Statutory and Regulatory Requirements and Success of Utility-sponsored Efficiency – or – How Good are Good Policies for Energy Efficiency?

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ABSTRACT

As utilities try to meet the needs of growing demand for efficiency, policy environments in which they operate become increasingly important. What sort of policy environment is most productive for utility-sponsored energy efficiency? While some series of state efficiency scores by various organizations have documented changing state policies compared to theoretically "good" policy environments, there has been less research into the relationship between utility funded program success and the policy environments in which they are operating.

To investigate the relative effect of different policy environments, this research presents a model relating observed state policy environments and reported utility energy savings. Based on reports by the U.S. Environmental Protection Agency and the U.S. Department of Energy, "good" policy environments are defined as those that: require energy efficiency at some level, establish an evaluation framework, align ratemaking and funding practices with energy efficiency, align utility incentives with energy efficiency, and develop independent programs. Each state's policies towards utility programs in 2006-2010 is reviewed for presence of these "good" policies. The model sets reported utility energy savings as a portion of sales from the Energy Information Administration's Form 861 as the dependent variable influenced by the policy environment independent variables for the states that utility operates in. Fixed effects are considered, as utilities operate programs in the same states over time.

Findings indicate that state fixed effects are significant on utility program savings. Of the policies considered, tariff riders, having efficiency targets, ensuring that there is an evaluation framework in place for cost-effectiveness, and removing the throughput disincentive all appear to contribute positively to utility program savings.

Introduction

The most relevant question about utility-sponsored efficiency programs for all interested parties is often: Do they work as they are intended? Evaluation seeks to address this question at the program level; evaluations include both the energy impacts and the process success of efficiency programs. As states become more active in utility-level efficiency programs, the evaluation methods have become part of policies – controlling not only who evaluates programs, but what savings are measured, and when. Evaluation of state policies to drive utility programs has not developed to the same extent. It must be noted here that state policies that are designed to drive savings themselves, like introduction of appliance standards and tightening of building codes, are being evaluated to determine their effects.

This study is organized into six sections. Section 2 describes policy environments that are expected to effect efficiency program success. Section 3 describes the West, the region that is the focus of this work. Section 4 presents the model used to evaluate the relationship between utility program savings and policy environments. Section 5 provides the results and a discussion of their meaning. Section 6 offers conclusions and implications.

Policy Environments

'Policy environments' is a term used to describe a set of policies that create a context in which an entity must act. Here, we are concerned with the policy environment for electric utilities related to energy efficiency. Vine et al. (2003) consider what kinds of barriers utilities face in providing programs at all and the barriers faced by consumers to participate in energy efficiency programs and then provide considerations for policy mechanisms that might overcome barriers to energy efficiency. The present research builds upon the theoretical foundations offered, with an attempt to evaluate the effects of policies.

Good Policy Environments

The focus in this study is on policies that are assumed to have an effect on utility efficiency program success, and thus might be considered "good" policies.

In 2006, leading researchers and practitioners published explicit guidance for what makes "good" policy for energy efficiency in the *National Action Plan for Energy Efficiency* (NAPEE 2007). Although one conclusion was that successful utility efficiency programs were operating under a variety of policy environments, the NAPEE report identified five key policy actions that states could take to improve outcomes:

- Recognize energy efficiency as a high-priority energy resource;
- Make a strong, long-term commitment to implement cost-effective energy efficiency;
- Broadly communicate the benefits of and opportunities for energy efficiency;
- Promote sufficient, timely, and stable program funding to deliver energy efficiency where cost-effective; and
- Modify policies to align utility incentives with the delivery of cost-effective energy efficiency and modify ratemaking practices to promote energy efficiency investments.

In parallel to the NAPEE effort, the U.S. Department of Energy (DOE) was conducting a study of state and regional policies that promote cost-effective utility programs to reduce energy consumption, as required by the Energy Policy Act of 2005 (EPAct) Section 139 (DOE 2007). Specific recommendations from the required study include:

- Consider energy efficiency as a resource in planning and procurement;
- Establish a formal evaluation framework including performance and cost-effectiveness;
- Adopt energy efficiency performance requirements or savings targets;
- Promote stable funding through efficiency targeted funding mechanisms over multi-years;
- Align utility incentives with energy efficiency through performance incentives, decoupling, or cost recovery;

- Develop independent or state run efficiency programs;
- Integrate education efforts with other efficiency programs; and
- Modify ratemaking practices to promote energy efficiency by consumers.

