Regulating Electric Transmission Policies in the American States

Sandra Davis
Department of Political Science
Colorado State University
Ft Collins, CO, USA 80525
sandra.davis@colostate.edu

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Introduction

Although many forms of energy affect a nation's future productivity and economic success, the focus here is on electricity and, in particular, the high-voltage transmission of electricity. As an energy source, electricity is important because it provides forty percent (40%) of all energy used in the United States. Wholesale electricity is generated at more than 10,000 plants across the country and transported via high-voltage lines. Those who operate the 157,000 miles of transmission lines must anticipate and deliver different amounts of electricity which vary by the time of day, weather conditions and other factors (U.S. DOT OEDER n.d.). The process of planning and siting transmission lines is an issue that is increasingly receiving public attention because of policy changes that have occurred since the late 1970s.

The electricity regime of public and private actors, laws, regulations and norms that shape decisionmaking is complex and dynamic. First, authority sharing in a federal system resides in multiple levels of government (and is also influenced market decisions). The federal government is currently pressing to move transmission siting and planning from a state to a regional level. States have taken the initiative to adopt policy in related areas such as climate change and renewable fuels as the federal government failed to address these issues with comprehensive legislation. In addition, a variety of economic and political factors play out in different ways across the 50 states. These factors will be examined to better understand pressures that facilitate and hinder the expansion of high-voltage transmission lines. To accomplish this goal, a model is created to identify the factors that inhibit and facilitate transmission expansion. The paper will discuss traditional intergovernmental relationships, set forth the model, present the findings and conclude with an assessment of the model and its explanation of transmission policy.

Traditional Authority Relationships between the States and Federal Government

In the monopolistic electricity system developed early in the 20th century, individual utilities planned, constructed, owned and operated their own generation plants and transmission lines. Electric utilities both generated power and delivered it to customers in geographically defined areas that were primarily regulated by state agencies.[1] From 1935 to 1965, states regulated vertically integrated utilities that provided the services necessary to provide its customers with electricity. A state public service commission provided permission for construction projects, reviewed utility service and regulated the price of retail electricity Tomain and Cudahy 2004, 109-110). FERC dealt with wholesale and interstate sales of electricity (Tomain and Cudahy 2004, 264) as well as interstate generation and transmission.[2] State regulators made decisions about transmission line expansion (Struble 2008, 577) based on complex technological criteria. Electricity policy decisions were not highly visible or salient. State agencies such as public utility commissions reviewed and generally approved utility requests to expand transmission service necessary to deliver power to customers. This vertically integrated system was institutionalized by the 1920 Federal Power Act.

After World War II, the demand for electricity grew and utilities began to find it to their advantage to build jointly-owned generation plants and transmission lines (Abel 2007; Tomain and Cudahy 2004, 269; U.S. DOT EIA n.d.). Interstate generation and transmission were federally regulated. Utilities adopted voluntary standards to promote coordination and reliability. The electricity industry gradually came under strong pressure as technical change slowed, inflation and labor costs rose, the construction of new nuclear electrical plants ended and electricity prices rose.

Since the 1970s, major changes in the electricity industry have occurred and are still in progress. One major impetus for change came from federal policies that promoted competitive wholesale and retail electricity markets and often separated generation from transmission. The Public Utilities Regulatory Act (PURPA) of 1978 encouraged small generators called qualifying generators as an alternative to large scale utilities. They produced cheaper electricity that local utilities had to buy, promoting increased competition and a new market for electricity. In 1992, Congress passed the Energy Policy Act (EPA92) that encouraged companies to build generation plants away from demands centers and required bulk transmission of power across a transmission system that was not designed for this load. EPA92 also authorized the Federal Energy Regulatory Commission (FERC) to open access of the transmission system to wholesale electricity. The agency did so in Order No. 888 (1996) and Order No. 2000 (1999) which separated utilities' generation and transmission capacity and established independent system operators (ISOs) and regional transmission organizations (RTO) that manage transmission systems but don't own them (Abel 2007; EPSA 2011; Joskow 2005, 103-104; Tomain and Cudahy 2004, 270-282; U.S. DOT EIA n.d.).

Some states responded by restructuring their electrical industry to promote competitive markets. Others chose to retain their traditional regulatory structure although they had to adjust to competitive wholesale markets and a transmission system that was separated from generation. The current system is a combination of older integrated utilities and newer competitive markets which create a "balkanized U.S. electricity infrastructure" (Trahan 2010, 3). As utilities and customers were given the option to acquire electricity from a variety of generators, the need for expanded transmission system that could transmit electricity longer distances was created.

Second, there was also pressure for change as states encouraged the use of renewable fuels in electric generation facilities. Some states adopted Renewable Portfolio Standards (also called a Renewable Energy Standard) that required a defined percentage of electricity be generated from renewable fuels by a specified date. By 2012, twenty-nine (29) states had established these requirements. Many renewable fuels are located in remote areas a long distance away from customers, requiring new or expanded transmission line (FERC 2011).

This discussion of renewable fuels is part of a larger discourse about climate change that involves national environmental groups, academic researchers, Washington think tanks, trade associations and renewable energy generators, fossil fuel utilities and government regulators. Decisions about generation and transmission that used to be the purview of state regulators have expanded and become fractious. Planning and especially transmission line siting have become part of a highly contentious debate about carbon emissions (Wassertrom and Reider 2010, 3). Yet, despite all the changes, states continue to have authority to site new transmission lines. To evaluate the factors impinging up states' decisions about transmission expansion, a model is now presented.

The Model

An explanation is synthesized from existing models to incorporate the diversity of factors at play in transmission policy. The model based assumes that no single factor will explain a complicated policy issue such as transmission (Lowry 1992, 10) and draws from models of state regulatory policymaking and policy diffusion.[3] Gormley's salience and complexity model (1986) evaluates how the change in the transmission issue affects the decisions making process. Lowry helps explain the dynamics of federalism by emphasizing that vertical and horizontal federalism are different but important. Vertical federalism is illustrated by the federal government's pressure for competitive markets, separation of generation and transmission and goal of more coordinated transmission planning. Horizontal federalism, on the other hand, explains the diffusion of policy among states. To guide the evaluation of diffusion of transmission policy, I rely on Ingle, Cohen-Vogel and Hughes' model of diffusion (2007). The elements of the model are now discussed.

