Empirical Assessment of Shareholder Incentive Mechanisms Designs under Aggressive Savings Goals: Case Study of a Kansas "Super-Utility"

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ABSTRACT

Achieving significant reductions in retail electric sales is becoming a priority for policymakers in many states and is echoed at the federal level with the introduction of legislation to establish a national energy efficiency resource standard. Yet, as the National Action Plan on Energy Efficiency (NAPEE) pointed out, many utilities continue to shy away from seriously expanding their energy efficiency program offerings because they claim there is insufficient profit motivation, or even a financial disincentive, when compared to supply-side investments.

In response to an information request from the Kansas Corporation Commission staff, we conducted a financial analysis to assess the utility business case in Kansas for pursuing more aggressive energy efficiency that complies with recent state legislation. Kansas' utilities are vertically integrated and don't face retail competition. With historically low retail rates and modest experience with energy efficiency, the achievement of rapid and substantial sales reductions from energy efficiency will require a viable utility business model.

Using a conglomerate of the three largest utilities in Kansas, we quantitatively illustrate the tradeoff between ratepayer and shareholder interests when a 1% reduction in incremental sales is achieved through energy efficiency both with and without the impact of future carbon regulation. We then assess if the utility can be compensated in a manner that produces a sufficient business case but leaves an adequate amount of net resource benefits for ratepayers at a cost that is not overly burdensome. Finally, we show how several common shareholder incentive mechanisms would be designed to achieve this balance.

Introduction

Many state regulatory commissions and policymakers want utilities to aggressively pursue energy efficiency as a strategy to mitigate demand and energy growth, diversify the resource mix, and provide an alternative to building new, costly generation. However, as the National Action Plan for Energy Efficiency (Jensen 2007) points out, many utilities continue to shy away from aggressively expanding their energy efficiency efforts when their shareholder's fundamental financial interests are placed at risk by doing so. Thus, there is increased interest in developing effective ratemaking and policy approaches that address utility disincentives to pursue energy efficiency or lack of incentives for more aggressive energy efficiency efforts.

New regulatory initiatives to promote increased utility-administered energy efficiency efforts also affect the interests of consumers. Ratepayers and their advocates are concerned with issues of fairness, impacts on rates, and total consumer costs. From the perspective of energy efficiency advocates, the quid pro quo for utility shareholder incentives is the obligation to acquire all, or nearly all, achievable cost-effective energy efficiency. One of the key challenges in designing incentive mechanisms is setting the incentive at a level high enough to motivate the utility to maximize cost-effective energy efficiency savings while achieving an equitable sharing of benefits, costs and risks among the various stakeholders.

[1] The work described in this paper was funded by the Department of Energy Office of Energy Efficiency and Renewable Energy, Weatherization and Intergovernmental Program and the Office of Electricity Delivery and Energy Reliability, Permitting, Siting and Analysis of the U.S. Department of Energy under Contract No. DE-AC02-05CH11231.

The state of Kansas provides a recent example where state policymakers enacted legislation supporting enhanced energy efficiency efforts. The Kansas Corporation Commission (KCC) opened a docket in November 2007 in response to Kansas Senate Act 74-616(b), which directed the Commission to develop a comprehensive state energy conservation plan and implementation procedures (KCC, 2007). The Commission planned to address methods for cost recovery of energy efficiency programs, the use of decoupling to mitigate lost fixed cost recovery concerns, as well as the conditions under which shareholder incentive mechanisms would be appropriate. Retail rates in Kansas are currently lower than the national average and Kansas utilities have historically preferred and received regulatory approval to build new base load (e.g., coal) generation in advance of need, selling power on the wholesale energy market. With this business model and low perceived demand from customers, investor-owned utilities in Kansas have not been particularly interested in aggressively pursuing energy efficiency. However, requirements to implement the new state legislation on energy efficiency coupled with the increasing difficulty in siting new coal plants (and the prospect of federal carbon legislation) has spurred renewed interest among Kansas state regulators and utilities to re-examine the business case for energy efficiency in this changing environment.

As part of this investigation, the KCC staff requested that Lawrence Berkeley National Laboratory (LBNL) provide technical assistance by quantitatively assessing the impact of several different business models for energy efficiency under various EE portfolio savings goals and both with and without the effects of likely carbon regulation. The hope was that this analytical framework would help stakeholders focus the discussion concerning appropriate business models for the state's largest utilities to more aggressively pursue energy efficiency.

Specifically, we modeled a conglomerate of the three largest vertically-integrated electric investor-owned utilities in Kansas. We analyzed the impact of a relatively aggressive energy efficiency portfolio (1% annual reduction in incremental retail sales) on utility shareholders and ratepayers as well as the incremental effect when lost fixed cost recovery and/or utility shareholder incentive mechanisms are implemented. The impact of likely future carbon regulation is also included in our analysis; our results suggest that a moderate carbon adder significantly changes the business case for energy efficiency, relative to supply-side investment. Finally, given the estimated costs, benefits and risks of energy efficiency and supply-side alternatives, we assess conditions under which a sustainable business model for utility EE program administration is achieved and also provides significant benefits to ratepayers, or if alternative options need be considered.

