and thus could potentially be a means of adapting the RPS to retain more of its benefits within the state. Likewise, in 2009, Maine passed a community wind multiplier, which provides 1.5 RECs for every MWh of generation from community renewable energy projects. Given that these projects are by definition in Maine, the policy could have been inspired by an effort to foster generation within the state.

Another category of policy design elements which may have been inspired by efforts to keep resources in the state include long-term contracting requirements. This policy may have benign intentions. Indeed, one benefit of long-term contracting requirements is that they lower the cost of capital for projects by reducing risk associated with the project's cash-flows. Yet, this policy can also be used for more parochial reasons. States have included provisions in their long-term contracting requirements, which require that at least some of the generation come from facilities within the state. Massachusetts most famously had its long-term contracting requirement, which required that utilities "enter into cost-effective long-term contracts to facilitate the financing of renewable energy generation within the jurisdictional boundaries of the Commonwealth of Massachusetts." Following a suit brought by electricity wholesaler Trans Canada, this language was removed. However, similar contracting requirements remain in other states. Rhode Island, for example, requires that 3MW of the contracted

capacity be solar energy from within the state. Connecticut created Project 150 where the Connecticut Clean Energy Fund entered into long-term electricity purchase agreements with facilities within the state.

Beyond RPS policy design elements there are many ancillary and alternative policies in New England states. In addition to Maine's renewable portfolio standard, for example, the state has set a number of capacity goals for the development of wind facilities. Vermont considered a renewable portfolio standard, but ultimately pursued a goal for in-state resources within which renewable electricity certificates could be sold elsewhere.

Results

While the impacts of interstate relations on RPS policy design and modes of interaction are varied, comments from this study's interviewees made it clear that states are not acting in isolation on renewable energy policy. Even before being asked about the influence of other states, a majority of interviewees (66%[4]) mentioned the influence of other states on their state's renewable portfolio standard. These influences were various. Interviewees noted that during the RPS development — or revision — process stakeholders referenced, noted, or studied one or more of the following: experiences in other states; generators in other states; export opportunities to other states; a tendency of their state to follow the lead of other states; a desire to keep benefits in-state; and/or a consideration of the regional nature of the grid and/or REC market. These observations affected decisions to adopt a RPS. Observations of the experience of other states also shaped the design of the RPS policy and inspired both competitive and collaborative behavior. At the same time, internal determinants had an impact, though in unexpected ways. Coordinated constituencies (lobbies) seem to have been a key driver in policy design but the experience with renewable energy generation in the past had mixed results.

COMPETITION AND COLLABORATION IN THE ADOPTION AND REVISION OF RPS POLICIES

As diffusion theory would suggest, later states were inspired to adopt RPSs by observing the actions of the early adopters. As one official in New Hampshire noted: "the fact that we were last in the region is significant... Supporters were saying, 'people have already done this, we can piggyback on systems already in place, and it has worked in other states'"(NH-1). A senior staffer for the Rhode Island General Assembly noted that "RPS

[4]Number calculated as part of interview coding. If other US states or Canadian provinces were mentioned by an interviewee prior to the part of the interview where they were asked about the effect of other states, the interviewee was coded as "yes." These "yes" answers were then calculated as a percentage of total interviewees (42, which is 45 interviews less 3 interviews which were very brief).

legislation was occurring in other jurisdictions and that action was highly influential to Rhode Island's decision to adopt"; Rhode Island didn't want to be left out (RI-6). One environmentalist who had been intimately involved in the first RPS legislation in Massachusetts and Connecticut, noted that Massachusetts's adoption of its RPS influenced Connecticut's decision to adopt (MA-1).

In addition to later adopters being spurred to adopt by early adopters, early adopters were motivated by late adopters to ramp up their efforts. As a consultant to Massachusetts's original RPS noted, the state's Division of Energy Resources determined it should not develop an existing renewable energy tier because there was too much existing generation in the region for it to support through its own policy (MA-8). The state ultimately did adopt an existing resource tier in 2008, in part because other states had done so (MA-8). Likewise, the adoption of more stringent targets in other states spurred revisions in Maine and Connecticut, which increased the stringency of their states' targets. One Senator in Maine noted that his state was inspired to add a new-generation resource tier to its RPS partly due to the demand in other states for renewable energy and the subsequent opportunity to "get in the game [and] be a source of renewable energy for other states in the region"(ME-4). An environmental activist in Connecticut noted that when the state increased its RPS target in 2005, there was consensus among stakeholders "to bump it up like other states from ten to twenty percent"(CT-4).