Characteristics of the Issue Area

Gormley argues that the salience and complexity of an issue determine the type of policymaking that occurs. During much of the 20th century when states regulated vertically integrated utilities, utility generation and transmission decisionmaking was Board Room politics characterized by minimal public influence, little media coverage and few court suits (Gormley 1986, 606-608). Politicians did not participate actively and most disputes were resolved in the state public utility commission arena in which utilities were important participants.[4]

As electricity policy became more salient, transmission began to transition into Operating Room politics. A focus on restructuring and renewable energy brought attention to the policy. The general electricity policy area has moved from Board Room (low salience and high complexity) into the Operating Room category (high salience and complexity) and utilities are no longer are the major political participants that influence policy. Rather, high level bureaucrats and politicians now routinely participate. Politicians address the issue although they are more likely to focus on procedural changes (such as structural changes to public utility commissions or opportunities for citizens to participate through administrative procedures) rather than substantive changes. Higher level bureaucrats often dominate because of their expertise. Citizen groups participate even though the complexity of the issue limits their ability to influence policy decisions.

Several issues arise with the application of Gormley's model to the electricity regime. First, it was not created to track changes across time but transmission policy is a dynamic issue. The movement of electricity politics from one category to another helps compensate for this limitation. Another issue arises with Gormley's model because contrary to his expectation, state politicians were very important in making decisions to maintain a regulated or adopt a restructured electricity system. Furthermore, some politicians such as former Colorado Governor Bill Ritter have acted as policy entrepreneurs to campaign and define their administration as one that promotes a green economy that brings new companies and jobs to the state (Jaffe 2010).[5] Transmission is more consistent with Gormley's model because high level bureaucrats in FERC, state public utility commissions, state and local siting agencies and/or transmission organizations make substantive decisions. The saliency of transmission is another matter to be considered. While transmission may be of limited interest to the public, those who seek to expand clean electricity or manage the electricity regime are well aware of the need for more interstate transmission lines, making transmission a more salient issue.

Federalism

The next component of the model is federalism. Lowry distinguishes between vertical and horizontal federalism. Vertical federalism occurs as federal officials pressured states to undertake changes. Federal involvement can be accomplished through "… signaling, cue taking, information exchange, development of professional associations and coordinated research" (Lowry 1992, 15). Or federal involvement can result from legislative or regulatory directives. It is also possible that successful programs at the state level may be adopted by the federal government in a bottom up dynamic. Posner (2010, 74-75) argues that as more states are credited with policy innovations, the federal government is more likely adopt their successful programs. For example, in a policy area such as climate change, state success has spurred federal officials to consider incorporating state innovations into federal policy. The other type of federalism is horizontal in nature. This type of federalism encompasses the relationships among states. Since this type of federalism is at the heart of policy diffusion, the focus now turns in that direction.

Diffusion

Like Lowry's horizontal federalism (1992, 15-17) that examines the effect of state interaction with other states, diffusion is concerned states adopting programs from their neighbors. Diffusion asks if or how policy ideas are borrowed from nearby states. Thus, Lowry's horizontal approach is incorporated into Ingle, Cohen-Vogel and Hughes' diffusion model which has 2 components: diffusion of policy across states and internal determinants that influence states' decision about the adoption of new policy. In an attempt to explain both innovative adopters and "hold-out" states, Ingle, Cohen-Vogel and Hughes incorporated two approaches to diffusion. First, there is regional diffusion (Dye, 1990; Mintrom and Vergari, 1998; Mooney, 2001; Pierce and Miller, 1999; Sabatier, 1988; Walker, 1981) characterized by a) interstate competition to adopt policies that produce resources such as jobs or a better educated citizenry and b) professional networks that provide information to assist states that consider adopting new transmission policy. Second, internal determinants (Haider-Markel, 1998; Mohr, 1969; Mintrom, 1997; Walker, 1969) are factors that may persuade states to adopt new policy. The factors are 1) economic such as the need to strengthen the economy and provide revenue to pay for services, 2) demographic characteristics such a growing need for electricity that may convince states to expand it transmission lines and 3) political factors such as the intensity of public opposition which might block the adoption of a program. Combining both approaches provides a more complete explanation of policy diffusion across the states (Ingle, Cohen-Vogel and Hughes 2007, 613-624).

Methodology

Research Questions and Analysis

In this complex landscape, it is important to learn why some states are more successful in promoting an expansion of the power grid than others. First, what is the effect of vertical federal pressure on states to adopt policy to promote the expansion of transmission lines? Second, are there factors that encourage states to borrow policy ideas from nearby states? Third, are the factors affecting transmission policy internal determinants specific to each state?

A variety of data are analyzed to answer these questions. They come from reports and data released by 3 trade associations, 4 research organizations, 4 federal agencies and 1 environmental group (see Appendix I). Quantitative analysis is done to assess the impact of variables from the model on state transmission policy. Bivariate nonparametric measures of association determine the strength of relationships across the forty-eight continental states. However, due to limitations of bivariate analysis and indicators that only approximate the effect of important explanatory factors, qualitative analysis will provide more in-depth analysis. None of the analysis will be definitive but reliance on different types of type of data and analysis will strengthen the analysis.

Variables

Dependent Variable. The dependent variable of greatest interest is the success of states in building sufficient transmission lines to promote renewable energy and provide reliable electric service to customers. Unfortunately, measures of the necessary expansion transmission service and the states' success in providing it are limited. First, there is disagreement about amount of necessary expansion. Although it is commonly asserted that the need for expansion is urgent (see Eagle 2005; Meyer and

Sedano n.d.; US DOE 2007), a recent MIT study questions this by noting the system is reliable and has been upgraded and expanded with new lines (MIT 2012, 7-11).[6] Furthermore, the definition of necessary expansion depends on the goals of different parties. Some want to promote renewable energy which requires a different electric grid than is necessary for nuclear or fossil fuel generated electricity. Thus, determining how much and what kind of expansion is needed is problematic.

Second, there is limited information about what states are doing to expand transmission. While states approve transmission siting, they are only one of a number of institutions that gather data and make decisions about the electric grid. Much of the available data is compiled by transmission companies, independent system operators and reliability councils rather than states, making it difficult to secure state level indicators. Third transmission is traditionally evaluated in terms of reliability or the ability to provide sufficient electricity while meeting the standards established by National Electricity Reliability Council (NERC) and FERC.[7] These measures neither incorporate the challenge of integrating renewable energy sources nor the need to build transmission lines in geographically remote areas where renewable energy sources are located.

Recognizing these limitations, the dependent variable used in the statistical analysis is drawn from the Department of Energy's 2009 congestion study. DOE identified Type 1 Conditional Congestion Areas in which substantial additional generation would be constrained by inadequate transmission availability (US DOE 2009, 22-23). If a portion of a state included conditional constraint areas, it was coded 1 while states with no or very limited conditional constraint areas were coded 0.[8]

Independent Variables. The effect of vertical federalism is measured as the number of states that chose to respond to federal encouragement to restructure their electricity operations. There are 15 states with active restructured electricity systems. Another 7 states launched restructuring but then suspended or stopped it, returning to a regulated system. When these 7 are added to the 28 states with regulated electricity, 35 states are classified as regulated and 15 as restructured (US EIA 2010).

