The effect of stakeholder involvement on electricity generation: an IAD study of state electric sector decision-making

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Introduction

Today's electric sector is highly complex, with multiple actors and technical options for meeting consumers' needs. Electricity was once seen as the textbook example of a monopoly good, due to its reliance on large, capital-intensive coal, nuclear, and hydroelectric power plants with declining marginal costs of production (Posner 1974). By the end of the 20th century, however, the monopoly assumption had been discarded, and states began to restructure electricity markets to allow new sources of generation, primarily natural gas-fired power plants, to compete with more traditional sources (Cole and Grossman 2003). New technologies have also become available that blur the lines between producer and consumer. Factories, for example, can convert waste heat to electricity, and residential customers can self-generate using small-scale renewable systems (Borbely and Kreider 2010). Nor are these changes limited to the supply side of electricity. Advances in energy efficiency allow consumers to reduce their energy use in ways that, when aggregated, can avoid or forestall the need for new sources of supply (Gellings and Smith 1989). All of these changes increase the complexity of electric utilities' generation decisions.

As with electricity generation, governance in the electric sector has also become more decentralized and complex over time. Initially, electricity regulation – which occurs primarily at the state level -- was a highly centralized affair, primarily involving investor-owned utilities (IOUs) and state regulators. IOUs decided which resources to invest in, and state regulators could approve or deny cost recovery from ratepayer's investments (Jamison 2005). In the 1980s, many states began to experiment with resource planning, giving regulators more oversight over states' investment decisions (Gellings and Smith 1989). Regulatory oversight decreased in the early 2000s as resource planning gave way to market competition in many states, allowing market participants, not just IOUs, to make investment decisions (Markiewicz, Rose, and Wolfram 2004). More recently, concern over environmental impacts of the electric sector has prompted a number of states to enact legislative mandates requiring the inclusion of renewable energy sources or establishing energy efficiency programs (Carley 2011). Often, these mandates are accompanied by more inclusive resource planning processes that allows a wide range of

actors –such as consumer groups, state environmental agencies, and environmental advocates – to participate in developing, implementing, or overseeing state energy policy (Baldwin, 2013).

While scholars have begun to assess the effects of some of these governance approaches – such as competition (Markiewicz, Rose, and Wolfram 2004) and renewable energy mandates (Carley 2009), little is known about how resource planning affects outcomes in the electric sector. Stakeholder involvement in electric sector decision-making is similarly understudied. In this paper, I compare two states' approaches to electric sector resource planning – Minnesota and Maryland – to develop hypotheses about how a) resource planning and b) stakeholder involvement in resource planning affect key environmental outcomes, such as resource mix diversity, total electricity consumption, and use of renewable energy. Analysis is based on resource-related PUC decisions in each state from 1990 – 2012, tracking changes in resource planning rules and stakeholder participation in decision making during that time.

This paper draws on Elinor Ostrom's (2009) Institutional Analysis and Design (IAD) Framework to identify the way that formal and informal rules affect states' resource planning processes and, in turn, environmental outcomes. Ostrom (1990) defines institutions as "the set of working rules that are used to determine who is eligible to make decisions in some arena, what actions are allowed or constrained . . . what procedures must be followed, what information must or must not be provided, and what payoffs will be assigned to individuals dependent on their actions." This paper, then, identifies the key "set of working rules" that guide utilities' and merchant generators' decisions to invest in and operate electricity generation units. It also examines how these institutions have changed over time, as well as how divergent actors have participated in shaping and implementing the rules of the game.

This application of the IAD framework is somewhat novel. The IAD framework was developed to analyze governance of common pool resources, and has since been applied primarily in situations where a group of resource users have successfully overcome a collective action dilemma (Gibson, MacKean, and Ostrom 2000; Imperial and Yandle 2005; Shivakoti and Ostrom 2002). The electric sector, in contrast, does not present a collective action dilemma so much as a principal-agent problem (see below),

and presents a degree of institutional complexity that is missing from most commons dilemmas. Nonetheless, the IAD framework is well-suited to understanding the changing nature of the electric sector, because unlike most forms of policy analysis, it directs the analyst's attention toward the full range of actors who are involved in decision-making, as well as the way that formal and informal institutions shape those actors' behavior. Such a framework is needed to undertake analysis in the context of an electric sector has become more complex, with a wider range of actors, divergent interests, and evolving institutions that shape behavior.

It is important to note that the IAD is a framework for analysis – it directs attention to particular variables, particularly institutional variables, and requires examination of how these variables affect actors' behavior in a particular action situation. It does not posit any specific mode of analysis or any theoretical relationships between variables; indeed, one of the main uses of the IAD is to guide the deductive process of developing theories and hypotheses, usually followed by subsequent empirical or modeling work to test these theories and hypotheses.

This paper proceeds as follows. The following section provides an overview of the basic institutions and actors involved in the electric sector. Next, I briefly describe the paper's approach to case study selection, data, and methods of analysis. Finally, I assess Maryland and Minnesota's institutions and their likely affect on outcomes, using the IAD framework as a guide.

Electric Sector Background

While it is common to think of electricity as a commodity and electric utilities as selling kilowatt hours (kWhs), electric systems actually comprise three functions: generation of electricity; transmission of electricity from its point of generation to a specific distribution area; and finally, distribution of electricity to residential, commercial, and industrial users (Joskow 1997). Vertically integrated utilities take on all three functions at once, and this was the predominant business model when the U.S. electricity system – and electric regulatory system – was formed (Swartwout 1992).

The basic regulatory model adopted in U.S. states was designed to achieve two goals – reliability of service and low rates -- as simply as possible. Under this model, utilities

make investments in electricity generation and distribution, and state public utility commissions (PUCs) review these decisions and, assuming that the decisions were prudent, allow utilities to recover costs over time by charging customers a specified rate per kilowatt hour (kWh). Rates are determined by allowing the utility to recover capital costs plus a reasonable return on their investments (Jamison 2005). This "rate of return" approach to regulation gives utilities decision-making authority over what types of generation will be used and where those facilities will be located, while giving regulators decision-making authority over the rates that customers will pay.