While most New England states were inspired to adopt or revise RPS legislation because of their neighbors, the actions of neighboring states had the opposite effect on Vermont. Oddly, RPS adoption in the region was a core reason why Vermont chose not to adopt a renewable portfolio standard. The state has instead adopted the Sustainably Priced Energy Development (SPEED) Program to promote the construction of renewable energy generators in the state. The program's target is voluntary with the caveat that it will become mandatory if it is not being met. Vermont has thus adopted what one state representative (VT-7) described as a "RPS in drag." The generation capacity focus of the program allows for the sale of the generator's RECs outside of the state to utilities in the region which need to meet renewable portfolio standard requirements. This shifts the rate-payer impact of those RECs out of the state. Indeed, of the seven Vermont interviewees partaking in complete interviews, four listed the ability to export RECs to other states as one of the top reasons the state has not adopted a renewable portfolio standard[5].

INTRAREGIONAL POLICY COORDINATION

Besides from the Vermont experience, state RPS adoption has positively influenced the decision of other states in the region to adopt renewable portfolio standards. In addition

[5]One interviewee was only able to address a couple of the questions due to time constraints and thus is not included in this count.

to cross-border observation, there have been efforts in state capitols for state legislation which is coordinated with the rest of the region. Indeed, numerous interviewees mentioned how New England is a regional market for electricity and RECs, and how states have had to recognize this regional market when formulating their policies. The impact of this recognition on policy design has been noticeable in several instances. One of the later adopters, New Hampshire, sought to base their alternative compliance payments on those of Massachusetts so as not to distort the regional REC market (NH-6, NH-7). In setting the class II goal, Massachusetts based it on Massachusetts demand as a fraction of the New England load. As a then-legislative-staffer observed, during the passage of the original renewable portfolio standard in Massachusetts, some developers wanted geographic restrictions on eligible resources, but many policymakers noted that "we're one airshed" and that the environmental benefits were the same whether they came from Maine or Massachusetts (MA-7). ISO New England's Generation Information System, which manages REC tracking for the regions, is the most notable example of policy coordination. Since this system was created at the regional level and is open to all generators in the region, agency officials from all of the New England states have had to collaborate in order for the system to come into being (MA-4).

DIFFUSION'S INFLUENCE ON POLICY DESIGN CHOICES

In addition to RPS adoption being "trendy" amongst New England states, policy design criteria diffused both amongst the region's states and from leading states around the country. For instance, when creating solar tiers/carve-outs in their renewable portfolio standards, Massachusetts and New Hampshire looked at New Jersey's solar carve-out and modified it to their own state's needs. One official in Massachusetts noted that Rhode Island borrowed much of the RPS design from Massachusetts's legislation in 2004 when it created its RPS, and Massachusetts in turn studied Rhode Island's provision for existing small hydro facilities when it revised its RPS as part of the 2008 Green Communities Act (MA-5). States also tried to avoid what they perceived as failures in other states. One Massachusetts state representative noted that the state sought to avoid the instability in REC markets that constantly changing policy spurred in other states (MA-2). A former New Hampshire representative said that her committee "watched Massachusetts and tried to learn from their mistakes" (NH-3). A former legislative staffer summarized this tendency in one sentence: "we didn't want to fall down the holes that other states had" (MA-6). One Rhode Island interviewee remarked that when Rhode Island's General Assembly adopted the long-term contracting provision for their RPS, the legislature chose to use the exact same incentive level used in Massachusetts's legislation (RI-2).