Diffusion occurs via interstate competition and professional networks that are measured by the presence or absence of a Renewable Portfolio Standard, competitiveness rankings and membership in professional associations. First, states are categorized according to their decision to adopt a Renewable Portfolio Stands. Sixteen states have an accelerated program requiring that 18-40% of the electricity come from renewable resources, 13 states have a 10-15% requirement and 21 states have not adopted a RPS. Second, competitiveness of the states is examined. An index of long term competitiveness is based on a series of sub-indexes focusing on government and fiscal policy, public security, infrastructure, human resources, technology, business incubation, openness and environmental policy. For example, a state high on the index might be characterized by a good bond rating, low crime, widespread availability of high speed internet, a well educated population, the award of a high number of science and engineering degrees, availability of venture capital and lower carbon emissions. These qualities should foster the creation of new businesses and strengthen existing companies (BHI 2010). A subindex, infrastructure competitiveness, focuses on electricity prices, availability of high speed internet, price of rental units and travel time to work (BHI 2010). Third, membership in an Independent System Operator (ISO) or Regional Transmission Organization (RTO) is indicated. These organizations, which operate but do not own transmissions, analyze the operation of the grid to insure that lines do not become so overloaded that the grid fails. Twenty seven states belong to these organizations that provide two-thirds of the electricity across the country (MIT 2012, 4). States belonging to these organizations gain access to transmission expertise and planning processes (Brown and Sedano 2004, 51; NCEP 2008, 9).

There are numerous internal determinants unique to the state that may affect its transmission decisions. These determinants may be categorized as economic, demographic or political. An index measuring the ratio of electricity generated to that sold (US EIA, SEDS n.d) classifies states as electricity importers or exporters. Values in the index below 1.0 indicate the state generated less electricity than it sold.[9] States lacking generation capacity rely on exports to meet demand. An index above 1.0 indicates that the state generates more than it utilizes and may export to other states. This data was coded two ways. First, states that had the greatest need for transmission (ie, the lowest quartile that imported most and the highest quartile that exported most) were distinguished as opposed to states that were closer to balancing their generation and sales (the two middle quartiles). A second variable was created from the same data by distinguishing exporting from importing states. Finally, the price of electricity was also measured to distinguish the 25 states that paid more from the bottom half of states that paid less (US EIA, SEDS n.d.).

Internal demographic determinants focused on population growth and growth in the use of electricity. Each state's rate of population growth from 2000 to 2010 was measured and categorized as above or below average (Census). The increasing rate of electricity use variable was also coded as above and below average (US EIA, SEDS n.d.).

Finally, political determinants of state transmission decisions are examined. In some states, governors and other officials have chosen to build a green economy in which to promote the expansion of renewable energy resources. If successful, the existing transmission system could be overtaxed. To measure the governors' efforts as a policy entrepreneur, their state of the state addresses for 2011 were analyzed to see how often energy was mentioned and whether those mentions focused on renewable energy.[10] Another political factor that might impinge upon a state's effort to expand the electric grid is the level of each state's environmental support. The League of Conservation Voters Scorecard for the U.S. House of Representatives was used as an indicator of environmental support. Each representative's score is based on the proportion of time that s/he supported environmental protection measures in the U.S. House of Representatives in 2011(LCV 2011).[11] Measures of partisan control of the executive and legislative branches in 2011 are additional indicators of political effect. Executive control was coded as 0 for Democratic and 1 for Republican control while legislative control also included a divided government category.[12] The locus of siting authority indicates whether a state's decision is made at the state level or whether it occurs at the local or state and local levels (Tri-State Generation and Transmission Association, 2011, 5-9). A more decentralized process provides more venues for opponents to block projects. The final political variable reflects the National Council on Electricity Policy's analysis of the language in 38 state statutes that encourages or discourages coordination of interstate transmission projects (NCEP 2008, 7-11).

Research Expectations

The first expectation suggests that state response to vertical federalism will affect the level of transmission congestion. Regulated are less likely to explore or succeed with new options and, therefore, more likely to face congestion problems. Expectation 1: Regulated states will have greater congestion problems than states that are restructured.

States that are more competitive in promoting their economic well-being, are more likely to monitor nearby states' policy, adopting programs to promote economic prosperity. Such states seek to plan and build new lines that provide the electrical power that a growing economy requires. Expectation 2: More competitive states will have fewer congestion problems because they are more likely to promote transmission expansion.

The diffusion model holds that states more involved in professional organizations are likely to adopt new policy. States that have joined an ISO or RTO have acquired access to information and professional expertise. Furthermore, some of these organizations plan for future needs. Expectation 3: States involved in organizations such as ISOs and RTOs will have fewer congestion problems.

The model suggests that internal determinants such as economic, demographic and political factors will influence states' decisions about transmission. These determinants might either facilitate or hinder the process of transmission expansion. States with high electricity prices should seek transmission expansion as a strategy to bring in less expensive electricity. Similarly, states that generate more or less electricity than they need have an incentive to promote grid expansion that can be used to import or export surplus power. Expectation 4: States with lower electricity prices will have more congestion because of greater demand for this inexpensive electricity. Expectation 5: States that need to import or export electricity will face greater congestion issues.

Demographic variables are also expected to be important. Higher increases in population growth and the rate of electricity consumption are likely to create pressure on the transmission system. Expectation 6: States with a faster growing population are expected to have more congestion problems. Expectation 7: States with increasing demand for electricity will have more congestion.

Finally, political determinants are examined. Based on the characteristics of the transmission issue (salience and complexity), bureaucrats rather than politicians are expected to make most the substantive policy decisions. Thus political factors should have limited effect. Expectation 8: political variables such as gubernatorial leadership, environmental support, partisan control of state institutions, level of siting authority and latitude for coordination allowed by state laws are not expected to be related to transmission congestion.

Quantitative Analysis

The effect of vertical federalism was measured as a state's choice to maintain a regulated electricity sector or to adopt a restructured system based on market competition. Since regulated states were assumed to be less likely to explore new options, they were expected to face more congestion options. As Table 1 indicates, this is what happens (phi = -.387, p = .007**).

The model suggests that interstate competition will be an important explanation for the diffusion of transmission policy. The first variable, adoption of Renewable Portfolio Standard might be expected to promote transmission expansion needed for the development of renewable fuels. This either is not the case or transmission policies have not been effective enough to reduce congestion. (phi =.100, p = .787). The other two measures of interstate competition are associated with transmission congestion. Competitiveness of states is measured as the degree to which states have policies and conditions that encourage general economic prosperity and growth. Contrary to expectation 2, states with policies and conditions to promote economic competition have more potential congestion problems (phi = .338, p= .019). Similarly, states with conditions that could facilitate infrastructure expansion such as appropriate planning processes and access to financing for infrastructure expansion are more likely to face a future in which generation expansion will be constrained by existing transmission capacity (phi = .472, p= .001). The findings are opposite expectation 2. One explanation for these results is that innovative states have pushed their economies forward and created more pressure on their transmission systems.