Overview of Analysis Method

We used a spreadsheet-based financial model adapted from a tool (Benefits Calculator) constructed to support the National Action Plan for Energy Efficiency (Cappers et al. 2009). The major steps in our analysis are displayed graphically in Figure 1. Two main inputs are required: (1) a characterization of the utility which includes its initial financial and physical market position, a forecast of the utility's future sales, peak demand, and resource strategy to meet projected growth; and (2) a characterization of the Demand-Side Resource (DSR) portfolio – projected electricity and demand savings, costs and useful lifetime of a portfolio of energy efficiency (and/or demand response) programs that the utility is planning or considering implementing during the analysis period. The Benefits Calculator also estimates total resource costs and benefits of the DSR portfolio using a forecast of avoided capacity and energy costs. The Benefits Calculator then uses inputs provided in the Utility Characterization to produce a "business-as usual" base case as well as alternative scenarios that include the impacts of energy efficiency resources. If a decoupling and/or a shareholder incentive mechanism are included, the Benefits Calculator model readjusts the utility's revenue requirement and retail rates accordingly. Finally, for each scenario, the Benefits Calculator produces several metrics that provides insights on how energy efficiency resources, decoupling and/or a shareholder incentive mechanism impacts utility shareholders (e.g. overall earnings, return on equity), ratepayers (e.g., average customer bills and rates) and society (e.g. net resource benefits).

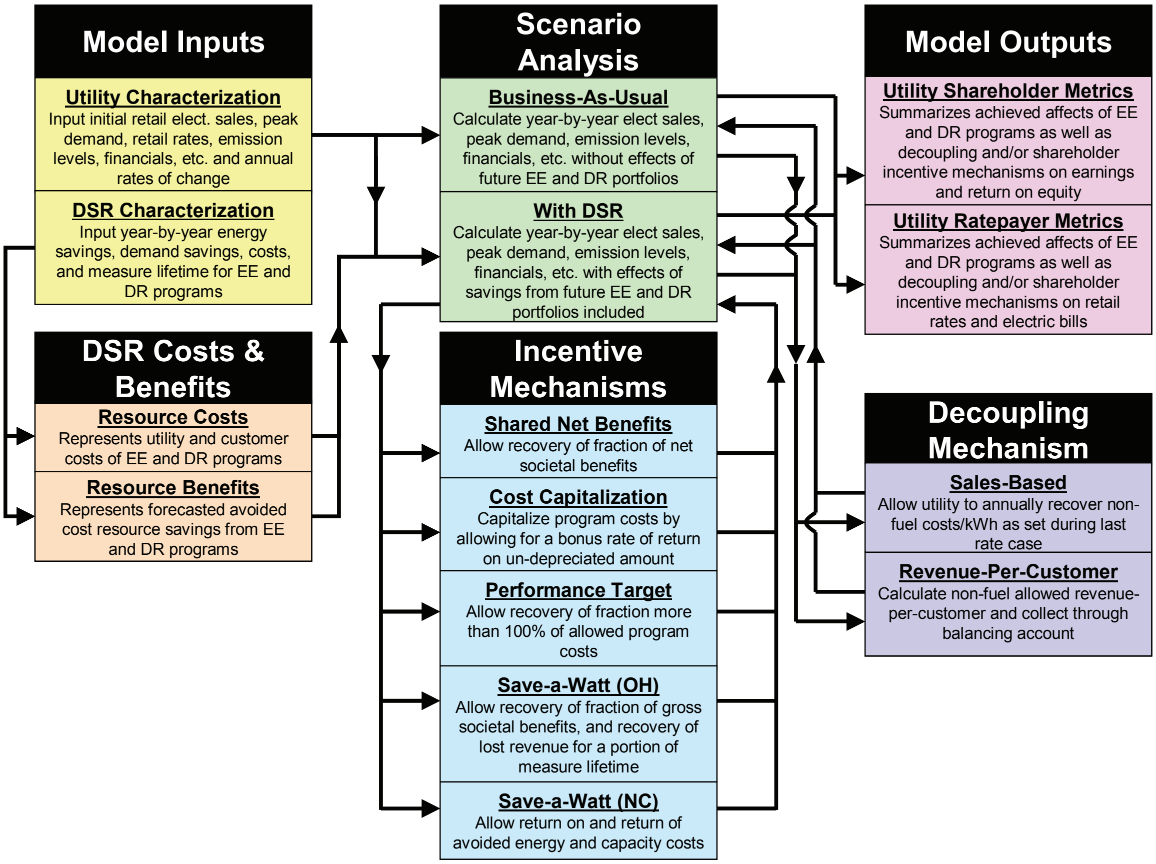

Figure 1. Flowchart for quantitative analysis of EE incentive mechanisms

Utility Characterization

We reviewed the physical and financial characteristics of the three largest investor-owned electric utilities in Kansas: Kansas Gas and Electric, Westar Energy, and Kansas City Power and Light. Based on this assessment, we combined the individual utility characteristics to construct a single super-utility, which would serve as the basis for our analysis. This approach was preferred by the KCC staff and allowed them to assess the likely impacts of energy efficiency on a statewide basis.

As shown in Figure 2, our Kansas super-utility has first-year (2008) annual retail sales of ~37,000 GWh and an initial peak demand of ~6,500 MW, which equates to a 65% load factor. Sales are forecasted to grow at a compound annual rate of 1.6%, while peak demand is expected to increase at a slightly faster rate of 1.7%. The super-utility has ~1.2 million customers in 2008 and expects customer account growth to increase at 1.0% per year. These load, peak demand, and customer forecasts represents our "business-as-usual" scenario if energy efficiency is not implemented (BAU No EE case).

