How Regulators Can Help to Increase the Benefits from Utility Energy-Efficiency Initiatives

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Briefing Note:
How Regulators Can Help to Increase the Benefits from Utility Energy-Efficiency Initiatives

The U.S. will expend substantial resources in the following decades to promote energy efficiency. The Obama administration has emphasized the importance of advancing energy efficiency, allocating billions of dollars to the states to further this goal. State public utility commissions (PUCs) and other state entities are also aggressively pushing energy utilities to promote energy efficiency. With large energy-efficiency expenditures, it is imperative to maximize the benefits. It is not enough to just implement energy-efficiency initiatives that pass some cost-benefit test; they should also produce the highest possible benefits for the dollars expended.

I. The obligation of regulators

State commissions have an obligation to utility customers and the general public to ensure maximum benefits from utility energy-efficiency initiatives. Let us assume that a utility is spending $20 million on energy efficiency, which when allocated most effectively can produce benefits of $30 million. The commission has an obligation to make sure that the benefits are $30 million rather than $25 million, even though the benefits would still exceed the costs.

Past utility energy-efficiency programs have confronted a number of problems in maximizing benefits. Poorly designed programs have included "free riders" as participants, featured nonalignment of program objective with a specific market or "behavioral" problem, provided low utility motivation for success, and contained inadequate utility financial inducements for consumer participation.

State PUCs often require energy utilities to spend a fixed amount of dollars on energy efficiency. In other instances, they require utilities to achieve targeted energy savings from initiatives. In either situation, the objective should be to maximize utility performance, either by producing the most energy savings from the dollars expended or by minimizing the dollars spent in achieving the targeted level of energy savings.

Many state commissions apply the cost-effectiveness test in evaluating utility energy-efficiency initiatives. Under the Total Resource Cost (TRC) test, for instance, the utility compares the cost savings from producing, transporting, and distributing less electricity with both the utility and customer costs for energy efficiency. Even if a utility's energy-efficiency initiatives pass the TRC test and are therefore economically tenable, they could fail to maximize economic benefits. Several factors can cause suboptimal benefits. This briefing note identifies such factors and provides advice on how to increase the benefits from utility energy-efficiency initiatives.

II. The meaning of energy efficiency and its implications

"Energy efficiency" here refers to the usable energy per unit of energy absorbed by an appliance or piece of energy-using equipment. (In contrast, "energy conservation" normally means the actions taken by consumers to reduce their energy use. Examples include turning off the lights when leaving a room and turning the air conditioner down or off at night.)

The promotion of energy efficiency aims to reduce the amount of kilowatt-hours or therms needed to satisfy a consumer's demand for end uses such as cooling, space heating, and hot-water heating. Consumers generally need to make upfront investments, such as more expensive, higher-energy-efficiency appliances and insulation, to reduce energy consumption. Under conventional rate structures, lower energy sales mean the utility suffers a decline in short-term earnings.

Energy efficiency is not synonymous with economic efficiency. Achieving more energy savings, for example, can result in additional costs that exceed the benefits. For this reason, regulators must examine the costs and benefits of any utility expenditure on promoting energy efficiency.

III. What should we get from energy-efficiency initiatives?

The major social benefit from energy efficiency comes from the avoidance of costs by energy utilities as they provide fewer kilowatt-hours or therms to their customers. These costs include variable costs, such as fuel and maintenance, as well as capital expenditures for new capacity that could be deferred. Benefits depend not only on physical energy savings but also on the dollar value of those savings. A utility would generally have higher cost savings during peak periods, as energy savings can eliminate the need for or defer new capacity additions.

Many experts consider energy efficiency a low-cost, near-term strategy for greenhouse gas mitigation. The commercialization of carbon-constrained technologies such as nuclear power, carbon capture and storage from coal plants, and some forms of renewable energy is not expected for several years. In the interim, energy efficiency can play a key role in meeting carbon dioxide targets.

For educational and information initiatives, it is especially difficult to quantify the benefits. Education could lead to "market transformation" that over time would cause utility customers to invest more in energy efficiency without any utility or government support. Education and advertising also can stimulate energy savings by making utility customers more aware of the benefits to be gained from energy-efficiency investments. How to measure these benefits with a reasonable degree of accuracy is beyond the capability of any existing analytical approach.

One position is that a utility should allocate less monies to those initiatives for which benefits are non-quantifiable and unverifiable. A utility can justify its expenditures on educational initiatives, however, based on evidence that utility customers either do not have access to adequate information on energy efficiency or have information that makes it difficult for them to make good decisions.

IV. Four principles for maximizing benefits

A first principle is aligning individual initiatives with an identified market or "behavioral" problem. Market problems can include inadequate consumer information or information that is confusing and difficult for utility customers to interpret; significant uncertainty about benefits; high transactions costs; and split incentives between builders and occupants. Market problems can also derive from regulatory actions such as setting faulty rate structures. One example of faulty pricing is subsidized rates that are offered to one class of customers and paid for by other customers. Behavioral problems can arise from consumers undervaluing the multi-year benefits of energy efficiency relative to the initial costs, as well as from inertia (e.g., laziness), in which consumers decide to do nothing even though they expect to receive net benefits from investing in energy efficiency.