It also, however, creates a nested set of principal-agent problems. In the larger of these principal agent problems, the PUC acts as the agent of the public interest, and must develop appropriate institutions to meet the needs of the public – usually defined by state Legislatures as minimizing rates while ensuring reliable service. In the smaller of these principal-agent problems, the regulator-as-principal is tasked with ensuring adequate service at low costs, while the utility-as-agent has an incentive to inflate costs in order to increase the "reasonable return" (Tollison and Wagner 1991). This principal-agent problem is exacerbated by the information asymmetry between the regulator and the utility (Williamson 1999) and the regulator's bounded rationality (March and Olsen 1984).

Neither of these principal-agent relationships was particularly problematic for much of the 20th century. Until the 1970s, the environmental impacts of electricity generation were not considered to be part of the "public interest," and the PUC's tasks were fairly straightforward: keep the lights on and rates low. During that time, demand for electricity was also steadily increasing and levelized electricity costs were decreasing, which allowed utilities to maintain consistent, high profits while keeping rates low for consumers. In the late 20th century, however, the energy crisis, increased environmental concern, and the availability of new supply and demand side technologies exacerbated both principal-agent problems.

Changed economic conditions in the late 1970s and early 1980s meant that utilities were no longer able to remain profitable without raising rates (Joskow and Rose 1985). Rate of return regulation, however, provides an incentive and an opportunity for utilities to inflate the costs of proposed investments or propose more investments than are

actually necessary to increase shareholder profits (Tollison and Wagner 1991). While new supply and demand side options were becoming available at lower costs – including natural gas units, small-scale hydroelectric plants, and demand-side management – these decentralized and distributed resources tend to undermine utilities' profitability, giving utilities an incentive to discourage their use (Moskovitz 1990). Thus, the wedge between the utilities' interests and the regulators' interests began to widen.

At the same time, increased public concern about the social and environmental impacts of electricity generation began to make the PUCs' role as steward of the public interest more complex. While low costs and reliability have always been – and likely will always be – key to PUCs' mission, citizens in many states began to express concern about the environmental effects of coal and nuclear power. The passage of the Clean Air Act in 1970 subjected most fossil fuel-based generators to basic regulation of air pollutants such as sulfur and nitrogen oxides, but did nothing to address the risk of nuclear waste or greenhouse gas emissions, two major concerns of environmental groups in the U.S. In pro-environment states such as Vermont, California, and Minnesota, legislatures in the 1990s began instructing PUCs to consider environmental costs in the resource planning process. Environmental costs are far more difficult to measure than cost or reliability, however, and PUCs have found it a challenge to weight environmental costs against the need for reliable power, as well as to translate environmental goals into rules and regulations to guide IOU behavior.

The emergence of these two principal-agent problems has given rise to a number of institutional changes in electricity regulation in the U.S., most of which focus on the utility-PUC relationship. There are two main approaches to addressing the wedge between utilities' and PUCs' interests. First, the relationship can be restructured, by putting resource decisions under market, rather than PUC, oversight. (This approach solves the problem insofar as the main wedge between utilities' and regulators' interests is cost-related). Such a change was prompted by the federal government in the 1978 federal Public Utility Regulatory Policies Act (PURPA), which required utilities to purchase electricity from merchant generators that could produce at less than the utilities' marginal cost, essentially mandating a competitive wholesale market (Cudahy 1995). Because PURPA left much of the institutional structure intact, however, the resulting

wholesale markets were far from perfectly competitive, and between 2000 and 2010, almost half of U.S. state legislatures mandated retail competition, under which customers could purchase electricity directly from generation companies; IOUs' main responsibility would thus be to transmit and distribute electricity, and generation decisions would be fully put to markets.[1]

An alternative way to resolve the wedge between principal and agent interests is to improve the principal's ability to monitor the agent for compliance with agreed-upon goals (Eisenhart 1989). In the 1980s, this approach was adopted when a number of states started to engage in resource planning processes – formal dockets in which utilities presented resource plans and justified their chosen mix of supply and demand side options, subject to PUC and public scrutiny (English et al. 1995). Resource planning was de-emphasized in the early 2000s, when states began to consider retail competition; even in states that officially required utilities to engage in resource planning, plans were often not filed in the early 2000s, pending PUC decisions on restructuring. In the mid-2000s, however, states began to renew their emphasis on resource planning, including a number of states in which retail competition had been mandated, but failed to emerge. In these states, utilities often remain the "default" provider of standard offer service for customers who cannot or will not choose a competitive supplier. Resource planning is seen as a way to ensure that utilities procure standard offer resources that are least-cost in both the short and long-term, and to protect customers against price fluctuations.

The larger principal-agent relationship – the relationship between the public interest and the PUC – has received less explicit attention. There are a number of institutional changes, however, that suggest that PUCs' fundamental missions have begun to change. The most easily identifiable changes are legislative mandates for renewable energy or energy efficiency. Currently, over 25 states have adopted such measures, usually citing concerns about environmental impacts of fossil fuels, or a desire for increased reliance on "home-grown" energy (Carley 2009). While IOUs often remain responsible for fulfilling

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[1] In practice, this has not happened in most states, either because utilities continue to own generation assets, or because customers fail to choose their own providers, making utilities the default provider of "standard offer service." Nonetheless, even without full retail competition, these states have given market participants substantial control over generation decisions.

these mandates, PUCs nonetheless must translate legislative mandates into rules and regulations for IOUs to follow, and these mandates add new dimensions to PUCs' definitions of "public interest."

There is a more subtle line of evidence, however, to suggest that PUCs may be re-evaluating their relationship with the public. Since the 2000s, as PUCs have developed rules and regulations to implement resource planning processes and RE or EE mandates, they have increasingly begun to act in consultation or collaboration with the public. Stakeholder involvement in PUC proceedings is particularly common in resource planning and energy efficiency proceedings, in which the PUC must weigh a number of competing values – environmental values against resource costs, for example – before issuing regulations that guide IOU behavior. Environmental groups, consumer groups, municipalities, chambers of commerce, industrial groups, and trade associations of merchant generators can all provide valuable input on how different choice might affect (their version of) the public interest.

As the above review suggests, there is considerable variation in approaches to electricity regulation across U.S. states. Federal law has required at least a minimal degree of "unbundling" generation, transmission, and distribution functions of vertically integrated utilities.[2] Regarding the generation function specifically, some states undertook resource planning in the 1980s, abandoned it in favor of competition, and have recently re-regulated at least some portion of their electric sector. Other states adhere more closely to a vertically integrated, rate-regulated model, while still others procure nearly all generation from competitive markets. Experience with deregulation suggests that it has had some positive effects (Markiewicz, Rose, and Wolfram 2004), as well as some unintended consequences (Carley 2009).