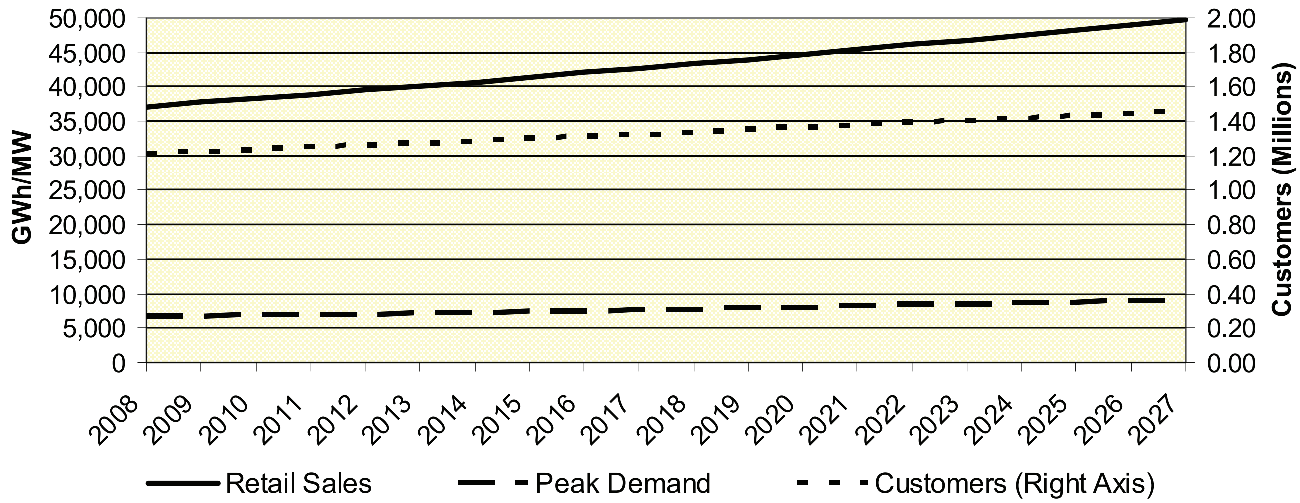

Figure 2. Forecasted retail sales, peak demand and load factor for Kansas "super-utility": Business-as-usual No EE case

The growth in sales and peak demand, coupled with the requirements of a renewable portfolio standard in Kansas, results in a resource plan for our super-utility that includes a substantial number of new generation facilities, both wind and traditional fossil-fuel plants, over the first ten years of our 20 year analysis period (see Figure 3). To finance these plants, the utility uses a capital structure of 51% debt financing at a cost of 6.07%, with the remainder coming from the issuance of equity at an authorized ROE of 10.41%.

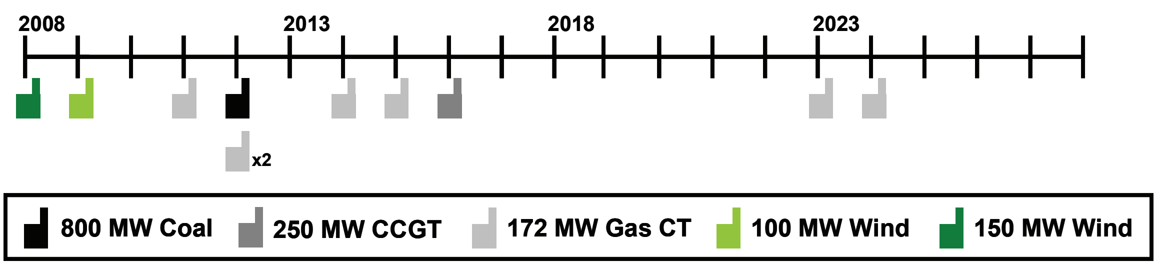

Figure 3. Generation expansion plan for Kansas "super-utility": Business-as-usual No EE Case

Our Kansas super-utility has excess generating capacity in 2008, but uses it for off-system sales when economically justified. The staff at the KCC indicated that the super-utility's proposed IRP plan continues this pattern over the first 10 years of the analysis period as the super-utility's rate base continues to increase, driven primarily by generation additions, even though the system has some excess capacity (see Figure 3).[2] Thereafter, the injection of additional major capital into rate base is greatly reduced. The utility is assumed to file a rate case when major capital investments are completed (>$100M) or if the utility's achieved ROE drops 100 basis points below the authorized level of 10.41%.[3]

[2] By statute, Kansas utilities are obligated to return the profits from these off-system sales back to consumers, which we have included in our analysis.

[3] We believe that this approach for triggering a rate case is more consistent with actual industry practice compared to an approach that pre-specifies the frequency of rate cases (e.g., every two or three years), which was used in Cappers et al. (2009). Given the impact that a significant EE portfolio can have on the utility's ROE and the timing of major capital

Under these assumptions, our Kansas super-utility has an all-in average retail rate of 7.1 ¢/kWh in 2008, which increases to 9.6 ¢/kWh (in nominal terms) by 2027, which is a modest increase in annual percentage terms of 1.6% /year (see Table 1).[4] In the business-as-usual case (without energy efficiency), the utility's average time-weighted return on equity over the analysis period is 10.45%, which is 4 basis points in excess of its authorized level.