Based on these studies of expected good policy environments, several observable state level policies are considered here. These policies are (in no particular order): require energy efficiency at some level, establish evaluation framework, align ratemaking and funding practices with energy efficiency, align utility incentives with energy efficiency, and develop independent (third-party or state-run) programs.

The Effect of Policy Environments

Despite the interest in evaluating state policies compared to theoretically "good" policy environments, there has been little research into the relationship between utility funded program success and the policy environments in which they are operating. Policy environment sets the context in which utilities operate. Energy efficiency researchers understand that this context is important. However, there has been little work to explore the effect of policy environments on energy efficiency activity of utilities, beyond spending.

Agapay and Gunn (2008) demonstrated, using 2005 and 2006 data for 22 utilities that utility costs and energy savings under state-mandated Energy Efficiency Portfolio Standards (EEPS) varied, with some utilities saving much more energy than the mean at lower costs. They posit that policy environments, beyond the EEPS, may contribute to the difference.

Perhaps the most similar work to the present study is a benchmarking effort published by Jones et al. 2011. That study examined energy sales, energy efficiency spending, and energy efficiency savings reported for 37 utilities across the country for 2010. The analysis considered customer mix, state policy, and ownership structure (e.g. Federal, Investor-Owned, Cooperative). Jones et al. (2011) developed metrics of policy that are similar to those presented in the ACEEE Energy Efficiency Scorecard (Sciortino 2011), but only as they apply to investor-owned utilities (IOUs). They found a relationship between their weighted average policy score and spending and reported savings; they do not go on to test the strength or significance of the relationship.

In a substantial effort to classify and organize energy efficiency program actions, regardless of administrator, Battacharjee (2010) developed a conceptual map of factors contributing to energy consumption under the broad groupings of people, environment, technology, and industry. He went on to identify where certain types of efficiency programs might target these factors. Using content analysis of program documents, actual programs were categorized for comparison to other states or countries. This kind of work is commendable, but the effort is extraordinarily time intensive, and is not attempted here. Future work that expands upon the categorization of program types within policy frameworks could improve understanding of how program types are contributing to energy savings over time and space.

The West

This study focuses on nineteen states west of the Missouri River representing a cross-section of the United States. These states include 174 utilities, 45 of which are IOUs. Nebraska offers a unique model (not only among the west, but the nation) where all electric power is delivered by publicly owned utility districts.

The West includes a variety of policy approaches and utility programs for energy efficiency. For the most part, the degree of policy attention to energy efficiency increases for states closer to the Pacific Coast, as identified in ACEEE's State Energy Efficiency Scorecard 2011 (Sciortino 2011). The scorecard ranks states into five tiers based on their energy policies with the states having the best policy environments ranked in the highest tier.[1] States near to one another tend to have more similar policy environments than those farther away; this is not surprising as Chandler (2009) demonstrated that energy policies, specifically portfolio standards, appeared to diffuse to neighboring states even when the internal factors for the policy were not present. Western states are nearly equally divided among the five "tiers" of energy efficiency policy scoring, as shown in Table 1.

Table 1. Western States in Scored Tiers (based on Sciortino et al. 2011)

Tier	Count	States in Tier
Top 10	4	CA, HI, OR, WA
11-20	3	AZ, CO, UT
21-30	3	ID, NM, NV
31-40	4	AK, MT, NE, TX
Bottom 10	5	KS, ND, OK, SD, WY

Methodology

The model in this study uses utility reported energy savings from the U.S. Department of Energy/Energy Information Administration's Form 861 as the dependent variable. The model in this study uses characteristics of utilities and characteristics of state policy environments as independent variables; these are described briefly here and in more detail below. Policy environment independent variables are based on statutory and regulatory policies for efficiency targets, program evaluation, cost-recovery, removal of revenue throughput disincentives, and development of third-party (non-utility) programs. Fixed effects that may be attributed to other unique characteristics of states, besides those variables included, are considered, as utilities operate programs in the same states over time; this means that a variable representing each state is included in the model to identify other variance. Characteristics of electric utilities were identified from EIA-861 for the years of 2006-2010. Characteristics of state policy environments were identified from secondary sources and confirmed, where feasible, from regulatory documents. The unit of analysis is a utility-year. This section begins with a description of the variables before explaining the four models employed.