Unlike competition, we have little scholarly work investigating the effects of resource planning or involvement of stakeholders in electric sector proceedings. This is particularly puzzling considering the amount of recent emphasis on collaborative decision making as a "4th generation" environmental policy instrument and calls for increased

[2] Some utilities still own generation, transmission, and distribution facilities, but they are required by federal law to allow merchant generators to access transmission facilities, and to purchase electricity from those merchant generators on the wholesale market.

empirical analysis of the effectiveness of collaboration compared with more traditional forms of environmental regulation (Arnold 2010). It is likely that, as with increased competition in the electric sector, stakeholder involvement in resource planning will achieve some goals, but may be less successful in others. This paper undertakes an institutional analysis of two states' resource planning processes to develop hypotheses about how resource planning and collaboration affect environmental outcomes in the electric sector.

Case Study Selection, Data & Methods

This analysis compares electric sector institutions and environmental outcomes of Minnesota and Maryland. These two states were selected for comparison in part because they are similar in many key attributes that might affect resource decisions: population size, environmental ideology, size of the manufacturing sector, and regulatory professionalism. Both states had similar electricity prices, regulatory institutions, and electricity generation resources in the early 1990s when the study began. In the late 2000s, both states adopted similar – and similarly stringent – renewable energy and energy efficiency obligations. Since 1999, however, Maryland has relied primarily on competition to secure electricity resources, while Minnesota has adopted a collaborative approach to resource planning. While we cannot attribute all differences in environmental outcomes solely to these diverging institutional approaches, the similarities and differences provide a rich context in which to develop propositions and hypotheses for eventual testing.

The IAD analysis in this paper relies on primary source documents – statutes, regulations, and PUC decisions regarding resource planning, procurement, or pre-approval in each state from 1990 - 2012. To put boundaries on the document collection necessary, the analysis focused on the largest utility in each state – Potomac Electric Power Company in Maryland, and Northern States Power Company (now Xcel) in Minnesota. While most of the regulatory decisions examined were thus specific to a single utility, most decisions describe, apply, or develop rules and regulations that apply more broadly throughout the states.

Each primary source document was analyzed using nvivo, a qualitative analysis software program that allows the user to code and track themes or ideas over several documents. Using nvivo, I coded each document for themes that included resource planning rules, stakeholder intervention and comments, stakeholder contributions to decision making, and stakeholder contributions to changes in rules and regulations.

Data on each state's generation capacity, actual resource mix, and electricity prices 1990 – 2010 were gathered from the U.S. Energy Information Administration (EIA).

A Framework for Institutional Analysis

Institutional analysis requires the analyst to identify key attributes of the physical environment, the community, and the rules-in-use that pertain to a specific action situation – in this case, the respective forums in which decisions about electricity generation investments are made. Action situations set up interactions between actors, which lead in turn to outcomes; based on participants' evaluation of the situation, outcomes may in turn affect the biophysical environment, community attributes, or rules-in-use (Fig. 1). For this analysis, I modify the IAD framework slightly. Instead of biophysical conditions, I describe key technical and economic conditions related to electricity generation; and rather than describe the community of Maryland and Minnesota in detail, I focus on actors that participate in resource generation decision-making.

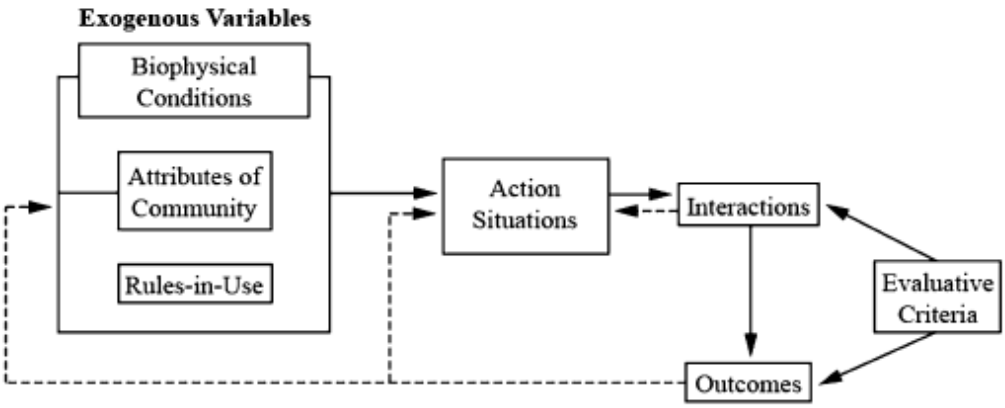

Figure 1. Basic Components of the IAD Framework.
Source: E. Ostrom (2010, p. 646).

Techno-economic Conditions

Many of the key technical and economic features of electricity generation have been described above and do not need to be reiterated here, but a few key points worth emphasizing remain. First, while kWhs are fungible, the resources that produce them are not. Electricity cannot be readily stored, and as a result, it must be produced and added to the grid at the exact moment that users demand it. Some resources are well suited to meet consumers' baseload needs – for example, coal or nuclear plants that rarely power off and are capable of producing steady amounts of electricity. Other supply-side resources – including natural gas fired plants – can be turned on quickly and are often used to meet peak electricity demand – e.g., demand on a hot afternoon when many customers run their air conditioners. Due to this variability in demand, some resource units will generally sit idle, while others run constantly. Many of the newer, cleaner, less capital-intensive resources are best suited to meet peak demand. Renewable resources such as wind are intermittent and cannot readily substitute for baseload generation. Thus, each supply side resource offers a different set of characteristics that must be considered in light of the rest of the portfolio or market.

In addition, each supply side resource has a different set of environmental costs, some of which are regulated elsewhere and others of which are not. Some of these

environmental costs – such as local air pollution -- are borne by same people using the electricity, while other environmental costs may be felt regionally or, in the case of greenhouse gas emissions, globally. Regardless of the environmental costs, market prices alone will rarely reflect these costs accurately. To reflect this, but not all, states include environmental costs in decision-making (MN does, MD does not).