Interviewees also suggested that because states regularly monitor the activities of others, the diffusion process was dynamic with ongoing feedbacks. A senior member of Maine's utilities committee noted that legislators are aware of the impact of other states on their generation through this regional market, such as how Massachusetts'

new biomass regulations are effecting biomass opportunities in Maine, or the impact that the Cape Wind offshore wind project would have on all of the RPS markets in the region should it come on line (ME-5). A Rhode Island legislator noted that since his state and Massachusetts are so dependent on each other, Rhode Island is constantly observing Massachusetts' electricity policy. Massachusetts' experience with the Cape Wind project was one development closely followed by Rhode Island. Rhode Island has observed this project because it hopes to develop a similar project as well as serve as a staging area for the equipment going out to build Cape Wind (RI-4).

Nonetheless, there was ample evidence of the strong impact of internal determinants on policy adoption and design. A legislative staffer who authored Rhode Island's Renewable Energy Standard made a comment which summarizes the mix of diffusion influence and internal determinants that impact RPS policy design. He noted that the process he undertakes in drafting legislation starts with Rhode Island conditions before looking out to other states for lessons (RI-6). Interviews seemed to confirm this view that the list of eligible resources for a state's RPS were determined largely by intrastate negotiations amongst stakeholders rather than interstate observations.

INTERNAL DETERMINANTS OF RPS POLICY DESIGN

One state representative noted a phenomenon in Massachusetts that captures the essence of the process by which a state's list of eligible resources is derived (MA-2). He states that "every session there is a push to open the RPS to new technologies." From the beginning, New England RPSs have sought to be open to many technologies. They have since become increasingly open.

Maine, home of the first RPS in the region, had eligibility requirements reflecting the existing resources in the state while remaining open to others (ME-1, ME-5, ME-2, ME-6). New Hampshire's provisions for biomass and hydro seem to be similarly driven by the existing renewable generators in the state. The process in New Hampshire, as one former state senator put it, began by defining classes IV, III, and II and then put "everything that was left over in class I" (NH-7). This meant including the biomass and hydro industries since they were important industries for the state and had influence at the state capitol in Concord (NH-6, NH-3). Interestingly, however, New Hampshire also adopted a tier exclusively for solar, which made a *de minimus* contribution to the state's generation. Thus, while RPSs seek to incorporate the existing generators, the current generation types are not necessarily predictive of the ultimate RPS design.

Throughout interviews, New Hampshire's solar tier was attributed to the influence of the New Hampshire Sustainable Energy Association (NHSEA). Likewise, other states supported emerging technologies when there was a coordinated constituency supporting them. As one utility staff member who has worked on RPS legislation in many states put it, much of what qualifies in a RPS reflects "a project in someone's district" (RI-5). This observation is supported by other interviewees. In Rhode Island,

the 3MW of in-state solar capacity provision in the long-term contracting bill was attributed to a project proposed in the state (RI-3, RI-2). The same was true for the inclusion of landfill gas in the state's RPS; the technology was included because of a project being developed by a local developer (RI-1). Landfill gas (NH-1) also made it into New Hampshire's RPS along with wave energy (NH-5), due to projects that were being developed at the University of New Hampshire. Connecticut was an early state to include non-renewable energy technology in an RPS. Connecticut considers itself the "fuel cell capital" (CT-2) and the developers of this technology pushed for its inclusion (CT-1, CT-2, CT-3, CT-7). So strong is the influence of local interests that the multiplier for community wind projects, while seemingly an effort to retain generation in the state, was in fact driven by communities that were trying to develop renewable energy projects and not by an effort to keep more generation in the state (ME-4, ME-1). The impact of coordinated constituencies may explain why state renewable portfolio standards in New England are frequently being revised to include more technologies.

The increasing inclusiveness of renewable portfolio standards is well exemplified by the expansion of renewable portfolio standards to non-renewable technologies. Connecticut was early to include energy efficiency within its renewable portfolio standard by adding a CHP class (class III) to its RPS. Like the inclusion of other technologies, this policy development was inspired by local developers (CT-7). One former Massachusetts staffer noted that the Alternative Portfolio Standard, which was added in 2008, was a way to "recognize there are non-renewable technologies which we still want to support". These examples reflect a general environment of inclusiveness. A utility lobbyist in Maine noted that during the development of the state's RPS "everyone dropped [into the RPS] whatever could possibility be in Maine" (ME-1). A representative from Maine likewise noted that people would propose technologies during the development of the RPS saying, "why not include this?" (ME-5). However, not all generation has in practice been embraced through the RPS design process. Indeed, capacity limits have provided one means of excluding generation from out of state.

