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Carrots and sticks: A comprehensive business model for the successful achievement of energy efficiency resource standards

Andrew Satchwell [a,*], Peter Cappers [b], Charles Goldman [a]

[a] Lawrence Berkeley National Laboratory, 1 Cyclotron Road, Mailstop 90R4000, Berkeley, CA 94720, USA
[b] Lawrence Berkeley National Laboratory, 7847 Karakul Lane, Fayetteville, NY 13066, USA

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ABSTRACT

U.S. utilities face significant financial disincentives under traditional regulation in aggressively pursuing cost-effective energy efficiency. Regulators are considering some combination of mandated goals and alternative utility business model components to align the utility's business and financial interests with state and federal energy efficiency public policy goals. We analyze the financial impacts of an Energy Efficiency Resource Standard on an Arizona electric utility using a pro-forma utility financial model, including impacts on utility earnings, ROE, customer bills and rates. We demonstrate how a viable business model can be designed to improve the business case while retaining sizable benefits for utility customers.

1. Introduction

U.S. regulators and legislators are utilizing energy savings goals in the form of energy efficiency resource standards (EERS) as a means to mandate aggressive energy efficiency (EE) savings (Barbose et al., 2009). As of December 2010, twenty-six U.S. states had some form of an EERS. Policy drivers for such mandates include offsetting potentially higher costs and environmental impacts associated with the construction of new generation resources and providing additional options for customers to control their energy costs. In the U.S., energy efficiency programs funded by utility customers are a common means of delivering these savings.

U.S. utilities face significant financial disincentives under traditional regulation in pursuing aggressive energy efficiency goals which limits the interest of shareholders and managers. Both are concerned that the pursuit of aggressive EE savings will result in reduced utility revenues, affecting the utility's ability to fully recover its fixed costs and ultimately increasing the likelihood that the utility under-achieves its authorized return on equity (ROE), and limited opportunities to expand rate base thereby foregoing earnings-generating investments. Regulators and policymakers are considering or have adopted more comprehensive business models (e.g., shareholder incentives, and/or lost revenue recovery mechanisms) to align the utility's business and financial interests with a state's public policy goals for the electricity sector (e.g., increased efficiency, reduced emissions).

In establishing energy efficiency goals and targets, policymakers and legislators in the U.S. can utilize varying combinations of "sticks" and "carrots". At one extreme is a "stick-only" approach, whereby utilities must meet mandated energy savings targets or face financial penalties. This approach is common in many U.S. states that have adopted a Renewable Portfolio Standard (RPS) with an alternative compliance payment provision if a utility does not achieve renewable energy goals. However, this "stick-only" approach (i.e., mandate with penalties) is much less common in the U.S. for energy efficiency.[1] As a practical matter though, because of financial disincentives, some U.S. utilities would characterize an energy savings mandate (i.e., EERS) absent the ability to recover fixed costs as a "stick-only" approach. In the U.S., utility energy efficiency programs have been most successful in those states that utilize a "sticks-and-carrots" approach, combining a mandated savings goal or target with a comprehensive business model (see Croucher, 2011).

Abbreviations: ACC, Arizona Corporation Commission; APS, Arizona Public Service; BAU, Business as Usual; DSM, Demand Side Management; EE, Energy Efficiency; EERS, Energy Efficiency Resource Standard; EES, Energy Efficiency Standard; FERC, Federal Energy Regulatory Commission; MOU, Memorandum of Understanding; O&M, Operations and Maintenance; ROE, Return on Equity; RPC, Revenue-Per-Customer; RPS, Renewable Portfolio Standard.

* Corresponding author. Tel.: +1 510 4866544; fax: +1 510 4866996.
E-mail addresses: ASatchwell@lbl.gov (A. Satchwell), PACappers@lbl.gov (P. Cappers), CAGoldman@lbl.gov (C. Goldman).

[1] Pennsylvania is an example of a state with an EERS with a financial penalty provision; currently utilities do not have an opportunity to earn an incentive for successful achievement of energy efficiency targets or to recover lost revenues.

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This study examines (1) the customer bill and rate impacts, and (2) the shareholder earnings and return on equity impacts when a utility achieves aggressive energy savings due to the existence of an EERS. Our analysis will compare a "stick-only" approach of mandated energy savings goals to a "sticks-and-carrots" approach that includes a comprehensive business model. We model our analysis based on the Arizona Energy Efficiency Standard (EES), which directs Arizona investor-owned utilities to achieve 22% cumulative energy savings by 2020.[2] We provide a long-term assessment of impacts on ratepayers and shareholders from energy efficiency programs that achieve these savings reduction targets (about 2% per year) through 2020 with impacts over a 20-year time horizon (2011–2030) to fully capture the benefits over the economic lifetime of the installed EE measures.