Rules-in-Use

Minnesota: Continuous Integrated Resource Planning

Minnesota's approach to resolving the utility-PUC principal-agent problem has been to require detailed resource planning, with extensive stakeholder involvement. In 1991, the Minnesota legislature passed a statute requiring Minnesota utilities to file biennial Integrated Resource Plans (IRPs).[3] The basic requirements are detailed in Minn Rules, parts 7843.0100 – 7843.0600. Minnesota IOUs are instructed to provide information regarding 1) Projected energy demand over the next 15 years; 2) The mix of supply and demand side resources they intend to use to meet that demand; 3) The analytical processes used to develop their plans; and 4) the reasons for selecting the proposed resource mix. The essential goal of the resource planning process is to ensure that utilities maximize demand-side resources to minimize new supply side needs to the degree consistent with the public interest, as well as to ensure that the environmental costs of supply side resources are considered as well as economic costs.

After a utility submits its IRP, agency staff and other interested parties are allowed to comment on the plan; after a comment period, the MPUC may approve, deny, or order modifications to the plan, based on the degree to which the plan comports with the public interest. Once approved, the IRP is used to inform rate decisions or certificate of need proceedings that authorize utility investment in new generation units. While these basic IRP requirements have changed little over time, the MPUC has made several modifications to the planning process (see below). The MPUC has also developed, in

[3] Utilities are also required to file periodic Conservation Improvement Plans (CIPs) that identify a suite of conservation programs that will achieve the demand-side savings identified in IRPs. Stakeholders are similarly involved in CIP dockets.

consultation with stakeholders, a competitive bidding process to ensure that the IOU complies with the competitive wholesale market requirements of PURPA.

Stakeholders have been invited to participate in this process from the start of the IRP process. Minnesota statute allows interested parties to become formal "intervenors" – non-party participants – to all proceedings. Although interested parties must petition the MPUC to obtain intervenor status, the MPUC has a norm of liberally allowing all interested parties to intervene. Intervenors to NSP's first IRP filing included municipalities, industrial customers, environmental groups, and a coalition of government, industry, and environmental interests working to promote energy efficiency. Moreover, NGO or citizen intervenors whose comments contribute materially to MPUC's final decisions are eligible for financial compensation, creating an incentive for civil society organizations to participate in MPUC proceedings. During the 20-year study period, stakeholders have made a number of material contributions, usually related to NSP's methods for forecasting or assessing cost-effectiveness of various resource options. Often, a stakeholder will raise an issue – such as NSP's evaluation of the cost-effectiveness of wind energy – in one resource plan filing, and the stakeholders' approach will be formally adopted or required by the MPUC in subsequent resource plans.

Participants have also developed a set of informal "working rules" that encourage stakeholder participation. For example, the MPUC directed stakeholders to form a "1991 Resource Plan Collaborative" to guide Northern States Power's initial resource plan filing. Over the next twenty years, this collaborative and its members have identified issues, brought them to MPUC attention, and worked with NSP to resolve any methodological problems with their IRP.

Regarding the relationship between the MPUC and the public interest, the Minnesota Legislature has provided some guidance, while leaving the MPUC with substantial discretion in how it fulfills its duty to promote the public interest. Minnesota statute instructs the MPUC to review and rule on IRPs based on IRPs' consistency with the public interest; this includes, among other things, evaluating a resource plan's ability to minimize adverse socioeconomic and environmental effects of resource decisions (Minn. Stat. ß 216B.2422, subd. 2.). Some statutes provide a degree of specificity that guides MPUC decisions – for example, a 1996 statute prevents the MPUC from

approving investments in non-renewable energy unless the utility has first demonstrated that renewable energy is not cost-effective (Minn. Stat. § 216B.2422, subd. 4). Similarly, 2007 revisions to the state's conservation statute establish ambitious energy savings goals and renewable energy goals. In other respects, however, the MPUC is given discretion regarding how to incorporate socioeconomic and environmental impacts into its decision making, and often turns to stakeholders to help inform these decisions – for example, by including Cree nations as intervenors in resource proceedings involving the purchase of hydroelectricity from a dam that had flooded Cree lands, or by inviting environmental organizations to suggest methodologies for determining environmental costs of supply-side resources.

Maryland: Competition

Maryland has adopted an institutional approach to electricity regulation that relies much more heavily on markets that Minnesota. The state had a resource planning process in place in the 1990s, but it was not designed to provide comprehensive oversight of utility plans; plans were filed with the Maryland Public Service Commission (PSC), but were rarely scrutinized in detail or commented on by stakeholders. Instead, the Commission reviewed IOUs' generation decisions and contracts with non-utility generators, approving rate recovery only for investments that were needed; utility generation investments would not be approved if non-utility generators could provide electricity at a lower price.

In the mid-1990s, Maryland began to move more seriously away from regulatory oversight and toward market oversight of generation decisions. In 1995, the MPSC approved a competitive bidding process to formalize wholesale competition in the state; the bidding process was run by utilities with minimal oversight by regulators. In 1999, the Legislature mandated full retail competition, requiring IOUs to divest their generation assets. Consumers could then contract directly with generation companies, and the IOUs would become "wires-only" companies. IOUs' decision-making regarding generation would be limited to a role in procuring "standard offer service" (SOS) on the wholesale market for customers who failed to contract directly with generators, and regulators would be responsible only for monitoring markets and SOS bids, with decisions left up to market participants.

Maryland also takes a different approach to stakeholder involvement than does Minnesota. Maryland does not provide compensation to intervenors, and the MPSC is allowed to deny intervenor status to interested parties whose interests are already represented by existing intervenors. The MPSC exercises this status to exclude potential intervenors, but only rarely. Perhaps unsurprisingly, most MPSC dockets have had little stakeholder participation relative to Maryland, and stakeholders are often representatives from state agencies such as the Department of Natural Resource and the Maryland Energy Agency. The role that stakeholders play in decision-making is similarly limited; stakeholders provide comments on key issues, but there is little evidence that stakeholders play the agenda setting or utility monitoring roles that Minnesota utilities play. Stakeholder involvement was, however, extensive in the dockets resolving issues regarding restructuring and competition, and the final decision implementing retail competition was developed through settlement negotiations between several government agencies and Pepco.