EXCLUSIVITY IN ELIGIBLE RESOURCES

While New England renewable portfolio standards have become increasingly inclusive, some technologies have been excluded due to concerted efforts to keep them ineligible. Capacity limits[6] are one means of effectively excluding generation from other states and regions. Hydroelectric dam capacity limits were present in every state's policy[7]. In Vermont, where the largest dam has a capacity of 180 megawatts, a 200 megawatt capacity limit was set[8]. In New Hampshire, class IV was designed so as to exclude large dams. As a former New Hampshire state representative noted, in forming the

[6]Capacity limits are limitations on eligible generation based on the size of the generators. For example, an RPS might exclude a hydro unit with a name-plate capacity (i.e., generation ability) of 30MW.
[7]Recently Vermont lifted its restriction.
[8]Note that in 2010 a revision was made to allow Hydro Quebec resources.

RPS's resource requirements, the state went out of its way to avoid Hydro Quebec's large hydro units from qualifying. Hydro Quebec's generation was an issue in all of the New England states and it is clear that capacity limits sought to exclude this specific generation source. Indeed, states have found means of circumventing their own limits when it supports preferable generation. As a utility representative in Maine noted, as large wind projects were being considered, the 100MW limit was interpreted to not apply to wind given that the capacity factor of wind is low and thus its output will effectively be far less than its nameplate capacity suggests (ME-1). The northern states were not unique in their discriminatory use of capacity limits; many interviewees from the southern New England states noted that stakeholders were concerned about including large hydro and sought to exclude resources from Hydro Quebec (CT-2, MA-7, MA-1, MA-4).

What is not clear is the motivation that drove the exclusion of large hydro from outside of the region. Part of the explanation for excluding large hydro can be explained by an internal factor: the fervent opposition by environmental groups on ecological grounds. The environmental and social impacts of large hydro, and the subsequent opposition by environmental groups, were noted throughout interviews. This explanation seems to have some credibility given that environmental groups have been influential in exclusions of indigenous generation they deem environmentally detrimental. In Connecticut, the state's waste-to-energy authority (CRRA) lobbied to have their facilities included in class I, but they ultimately compromised with environmentalists to have a new, lower-value tier (CT-4). Likewise, biomass was opposed by some environmental groups recently when Massachusetts considered the eligibility of biomass in the state's RPS (Enterprisenews.com). Still, despite the influence of these environmental concerns, an element of parochialism is also at play.

In some instances of exclusionary policy design, it is clear that protecting in-state generation was the prime motivator behind the policy design element. One senior member of the Maine legislature's utilities committee noted that protecting the state's small hydro producers against low cost electricity from Quebec was one of the things inspiring Maine's original RPS and the reason for the 100MW capacity limit (ME-5). A New Hampshire official noted that the capacity limit on biomass reflected the fact that New Hampshire had smaller biomass plants than other states, and thus would benefit the in-state generators (NH-6). There were also a number of interviewees who mentioned that legislators had wanted to restrict RPS eligibility to in-state resources, but could not because of the US Constitution's Commerce Clause (MA-1, MA-2, NH-2, NH-7, NH-6, RI-5, RI-2, VT-6, CT-5).

Like capacity limits, long-term contracting and solar policies are other policy design elements which were hypothesized as a manifestation of exclusionary behavior. Like capacity limits, the intent of these policy design elements is unclear. When asked about the rationale behind the solar carve-out in Massachusetts, a former legislative staffer noted that the interest was in opening access to the RPS to more constituencies (MA-

6). Parochialism was not mentioned or implied as a rationale behind solar policies. Only one of the interviewees (NH-2) mentioned an interest in keeping generation in the state as a reason for their state's solar provisions. However, when asked explicitly about this potential reason to support solar, one official in Massachusetts said "I would say that [developing in-state generation] is the driving force behind most solar carve-outs" (MA-3). This view is supported by the fact that New Hampshire, which has been receiving much of its solar from Massachusetts, sponsored a legislative study to determine how to get more generation in the state (NH-8).

