Are Energy Efficiency Standards within the Electricity Sector a form of Regulatory Capture?

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Matt Croucher[*]
Seidman Research Institute
W. P. Carey School of Business
Arizona State University

[*] Assistant Research Professor, Department of Economics and Senior Research Economist, L. William Seidman Research Institute, W.P. Carey School of Business. The views expressed herein are those of the author and do not necessarily reflect the views of Arizona State University.

1. Introduction

Stigler (1971) hypothesized that industries may actively seek, or not contest, various forms of regulation as the regulation introduced may in fact lead to welfare enhancing outcomes (increased profitability for example) for the industry. This concept has become known within the economic literature as regulatory capture.

One increasingly popular form of regulation being introduced at the state level in the electricity sector is energy efficiency standards (EES). Table one presents those states that have introduced (or plan to introduce) energy efficiency standards.

Table One: Energy Efficiency Standards/Targets across States

	Electricity Targets	Electricity and Gas Targets	Pending Energy Efficiency Targets
Arizona	x		
California		x	
Colorado		x	
Connecticut	x		
Delaware		x	
Florida	x		
Hawaii	x		
Illinois		x	
Indiana	x		
Iowa		x	
Maryland	x		
Massachusetts			x
Michigan		x	
Minnesota		x	
Nevada	x		
New Jersey			x
New Mexico	x		
New York		x	
North Carolina	x		
Ohio	x		
Pennsylvania	x		
Rhode Island	x		
Texas	x		
Utah			x
Vermont	x		
Virginia	x		
Washington	x		
Wisconsin			x
Wyoming			

Source: Pew Center on Global Climate Change

At their most basic level an EES generally requires that regulated electricity utilities reduce their retail sales by some given percentage through time or relative to a baseline level. Typically to meet a given EES utilities often offer financial incentives, such as rebates, to customers who decide to install energy efficiency devices and/or adopt other measures that may also assist with reduced electricity consumption for example weatherization measures.

An EES that is introduced is just another piece of regulation that an electricity provider has to deal with. For instance, due to their natural monopoly positions, electricity utilities also tend to have their *price* determined by regulatory authorities as well. In essence, with the introduction of an EES the regulatory authorities would now been quasi-determining prices as well as quantities. This in itself leads to some significant potential issues that require addressing.

In most electricity rate-setting environments the price set/allowed is a function of numerous different factors but the largest single factor is the expected single factor is the volume of forecast sales.[1] Once the price is set by the regulatory body the electricity utilities, under current rate-setting regimes, potentially have a profit incentive to encourage significant *increases* in consumption over and above forecast levels – which is a direct contradiction to the objective of energy efficiency standards.[2] Conversely, reductions in sales, for instance via energy efficiency standards, may potentially lead to utilities not obtaining an appropriate rate of return under current rate designs.[3]

An obvious question follows which is "if the utility is selling less electricity shouldn't their costs fall and thus offset any resulting reduction in revenue?" However, due to the cost structure of the electricity sector and what costs the price of electricity typically reflects, that is not the case.

The electricity sector is a sector that is characterized as having a cost structure where a significant amount of their overall costs are *fixed* costs. Fixed costs include such things as transmission and distribution costs. Transmission and distribution costs are the costs associated with the delivery network which is needed to move electricity from its generation location to consumer's location – homes and businesses.

[1] Because total sales ultimately determine a utilities *total cost* of provision as well as determining the base on which the costs of provision can be recouped.
[2] We say potentially because the price set attempts to reflect *average* costs of provision. Thus at the margin the utility only has a profit incentive if the cost of providing additional units of electricity is less than the price they will receive on those units. It is entirely possible that the marginal cost is above the price (average cost) at various different times of the day/month/year – for instance within the peak period the marginal cost of provision tends to be relatively.
[3] Again we say potentially because if the energy efficient measures reduce demand at points in time where the marginal cost of provision is high relative to the price received for provision then the utility is actually better off. This explanation is generally but forward as a reason why most utilities have energy efficiency programs even if they are not mandated.