The MPSC's institutions are less reflective of changed ideas about the MPSC's role in fulfilling the public interest. Increased competition is clearly designed to be in the public interest by encouraging competition and thus reducing costs to consumers. However, this suggests changes in the approach to fulfilling the public interest more than changing relationships in the nature of what constitutes the public interest. As in Minnesota, much of the way that the MPSC approaches its public interest obligation is mandated or dictated by statutes – the push for competitive electricity markets, mandates for renewable energy and energy efficiency. The main difference between Maryland and Minnesota in this regard seems to be that Maryland does not rely on stakeholder input to help define "public interest" in the same way that Minnesota does.

A final point worth mentioning is that this different approach to stakeholder involvement appears to reflect different institutional arrangements and options for stakeholders to engage in resource planning, rather than a dearth of stakeholder interest in Maryland's resource planning processes or their impact on the environment. Both Maryland and Minnesota enacted similar – and similarly stringent – renewable energy mandates and energy savings goals. Significantly, both states have adopted an approach to energy savings programs that places implementation responsibility in the hands of the

IOU, but relies on stakeholder collaboratives to guide and oversee utility's planning and implementation processes, both formally before the PUC and informally between Commission decisions. While demand-side management is not the particular focus of this paper, it is useful to note that in both states, energy conservation and demand side management is heavily guided by stakeholders, who participate both in developing the rules that guide utilities' behavior and in overseeing utility implementation.

Actors in Positions

These different institutional arrangements create different roles for actors in each state. Utilities used to play a dominant role in both states, but this role has changed substantially in both cases. In Minnesota, the utility's role is akin to that of a contractee, providing services according to PUC specifications, but retaining a key role in developing and executive a plan for service delivery. Because of its ownership of generation and transmission resources, and due to ratemaking practices, Minnesota utilities retain some incentive to use market power to favor their own generation, and to under-use resources on customers' side of the meter. In Maryland, the IOU is now a wires-only company that distributes other generators' electricity and conducts SOS bidding, which should make the IOU neutral regarding which sources of electricity are used.

The role of the regulator has also changed. In Minnesota, regulators play the role of a convener, bringing parties together to make decisions. The PUC also retains final agenda setting and decision-making authority, although in practice these functions are sometimes shared with stakeholders. In Maryland the regulator is more of a market monitor, monitoring the electricity market, but unlikely to intervene unless new issues or problems emerge that must be addressed. In both states, regulators are charged with ensuring that the electricity sector comports with the public interest.

Stakeholders also take on different roles in each state. In Minnesota, stakeholders play a key role, monitoring IOU compliance with PUC objectives: overseeing bids, examining IOU analysis, questioning analysis or decisions that don't comport with public interest. Stakeholders can also contribute to changing the rules of the game, suggesting analytical approaches to resource planning that the PUC often approves over time. At the

same time, different stakeholders have their own objectives that may or may not be synonymous with the public interest. Stakeholders in Maryland are less diverse than in Minnesota and play a more limited role, providing comments on key PSC decisions.

Interactions

Two key decisions that emerge from this action situation are 1) how much electricity generation should be procured, and 2) what sources of supply will be used. Over time and with repeated interactions, a related third decision is: what rules shape generators' behavior, and who participates in modifying these rules? In this section, I briefly review how actors interact to answer these questions in each state.

In both states, utilities initially made the decision of how much generation to procure, subject to some degree of regulatory approval. In Minnesota, utilities are still heavily involved in deciding how much electricity is needed, although they are required to use methods selected by the MPUC and stakeholders, and their projected electricity needs are scrutinized by stakeholders and ultimately must be approved by the MPUC. Stakeholders have helped to modify these rules over time, partly by being actively involved in determining utility forecast methodologies, and partly by participating in demand-side management policymaking, which ultimately reduces the need for new electricity generation.

In Maryland, market actors make nearly all generation quantity decisions, although utilities continue to decide how much generation is needed to fulfill SOS obligations. Interestingly, the MPSC recently revised its approach to SOS, putting risk of over-procurement on the IOUs; utilities now appear reluctant to call for large new quantities of generation. As Maryland has revised its rules regarding generation, stakeholders in have provided comments, but with the exception of the major ruling on retail competition, it is not clear that stakeholders play an important role in either developing rules or monitoring compliance with them.

Regarding the sources of electricity that are procured, the two states take very divergent approaches. In Minnesota, utilities develop a planned resource mix that complies with statutory obligations and considers environmental cost and future risk, again with scrutiny by stakeholders and regulators. While cost is a concern in this

process, it is one of several concerns; cost alone does not dictate resource procurement. In Maryland, cost is a much more important determinant of resource procurement. In both states, legislatures have also established mandates that require a certain amount of renewable energy procurement, although in Minnesota, this obligation is considered to be a floor, rather than a ceiling, since renewable energy resources could conceivably compete with other sources of supply, once environmental costs are figured into the decision making process.

Outcomes in Minnesota and Maryland

In this section, I briefly review evidence regarding key environmental outcomes of Minnesota and Maryland's electricity generation decisions, as well as their change over time. I examine retail sales per capita to examine the degree to which each state's needs are met through supply side, rather than demand side, resources. I also examine the diversity of each state's installed generation capacity, as well as its actual generation mix. Diversity of the electricity mix is a proxy for environmental outcomes that lets us examine the degree to which a state is reliant on highly polluting resource – such as coal – compared to less polluting resources, such as natural gas or renewable energy.

It is important to remember that differences between Maryland and Minnesota's outcomes cannot be attributed to differences in rules and institutions on the basis of this inquiry alone; these outcomes could be influenced by economic conditions, environmental regulations, or other factors that remain unexplored in this analysis. Nonetheless, they do provide a useful starting point for developing hypotheses about the way that different institutional approaches affect electric sector outcomes.

First, retail sales per capita data shows that total demand is growing more quickly in Minnesota than in Maryland. To the degree that these sales per capita data reflect each states' efforts at reducing electricity use via demand side management, this suggests that Maryland's rules may be better suited to limiting load growth, perhaps because it removes utilities' incentive to maximize use of utility-owned generation. Maryland actually decreased per capita consumption between 2000 and 2010, although this may have been due to the economic downturn as much as success in demand-side management programs.