The diffusion component of the model also suggests that membership in a professional network provides access to information and expertise and, consequently, should be associated with fewer transmission problems. When professional network is defined as membership in an ISO or RTO, a weak relationship appears (phi = -.277, p = .055). States that are not members are somewhat more likely to face congestion problems. The relationship, while weak, occurs in the direction suggested by expectation 3.

The model also includes economic, demographic and political factors that may either facilitate or discourage transmission expansion. Two variables were used to measure economic forces that might influence state decisions. First, the price of electricity was associated with transmission congestion. States with lower electricity prices were more likely to face congestion than states with higher electricity prices (phi =-.420, p=.004). This supports the fourth expectation. The second economic variable measured whether a state imported or exported electricity. States that imported or exported the most were not more or less prone to potential transmission congestion (phi = .049, p= .732). The states were also categorized to distinguish between the 17 importing states and the 33 exporting states. Again, this difference between states was not associated with potential congestion (phi =.184, p=.202). Thus, the data fail to support the 5^{th} expectation.

Demographic variables included the rate of increase in population growth and electricity usage. Consistent with expectation 6, states with faster growing populations have more potential congestion problems (phi= .396, p = .034). Although growth in electricity use might seem to be more directly related to transmission capacity, the rate of growth in electricity usage is not associated with transmission congestion (phi=.204, p = .157). Thus, the data support one of the expectations (6) about demographic factors but not the other (7).

Finally, the political variables that might determine the states' policies were examined. Based on Gormley's description of issue characteristics, the 8^{th} expectation was that political variables would not be related because most of the decisionmaking on this complex and salient issue would be made by high level bureaucrats. To provide better evidence that political variables are not related to transmission, 7 political variables were included. Since governors have the ability to play a strong leadership role, 2011 state of the state addresses were examined to determine if the governors' policy agendas emphasized the importance of energy issues. The addresses were coded to indicate whether or not any energy topic (phi = .131, p = .364) or renewable energy issues (phi = 0.15, p = .915) were included in the state addresses (phi = 0.15, p = .915). Neither variable was related to congestion, suggesting that potential congestion was not a factor that moved governors to focus attention on the matter. The third variable is the League of Conservation Voters score for state delegations in the U.S. House of Representatives in 2011. This LCV score was weakly related. States with low support for environmental protection were a bit more likely to face congestion problems (phi = -.272, p = .059). Partisan control of the governorship and state legislature were also examined and found not be associated with congestion (phi = .095, p = 514 and Cramer's V = .231, p = .285, respectively). State siting authority was also examined to determine whether the states with sole authority had more centralized and potentially efficient processes that facilitated expansion. States with more decentralized authority vested in local governments or a combination of state and local governments were grouped together but the loci of state siting authority were not related to transmission congestion (phi = -.204, p= .167). Finally, the latitude for cooperation that state laws allow to decisionmakers was examined. Inward-looking or parochial laws prohibit or limit states' consideration of benefits that might be enjoyed outside state boundaries. This latitude, however, was not associated with congestion (phi = -.122, p= .452). Six (6) of the 7 political variables were clearly not related to transmission congestion while the state's support for environmental protection was weakly associated. Thus, the quantitative analysis suggests that factors other than politics better explain transmission capacity.

Qualitative Analysis

The quantitative analysis is suggestive but the qualitative analysis provides an opportunity to delve into specific institutions, laws and processes that may explain state decisions. This analysis examines vertical federalism, interstate competition, professional networks and internal determinants.

Vertical Federalism

Impetus for change was an example of vertical federalism. In 1978, the Public Utilities Regulatory Act (PURPA) encouraged small generators to produce cheaper electricity that local utilities had to buy, promoting increased competition and a new market for electricity. These small generators, however, did not have adequate access to transmission lines. In 1992, the Energy Policy Act (EPA92) encouraged the restructuring of wholesale electricity generation and required bulk transmission of electricity across a system that was not designed for this load. EPA92 also authorized FERC to open access of the transmission system to wholesale electricity generators. The agency did so in Order No. 888 (1996) which separated utilities' generation and transmission functions. The goal was to supply local utilities with competitively priced power and to provide these wholesale generators with access to transmission lines. California and three Northeastern power pools responded by creating Independent Service Operators (ISOs) to allocate limited transmission capacity, provide open access to many generators and plan for regional infrastructure that would benefit customers. The Midwest ISO was proposed in 1998 and a year later the Texas legislature added ISO responsibilities to the existing Electric Reliability Council of Texas (ERCOT). Anticipating that states would follow California's lead in fostering competitive markets, FERC issued Order No. 2000 (1999), to further separate generation and transmission by calling for Regional Transmission Organizations (RTOs) that managed transmission systems but did not own them. (Abel 2007; EPSA 2011; Joskow 2005 103-104; Tomain and Cudahy 2004, 270-282; EIA n.d.). Regional transmission organizations (RTOs) provided equal access to the electric grid, coordinated transmission outages, planned to address future needs and encouraged competitive market pricing. Transmission owners had to form a RTO or explain the barriers that stood in the way (Abel 2007; Joskow 2005 103-106; Pondent N.d., Tomain and Cudahy 2004, 270-282; U.S. DOT EIA n.d.).[13]

Initially, 22 states chose to restructure. The diffusion of restructured electricity systems stopped after the 2000-2001 electricity crisis that California suffered with its restructured system (Tomain and Cudahy 2004). Seven states were unsuccessful in creating the necessary competitive markets and by 2010, only 15 states had active restructured systems while the remaining 35 maintained a regulated regime (RAP 2011, 14). Factors that hindered competitive markets included lack of national policy creating a market model; limited federal authority to promote this change; and state wariness of expanding federal authority (Joskow 2005, 96-97). The current system is a combination of the older integrated utilities and the newer competitive system in a "balkanized U.S. electricity structure" (Trahan 2010, 3). Despite this balkanization, some states such as Texas positively responded, and put new laws in place to expand the transmission available for renewable energy.

In a second round of federal pressure to reshape the electricity regime, federal decisions made since 2005 continued to push states to make changes. First, in 2005, Congress passed the Energy Policy Act (EPA05) that gave FERC and Department of Energy (DOE) authority to encourage transmission line construction (Abel 2007). The law provided "backstop authority " to DOE and FERC. DOE is authorized to study transmission congestion and designate "national interest transmission" corridors. FERC may issue permits for the new lines. "Backstop authority" was not a sufficient stimulus to prompt states to undertake grid expansion. In 2007, the Bush administration identified 6,000 possible miles of "national interest transmission" corridors in 11 western states but the Ninth Circuit Court dismissed the corridors in February, 2011, because the states were not consulted and environmental analysis required by the National Environmental Policy Act was not conducted (Sullivan 2011; Tannen 2011). While FERC may approve transmission projects in "national interest transmission" corridors if states failed to act, the agency was not able to overrule "reasonable" state decisions. In a ruling that was one additional disappointment to expansion supporters, the Fourth Circuit Court ruled that FERC over reached its authority when the agency made two corridor designations (Behr 2009). A coalition of fossil fuel and renewable energy companies and transmission organizations asked the U.S. Supreme Court to reconsider this limitation of federal authority (Ling 2009) but the U.S. Supreme Court refused (Ling 2010).