We characterize and model Arizona Public Service (APS), which is the largest investor-owned utility in Arizona, and analyze two EE portfolios: (1) a "business as usual" (BAU) EE scenario as if the EES was not enacted and APS continues on its pre-existing EE savings path of approximately 1% annual savings; and (2) an EES scenario as if APS meets the EES savings targets of about 2% annual savings.[3] We examine issues from a customer perspective – impacts of the EES on aggregate customer bills and rates compared to the "business as usual" case. We also analyze issues from the perspective of utility shareholders and managers and assess the effects on earnings and ROE of the EES compared to the "business as usual" case with and without a comprehensive business model (e.g., a revenue-per-customer decoupling mechanism and a shareholder incentive mechanism).

The remainder of the paper describes the comprehensive business model, discusses the study approach (including the utility financial characterization, EE portfolios, and ratepayer and shareholder impact scenarios), presents analysis results, and concludes with key findings and policy discussion.

2. Comprehensive business model

The traditional electric utility business model in the U.S. provides a financial incentive for increasing electricity sales and making investment in supply-side generation. Regulators in the U.S. establish a utility's tariff (i.e., rates), based on forecasted sales and its existing and forecasted costs, including a return on investment, in a rate case proceeding. Once rates are established, the utility may improve its financial performance between rate cases by either increasing sales above those forecasted and/or managing its costs. This financial incentive comes in the form of increased revenues and/or lower costs, respectively, and hence larger profits (if revenues grow faster than costs), as well as a guaranteed return on supply-side investments that are utilized to serve increasing demand.

Conversely, a utility may experience financial harm when sales decrease between rate cases. Because a utility's revenues are a function of the regulated price for energy and its sales to customers, any downward change in sales from the forecasted level results in reduced utility revenues. The pursuit of energy savings exists then as a disincentive to the investor-owned utility as it directly impacts and reduces the utility's collected revenue and hence profitability between rate cases (again only if revenue reductions outpace cost savings) through decreased sales while deferring investment in supply-side generation. Despite the clear benefits of EE to ratepayers and society as a whole, there is a bias among U.S. investor-owned utilities against the pursuit of energy savings under the traditional regulatory model (Jensen, 2007).

A regulatory or legislative energy savings mandate (e.g., EERS) may adversely affect utility earnings opportunities under traditional regulation; thus a viable business model is needed to encourage utilities to capture the societal benefits of energy efficiency, delivering benefits to customers, while ensuring that profitability can in fact come from EE investment (see Moskovitz, 1989; Hirst et al., 1991; Hirst and Blank, 1994; Harrington et al., 1994; Golove and Eto, 1996).

There are three components of a comprehensive EE business model, from the utility perspective: recovery of prudently incurred program costs, collection of lost revenues associated with EE savings (the portion of lost revenues that would be used to recover authorized fixed costs), and the development of a shareholder incentive. If a regulator approves only a subset of the three components, the effectiveness of any component may be undermined (Hayes et al., 2011). To whit:

1 *Ensure cost recovery*. The recovery of program costs is intended to allow the utility to fully offset the costs of implementing and administering EE programs. In the U.S., when energy efficiency programs were first offered by utilities in the late 1980s and early 1990s, a few utilities were unable to recover all of their costs for administering EE programs in subsequent regulatory proceedings because cost recovery mechanisms were not in place. Since then, utilities request and regulatory authorities often provide guidance on the cost recovery mechanism that utilities can use to contemporaneously recover program costs associated with administering energy efficiency programs. In many cases, regulatory authorities allow and authorize utilities to expense their program costs incurred in situations where the regulatory authority has reviewed and approved an EE plan; this approach is designed to mitigate the risk that the utility will not fully recover prudently incurred EE program expenses in a timely fashion.
2 *Reduce the disincentive*. The utility must have sufficient revenues to cover its system costs. A utility's past investments in their generation, transmission, and distribution systems are recovered through current and, to some degree, future retail rates based on a forecast of energy sales, among other things. As discussed earlier, any decrease in forecasted sales between rate cases, because of, for example, energy savings from energy efficiency programs, may result in a reduction in utility revenues. Regulators may approve the collection of those revenues lost due to the decline in sales in order to insulate the company from being unable to recover its fixed, non-fuel costs, thereby making the utility financially indifferent to a change in sales from EE. Decoupling is a common form of lost revenue recovery mechanism and is designed to remove the link between sales and revenues by establishing a determined amount of revenues the utility may collect for a set period of time, regardless of sales levels (Eto et al., 1997).
3 *Provide a shareholder incentive*. The intent of a shareholder incentive is to provide a utility with an opportunity for additional earnings if it is successful in achieving aggressive savings goals and to make energy efficiency a potential business "profit center" for the utility. Supply-side investments are often much larger than dollars spent on EE and utilities can account for such investments in its rate base, or value of utility property, and earn a return on the investment. This presents a potential

[2] Arizona Corporation Commission. *In the Matter of the Notice of Proposed Rulemaking on Electric Energy Efficiency*. Decision No. 71819. Docket No. RE-09-0427. August 10, 2010. An Energy Efficiency Standard (EES) is the same as an Energy Efficiency Resource Standard (EERS).

[3] The specific provisions of the Arizona EES allow utilities to take some credit for energy efficiency measures installed prior to 2011 (starting in 2016), demand response programs, and the effects of improved building codes as part of complying with their savings target.