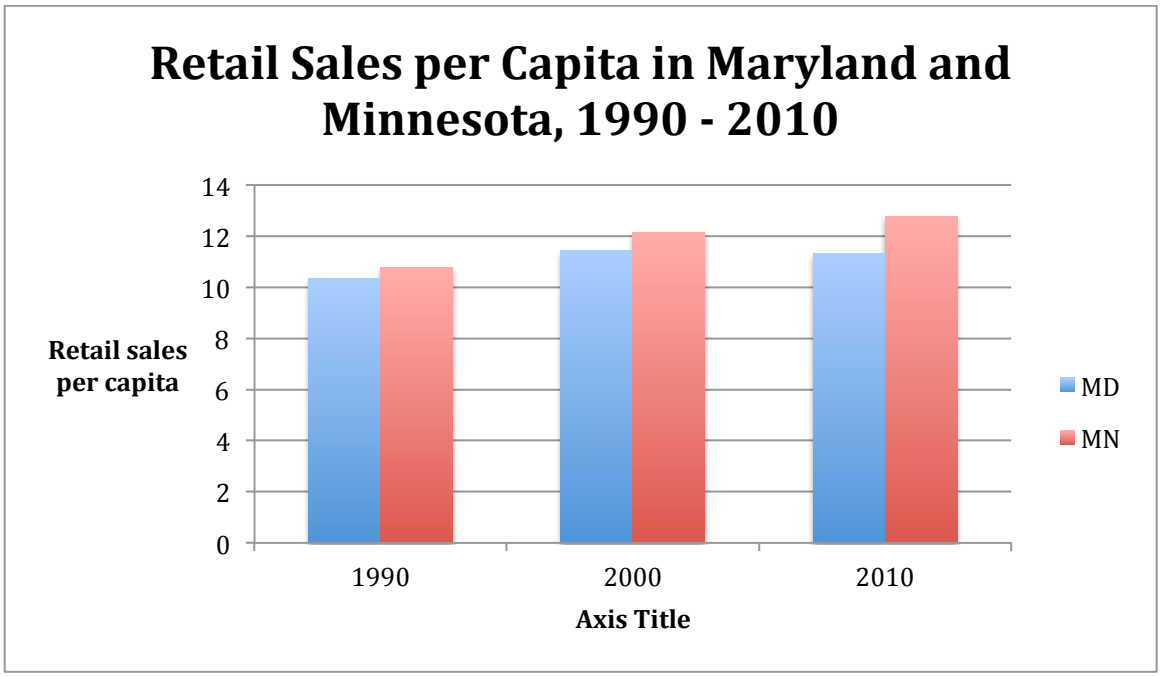

Figure 2. Retail Sales per Capita in Maryland and Minnesota, 1990 – 2010.

Comparing the states' capacity and generation mixes reveals interesting patterns. Over time, Minnesota has reduced its coal-fired capacity and added substantial renewable energy capacity. Moreover, these trends pre-date Minnesota's 2007 renewable energy mandate, suggesting that the state's approach to integrated resource planning and consideration of environmental costs may be important drivers of renewable energy procurement. Maryland has added built much less new capacity over time, although this may reflect regional trends more than institutional approaches. Maryland has been much slower than Minnesota, however, in phasing out fossil fuel capacity and shifting toward cleaner sources of electricity.

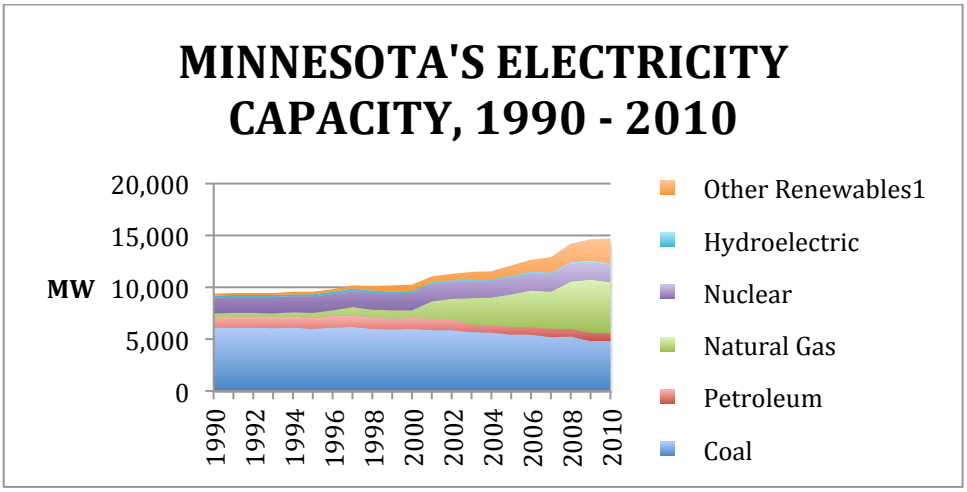

Figure 3. Minnesota's Electricity Capacity, 1990 -2010.

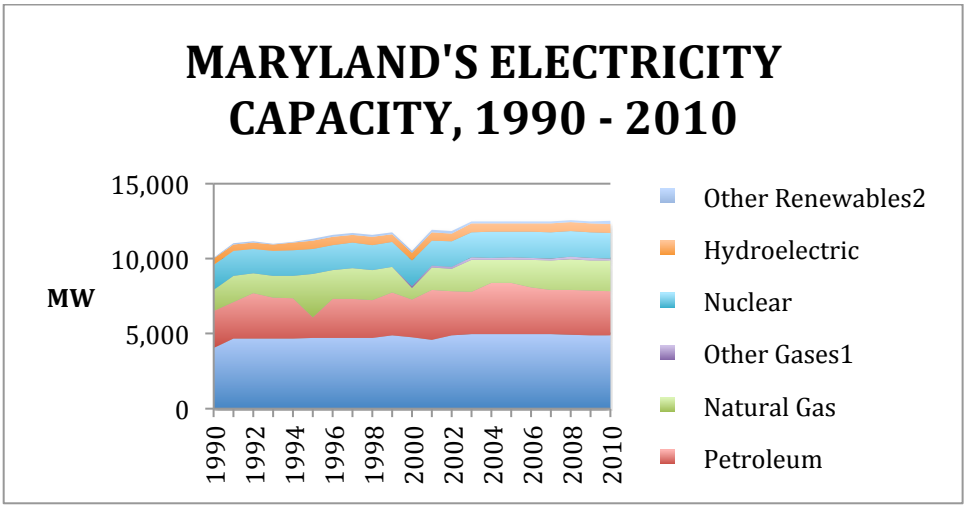

Figure 4. Maryland's Electricity Capacity, 1990 – 2010.