Table 1. Kansas super-utility (Business-as-usual No EE case): Major budget expenditures and projected growth

Utility Budget Category	2008 Level ($B)	2017 Level ($B)	2027 Level ($B)	Annual Growth Rate (%)
Capital Expenditure	$0.20	$0.24	$0.30	2.1%
Rate base	$7.16	$8.31	$6.84	N/A
Operations and Maintenance	$0.95	$1.40	$2.04	4.1%
Fuel & Purchased Power	$0.60	$0.91	$1.45	4.7%
Annual Revenue Requirement	$2.64	$3.73	$4.79	3.2%
All-In Retail Rate	*7.1 ¢/kWh*	*8.7 ¢/kWh*	*9.6 ¢/kWh*	*1.6%*

Motivating utilities to achieve energy efficiency savings goals

Kansas state policymakers and regulators want utilities to increase efforts to capture cost-effective energy efficiency resources. In this analysis, we assumed the utility is considering implementing a portfolio of EE programs over a 10-year time horizon. The goal of this portfolio is to achieve a 1.0%/year reduction of incremental retail sales after five years and maintain this level of incremental energy savings each year for the next five years. We assumed that about 27% of the electricity savings occur during the peak period, defined as between 1 and 7 PM, and during summer weekdays. Annual peak demand savings from the suite of energy efficiency programs is 11 MW in the first year and increases to 71 MW by year 10; the aggregate peak demand reduction of the EE portfolio is 548 MW over 10 years. Each year's portfolio of energy efficiency programs has its own weighted-average measure lifetime – these vary between 11.0 years in the first year of the 10 year program cycle and 12.7 years in the last year of the cycle. We assume that the total resource costs for the EE portfolio is 3.4 cents per lifetime kWh, or $896 million on a PV basis. The benefits of the EE programs, as measured from a TRC perspective, are estimated to be $1.105 billion, which results in $209 million in net benefits and a benefit cost ratio of 1.23. Although net resource benefits to society from energy efficiency are significant, aggressive pursuit of energy efficiency conflicts with shareholder interests, as the utility's average achieved ROE drops from 10.46% in the BAU No EE case to 10.15% when these energy efficiency efforts are undertaken.

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expenditures, the difference in the timing of rate cases under these two alternative methods for triggering rate cases (e.g. ROE erosion vs. pre-specified, fixed intervals) can be substantial and hence have a large impact on our super-utility's financial position.

[4] Projections of future utility costs (relative to sales growth) are based on the recent historical experience of the three largest investor-owned utilities in Kansas as reported in FERC Form 1.

Given the erosion in shareholder value, the regulatory commission is considering a host of different financial mechanisms to help remove some or all of the disincentives in order to better align the utility's financial interests with the state's policy goals. First, the reduction in sales between rate cases due to the introduction of energy efficiency potentially puts the utility's full recovery of fixed costs at risk. Regulators are considering a revenue-per-customer decoupling mechanism as one strategy to mitigate this issue. Second, a longer-term disincentive arises as the utility is deferring supply-side capital investments, which generate earnings, with energy efficiency investments that do not contribute to shareholder wealth under traditional regulation.

There are several different types of shareholder incentive mechanisms that reward the utility for successfully implementing their energy efficiency portfolio. Three shareholder incentive mechanisms (Performance Target, Cost Capitalization, and Shared Net Benefits) have been implemented at a number of utilities over the last two decades. These three incentive mechanisms are modeled separately with and without the decoupling mechanism. In addition, we include two shareholder incentive mechanisms recently proposed by Duke Energy which are more comprehensive in nature, combining several different objectives into a single mechanism. The specific financial mechanisms analyzed are:[5]

- **Revenue-per-customer decoupling**: This mechanism fully decouples utility sales from non-fuel revenues. The actual allowed non-fuel revenue collected by the utility is the product of the average non-fuel revenue requirement per customer at the time of the last rate case, adjusted upwards annually until the next rate case at a rate of 0.885%/year in order to account for both the effects of inflation on utility budgets but also offset by assumed increased utility productivity, and the current number of customers being served.[6] Thus, the total non-fuel revenue collected by the utility increases as the number of customers being served rises and with each passing year between rate cases due to the adjusted inflation factor. A balancing account is used to ensure ratepayers are either debited or credited for under- or over-collection of the authorized per-customer non-fuel revenue requirement. A full decoupling mechanism mitigates the potential for lost profit from any under-recovery of fixed costs through a reduction in retail sales between rate cases, relative to the business-as-usual case.
- **Performance Target**: The utility receives a bonus of an additional percentage of program administration and measure incentive costs for achieving program performance goals. Program costs are explicitly recovered in the period expended through a rider.
- **Cost Capitalization**: The utility capitalizes energy efficiency program administration and measure incentive costs over the first five years of the installed measures' lifetime and is granted the authority to receive a bonus on its authorized ROE (10.41%), expressed as a specified increase in basis points of earnings on energy efficiency expenditures.
- **Shared Net Benefits**: The utility retains a pre-determined share of the net resource benefits (i.e. avoided energy and capacity cost benefits minus utility program costs and installed costs of the energy efficiency measures) from the portfolio of energy efficiency programs. Program costs are explicitly recovered through a rider.

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[5] For each incentive mechanism, the utility's expected earnings are represented on an after-tax basis. Thus, ratepayers are obliged to pay an incentive mechanism to the utility that is grossed-up for the assumed ~40% tax liability faced by the super-utility (e.g., local, state and federal government taxes).