[1] There are several considerations for what the ACEEE Scorecard measures that cannot be restated here, due to space constraints. In general, it is expected that states with the most progressive policies to drive energy efficiency within the areas of utilities, combined heat and power, buildings, and transportation, will rank highest.

Dependent Variable

The dependent variable is annual incremental savings (MWh) reported for a utility territory divided by the total sales in the utility territory (in MWh) for a given year (2006-2010). Annual incremental savings are defined by EIA as the annualized changes in energy use (measured in MWh) caused in the current reporting year by new participants in existing DSM programs and all participants in new DSM programs. Savings that might accrue to a program in a year due to participants from previous years are not included in annual incremental savings.

The savings reported in the EIA Form 861 do not have to be independently evaluated, so there is some risk that these reported savings do not reflect actual savings. Identifying evaluated savings for each utility for each year would be a costly undertaking; looking more deeply into the difference between ex-ante estimated savings and ex post verified savings is a whole other area of research. Jones et al. (2011) attempted to reconcile savings and expenditures reported by utilities on EIA Form 861 with publicly available reports, filed with regulatory agencies; they found that about half of the utilities in their sample reported values within 10 percent of one another in their annual reports and on the EIA Form 861. However, differences between program years and calendar years, and other underlying differences, such as utilities reporting only some programs or only every three years, did not allow for comparison for all utilities in their study. Since so many forecasts, like the EIA's Annual Energy Outlook, are based upon the reported data in Form 861, and Jones et al. (2011) found them to be reliable estimates when they were comparable to other reported values for the same efforts, we assume that the Form 861 values are reliable estimates of utility savings.

After cleaning the EIA Form 861 data from 2006 through 2010, utilities with missing data were removed; 360 utility-years remain and are included in this analysis For the four types of utilities in the data set, mean savings are shown in Table 2. We can see that mean savings for IOUs in the West increased by much more than utilities of other types. For all utilities, the mean savings in 2010 was 0.21 percent of sales. While many of the independent variables considered are directly important to investor owned utilities, they represent the policy environment under which all utilities are operating.[2]

Table 2. Mean Savings as a Portion of Sales

Ownership	2006	2010
Cooperative	0.01	0.07
Investor Owned	0.09	0.82
Municipal	0.03	0.29
Political Subdivision	0.07	0.32

[2] Ownership type was considered as a factor in the model. Investor ownership is both positive and significant in the model; the other variables maintained similar directionality and significant, so these factors are not presented here, for simplicity.

Independent Variables

While current policy environments can usually be identified directly, identifying past policy environments is more challenging. This study relies upon state policies as described in the Regulatory Assistance Project's (RAP) State Energy Efficiency Policy Inventories, ACEEE Scorecards, and in State Energy Efficiency Regulatory Framework Updates (Eldridge et al. 2007, 2008, 2009; IEE 2009, 2010; Molina 2010; RAP 2011). The American Council for an Energy Efficient Economy (ACEEE) has ranked states on its Energy Efficiency Scorecard for every year in this analysis except 2007. The specific scoring methodology has evolved over time to result in a more robust and defensible score, but the idea behind the scorecard has remained the same: policies that are theorized to have high potential for energy savings result in higher scores.

The independent variables used in this model are presented in groups by the anticipated good policy environments presented earlier. Independent variables are developed for each state; all of these variables, except EEPS per year, are logical: either a state has the policy in place or it doesn't. EEPS per year is not transformed because it is still on the order of 1. The values for any individual utility-year are the averages of the values from the states in which it operates. As such, policy environment variables in the model are continuous variables with a range of *0* to *1* for the unit of observation. Descriptive statistics can be found in Table 3, below.

Require energy efficiency at some level. This analysis considers two variables for requiring energy efficiency. States with no Energy Efficiency Portfolio Standard will have *0* for both variables.[3]

EEPS per year (EPY). The average annualized efficiency targets represent the degree of effort required to meet the EEPS. These are included in the model; EEPS per year (in percent) is expected to have a positive relationship with the dependent savings variable (as a percent of sales).