As with the solar provisions, no respondents mentioned preferential treatment of in-state generators as a reason for long-term contracting requirements. Two respondents were asked explicitly what the motivation was for states to adopt long-term contracting provisions and both argued that the provision was supported because of its impact on the viability of projects rather than the location of those projects (RI-5, NH-7). At the same time, the Trans Canada case highlighted the fact that supporting in-state generation was clearly a goal of the Massachusetts' long-term contracting provision.

THE ODD EFFECT OF EXISTING GENERATION ON ADOPTION

While this study has yielded ambiguous results on the intent of solar policies and long-term contracting provisions, its interviews shed light on an oddity in RPS adoption: some states with ample renewable energy generation choose not to adopt renewable portfolio standards while others do. This has been one of the odd occurrences which the econometric studies have not been able to explain. Three states (Maine, New Hampshire, and Vermont) had large amounts of renewable generation in the 1990s but very different outcomes. Maine was a very early adopter, New Hampshire a relatively late adopter, and Vermont has chosen to abstain from adopting a RPS. The contract-terms for renewable energy units and the amount of generation subsequently built in the 1980s and 1990s as "qualifying facilities" under the Public Utility Regulatory Policy Act (PURPA) seems to have been a factor in this decision making.

The cases of Vermont and New Hampshire suggest that the experience with qualifying facilities was a deterrent to renewable portfolio standard adoption. In both New Hampshire and Vermont interviewees expressed the belief that prices paid for renewable energy under PURPA were too high and subsequently have soured feelings toward the act; as one Vermont official noted , "people try to keep a ten-foot pole between them and PURPA" (VT-1). An environmentalist in the state went one step further to suggest that the rate impact of qualifying facilities was one of the reasons why the state did not adopt a renewable portfolio standard (VT-5). Instead the state chose to adopt a voluntary goal (the SPEED program) which incentivized the construction of renewable generation capacity but allowed for the RECS (and thus part of the cost of the facility) to go to ratepayers out of the state (VT-5). Indeed, this environmentalist suggested that the feed-in tariff the state created was one way to avoid the high costs

associated with PURPA's "qualifying facilities" model. A former Public Service Board Commissioner and current consultant to the Commission summed up the subsequent effect of the generation built under PURPA by saying there is a "sense that Vermont has paid for clean resources already" (VT-6).

Like Vermont, New Hampshire had paid high prices for its renewable generation prior to adopting its renewable portfolio standard. Avoided cost for the state's largest utility, Public Service New Hampshire, was based on the expensive Seabrook nuclear plant. The result was prices well above the market price for generation; at one point the rate was five times above the market rate. As one official noted, this was a "huge obstacle to doing a renewable portfolio standard" in the legislature (NH-6). In forming a renewable portfolio standard, stakeholders had to be convinced "why this was different than before;" part of this argument was that the RPS would not be like PURPA (NH-6).

Conversely, existing renewable energy capacity built under PURPA explains why Maine adopted its renewable portfolio standard. Indeed, as the state considered restructuring, it felt that many of the existing units in the state would become uneconomical as the state moved into a competitive generation market. The solution was to prescribe a floor[9] for renewable energy in the state and thus protect the existing renewable energy generation in the state (ME-1, ME-5, ME-2, ME-6). The interviews from these three different states thus suggest that exiting renewable energy generators can have very different effects on adoption, depending on the expense incurred to build those existing generators. This in turn could explain why econometric models used by other RPS researchers have failed to identify a consistent relationship between existing generation and RPS adoption.

ANCILLARY AND ALTERNATIVE POLICIES FOR INCENTIVIZING IN-STATE GENERATION

While high PURPA prices might have blunted appetites for renewable portfolio standards, some states have created policies which promote the construction of more renewable generation than the state can consume. In order to incentivize renewable generation within the state, some states are creating policies to build for export. One example is Maine's wind capacity goals. In addition to having a renewable portfolio standard, Maine has capacity goals for the installation of wind facilities. As a former member of the Maine legislature's utilities committee noted "If you think about it [the wind capacity goal] is not for Maine usage...we wanted to encourage the investment in Maine" (ME-2). Furthermore, this former representative noted that "this whole idea of RPS is an indirect way of influencing what is installed for capacity. It is an indirect way of getting to what we want." A utility lobbyist in Maine noted how this interest in exporting renewable energy to other states was a salient issue, most recently in

[9]This is the 30% of generation target in the original RPS.

discussions over the utilities proposed transmission project (ME-1). While Maine has sought auxiliary policies to promote renewable energy development for export, Vermont has centered its SPEED program on development for export.