[6] In many jurisdictions where regulators have allowed for this adjustment to the revenue requirement used in the decoupling mechanism, the productivity offset (often called the X-factor) is typically a negotiated value. In our analysis, we set the X-factor at a level such that the utility's time-weighted average achieved ROE was identical to the authorized ROE regardless of the utility's decision to pursue this level of energy efficiency savings (i.e., the decoupling mechanism perfectly removed the utility's disincentive from pursuing energy efficiency).

- **Save-a-Watt NC**: The utility capitalizes and collects revenues that are set at a specific percentage of the present value of the stream of total avoided cost savings realized over the lifetime of the installed energy efficiency measures. Given the potential revenue stream, under this proposal, the utility waives the right to collect its program costs and any associated lost earnings from reduced sales volume.[7]
- **Save-a-Watt OH**: The utility retains a specified fraction of the present value of the gross benefits (i.e. avoided energy and capacity cost benefits) from the portfolio of energy efficiency programs. Program costs are to be covered by this payment. An explicit "lost revenue" component is also included that allows the utility to recover the first three-years of savings from each year's implemented measures or up until the time of the next rate case, whichever comes first, valued at the then existing average retail rate (excluding fuel).[8] Although Duke Energy Ohio also agreed to an earnings cap on the contribution made by the incentive mechanism, we have excluded this component for consistency as none of the other mechanisms are modeled with an explicit earnings cap.

Quantitative approach to designing shareholder incentive mechanisms

One approach to aligning utility's financial interests with a state's energy efficiency policy goals would be for a regulatory commission to indicate its willingness to consider incentive mechanism proposals that provide utility shareholders with the opportunity to earn a specified and targeted increase in the utility's after-tax ROE, if the utility successfully achieves an energy efficiency savings goal, while retaining a minimum specified share of net resource benefits for ratepayers. This approach could lead a regulatory commission to make an implicit determination on the issue of "how much is enough" to motivate utility management to achieve superior performance in administering a portfolio of energy efficiency programs. An important by-product of this approach is that it potentially sets an upper limit on the financial (and rate) impacts of a shareholder incentive mechanism, which may be important to certain stakeholders.

Assume that the regulatory commission decides that at least 80% of the resource benefits of energy efficiency should be provided to ratepayers and that the utility should be provided an opportunity to increase its after-tax ROE by a maximum of 15 basis points compared to the BAU No EE case.[9] We assume that the PUC has decided that this sharing formula allows ratepayers to receive the bulk of the benefits from energy efficiency and that a 15 basis point increase in ROE represents an attractive financial incentive which it believes is sufficient for the utility to develop a sustainable business model for energy efficiency.

One goal of our analysis is to assess the extent to which these policy targets can be met and if so then to illustrate the design (i.e., earnings basis) of each shareholder incentive mechanism under two different circumstances.

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[7] Duke Energy Carolina originally proposed Save-A-Watt in May 2007 to the North Carolina Utility Commission (Duke Energy 2007), and subsequently filed a similar proposal in South Carolina and Indiana. Program costs are not explicitly recovered and this mechanism also covers any loss of profit due to a reduction in sales. See Cappers et al 2009 (Appendix C) for a detailed description of our modeling of the Save-A-Watt (NC) proposal in the Benefits Calculator.

[8] Duke Energy Ohio filed a revised Save-A-Watt proposal in Ohio on July 31, 2008 (Duke Energy 2008), after settling on a similar version of the Save-a-Watt design with the Indiana Office of Utility Consumer Counselor (IOUCC 2008). Lost revenues associated with the successful implementation of energy efficiency are directly accounted for and recovered as a *separate* component of this mechanism. See Cappers et al 2009 (Appendix D) for a detailed description of our modeling of the Save-A-Watt (OH) proposal in the Benefits Calculator.

[9] This proposal for the development of a shareholder incentive mechanism is ours alone, and has neither been advocated nor adopted by the KCC. Instead, we use it to illustrate an approach that a regulatory commission could use to ensure at least two of the major stakeholders' (i.e., ratepayers and shareholders) interests are reasonably met.

- **Decoupling mechanisms** are being considered but are not universally supported by all stakeholders. The regulatory commission is interested in comparing the design (i.e., earnings basis) of various shareholder incentives mechanisms when a revenue-per-customer (RPC) decoupling mechanism is absent versus when it is applied. We have combined this RPC decoupling mechanism with the Performance Target, Shared Net Benefits and Cost Capitalization incentive mechanisms, but not to the two Save-a-Watt mechanisms, which already implicitly or explicitly account for the recovery of lost fixed costs.
- **Carbon regulation** appears much more likely at the federal level over the utility's resource planning horizon. We assume that the regulatory commission wants to better understand the potential impacts of carbon regulation on the benefits and costs of alternative resource portfolios. The PUC also wants to understand whether and how carbon regulation might affect the design and impacts of a shareholder incentive mechanism for energy efficiency. There are many ways to model the impacts of carbon regulation on the benefits associated with energy efficiency. We took a relatively simple and static comparative approach to this problem. First, we do not alter any of the utility's non-fuel budgets (e.g., the generation expansion plan) to account for the potential impact of carbon regulation.[10] Second, since carbon emissions are directly tied to the electric output of a generating plant, we assume that the cost of carbon compliance would be fully represented in the variable fuel cost of the power plants and therefore increase the average fuel cost and avoided energy cost. We chose to use a value of ~$15/ton of carbon starting in 2012 and applied a 9.5% escalation rate annually thereafter (see Table 2).[11]