Second, DOE has recently developed a new approach to encourage grid expansion. The agency will conduct the 2012 congestion study to identify problem areas. Once the study is complete, Energy Secretary Steven Chu will invite utilities, transmission owners and investors to submit projects to alleviate congestion. The new approach tries to reduce opposition to federal involvement in transmission decisions by linking future national interest corridors to transmission developers' priorities (Behr 2012). Third, in July 2011, FERC issued Order No. 1000 that required transmission developers to participate in regional planning efforts to create a strong transmission system.[14] Public utility transmission providers are required to submit plans by October 2012 while nonpublic transmission developers are not required to participate (Lewis 2012; Northey 2012).

Despite federal attempts to promote markets and foster integrated planning, some say the difficulties in transmission planning can be partially attributed to the federal push for change. Restructuring electricity regimes, introduction of wholesale market competition and separation of generation from transmission activities has created additional new participants and made it more difficult to plan and site projects. Utilities in regulated states that continued to provide vertically integrated services may find it easier to coordinate the incorporation of renewable fuels into their generation and transmission systems. Restructured electricity systems find planning difficult because of the larger number of participants (3 types of transmission line owners, another set distribution companies, transmission-dependent utilities, transmission planners and grid operators) (NCEP 2004, 50-56). Finding effective ways for participants in a restructured system to work together is a challenge.

In summary, vertical federalism has been a strong force. Congress, FERC and DOE have engaged in a long-term effort to pressure states, electricity generators and transmission providers and developers to make major changes in the electric system. There has been a decades-long response to this top-down pressure, producing a diversity of responses. While some states enthusiastically moved toward competitive markets, others either tried and failed to restructure or chose to maintain a regulated system. Despite this uneven response, the federal government continued to push for changes. Since 2005, federal agencies have been given authority to promote transmission expansion via congestion studies and, under certain circumstances, authorization to permit transmission projects that states failed to act on. At minimum, the federal government has inserted itself into a traditional state responsibility and, according to some, preempted state authority (Struble 2008, 589).

States and the Effect of Interstate Competition on Transmission Decisions

Regardless of whether a state is regulated or restructured, transmission developers are required to seek state permission to construct transmission lines. The states' siting policies and processes were initially set up to serve vertically integrated utilities that constructed their own transmission lines and they still work well when projects are small in scale and intrastate in nature (Eagle 2005, 4; Mayer and Sedano n.d., E7). Texas provides an example of a state that successfully sited recent transmission projects. In part, Texas was able to do so because most of its grid is located within the state and not interconnected with the two large grids (the Eastern Interconnection and the Western Interconnection) that supply electricity to the rest of the continental United States. Texas and its planning and siting processes are now examined.

Texas Mini- Case Study

Texas is credited with successfully creating a process that promoted both renewable energy and transmission expansion. Texas might not seem to be a likely proponent of renewable energy given the importance of the oil and gas industry, but the state has installed more wind generation than any other state (Middleton n.d.). A number of factors explain why Texas moved quickly and assertively to expand its transmission capacity. It had reason to be concerned about its future supply of electricity: a high level of electricity use, isolation from the Eastern and Western Interconnection grids and the need to import fossil fuels to generate electricity. Issues of air pollution and greenhouse gases also made wind energy an appealing choice (Pew Center on Global Climate Change n.d). To address the problems, Texas turned to renewable energy and expanded transmission. This worked for the state since it is blessed with tremendous wind resources; in fact, it is number 2 in potential wind capacity. Finally, the state may have felt comfortable in working out conflict between protection of individual property rights and the expansion of the wind energy sector because of its experience with the fossil fuel industry (Smith and Diffen 2009-2010, 176).

The Texas Legislature passed electric sector restructuring to promote a competitive retail electric market (Senate Bill 7 or SB7 in 1999) (Trahan 1010, 7). In 1999, SB7 mandated an increase in renewable energy production but lacked provisions to increase transmission. As production of renewable electricity increased, existing transmission lines became more congested (Middleton n.d.). In response, Senate Bill 20 (SB20) 1) again increased the renewable energy goal and 2) required the Texas Public Utility Commission (PUCT) to create Competitive Renewable Energy Zones (CREZ) (Middleton n.d) to facilitate the construction of new transmission lines (Smith and Diffen 2009-2010, 202 & 207). Texas has an advantage over most other states because most electricity generated and transmitted in Texas is intrastate (Smith and Diffen 2009-2010, 201).

Senate Bill 20 created Competitive Renewable Energy Zones (CREZ) to establish an integrated system in which both renewable generation and transmission were planned together. ERCOT identified the best wind resources in the state which were located in remote locations with insufficient transmission infrastructure. CREZs were identified in these areas and the PUCT devised a process by which transmission service providers (TSPs) were selected to construct the new lines (Smith and Diffen 2009-2010, 201-202). In May, 2009, eight companies were chosen as TSPs (Smith and Diffen 2009-2010, 208). Once a TSP received regulatory approval, the provider negotiated with the landowners. If owners refused to settle on a payment for the use of their land, transmission companies were authorized to use eminent domain proceedings to acquire use of the property (Texas Tribune 2011). Some landowners in the Hill Country of Texas appealed siting decisions. In one instance, the PUCT ruled in their favor, saying it was possible to forego the new project if a shorter existing line was upgraded; however, the commission warned it might ultimately be necessary to construct the longer and more intrusive project in the future (Galbraith 2010). The speed with which the state moved and support it lent to the development of renewable energy projects made it difficult for opponents to mount effective resistance.

In summary, Texas chose to promote renewable energy, competitive electricity and transmission markets. Texas law authorized two state agencies, PUCT and ERCOT, to plan and execute transmission expansion that would deliver renewable energy. More so than is normal in many states, these agencies had centralized authority that allowed them to expeditiously expand the power grid for two reasons. First, the permitting process was less cumbersome than that found in other states. Second, although opponents occasionally persuaded the PUCT to move transmission lines elsewhere, much of the time state law gave developers eminent domain authority to proceed with their projects. Whether Texas' rapid move to increase its transmission infrastructure is a good thing is a matter that is debated within the state. It is clear, however, that the unified decisionmaking process provided important support for the development and transmission of renewable energy. With its intrastate transmission projects, Texas had an important advantage over other states: the state permitted and built intrastate projects that did not require consideration of the needs or benefits flowing to other states. This issue of intrastate and interstate benefits is an important factor that can hinder states ability to cooperate on transmission projects.