In terms of actual generation, however, the two states share a number of similarities. In both states, nearly half of electricity generation comes from coal, and an additional roughly 25% comes from nuclear energy. The main difference between the two states is that Minnesota has steadily increased its renewable energy use over time; in comparison, Maryland uses a relatively small amount of renewable energy, mainly hydroelectricity, and renewable energy generation has not increased substantially since 1990. Both states' coal use increased slowly until the mid-2000s before beginning to slowly decline.

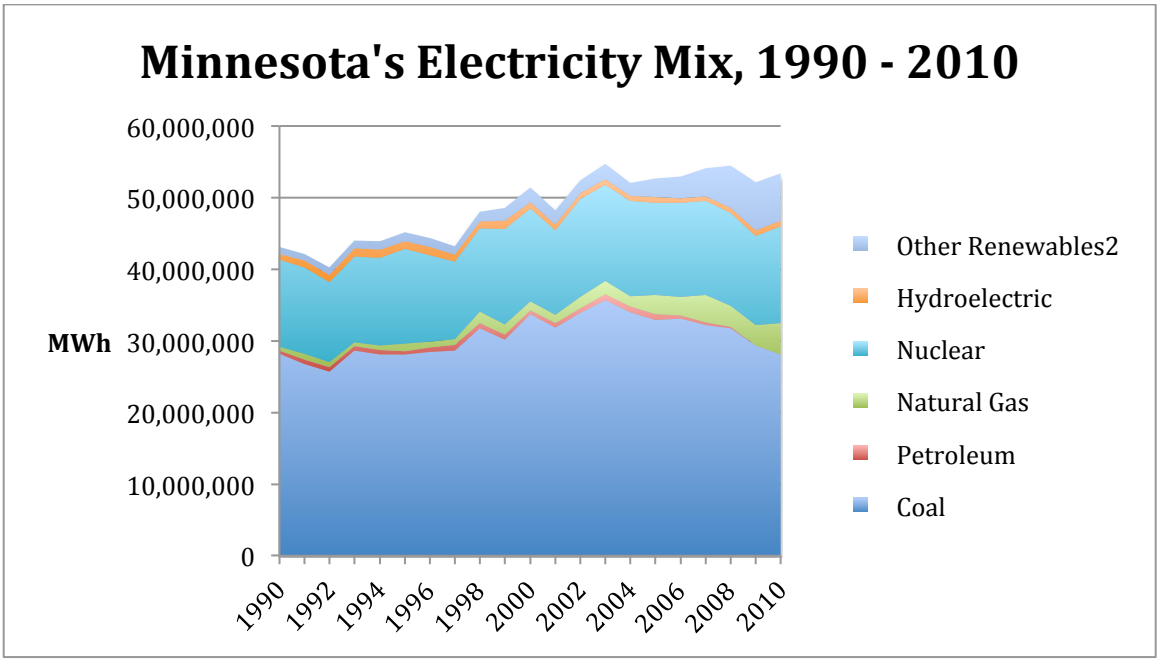

Figure 5. Minnesota's Electricity Mix, 1990 – 2010.

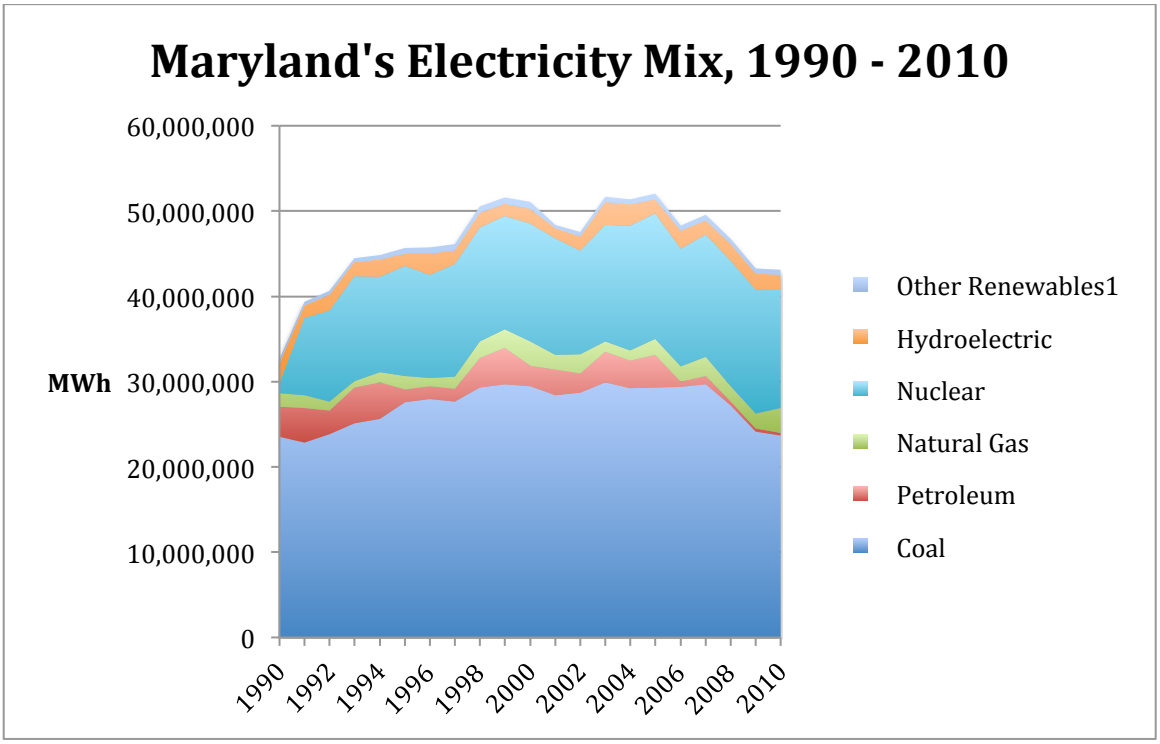

Figure 6. Maryland's Electricity Mix, 1990 – 2010.