Table 2. Assumptions used in Carbon Regulation Case

Fuel Type	Carbon Emissions Level (Tons/MWh)	Carbon Credit Price ($/Ton)	Fuel Cost Adder ($/MWh)
Nuclear	0.000	$15.27	$0.00
Coal	0.911	$15.27	$13.90
Natural Gas	0.494	$15.27	$7.55
Renewables	0.000	$15.27	$0.00

Since the incentive mechanisms are to be designed with a specific criterion in mind from the utility's perspective (i.e., to improve ROE), it is important to understand that increasing the utility's actual return on equity is a function of two factors: earnings and equity. In cases where the shareholder incentive mechanism does not require the issuance of additional equity, then its contribution to earnings will directly improve the utility's ROE. However, under a Cost Capitalization mechanism, the utility issues additional equity to fund the return on and of energy efficiency program administration and measure incentive costs. Thus, the same contribution to earnings will produce a smaller increase in ROE. To achieve the same level of ROE, Cost Capitalization must generate a greater contribution to earnings to overcome the mitigating effects of the increase in equity that must be issued.

[10] If carbon regulation were implemented (and depending on carbon prices), it is certainly possible that the utility would alter the timing and type of generation plants in its resource plan. However, development and analysis of alternative generation expansion plans triggered by various carbon price levels would require an analysis that was beyond the scope of this study.
[11] The carbon prices used in this analysis were taken from an EIA analysis of Senate bill S.820 (EIA 2008).

Analysis Results

If our Kansas super-utility successfully achieves the savings goal of reducing retail sales by 1% per year, then its average ROE decreases to 10.15%. A shareholder incentive must contribute $225M over the planning horizon so that the utility's ROE returns to the BAU No EE level of 10.46%. This amount of shareholder incentives (i.e., $225M) represents somewhat more than 40% of the total cost of the EE portfolio and requires a transfer of $209M of net resource benefits achieved by the energy efficiency portfolio to utility shareholders. In this situation, it is unclear that customer groups would support a Cost Capitalization, Performance Target or Shared Net Benefits incentive mechanism, possibly because of fairness concerns or because shareholder incentives significantly increase the cost of the EE portfolio to customers.

If the utility jointly implements a decoupling and shareholder incentive mechanism, then it is now possible to increase a utility's return on equity above the business-as-usual No EE case while still retaining a substantial portion of the net resource benefits for ratepayers (i.e. 80%, or more) provided the cost of the decoupling mechanism, from a revenue requirement standpoint, is not taken into consideration.[12] Figure 4 illustrates the tradeoff between ratepayer benefits and the utility's achieved ROE for various incentive mechanisms in a world in which there is not a carbon regulatory regime. The shaded area in Figure 4 shows where at least 80% of net benefits are provided to ratepayers and the utility's actual ROE increases compared to the "business as usual" No EE case. In this scenario, only the Performance Target and Shared Net Benefits mechanism can be designed to provide ratepayers with 80% of the net resource benefits while at the same time increasing the utility's actual ROE by ~7 basis points relative to the business-as-usual case. Because the Cost Capitalization mechanism capitalizes the program costs through debt and equity, it immediately dilutes the returns to shareholders when implemented. In order for the utility to return to its business-as-usual ROE, a bonus kicker of 215 basis points must be provided in a Cost Capitalization mechanism that consumes 20% of the net resource benefits. In order to achieve a 15 basis point improvement in ROE, the Cost Capitalization mechanism would have to provide a bonus kicker of 1,560 basis points, which would leave ratepayers with only 35% of the net resource benefits. Figure 4 also shows that each of the Save-a-Watt mechanisms requires that shareholders receive the bulk, if not all, of the net resource benefits to make the utility indifferent to implementing energy efficiency, while only minimally, if ever, contributing positively to their returns. Under these conditions, the only incentive options that would likely garner broad support by stakeholders would be the Performance Target and Shared Net Benefits. It is important to note that the difficulties in satisfying these two criteria (e.g. 80% ratepayer share of net benefits and earnings opportunity for the utility) are driven in part because the EE portfolio in Kansas has a relatively low B/C ratio (e.g. 1.2), given projections of future avoided costs.

[12] There is substantial debate about whether or not the cost of decoupling should be included as a cost of energy efficiency, given that it deals with issues above and beyond those simply caused by the reduction in sales due to EE efforts.