EEPS binding (EB). In some cases, states have designed EEPS to be binding on utilities, and these utilities will face fines or other "sticks" for not meeting the target; in other states, EEPS include caveats, such as cost caps, that allow utilities to argue to not meet the target. A binding EEPS, which would have a value of 1 in the model, is expected to have a positive relationship with the dependent savings variable (as a percent of sales).

Establish evaluation framework. There are three variables included for evaluation framework; these variables relate to savings estimates for programs and cost-effectiveness. Notably, requirements for who will evaluate (e.g., the utility, an independent evaluator) could not be consistently determined over the study time period and is excluded.

Net Savings. Two binary variables are included for the consideration of net savings. These are whether free-riders (*FR*) or spillover (*SO*) are included in a state's definition of net savings. These two variables can each take on the value of 1 in the full model, but they are combined in the compressed model, described below, taking on a value of 1 if either are considered.

Cost-effectiveness (CE). Many states use one of the five cost-effectiveness tests presented in the California Standard Practice Manual. If a state requires calculation of cost-effectiveness of

[3] Some states have included efficiency as part of a Renewable Portfolio Standard (RPS) or other named policy; if these include efficiency, they are considered EEPS for the purpose of this study

efficiency programs, this variable will be 1. The validity and relative usefulness of these tests has been called into question as they do not represent an equivalent test of risk to ratepayers as supply side options are assessed against. Neme and Kushler (2010) argue for restructuring the cost-effectiveness tests in order to more adequately compare the costs and benefits of efficiency against supply options. Despite their weaknesses, these tests remain the standard way to compare the cost-effectiveness of efficiency programs and portfolios to potential supply options and protect ratepayers. Having a cost-effectiveness standard in place for the state is part of a commitment to a formal planning and evaluation framework as suggested by the NAPEE and DOE reports. It also gives utilities a starting point for making the case for energy efficiency programs to shareholders, customers, and regulators, as applicable.

Align ratemaking and funding practices with energy efficiency. There are three policy environment variables for aligning ratemaking practices with energy efficiency, or cost recovery (CR): use of rate cases, special efficiency tariff riders, or collection of systems or public benefits charges.

Rate case (RC). Many states allow utilities to make special rate cases that include consideration of energy efficiency programs. RC takes on a value of 1 if rate cases are used by the state.

Tariff rider (TR). Some states allow utilities to develop independent tariff riders to collect funds that can be used specifically for energy efficiency programs. This creates a pool of funds for a particular program, much like an excise tax that is then earmarked for a particular use (gasoline taxes funding highway maintenance is an example). TR takes on a value of 1 if tariff riders are used by the state.

Systems benefits charges (SBC). Similarly, some states collect fees from all consumers in particular rate classes across the state. These charges are designed to fund a portfolio of energy efficiency options within a state rather than specific programs at a utility. SBC takes on a value of 1 if these charges are used by the state.

Align utility incentives with energy efficiency. Three policy environment variables for aligning utility incentives with energy efficiency, or removing the throughput disincentive (RTD) are: Decoupling revenues from sales, adjusting for lost revenues, and providing a performance incentive when utilities meet or exceed efficiency goals..

Decoupling (DP). Decoupling revenues from electricity sales is expected to remove the throughput incentive for utilities to sell as much electricity as possible, which is reflected in many regulatory structures that define rates based on expected sales and allowed return on investment. DP takes on a value of 1 if the state decouples revenues from sales.

Lost Revenue Adjustment (LRA). A similar policy mechanism is designed to offset revenue 'lost' from sales that did not occur because of efficiency programs. LRA takes on a value of 1 if the state employs a LRA.

Performance Incentives (PI). States that offer incentives for utilities that meet or exceed savings goals are expected to have greater utility efficiency program success. Performance incentives may be, and often are, structured in tandem with penalties for not meeting goals. Roberts (2009) cautions that these incentives are not always structured in a way that encourages long term energy-efficiency, for example California's redesigned risk recovery incentives that encourage incentives over savings. PI takes on a value of 1 if the state employs PI.

