SHAREHOLDER INCENTIVES FOR UTILITY-BASED ENERGY EFFICIENCY PROGRAMS IN CALIFORNIA

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Overview

Energy efficiency is increasingly being recognized as a preferred resource warranting aggressive public investment. Many policy makers, regulators, and utilities are currently taking a serious look at policy mechanisms that are being considered or are already in place in many states to encourage utilities to pursue energy efficiency. Along with this circumstance, the State of California has committed an unprecedented sum of $2.2 billion in ratepayer funds to energy efficiency programs from 2006 through 2008; the State finalized in 2007 the determination of the shared-savings incentive mechanism for the 2006-2008 programs and beyond. A rigorous scrutiny of California energy efficiency programs and the associated incentive mechanism could assist the state in delivering energy efficiency more effectively, while ensuring political support for the programs.

This paper focuses on California energy efficiency programs, which employ the shared-savings incentive mechanism. The incentive mechanism, by definition, specifies how large a share of the net monetary benefits created by program implementation the utility shareholders would be allowed to acquire. This paper seeks to examine whether the adopted shared-savings incentive mechanism will ensure an efficient delivery of the programs, and what reforms, if any, could be proposed to meet this end. The crucial question is whether the adopted incentive rate for the mechanism is appropriate not only to prompt utility managers to commit their resources to the achievement of the energy savings targets adopted by the California Public Utilities Commission (CPUC) but also to maximize net social benefits.

The entire paper is organized as follows: Section 2 presents background of the research by reviewing the proceedings on California's energy efficiency programs. Section 3 builds an economic model and analyzes the implementation of the programs. Section 4 then shows numerical analysis results drawn from the economic model and discusses policy implications. Finally, Section 5 reviews the important findings presented in this paper.

Methods

In order to conduct an informed analysis of the California case, I review the state's regulatory proceedings on the design and implemetation of energy efficiency programs. I then construct a game theory model, in which both a regulator who establishes a shared-savings incentive mechanism and a utility firm facing the opportunity costs of program management behave optimally at any stage of the implementation of energy efficiency programs.

Results

Two important findings emerged from this work.

First, each utility firm requires a *minimum* level of incentive rate that will encourage the firm to achieve its energy savings target, while producing non-negative bill savings for its customers. This minimum sufficing rate declines with a parameter, which I call the design flexibility, the level of which is collectively determined by, and increases with, the per-customer energy savings target, the marginal energy savings benefit, and the firm's program management efficiency. That is, the minimum sufficing rate is lower for energy efficiency programs with a higher per-customer energy savings target, for those implemented in utility service areas with a higher marginal energy savings benefit, and for those managed by a utility firm with higher program management efficiency.

Second, a *higher-than-minimum* incentive rate can be needed to achieve not only a greater net social benefit but also greater bill savings for the customers. While the minimum sufficing rate under the low range of design flexibility produces both the greatest possible net social benefit and the greatest possible customer bill savings, the minimum sufficing rate under the mid-to-high range of design flexibility does not. Under the mid range of design flexibility, a higher-than-minimum incentive rate is required to achieve a greater net social benefit. Under the high range of design flexibility, a higher-than-minimum incentive rate needs to be established to achieve not only a greater net social benefit, but also greater bill savings for the customers. Specifically, if the adopted incentive rate is socially efficient, the energy efficiency programs will accomplish the dual regulatory goals. The socially efficient incentive rate depends again on design flexibility: the higher the level of design flexibility, the lower the socially efficient incentive rate.

Conclusions

Closer examination of California energy efficiency programs in light of the above results suggests that a *higher-than-adopted* incentive rate can be established to achieve not only a greater net social benefit but also greater bill savings for the customers. The main reason is that current market circumstances yield sizeable design flexibility, under which a more aggressive incentive rate can return an increase in a net program benefit – by allowing the CPUC to authorize lower program funding to utilities – more than offsetting an increase in the utilities' opportunity costs associated with energy efficiency program management. Furthermore, the examination suggests that social efficiency can be improved by customizing incentive mechanisms for individual utilities and updating them on a regular basis. This is because any of the crucial program parameters can vary across the utilities and over a series of energy efficiency program cycles, requiring a different level of the socially-optimal incentive rate to be established for the incentive mechanism.

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