Also, most technologies utilized to generate electricity are relatively capital intensive – for example, coal, nuclear and renewable generation technologies. Thus, there are also significant fixed costs associated with the generation component of electricity provision. The largest *variable* cost is typically the cost of fuel used at the generation facility or purchased power from the wholesale market.[4]

The result of these significant fixed costs coupled with most rate designs currently in place is that when electricity sales fall the reduction in revenue is a *greater* percentage than the overall reduction in the costs of provision – thus a reduction in rate of return occurs.[5]

For instance, Cappers et. al (2010) examined the impact of aggressive energy efficiency savings occurring in Massachusetts relative to a business as usual case of moderate energy efficiency savings. They find that the aggressive energy efficiency savings would cause retail prices to increase at a more rapid rate because *"…. the reduction in sales exceeds the utility cost savings from EE"*[6]

This asymmetry reaction of costs and revenues to changes in retail sales occurs because of the current methods authorized by regulatory authorities that allow electricity providers to recoup their costs. Most regulated electricity providers current rate design include some amount of fixed customer charges per month – which is often less than the actual fixed cost per month of provision - and a variable component which is a function of the electricity price and actual electricity consumption. The per unit price, in turn, is a function of variable costs (fuel) and the remaining fixed costs that are not recouped in the upfront fixed cost charge.

[4] Some purchased power are part of purchasing power agreements which can be for a significant long time period and thus represent fixed costs/obligations – the variability of this cost is a dependant on the type of purchasing power agreement.

[5] Note as the required amount of renewable generation (which are mainly capital intensive with no fuel payments) increases in the United States due, in part, to renewable portfolio standards, this effect may become amplified.

[6] Cappers et. al (2010) pg. 18.

Therefore, under most current rate designs the price of electricity is a *mixture* of fixed and variable cost elements. Thus, reductions in overall sales will inevitably push a utility towards a rate case (generally requesting an increase in price) with the relevant regulatory authority.

Any rate case can potentially be expensive and time consuming. Thus, it is generally preferable if mechanisms are in place that will automatically adjust to assist with ensuring the utilities receive an acceptable rate of return, especially in an environment where the regulatory authorities are encouraging reduced usage of the product.[7] Simply put, if the regulatory authority is going to attempt to control quantities it may have to relinquish some (or all of) its control over prices and vice versa – it cannot successfully control both.[8]

One obvious solution is to eliminate the component of electricity prices that reflects partially some fixed cost of provision. So instead electricity prices only reflect any variable costs such as the fuel costs incurred to generate the electricity consumed. To achieve this, alterations to the fixed charge per month would be required such that the monthly fixed charge reflects *all* of the fixed costs associated with provision rather than it only reflecting a reduced percentage.

This approach is often not adopted for numerous reasons. For one, this method may adversely affect low-income households such that their electricity bill would increase.[9] There may be difficulties in determining which fixed costs should be paid by which consumers.[10]

Also from an energy efficiency point of view it would lower the financial incentive to reduce electricity consumption at the margin. This is because under most current rate systems the price of electricity would be higher than a rate system where the price reflects only variable costs. Thus within current rate designs the incentive to reduce electricity consumption (avoided electricity costs) is higher.

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[7] For instance most regulated utilities have a fuel adjustment escalator which allows them to charge customers extra if the price of a particular fuel used in generation changes significantly.
[8] So says the law of demand.
[9] This is because the volume of electricity consumed (and thus the variable component of their electricity bill) by low-income households may not not cover all of the actual fixed costs of provision.
[10] Should fixed costs be distributed equally across consumers? Or should population centers that are further away from generation sources and have lower population densities pay higher fixed charges?

One increasingly popular mechanism that assists with ensuring utilities receive their acceptable rate of return in an environment that promotes energy efficiency without the need for increasingly regular rate cases is decoupling.[11]

Decoupling is typically defined as *"a regulatory mechanism/tool that is designed to separate a utility's revenue (and thus rate of return) from changes in the utilities overall energy sales"*. Thus, utilities revenue becomes "decoupled" from their sales. If this link is broken then reductions in sales do not adversely affect the utilities revenue.

In its simplest form decoupling is any mechanism that *adjusts* rates/electricity prices periodically - monthly, semi annually, annually - to ensure that a utility receives the amount of revenue authorized independent of its volume of sales.[12] Simply speaking, if sale volumes fall – potentially due to successful energy efficiency programs - then prices *automatically* adjust on some regular basis in an upwards manner.[13]

This *automatic* (by rule/formula) adjustment in prices to varying volume changes is the very reason that electricity providers *may seek regulation* in the form of energy efficiency standards. This is because once energy efficiency standards are in place, this quantity regulation, leads to, and provides, significant and overall compelling arguments that decoupling is a necessary mechanism to ensure that energy efficiency standards are successful by potentially re-aligning utility incentives with that of the regulatory authority.[14] As a result, the vast majority of states that allow a decoupling mechanism within the electricity sector have some form of an energy efficiency standard.[15]

[11] As of 2009 a total of 28 natural gas local distribution utilities and 12 electric utilities, across 17 states, have operative decoupling mechanisms (Lesh, 2009).
[12] See Lesh (2009). "*Rate Impacts and Key Design Elements of Gas and Electric Utility Decoupling: A Comprehensive Review*" and ICF International. (2007). "*Aligning Utility Incentives with Investment in Energy Efficiency.*" for a more detailed discussion of potential variations in decoupling mechanisms.
[13] Note if sales increase then the rate will decrease Lesh (2009) notes that this has happened, and thus decoupling should not just be treated as a mechanism that will cause prices to simply increase.
[14] As well as consumer incentives.
[15] See Lesh (2009).