Finally, I examine differences in average retail price per kWh in Maryland and Minnesota. Although the main focus of this paper is on environmental, rather than economic, outcomes, the goal of cost-minimization is so fundamental to the resource planning process that prices should be given at least a cursory examination. As fig. 7 reveals, prices have been consistently lower in Minnesota. Although prices were similar shortly after retail competition, when the MPSC imposed rate caps on IOUs, as the rate caps have expired, prices have diverged, with Maryland's prices per kWh rising much more quickly than Maryland's.

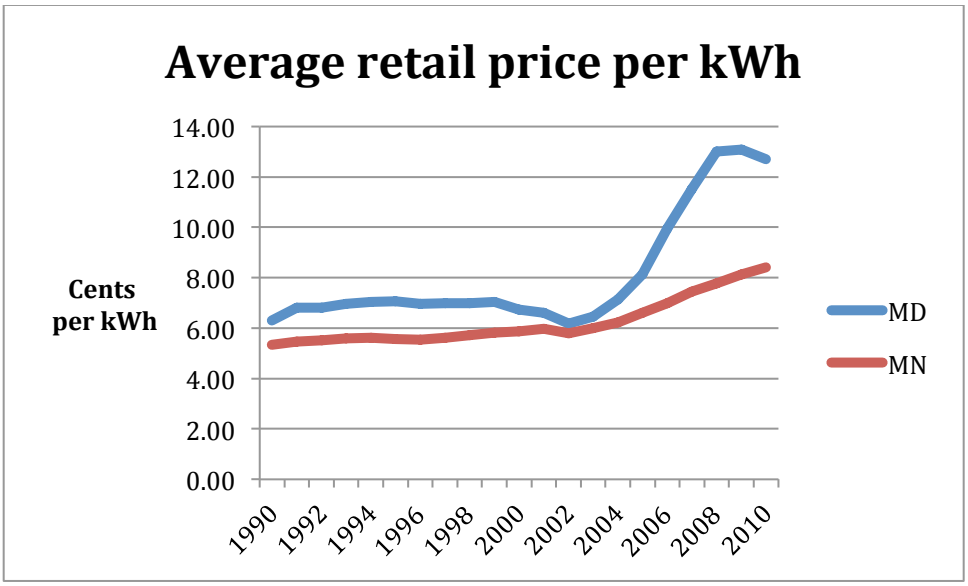

Figure 7. Average retail price per kWh in Maryland and Minnesota, 1990 – 2010.

DISCUSSION

This paper has suggested that there are two underlying principal agent problems in electricity regulation that have grown in importance over the past several decades. Across the U.S., substantial reforms have addressed the narrower of these principal agent problems: the wedge between the interests of vertically integrated, investor-owned utilities and those of regulators tasked with cost minimization. Maryland and Minnesota illustrate two ways that this principal agent problem could be addressed: increased use of markets rather than regulatory oversight, and increased use of regulatory proceedings, planning, and stakeholder monitoring of utility actions.

This preliminary institutional analysis suggests that, while Minnesota's approach does not eliminate utilities' incentives to over-invest in capital-intensive resources, the use of stakeholder monitoring may be an effective way to address the wedge between utility and regulators' interests. Throughout the study period, Minnesota experienced lower rates than Maryland, even while increasing use of renewable energy and switching its resource fleet away from coal-intensive resources and toward cleaner sources of electricity. Nonetheless, it is not clear that these differences translate into near-term environmental advantages, considering that Minnesota's per capita usage increased more rapidly than Maryland's, and the two states' reliance on coal-fired generation was similar over the course of the study period. Both of these facts suggest that Minnesota utilities' incentives to sell more kWhs of their own generation may persist, despite the monitoring activities of stakeholders. Moreover, while Minnesota's resource planning process appears to have increased use of renewable energy throughout the entire study period, it does not seem to have had an effect on coal-fired generation until the mid-2000s, after many IRP cycles, despite the emphasis on environmental costs of supply-side resources.

It is more difficult to discern the way that institutions may have shaped outcomes in Maryland. Although Maryland has experienced less per capita electricity use over time, has invested in less new capacity, and has seen a quick drop in total generation in recent years, all of these phenomena coincide with downturns in the national economy. To the degree that competition has played a role in these patterns, however, it does suggest that putting generation decisions to markets may make utilities neutral to the amount of electricity that customers use – or save – thus paving the way for more effective demand-side management programs. Finally, the fact that electricity prices are consistently higher in Maryland is surprising, given the cost benefits that were expected to materialize from deregulation; however, the more recent downward trend suggests that it is possible for the benefits of deregulation to be experienced over a longer time horizon.

Examination of these outcomes sheds little light on the broader principal-agent problem: the changing relationship between PUCs and the public interest. In both states, the legislatures has added environmental concerns to the traditional mandates for reliability and reduced costs. The Minnesota PSC in particular has been directed to

incorporate environmental and social concerns into the resource process, and has turned to stakeholders and public participation to shed light on these harder-to-define aspects of "the public interest." While these efforts may not directly translate into outcomes, they are interesting phenomena for future study.

Finally, this review shows that in Minnesota, stakeholders have been instrumental not just in monitoring utility behavior, but also in shaping the rules that govern that behavior. This role for stakeholders echoes one of Ostrom's (1990) Design Principals for common pool resources: the ability of the community to participate in collective choice arrangements and modify the rules of resource use. It may be that this ability for stakeholders to shape the rules-in-use has an important effect on eventual outcomes in the electric sector.

Conclusions

This preliminary institutional analysis suggests several hypotheses to be tested in future work. First, it suggests that resource planning can be as effective – if not more effective – at rate minimization and promoting cleaner energy sources, compared to competition. These benefits, however, may be limited to the degree by which knowledgeable stakeholders are active in monitoring utilities' plans and actions to ensure that they comport with state objectives regarding cost minimization or environmental concerns. Second, it suggests that any reform – either competition or resource planning related – will be more successful over time, as participants gain experience and unexpected problems or issues are resolved.

Finally, this analysis suggests that stakeholders' ability to shape the "rules-in-use" that guide electric sector decision-making deserves additional examination. In Minnesota, this type of stakeholder involvement seems to be a factor in encouraging greater use of renewable energy. It remains to be seen, however, what outcomes might result in other states with different conceptions of "the public interest," or in states with different norms and practices regarding stakeholder and PUC interactions.

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