Vermont's SPEED goal is specifically designed to foster the development of in-state resources and use export of the renewable energy certificates as a way to shift the cost burden to ratepayers outside of the state. As a Vermont environmental advocate noted: "you shouldn't think of the SPEED goals as renewable energy policy, it is economic development policy" (VT-5). The provision allowing for utilities to contract for the generation but not the renewable attributes was precisely an effort to get the generation in-state while exporting the rate-impact of the more expensive generation via the RECs. A long-time consultant and former regulator in Vermont noted that Vermont's adoption of a feed-in tariff (which is unique for states in the New England region) was adopted because the state wanted to develop resources in the state and a renewable portfolio standard would not allow that because of constitutional limitations under the Commerce Clause (VT-6).

Discussion

The experience of the New England states does not conform to previous models that have used internal determinants to explain RPS adoption. While much of this prior research has questioned the role of policy diffusion, the interviews done for this study provide consistent and considerable evidence of policy diffusion occurring. Indeed, the elements of interstate policy diffusion described by Freeman (1985) were evident throughout the interviews. However, this relationship has been shown to be more complicated than previously thought. Interstate interactions have an on-going impact on state RPS adoption and RPS policy design at a granular level.

What Freeman would not expect is that the New England states draw heavily on the policy design experience of other states rather than simply observing adoption without substantive study. Adoption of renewable portfolio standards is thus not merely the result of mimicry. While Barry Rabe (2006) observed that shortly after Nebraska adopted carbon sequestration legislation "three other states adopted essentially identical legislation [after] virtually no contact between officials in the respective states," the interviews for this study suggest that this is also not typical for RPS development. States studied policy design elements ranging from the level of alternative compliance payments to the success of solar carve-outs. In general, there was an understanding of what was happening in other states at a granular level and an appreciation for the potential opportunities, threats, and lessons from what was happening in neighboring states.

This research suggests that Rabe and Chandlers' assertion that competition is driving diffusion is not a complete explanation of the dynamics of diffusion. Competition drove late adopters like Rhode Island and New Hampshire to adopt, and early adopters like Maine to ramp up their efforts. At the same time, competition had a completely different effect in the case of Vermont as regional adoption was a central reason that Vermont didn't adopt a RPS. This finding also challenges the finding by Berry and Berry (1990) that states adopt policies because other states have already done so. It is clear that a more complicated relationship exists and that this relationship is in need for further study.

In addition to confirming the impact of policy diffusion on adoption, this study's results echo the findings by Chandler (2009) and Freeman (1985). Chandler found that RPS adoption isn't "nationally trendy" and Freeman found that states look to their neighbors and leaders. Indeed, besides New Jersey (which is a national leader in solar RECs) and California (which is a national renewable energy policy leader and was one of the first states to consider a renewable portfolio standard), very few states outside of the region were referenced during interviews. One former staffer in the Massachusetts legislature noted that "the closer you [a state] are to us, the closer we'll look at you" because of the similarities amongst the New England States (MA-6). This finding

conforms with Bowman and Kearny (1986) who argued that states are most likely to look to similar states.

The findings of this research also have implications for the internal determinants literature. Indeed, one of the recurrent problems with that literature is the ambiguity surrounding the impact of a state's existing renewable energy generation on RPS adoption. Indeed, as this study showed, existing renewable energy generation and renewable energy potential do little to explain RPS adoption in New England. Resource-poor states such as Connecticut and Massachusetts had little existing generation and seemingly little potential when they adopted their policies. However, renewable energy potential was not the only motivator to adopt. Maine adopted in order to protect its renewable generation (which was equal to roughly 60% of total generation at the time) as the state restructured its electric sector. Why then did New Hampshire not seek to protect its considerable renewable energy generation when it restructured and why has Vermont abstained from adopting a RPS all together? The high prices paid to facilities under the "qualifying facilities" provision of the Public Utility Regulatory Policy Act of 1978 (PURPA) in New Hampshire and Vermont seem to explain this odd occurrence. Future econometric models could test an interaction term between existing generation and compensation levels paid under PURPA to see if it resolves the ambiguous effect of existing generation that previous research has found. Beyond this one finding, the findings of this study have other implications for the econometric literature on renewable portfolio standards.