The Effect of Parochial Laws on Interstate Competition and Policy Diffusion

Another aspect of interstate competition explored in this qualitative analysis is the issue of parochial laws that prohibit a state from considering transmission project benefits that accrue to citizens who live outside the state. State laws may emphasize or require that benefits for in-state citizens determine whether a project is built (Meyer and Sedano n.d., 586). The states vary in the degree to which parochialism may derail interstate projects. One extreme example of parochialism is a project that Mississippi Power and Light wanted to build that would send electricity out of the state and into Louisiana. Although Mississippi government initially granted the power company the right to proceed, the utility confronted problems when landowners refused to sell their property. Mississippi Light and Power proceeded with condemnation. When the landowners contested this in court, the Mississippi Special Eminent Domain Court dismissed the utility's attempted condemnation because project benefits were primarily regional rather in intrastate (Struble 2008, 593-594). Mississippi resides at the end of the continuum at which parochialism dominates. States such as Pennsylvania have parochial laws but their courts have chosen to place little emphasis on the requirement that projects provide in-state benefits. Wisconsin and Ohio are at the opposite end of the continuum because their laws expressly allow officials to evaluate transmission projects by considering interstate benefits (Struble 2008, 595-596).

Twenty-three (23) states encourage interstate cooperation and coordination. This may take several forms: language that encourages cooperation more generally or specifies joint investigations and hearings. Statutes may also authorize states to enter into transmission compacts with other states for the purpose of planning and building transmission lines (NCEP 2008, 7-8). States may also be guided by language that emphasizes the importance of an adequate supply of electricity; promotion of environmental and economic benefits to the state; and reliance on interstate generation of electricity to insure that electricity availability and reliability to the state and its neighbors (NCEP 2008, 10-12). Although states with parochial laws may be limited in their ability to cooperate in interstate projects, there may be offsetting statutory language or court decisions that allow them to move forward in the pursuit of expanded transmission (Meyer and Sedano n.d., E13). On the other hand, there are instances in which courts, legislatures and agencies emphasized the value of interstate benefits. For example, the Superior Court of Pennsylvania held that regional integration is a direct intrastate benefit to the state because of economies of scale, improved grid reliability and provision of alternative sources of energy in an emergency. Similarly, Massachusetts passed a statute that recognized the benefits from regional transportation may improve grid reliability. Finally, the New Hampshire Public Utilities Commission found that interstate benefits are as desirable as those delivered within the state. As regional energy markets become important, states may find additional ways to respond to the new importance of interstate lines and regional planning (Eagle 2005, 8-10).

Professional Networks

Another factor that may facilitate policy diffusion and interstate cooperation is membership in professional networks. Policy diffusion is stimulated by professional networks that provide a forum at which states may obtain information and learn about policy successes in nearby states. Although the quantitative analysis showed only a weak relationship between congestion and membership in RTOs and ISOs, these and other professional networks that can foster cooperation on interstate projects.

Independent System Operators (ISOs and Regional Transmission Operators (RTOs) such as PJM (Pennsylvania-New Jersey-Maryland) operate transmission lines and plan for grid expansion. The ISOs and RTOs serve two-thirds of American and more than 50% of Canadian customers. States that do not belong to these organizations are primarily located in the west and southeast (IRC 2010; NCEP 2008, 1).

The North American Electric Reliability Council (NERC) and 8 regional reliability councils monitor the reliability and security of wholesale electricity transmission in North America. NERC establishes and enforces reliability standards, trains personnel and assesses the capacity of the system to provide for future needs. One regional affiliate, the Western Electricity Coordinating Committee (WECC) has long assessed the reliability of transmission systems and planned for needed expansion across the entire western United States and Canada. Only recently has an interconnection-wide planning process been undertaken in the eastern United States (MIT 2012, 84; NCEP 2008, 16).

The National Association of Regulatory Utility Commissioners' (NARUC) and its affiliate groups provide another professional network that states can tap into. Every state has a membership in NARUC and one of its affiliate groups. Affiliate groups meet regularly and provide a forum for open discussion. These groups do not have regulatory authority to compel states act (NCEP 2008, 16).

Other planning organizations include large utilities such as Southern California that provide power over several states (NCEP 2004, 51) and interstate compacts such as the Northwest Power and Conservation Council that provide a forum through which states can work together on transmission projects. Finally, decisionmaking forums created to address expansion for renewable energy such as California's Renewable Energy Transmission Initiative (RETI), Texas' Competitive Renewable Energy Zones (CREZ) which was discussed above and the Western Governors Association's Regional Transmission Expansion Planning exist (CEC n.d.; MIT 2012, 14-16; PUCT 2010; WGA n.d.).

There are obvious differences among these organizations: 1) some deal with electricity generated by all types of fuel while others focus on renewable energy, 2) some organizations have regulatory authority to compel its members to act while others facilitate discussion and 3) some have memberships from all states in their jurisdiction while encompass only some of the potential members. It is unclear which organizations are most influential or how the organizations with different missions might complement each others' work. The diversity and number of organizations, however, do provide multiple opportunities for states gain information from professional networks that may influence interstate transmission.

An Important Internal Political Determinant: Local Opposition

Internal determinants or conditions within a state are thought to be important determinants of states' decisions to site transmission projects. One such determinant is local opposition or "not-in-my-backyard" sentiment (NIMBYism) which is often mentioned as an internal obstacle to grid expansion. Infrastructure siting opposition is driven by the health or environmental impacts that local citizens fear. In particular, concerns over the effect of electromagnetic fields[15] on human health have prompted some states to route transmission lines away from cities when there is a viable alternative. The likelihood of local opposition derailing a project will vary according to proximity of the project near scenic areas, strength and effectiveness of opponents, the thoroughness and care taken in the siting and permitting process, the proximity to large population centers, regional energy economies and rapidly changing nature of politics (Eagle 2005, 11). When environmental concerns are raised, opponents are often chided for engaging in NIMBYism. Analysts, however, note that transmission lines can significantly affect the local environment (Eagle 2005, 11-12; MIT 2012, 98).

Transmission developers have fears of their own: the availability of multiple venues empowers local opposition (Eagle 2005, 6). Multiple venues exist when siting approval must be obtained from several states or several states and multiple local siting agencies. In over half the states (26), the siting decision is made by a state agency such as a public utility commission but in 7 states, siting authority is vested in local agencies while fifteen states requires both state and local approvals (Tri-State Generation and Transmission 2011, 5-9).[16] Part of the approval process often includes an environmental assessment related to endangered species, habitat protection, construction in roadless areas and visible impacts, further increasing opponents' ability to block projects (Meyer and Sedano n.d., E4). Thus, state and/or local siting authority may hinder transmission construction because of the multiple veto points through which a project must pass (Eagle 2005, 6). Furthermore, those who fear negative public health or environmental consequences are unlikely to be persuaded by the community-wide or region-wide benefits resulting from high-voltage projects (Eagle 2005, 11).