Third party administration (TPA). In some states, changing the regulatory structure to align utility incentives is not desired; these states may choose to administer programs at the state level. If a third party is responsible for implementing energy efficiency program in a state, efficiency savings for programs run by the utilities are anticipated to be lower than what would be the case if the utility implemented their own programs.[4] As such, a dummy variable indicating third-party administration is added. Two states in the west use third party administrators at the state level: Hawaii and Oregon. The Energy Trust of Oregon (ETO) has been in place since 2002, which Hawaii Energy started its efforts in 2009. This is the only independent variable that is expected to have a negative relationship with utility savings.

Table 3. Descriptive Statistics for Independent Variables

Variable		Mean	Std. Dev.	Min	Max
FR	Free-Ridership	0.68	0.45	0	1
SO	Spillover	0.32	0.44	0	1
CE	Cost effectiveness	0.88	0.32	0	1
EPY	EEPS per year	0.47	0.59	0	2
EB	EEPS binding	0.35	0.46	0	1
RC	Rate case	0.41	0.48	0	1
SBC	Systems benefits charge	0.43	0.48	0	1
TR	Tariff rider	0.28	0.43	0	1
DP	Decoupling	0.19	0.38	0	1
LRA	Lost revenue adjustment	0.08	0.27	0	1
PI	Performance incentive	0.49	0.48	0	1
TPA	Third party administration	0.12	0.31	0	1

Means are the mean value of the variable for the utility-years included in this study; they reflect the mix of state policies and the distribution of utilities across states. For example, the 0.68 Mean for the FR variable means that 68% of utilities in the data are operating in a state policy environment that includes free ridership in its definition of net savings.

Model

For each utility (i) in year (t), the total incremental energy efficiency savings (in MWh) divided by total sales (in MWh), is set against the independent variables described above. Four models are considered, full (1,2) and compressed (3,4) with and without fixed effects for states. The full models include each of the policies described above while the compressed models include a logical variable for the presence of any. For example, the cost-recovery variable (CR) in the compressed model reflects the presence of rate case (RC), tariff rider (TR), or systems benefit charge (SBC) policies.

$$\frac{Savings_i}{Sales_i} = \alpha + \beta X_{i,t} + \gamma_1^{19} S + \varepsilon \qquad (1)$$

$$\frac{Savings_i}{Sales_i} = \alpha + \beta Z_{i,t} + \gamma_1^{19} S + \varepsilon \qquad (3)$$

$$\frac{Savings_i}{Sales_i} = \alpha + \beta X_{i,t} + \varepsilon \qquad (2)$$

$$\frac{Savings_i}{Sales_i} = \alpha + \beta Z_{i,t} + \varepsilon \qquad (4)$$

[4] Readers are cautioned that this statement is in no way intended to mean that savings overall will be less when run by third parties – only that savings claimed by utilities on their Form 861 do not reflect these programs.

where

$$\beta X_{i,t} = \beta_0 EPY_{i,t} + \beta_1 EB_{i,t} + \beta_2 FR + \beta_3 SO + \beta_4 CE + \beta_5 RC + \beta_6 TR + \beta_7 SBC + \beta_8 DP + \beta_9 LRA + \beta_{10} PI + \beta_{11} TPA$$

$$\beta Z_{i,t} = \beta_0 EPY_{i,t} + \beta_1 EB_{i,t} + \beta_2 NET + \beta_3 CE + \beta_4 CR + \beta_5 RTD + \beta_6 TPA$$

and $\gamma_1^{19} S$ is a series of state dummy variables, it is not included in model (2) or (4).

Discussion

Results

A correlation matrix for the independent variables in the full model is given in Table 3; as we might expect many of these policies are found together, as states do not adopt just one policy to encourage utility efficiency program savings (i.e. there is multi-collinearity). The multi-collinearity cannot be avoided if we are interested in the effects of these policies, but readers should take this as a note of caution in interpreting the findings.