Several findings suggest needed changes to the models currently being used to predict RPS adoption. The first is that the list of in-state provisions identified by Lyon and Yin (2010) need to be expanded to include exclusionary provisions that are not explicit, especially capacity limits. As this study has documented, states are influencing not only the adoption of RPS policies in other states but also revisions to those other states' policies. This dynamic, and the many revisions that are occurring, call for a move beyond the binary "adopt/don't-adopt" dependent variables that have been used throughout the literature and which do not capture changes over time; Matisoff (2008) has also identified this need. Another variable in need of clarification is the influence of the renewable energy industry. The relationship between coordinated constituencies and renewable portfolio standard adoption and design was affirmed by this study, but the literature has yet to find a means of measuring this relationship. While Lyon and Yin (2010) found a strong relationship between RPS adoption and the presence of a renewable energy lobby, they used the presence of an American Solar Energy Society (ASES) chapter (a binary variable) to estimate adoption. This study's findings suggest that this is far too crude a measure since it is often project developers (rather than associations) which drive the RPS policy development process. It is also not clear that ASES is a good indicator of the presence of a renewable energy lobby.

Conclusion

The thirty-three instances of renewable energy policy adoption and the subsequent fifty-three major revisions to RPS policies provide data points of state activity where the states have had the opportunity to legislate and regulate in a manner that is collaborative or combative. The history of RPS adoption and policy design in New England provides a good first attempt at examining these data points. The forty-five interviews for this study presented a consistent but complicated story about how legislating in the states is impacting intraregional collaboration. While ambiguities remain, it is clear that much of the literature on renewable portfolio standard adoption has been too simplistic in its explanations as both internal factors and diffusion impact adoption and they do so in complex ways. RPS policy design is likewise a function of both internal determinants and policy diffusion.

The dynamics of policy diffusion are clearly at play in the New England states, providing one level of collaboration as states routinely look to each other for lessons. This interstate interaction also has positive competitive dimensions. States in New England compete, as suggested by Barry Rabe (2007), to be leaders in renewable energy. These states also compete to export generation to other states. At the same time, competition is also a manifestation of parochialism; capacity limits are one universally employed method of excluding out-of-state generation, while solar carve-outs and long-term contracting have similar effects. Disaggregating the different motivations for these exclusions is difficult. RPS policy design is a process driven by local interests, including renewable energy project developers and environmentalists. At least some of the preferential treatment is thus a product of the fact that the bills are being written as a result of their lobbying. At the same time, some interviews suggested that more parochial interests were drivers.

While illuminating this new question of whether environmental interests or parochial interests drive resource exclusion, this research also provides insights for existing research and, in places, suggests a course correction. The method adopted by this study provides for some insights not afforded by more quantitative methods including the depth and dimensions of interactions amongst states. The granularity of its findings also helps to solve some of the puzzling ambiguities within the literature. Yet, while the study provides further clarity on the dynamics of RPS policy design it also raises new questions.

It is clear that RPS policy adoption and design are influenced partly by collaboration and competition, but the boundary between interstate and intrastate influences needs to be more closely examined.

Another area in need of exploration is how policy adoption in other states can have divergent impacts on a state's decision to adopt a similar policy. Is the divergent response of Vermont to free-ride on the efforts of other states the result of the

peculiarities of Vermont? Or is it indicative of a universal phenomenon? Is there, for example, a threshold of market development after which it makes sense for new entrants (states) to free-ride on the efforts of earlier adopters? Likewise, is the trend for increasingly inclusive generation criteria a phenomenon that is common outside of New England? And to what extent are in-state constituencies and out-of-state policy development influencing this process? Further study could do much to develop this area of research, beginning with an exploration of these questions.

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