Overall, the introduction of the decoupling mechanism means that more of the rate-setting process is by rule and formula and thus prices changes are more automatic and potentially smoother in their incremental changes than regular rate-setting mechanisms. Instead of potentially time-consuming and expensive rate-cases, a decoupling mechanism reduces the need for the regulated utilities to have to approach the regulatory authority to formally approve rate changes.

Importantly, the decoupling mechanisms introduced do not just allow changes in retail prices to occur if and only if changes in sales are caused by successfully meeting energy efficiency standards. In fact, there is a significant debate within the economics literature about the true success of energy efficiency improvements/standards in reducing sales. Much of this literature focuses on estimating the size of the rebound (take-back) effect as household and business invest in energy efficiency measures.[16] [17] Given the potential presence of a rebound effect, this implies that the changes in sales caused by an energy efficiency standard will typically be smaller than what the standard requires.[18]

Instead, *any underlying demand factor*, for example, unpredictable or abnormal weather conditions, population or income changes etc, through their impact on retail sales, could cause changes in prices to occur within the decoupling framework.

Therefore, within a decoupling framework, utilities have less concerns over the volatility of their sales and/or encouraging their customers to reduce their consumption of electricity as (automatic) price changes will reflect changes in sales and assist with ensuring utilities obtain

[16] Especially since the majority of energy efficiency standards are met by encouraging consumers to purchase more efficient devices such as CFLs and higher SEER rating air-conditioning units.

[17] See Croucher (2010a) for more details on the literature.

[18] Note, to meet most energy efficiency standards most forecasts of electricity savings that occur due to the introduction or installation of an energy efficiency measure are calculated using savings estimates that rely on examining the differences in (often field-adjusted) technical specifications between the energy efficiency measure and the "standard" measure. For example the predicted annual and lifetime savings from installing a more efficient AC unit is calculating by comparing technical specifications between that unit and the standard measure (typically an AC unit with a SEER rating of 13). Thus, energy efficiency standards that rely on measuring electricity savings via this approach are in essence standards that require a certain amount of *potential* savings to be made available via the introduction of energy efficiency measures. The *actual* amount of electricity reductions may in fact differ significantly from the estimated or measured electricity savings – mainly due to the rebound effect.

their authorized rate of return – something which does not always happen under current rate setting regimes due, in part, to the (significant) time delays between rate cases.

2. Conclusion

At first glance it would appear paradoxical that electricity utilities would be in favor of energy efficiency standards given that energy efficiency standards do not just require utilities to reduce their sales, but in order to actually meet the standards the utility may even have to provide financial incentives to customers.

However, the introduction of an energy efficiency standard means that if quantities are quasi-controlled by the regulatory authority the authorities may have to relinquish some control over price. The major mechanism that is introduced in states that have an energy efficiency standard is decoupling. Automatic and regular price adjustments like those that occur within a decoupling framework may ultimately lead to a reduction in rate cases for a particular utility.

The words *"automatic and regular price changes"* are potentially "music to a utility's ear "as they typically assist with ensuring that the correct rate of return is received. Also decoupling mechanisms can potentially reduce the amount of "politicking" that can occur during a particular rate case.

Thus, if a prerequisite to having a decoupling mechanism implemented is the introduction of an energy efficiency standard, it highly unlikely that a utility will object (and in fact they may openly encourage its introduction) to this – largely administrative - piece of regulation.

Finally, most people think of regulatory capture as an industry benefiting from the introduction of regulation *at the expense* of some other agent in the economy, be it, the government, consumers or other industries. Regulatory capture via an energy efficiency standard is not like that.

In fact, the regulators potentially benefit as they receive the plaudits for attempting to implement strategies that may have environmental benefits.[19] The regulated firms potentially benefit from a more automatic and formulaic rate-setting process and the more energy-savvy consumers receive encouragement via rebates (and increasing electricity prices) to reduce their electricity consumption.[20]

[19] Some commentators argue there are economic benefits as well.
[20] Note decoupling can also potentially limit the size of the rebound effect. See Croucher (2010b) for more details.

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