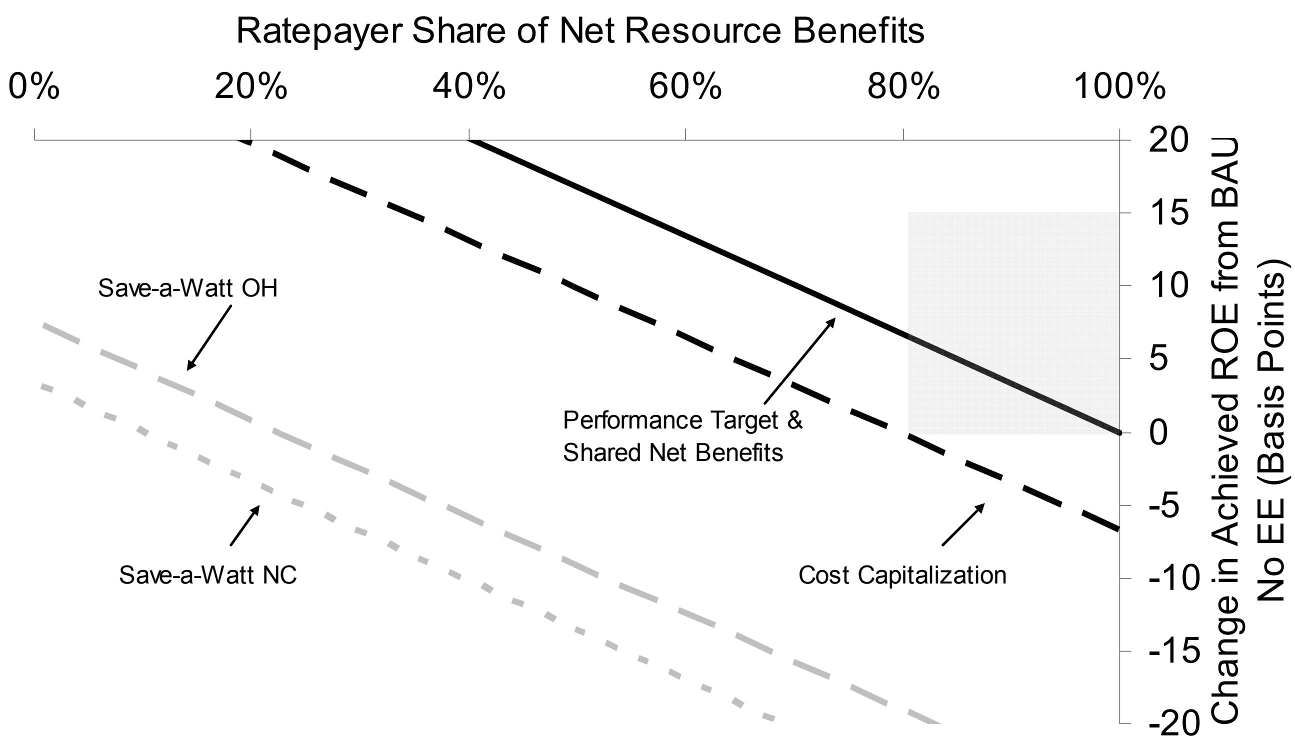

Figure 4. Tradeoff between ratepayer and shareholder benefits without carbon regulation

If the utility were to implement and achieve its electricity savings goals (1% reduction in incremental retail sales), then its actual achieved ROE could increase by only 8 basis points, which is less than the regulatory commissions' goal of 15 basis point increase in actual achieved ROE. If a regulatory or legislative body concludes that a utility is unlikely to achieve the savings target, given this "weak" business case, then alternative strategies may be considered. These include: (1) statutory or regulatory directives, such as the use of an Energy Efficiency Resource Standard (EERS) and (2) using non-utility, third party entities to administer a portfolio of energy efficiency programs. Some advocates argue that using these options might be less costly, and perhaps more effective, than trying to re-align utility incentives through efforts such as decoupling and shareholder incentives (as shown in Figure 4).

However, it is important to recognize that there are significant uncertainties associated with the resources selected by the Kansas super-utility in its resource plan. Among the largest uncertainties is the specter of carbon regulation which may significantly affect the cost and risks of fossil-fuel, generating technologies. Ironically, if a cost is assigned to carbon emissions, then the utility will see a greater increase in returns to its shareholders from energy efficiency in general and any incentive mechanism that is tied to societal benefits. In this case, the Performance Target, Shared Net Benefits, and Cost Capitalization can all be designed to provide the utility with a 15 basis point increase in its achieved ROE, relative to the business-as-usual No EE case (see Figure 5). Ratepayers retain between 86 to 89% of the net resource benefits if the utility successfully implements the EE portfolio under these three incentive mechanisms. In contrast, even under our carbon regulation scenario, ratepayers would only receive between 55-65% of the net resource benefits with the Save-A-Watt mechanisms if the utility's achieved ROE were to increase by 15 basis points.