Montana Mini-Case Study

Montana's planning and siting process is analyzed to help explain local opposition and other internal determinants that influenced transmission politics. First, background about Montana electricity regime is provided. Montana began but had to abandon a restructuring plan when a retail market for electricity failed to evolve. Second, with a sparse population, huge land mass and excess electricity generation, the state found itself with a need to expand interstate transmission (Montana Legislature ETIC 2008, 43). From the utility perspective, this was good thing because it provided greater business opportunities. However, property owners who anticipated having transmission lines strung across their property were resentful that their land was defaced to deliver electricity to those outside the state (Missoula Independent 2007). Although a number of transmission projects have been proposed and opposed, attention will be focused on one of the most contentious ones to illustrate how transmission siting can become mired in controversy.

The Montana Alberta Tie Limited (MATL) was proposed as a 600 MW, 215 mile private line (Governor's Office of Economic Development 2011). When MATL found three companies that wanted to use the line, the project moved forward to secure funding from developer Tonbridge Power Corporation (a Toronto based investment firm) and began the permitting process. Despite this auspicious start, the project was soon overtaken with problems.

Construction of the project began in October of 2010 (Governor's Office of Economic Development 2011) but within a year, Tonbridge acknowledged they needed an extra $25 million (a number that was later increased to $50 million) even though the company had been awarded $161 million from DOE's Western Area Power Administration. Tonbridge attributed its shortfall to regulatory uncertainty in the state, disputes with its contractor, increased material costs and a judicial decision that removed eminent domain authority from energy developers (Puckett 2011a; Puckett 2011c). When the court revoked developers' eminent domain authority, the Montana Legislature passed a statute returning eminent domain authority (Taylor 2011c)[17] and MATL filed condemnation proceedings against 49 property owners. Although the Montana Supreme Court upheld the Legislature's eminent domain statute, Tonbridge continued to have problems. They halted construction in June, 2011, and announced they would not return to work until all necessary easements were obtained (and, presumably, adequate funding acquired) (Puckett 2011b; Puckett 2011c). In August 2011, Enbridge Inc. announced that it would purchase Tonbridge and take over construction of MATL (Puckett 2011c).

Still, the developer faced the possibility of local opposition. Property-rights activists, landowners affected by the transmission line, environmentalists and citizens who want to protect wildlife habitats, public health and scenic views opposed expanding the grid (Flynn and Magraw 2011). Some complained that transmission expansion would industrialize rural areas (Tyer 2011). Concerned Citizens Montana (CCM) was the most active opposition group. It provided a clearinghouse that informed its 3,000 individual and 19 organizational members and sought to promote innovative energy solutions that were not harmful to the community (CCM n.d.). Court suits and other protests continued. Some brought a lawsuit against MATL arguing the project had not complied with the Montana's Major Facilities Siting Act and that Tonbridge had no right to force owners to accept transmission lines on their property. Individuals and organizations unsuccessfully lobbied against the eminent domain bill passed by the legislature (Tyer 2011). Individual citizens also fought condemnation proceedings.

In summary, Montana was subject to quite different internal conditions than Texas. The need to expand transmission created a conflicting set of incentives within the state. While energy generators and transmission companies needed expansion to participate in the electricity market, citizens living near proposed lines were reluctant to deal with the impact of the towers and lines when those benefiting would be utility companies and citizens in another country. Furthermore, efforts to expand transmission in Montana were highly contentious and problematic due, in part, to the state's planning and siting processes that were less effective and efficient than those in Texas. First, the state lacked a planning process similar to that of Texas that would have put state officials in charge of the identification of the best wind resources and the construction of lines. Rather, it was private developers who identified desirable routes and took the initiative to obtain permits. Second, state government in Montana played a more passive and less encompassing role than Texas. Montana failed to quickly push transmission construction forward or lend legitimacy to expansion. The slow-moving permitting process gave opponents time and multiple points of access to delay or derail transmission expansion. Both opponents and supporters became committed to their position, promising that future decisions will continue to be made on a battleground. Thus, internal determinants worked to foster opposition to transmission expansion.

Conclusions

Drawing upon the quantitative and qualitative analyses, the model helped explain transmission politics. Vertical federalism in both analyses affected transmission congestion. States' choices to adopt a restructured or maintain a regulated system was related to transmission congestion. The efforts by

Congress, FERC and DOE to move states towards market competition and transmission expansion were important determinants of state policy. Much about the relationship of the federal government and states government, however, remains to be determined. The simplest solution to promote transmission expansion is said to be giving FERC centralized authority. Such a solution, however, comes at a price: excluding states will result in the loss of their knowledge about local conditions (MIT 2012, 101). It also fails to recognize the innovative policies that states passed in related areas such as energy and environmental policy (Posner 2010, 74-75). States are credited with expertise that surpasses that of the national government. Furthermore, this author assumes that the practical realities of federalism will promote a continuation of the state quo: Congress and federal agencies will incrementally continue to expand federal authority to move states towards regional planning and greater grid interconnections and the states will both comply and resist, continuing to retain important authority in electric transmission. Thus, vertical federalism helped explain the diffusion of transmission policy in the states but at the same time, states chose policy options based on incentives to both compete and cooperate. It should be noted that the model failed to emphasize the possibility of cooperation.

As the model suggested, diffusion resulted from interstate competition. The degree of overall state economic and infrastructure competitiveness had statistically significant associations with transmission congestion, even though the direction of the association was contrary to the expectation. Thus, innovative states face more potential transmission congestion, possibly because they are victims of their own economic success. In the qualitative analysis, evidence was presented that states approved or rejected transmission projects according to benefits they expected to receive. States traditionally were successful in planning and siting smaller intrastate projects that obviously and directly provide benefits for state citizens. States may currently be engaged in a reassessment of the relative benefits of intrastate and regional benefits.

The model also suggested that participation in professional associations would encourage diffusion of policy because states would acquire information about new policies that had worked in neighboring jurisdictions. In the quantitative analysis, there was a weak association between membership and less congested transmission lines. The qualitative description of numerous professional transmission associations available to the states raised more questions than it answered. Without interviews of transmission regulators and operators, it remains unclear whether and/or how much these associations might encourage states to move forward with interstate projects.