The benefits from utility energy-efficiency initiatives directly relate to their effectiveness in addressing market and "behavioral" problems. Those problems, by definition, cause consumers to forgo benefits that exceed the costs of additional energy-efficiency investments. After all, the premise behind utility energy-efficiency initiatives is that consumers are not availing themselves of, for example, highly energy-efficient appliances with short paybacks.

Educational and information programs are more beneficial when consumers lack good information on the benefits of energy-efficiency investments, or when that information is difficult or time-consuming to acquire. When consumers lack the resources to invest in energy efficiency, utility financial assistance to reduce the initial cost could be beneficial. Utilities can reduce transaction costs, as well as consumer inertia, by consolidating information on their websites that decreases the time consumers must spend to make decisions on energy efficiency. A utility also can nudge consumers toward energy efficiency by pointing out the dollars they are losing by not investing in energy efficiency.

A second principle is that the benefit-cost ratios of potential utility initiatives should determine their prioritization. If a utility has a fixed amount of dollars to spend on energy efficiency, it should allocate resources to those initiatives with the highest benefit-cost ratios. This approach follows the idea that the utility should initially pursue the "low-hanging fruit." The presumption is that those initiatives with the highest benefit-cost ratios are addressing more serious market and "behavioral" problems.

All initiatives with a benefit-cost ratio greater than one are economically justified. The relative ratios across initiatives, however, can affect on the margin as well as on the aggregate how utilities should allocate dollars among initiatives. Assume, for example, that a utility has $10 million to spend on energy efficiency, and that the benefit-cost ratios for three alternative programs are 3.0, 2.5, and 2.0. Even though all the programs are economically justifiable (since

their benefit-cost ratio exceeds one), maximum benefits derive from allocating all of the $10 million to the first program. By doing so, the total benefits would be $30 million. If, alternatively, each program receives an equal share of the money, the total benefits would be only $25.

A third principle relates to harmonizing a utility's financial and other motivations with the energy-efficiency initiatives. This principle relates to what is called the "principal/agent problem"; namely, how to motivate a utility to achieve the objectives set out by the regulator. Let us assume that a regulator wants a utility to commit itself to effectively promoting energy efficiency. At the minimum, the utility hopes to avoid any negative financial consequences; this outcome could require a revenue-coupling rider, a lost revenue adjustment mechanism, or a rate design that protects the utility against unexpected sales declines (e.g., straight-fixed variable rate design). The regulator could go further by allowing the utility to earn a profit from taking on cost-effective initiatives comparable to profits for supply-side alternatives. Profits can come from shared savings, performance target incentives, and a rate-of-return adder. Without financial inducements, the regulator would have to more closely monitor the utility to make sure it is carrying out its goal for energy efficiency.

Regulators should consider three aspects of ratemaking as they relate to utility energy-efficiency programs: (1) cost recovery of utility energy-efficiency actions, (2) utility recovery of lost margins from energy efficiency, and (3) explicit utility-performance incentives for cost-effective energy-efficiency actions. Ratemaking decisions require a regulator to consider mechanisms that have differing effects on regulatory objectives, with most advancing some regulatory objectives while impeding others. Making trade-offs among ratemaking objectives that best serve the public interest poses a difficult but inevitable task for regulators.

A fourth principle for maximizing the benefits from utility energy-efficiency initiatives is to use the most effective institutional arrangement for designing, administrating, and implementing the energy-efficiency initiatives. The utility itself might not be the preferred party to undertake these functions. Outsourcing these functions to a third party could increase the benefits from energy-efficiency initiatives funded by the utility and its customers. The third party could be a not-for-profit entity or a state government agency that coordinates all the utility energy-efficiency activities in a state. An outside party could have more expertise, more experience, and more robust financial incentives than a utility with which to maximize the benefits from energy efficiency.

Outsourcing offers three kinds of potential benefits to a utility. First, the outside firm can pool the activities of a number of utilities and other firms, realizing economies of scale that can result in cost savings to a firm. Second, the outside firm could have a higher level of expertise than a utility. By specializing in a narrow area, it can achieve efficiencies that other firms such as energy utilities with broader functions cannot. Third, especially for small utilities, outsourcing can permit the acquisition of expertise that is cost-prohibitive to develop internally. As well, it could be easier to devise a performance contract between a utility and an outside party that gives incentives for good performance than for regulators to devise incentives that would lead to the same outcome. Unless a regulator is willing to allow a utility to profit from promoting energy efficiency, the utility will lack the motivation to maximize the effectiveness of those actions. Outsourcing then becomes a more attractive alternative.

V. Basic questions that regulators should ask

Regulators have an obligation to ensure that a utility's expenditures on promoting energy efficiency yield the greatest possible benefits to customers. This obligation includes regulators asking and getting answers to basic questions that include:

1. What particular market and "behavioral" problems are energy-efficiency initiatives addressing?

2. What energy-efficiency initiatives would most effectively address each of those problems?

3. What are the benefit-cost ratios for each energy-efficiency initiative?

4. How should a utility allocate the monies in an energy-efficiency budget to different activities, based on the benefit-cost ratios?

5. What financial motivation does a utility have to: (a) promote energy efficiency, and (b) design, administer, and implement energy-efficiency initiatives yielding the highest benefits?

6. What financial inducements would provide a utility with an adequate incentive to promote energy efficiency in the most efficient manner?

7. What are the advantages and disadvantages of a utility designing, administering, and implementing energy-efficiency initiatives, compared to a third party performing one or more of these functions?