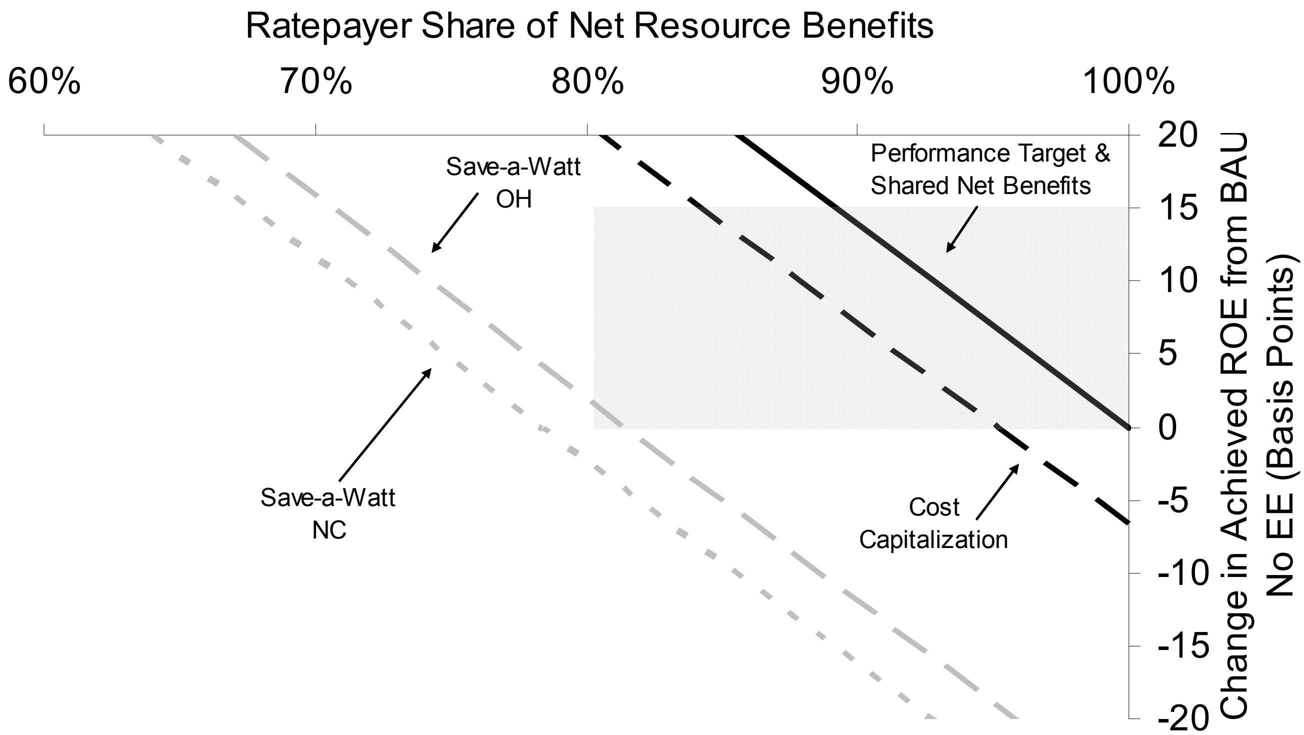

Figure 5. Tradeoff between ratepayer and shareholder benefits with carbon regulation

Table 3 shows the design of each shareholder incentive mechanism under consideration when an RPC decoupling mechanism is applied and carbon regulation is imposed, including the earnings basis, the ratepayer share of net resource benefits, and the relative impact of the shareholder incentive in increasing the costs of the EE portfolio. As noted previously, only the Performance Target, Shared Net Benefits and Cost Capitalization mechanisms can be designed within the guidelines (i.e. at least 80% of net benefits to ratepayers and the utility's actual ROE increases by 15 basis points). EE program costs would increase by an additional 15% under both the Performance Target and Shared Net Benefits mechanisms, while the Cost Capitalization mechanism would increase program costs by nearly 25%. The earnings basis for the Performance Target and Shared Net Benefits are well within the range of mechanisms that have been implemented in other parts of the country. However, this is not the case for Cost Capitalization, which would require a 1,560 basis point kicker; for comparison, in Nevada, utilities have a cost capitalization mechanism that increases ROE by up to 500 basis points on energy efficiency investments. Both Duke mechanisms, if designed to provide the utility with a sufficient business case for implementing energy efficiency, would require earning basis that are substantially lower than those currently being reviewed by regulators (43 to 45%): Duke Carolina originally requested to retain 90% of the avoided cost benefits while Duke Ohio filed a plan to keep 60% of the gross resource benefits.

Table 3. "Optimal" shareholder incentive mechanism designs under carbon regulation and application of a lost fixed cost recovery mechanism

	Performance Target	Shared Net Benefits	Cost Capitalization	Save-a-Watt OH (Revised)	Save-a-Watt NC (Revised)
Earnings Basis	% of Program Cost	% of Net Resource Benefits	Bonus ROE (Basis Points)	% of Gross Resource Benefits	% of Avoided Costs
Design Level	10.0%	6.2%	1,560	43.2%	45.2%
Ratepayer % of Net Resource Benefits	89%	89%	84%	71%	68%
Change in BAU No EE ROE (Basis Points)	15	15	15	15	15
Incentive as % of Total EE Program Costs	17%	17%	24%	45%	50%

Conclusions

We found that successfully implementing a significant energy efficiency portfolio has the potential to produce sizable net resource benefits for Kansas ratepayers if implemented by a Kansas super-utility that is a conglomeration of the three largest investor-owned electric utilities in the state. However, our results also suggest that successful implementation of a large-scale energy efficiency portfolio will adversely affect shareholder interests as the achieved return on equity of the "super-utility" is reduced by 31 basis points. We also found that a decoupling mechanism applied in conjunction with either Performance Target, Shared Net Benefits or Cost Capitalization would allow ratepayers to retain 80% of the net resource benefits and utility shareholders could realize an 8 basis point improvement in their returns. If the cost of meeting future carbon regulation is included in the utility's cost of service projections, all of the non-Save-a-Watt incentive mechanisms can be designed such that the utility sees achieved ROE increase by 15 basis points, relative to the BAU No EE level, while ratepayers receive at least 80% of the net resource benefits. The additional cost burden for ratepayers associated with these three shareholder incentive mechanisms is between 15-25% of the original EE program budgets.

Our study results illustrate the potential impact of carbon regulation on the value of energy efficiency to a relatively low cost utility in the Midwest that relies primarily on coal-based generation. The study also provides an important method for determining if a viable business case for the utility's pursuit of aggressive energy efficiency savings can be found. A quantitative assessment of the tradeoff between ratepayer and shareholder benefits in relation to a determination by regulators of what is the maximum incentive that should be provided to a utility for achieving these savings goals should result in either a prudent design of a shareholder mechanism that can help align the interests of various parties in promoting energy efficiency or an indication that other regulatory strategies or alternatives to utility program administration may be warranted.

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