Finally, internal determinants that could sway a state to approve or reject interstate projects were examined. These determinants were categorized as economic, demographic and political factors. One economic variable (price of electricity) had a significant relation with congestion: states with less expensive electricity were more likely to face transmission congestion. This may indicate that states with competitively priced electricity have more opportunities to sell and transmit their energy across interstate lines. Population growth was an important demographic determinant. States with faster growing populations were more likely to face transmission congestion. Finally, the expectation that politicians would not shape substantive transmission policy was examined. It seemed prudent to examine a large number (7) of political variables to see if variables were related to congestion. Of the 7, none were statistically significant at $p < .01$ or .05 level although states with higher environmental support were somewhat less likely to face transmission congestion, possibly reflecting these states' commitment to energy efficiency.

The effect of a political variable, local opposition, was examined only in the qualitative analysis. Local opposition was noted as an obstacle to project approval. While it is a political variable, it did not contradict Gormley's expectations that politicians would have limited effect on substantive policy because it was citizen participation that was influential. Of course, Gormley also asserted that citizen participation would have limited influence (Gormley 1986, 612). The important effect of opposition likely occurred because citizens' concerns are about problems that affected them in a direct and personal manner. Thus, the issue was very salient but opponents simplified and reduced the complexity to a threat to personal well-being.

The importance of local opposition calls attention to the fact that political variables are more important in the qualitative than quantitative analysis. Local opposition was also more important in Montana than Texas. Texans stood to enjoy the benefits of an expanded grid while citizens in Montana complained they would suffer the effects of the transmission towers and lines while Canadian citizens and utilities enjoyed the benefits. Texas' intrastate projects were atypical of other states which meant that debate about intrastate versus regional benefits was avoided. Since most states find it necessary to construct some interstate lines, the Montana experience may be more likely to occur in other states. The state's planning and approval process emerged as a second important political determinant of transmission policy. Texas planning processes and decisionmaking provided fewer opportunities for opponents to veto projects. The Texas government centralized authority into its own hands, promoted clean energy and expedited the actions to expand the grid. This made it more difficult for critics to intervene. Montana's process was much the opposite in that its planning and decisions dispersed more authority. Since the state failed establish a comprehensive program based on clearly stated goals, public and private actors engaged in a chain reaction of decisions. Thus, planning and approval processes were important in both states but in Texas they facilitated transmission construction while in Montana they hindered it.

Endnotes

[1]The U.S. Federal Energy Regulatory Commission (FERC) has jurisdiction over wholesale electricity sales and transmission rates (MIT 2011, 5).
[2] FERC also has statutory authority to approve sale and leasing of transmission facilities and mergers or acquisitions between investor-owned utilities and regulate interstate commerce (Struble 2008, 583).
[3] Gerbe and Teske examine principal agency theory, Gormley's model of salience and complexity and Lowry's dimensions of federalism model.
[4]It is also possible that there may be conflict between two regulated industries or a dispute between one regulated industry and the general business community (Gormley 1986, 607). Neither of these patterns was evident in electricity transmission.
[5] The importance of legislators and bureaucrats is consistent with Andrew's finding that state innovation is not the prerogative of either legislators or bureaucrats (2000,33).
[6] MIT researchers, however, do acknowledge that that the "… fragmented and often inconsistent policy regime" will constrain the operators' ability to respond to new demands that will be placed on it (MIT 2012, 79).
[7] There is a reliability problem when a transmission loading relief (TLR) event occurs that forces operators to cut back on the flow of electricity to avoid a violation of NERC or FERC requirements. Such events often occur as the result of storms or equipment failure (U.S. DOE 2009, 7).
[8] A second type of conditional constraint area was not coded because it had renewable resource potential that is not yet mature enough to be developed. An example is offshore wind potential along the Pacific and Atlantic coasts (US DOE 2009, 22-23).
[9] Once electricity is generated and released, there is no control over the path it takes over the grid. It is possible that electricity generated in California that my measure assumes is being utilitzed in that state is actually transmitted to another state. The measure is an indicator the capacity of the state to generate the electricity compared to retail sales.
[10] In some states, governors give a state of the state address every two years. When a 2012 state of the state address was not given, the 2011 state of the state address or a 2012 budget address was analyzed.
[11] The House scores were chosen because in most cases they greater local variation in opinions that reflect numerous constituencies.
[12] States in which an independent or other party official was elected were excluded from the analysis (NCSL 2010).
[13] Both ISOs and RTOs carry out the functions prescribed by FERC Order Nos. 888 and 2000. Not all utilities belong to an ISO or RTO. Utilities in the Northwest and Rocky Mountain states tried and failed to create such organizations. Utilities must abide by FERC's open access standards but may do so by relying on contracts and purchase agreements to achieve the same result. By 2011, ten ISOs and RTOs (which perform similar functions) supervised transmission of two-thirds of the nation's electricity (Abel 2007; Joskow 2005, 103-106; Pondent n.d.; Tomain and Cudahy 2004, 270-282; U.S. DOT EIA N.d.).
[14] FERC Order No. 1000 also changes cost allocation procedures. FERC reaffirmed its decision again in May 2012 when it declined to rehear the issue (Lewis 2012).
[15] Eagle (2005, 11) indicate there is a lack of consistent link between electromagnetic field effects and cancer.
[16] Georgia and Tennessee are outliers. In Georgia there is no agency or agencies with siting authority. Utilities have eminent domain power that supersedes local government planning and zoning. In Tennessee, the Tennessee Valley Authority (a federal agency) owns 99.7% of the lines that are under federal regulation. The remaining 0.3% of lines are regulation by the Tennessee Regulatory Authority (Tri-State Generations and Transmisison Association 2011, 5-9).
[17] In June, 2011, the Montana State Supreme Court upheld this grant of authority (Land Letter 2011a).

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Table 1. Association of Independent Variables with Potential Transmission Congestion[17]

Variable	Phi or Cramer's V [17]	significance[17]	N[17]
Vertical Federalism			
Regulation v. Restructured Electricity	-.387	.007***	48
Diffusion: Interstate Competition			
Renewable Portfolio Standard	.100	.787	48
Overall Competitiveness Index	.338	.019**	48
Infrastructure Competitiveness Index	.472	.001***	48
Diffusion: Professional Networks			
Membership in ISO or RTO	-.277	.055*	48
Internal Determinants: Economic			
Balance Between Electricity Generation and Retail Sales	.049	.732	48
Importer versus Exporter States	.184	.202	48
Price of Electricity (Dollars per Million Btu)	-.420	.004***	48
Internal Determinants: Demographic			
Population Change, 2000-2010	.396	.034**	48
Increase in Use of Electricity	.204	.157	48
Internal Determinants: Political			
Governors' Mention of Energy in State of State Address	.131	.364	48
Governor's Mention of Renewable Energy	.015	.915	48
LCV Score of Environmental Support, US House, 2011	-.272	.059*	48
Partisan Control of Governorship,2011	.095	.514	47
Partisan Control of State Legislature, 2011	.231	.285	47
Level of Authority to Site Transmission Lines	-.204	.167	46
Degree that State Policy Allows Coordination with Other States	-.122	.452	38

Appendix I – List of Data Sources

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