Table 4. Correlation Matrix for Independent Variables

	CE	FR	SO	EPY	EB	TPA	RC	SBC	TR	DP	LRA
FR	0.53***										
SO	0.23***	0.46***									
EPY	0.30***	-0.16**	-0.29***								
EB	0.29***	0	-0.09	0.84***							
TPA	0.09	0.23***	0.29***	0.11*	0.26***						
RC	0.33***	0.31***	-0.32***	0.14**	0.27***	-0.1					
SBC	0.31***	0.05	0.27***	0.39***	0.40***	0.19***	-0.16**				
TR	0.24***	-0.11*	-0.15**	0.35***	0.06	-0.14**	-0.16**	-0.09			
DP	0.17**	0.35***	-0.03	0.35***	0.59***	0.50***	0.29***	0.38***	-0.31***		
LRA	0.10*	0.15**	0.12*	-0.20***	-0.17***	-0.09	-0.14**	-0.26***	0.44***	-0.14**	
PI	0.39***	-0.02	-0.25***	0.45***	0.40***	-0.19***	0.57***	0.03	0.20***	0.16**	0.04

Results of the four linear models are shown in Table 4. Each model's results are briefly explained here.

Model 1 (the full model) shows that states and tariff riders for cost recovery have significant effects on savings as a portion of sales. Tariff riders are positive and significant, possibly because tariff riders provide a dedicated funding source for energy efficiency programs, decreasing utility uncertainty.

Model 2 (the full model with no state fixed effects) also shows tariff riders for cost recovery to be positive and significant. However, the effect is not as strong, suggesting that state implementation of tariff rider policies matters in how they effect savings; a difference that might have been absorbed in the state fixed effects.

Model 3 (the compressed model with state fixed effects) does not predict the savings as a percentage of sales as well as Model 1. Model 3 shows that the difference of the types of policies within a policy goal, like the different ways a state might enable cost-recovery, may be less important than providing policies that meet the goal. This is clear because the compressed variables for net savings, EEPS, and cost-effectiveness are significant. While the coefficient for the EEPS and cost-effectiveness are positive as expected, the coefficient for net savings is negative. This does not necessarily mean that considering net savings in a state's regulator framework leads to lower savings for utility programs; rather, it may be that utilities in states considering net savings are more diligent with measuring net savings and report these measures to the EIA; it may also be a function of the maturity of programs. As programs mature, savings are more and more costly to find, and it may be harder to maintain savings at the same portion of sales. State fixed effects are still important for some states.

In Model 4, EEPS, revenue throughput disincentive policies, and having a third party administrator are significant in the directions expected.

Model 1 and Model 3 show that when state fixed effects are included in the model, states do appear to be significant. This suggests that state implementation of policies is not the same, and further research or classification of policies may be necessary to understand what underlying things may be driving savings related to the policies considered.

Table 4. Regression Results

	(1)		(2)		(3)		(4)	
FR	-0.35	(0.36)	-0.06	(0.12)				
SO	-0.07	(0.41)	0.14	(0.13)				
CE	0.18	(0.32)	0.05	(0.11)				
EPY	-0.12	(0.21)	0.14	(0.15)				
EB	0.45	(0.31)	0.07	(0.18)				
RC	-0.02	(0.13)	0.02	(0.11)				
SBC	0.07	(0.15)	-0.11	(0.09)				
TR	0.44***	(0.12)	0.23**	(0.1)				
DP	0.06	(0.2)	-0.12	(0.15)				
LRA	-0.1	(0.22)	-0.17	(0.14)				
PI	-0.15	(0.23)	0.14	(0.09)				
TPA	-0.04	(0.28)	-0.08	(0.12)	-0.21	(0.22)	-0.23**	(-0.23)
NET					-2.06***	(0.75)	-0.11	(-0.11)
CE					1.8**	(0.71)	0.13	(0.13)
EEPS					0.42***	(0.1)	0.19***	(0.19)
CR					0.17	(0.12)	0	(0)
RTD					-0.09	(0.13)	0.17**	(0.17)
AZ	0.14*	(0.08)			0.15*	(0.08)		
CA	-0.03	(0.24)			0.39***	(0.14)		
CO	-0.01	(0.27)			-0.11	(0.14)		
ID	-0.29	(0.24)			0.09	(0.14)		
KS	0.02	(0.24)			0.01	(0.16)		
MT	0.2	(0.25)			0.38*	(0.2)		
ND	0.18	(0.22)			0.1	(0.15)		
NE	0.2	(0.31)			0.14	(0.13)		
NM	0.1	(0.14)			0.05	(0.13)		
NV	0.38	(0.24)			-0.9*	(0.52)		
OK	0	(0.22)			-0.21	(0.16)		
OR	0.62*	(0.34)			0.37**	(0.16)		
SD	0.21	(0.32)			0.27*	(0.15)		
TX	-0.04	(0.37)			0.16	(0.18)		
UT	0.14	(0.3)			0.06	(0.18)		
WA	0.59**	(0.29)			0.16	(0.14)		
WY	-0.49*	(0.28)			-0.33	(0.25)		
HI	-0.97**	(0.4)			-2.4***	(0.76)		
AK	-0.12	(0.42)			-1.84**	(0.82)		
Adj R2	0.27		0.23		0.25		0.19	
prob(F)	0.00		0.00		0.00		0.00	
Signif. codes: '***' 0.01 '**' 0.05'*' 0.1 ; standard errors in parentheses								

The differences between models suggest that the type of policy that is least similar in effect is the method of cost-recovery. While tariff riders are significant in the full model, cost-recovery as a whole, or having any method of cost-recovery, is not significant in the compressed model. On the contrary, EEPS, consideration of net savings, and removal of the throughput disincentive are significant in compressed models while none of the components are significant in the full models. It may be that these kinds of policies are less different from each other, or there may be other unobservable variables that are also related.

Limitations and Future Work

Data reported on EIA-861 may not be the best estimate of actual energy efficiency activity at a utility. However, these data are used in EIA annual reports and forecasting, and represent the most complete data set available. Future work should explore the results if evaluated savings were used instead of reported savings; this may require working with a smaller set of utilities.

Policies that have been identified as being in place during a year may not reflect the policy environment that the utility expects or considers when planning programs. Potential for a lag in effects could be explored with more years of data. Exploring potential lag between implementation and effect may be useful to inform policy options by providing guidance to them on when an evaluation of a states policy approach may be warranted. In this study, the independent policy environment variables were determined as the average of all states in the utility territory; it is possible that utilities design their efforts based on a single state with the most aggressive policies instead of considering all of the policy environments in their territory. It appears that policy nuance may also contribute to varying degrees of influence of a particular policy type. Policy implementation represents a non-trivial permutation to policy; use of a categorization scheme, along with other factors, as presented in (Bhattacharjee 2010) could identify policy environment influences at a more refined level.

In addition, policy effects on utility program savings may run counter to the policy effects on overall savings within a state. States with the policies designed most specifically to harness utility energy efficiency program savings may also have the most aggressive state level policies for other industries, making each kWh of savings more difficult to reach for utilities. For example, states which enact, and ensure compliance with, strict building codes and appliance standards push the baseline efficiencies and costs for savings in buildings and appliances up, and present utilities with greater difficulty in finding additional savings for these sectors. The state regulatory and statutory bodies are focused on energy consumption at the state level, utility efforts are just one piece of that pie. There are factors that obfuscate measuring additionality from utility programs. Notably, utilities and states sometimes coordinate program efforts at varying degrees of interactivity. Goldman et al. (2011) reviewed coordination; all western states included in the case studies (CA, CO, HI, OR) had either complementary efforts by utilities and states or full coordination between their efforts, but two of these states (CO, OR) have not determined how to attribute, or split, savings credits between the state and utilities.

Summary and Implications

This study adds to the understanding of energy efficiency savings by utilities working in different policy environments. The findings show that intrinsic differences between states are not consistently driving energy savings, but a few policies do seem to have an effect: tariff riders for cost-recovery, having an EEPS, and removing the throughput disincentive are positive and significant.

While tariff riders are significant in the full model, cost-recovery as a whole, or having any method of cost-recovery, is not significant in the compressed model. On the contrary, EEPS, consideration of net savings, and removal of the throughput disincentive are significant in compressed models while none of the components are significant in the full models. It may be that these kinds of policies are less different from each other, or there may be other unobservable variables that are also related. This suggests that state implementation of policies matters. It also suggests that future studies should consider fixed effects models to account for state differences.

Policy makers who hope to increase utility energy efficiency program savings may want to focus on tariff riders to ensure that programs are fully funded. This may greatly reduce policy and funding uncertainty that utilities face when designing programs. States may also consider having efficiency targets, ensuring that there is an evaluation framework in place for cost-effectiveness, and removing the throughput disincentive.

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