ENERGY & ENVIRONMENT

A Cautionary Tale About Energy Efficiency Initiatives

If these programs are such bargains, then why does government mandate them and energy utilities push for them?

BY KENNETH W. COSTELLO

I constantly hear about how wonderful utility and government-mandated energy efficiency (EE) initiatives are. Many EE supporters claim these efforts to push consumers to buy higher-efficiency appliances and use more insulating materials are "negative-cost" ways to reduce carbon emissions—that by reducing energy consumption along with emissions, these changes more than pay for themselves.

For instance, in 2009 the consulting firm McKinsey & Co. estimated that adoption of cost-effective EE investments in the United States could generate $700 billion in net private cost savings. Amory Lovins, an environmental scientist and chairman of the Rocky Mountain Institute, once remarked that EE is the "lunch you are paid to eat."

Yet these free lunches seem suspicious to me—and to many analysts who have studied the benefits and costs of EE initiatives. If these efforts are such a bargain, then why must government mandate them and utilities push for them?

WHY DO WE NEED EE POLICY?

The conventional economic defense for government-imposed EE standards begins by assuming deep flaws in consumer rationality, barriers to information, or underpricing of energy. Supposedly, these factors lead to consumers making incorrect calculations and tradeoffs between the initial costs of appliances and their subsequent energy-use costs. Consumers allegedly are unwilling to pay more initially for consumer durables that would use less energy and save money in present value. Instead, they buy cheap durables that are costlier to run over time. Mandatory energy standards force consumers to make the "correct" tradeoff between initial and operating costs, "purchase" more energy efficiency, and eliminate the so-called "EE gap."

In the typical EE gap study, analysts often calculate the savings in energy costs over the lifetime of an appliance by using a discount rate converting the stream of annual costs into a present value. If the present value of cost savings from an efficient appliance is greater than the incremental cost of the efficient appliance relative to a conventional substitute, then an EE gap is said to exist. Said differently, the discount rate that consumers appear to use in their decisions about paying more initially for later energy savings is "too high" relative to the "market" discount rate used by the analyst.

This gap provides the justification for both government EE standards and utility EE initiatives. Policymakers attribute the "low" adoption of EE investments to market failure or consumer-behavioral problems. The presumption is that consumers are incapable of making the correct calculations or else make decisions contrary to their self-interest.

Hence, there is an economic rationale for government policies such as energy building codes, appliance standards, and utility subsidies. However, this rationale includes two assumptions that often go unrecognized by EE supporters:

- The gap truly represents a market or behavioral failure.
- The benefits from correcting this failure are greater than the costs.

Just because market problems exist that might hinder EE invest-

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ments does not mean that utility or governmental intervention is socially desirable.

RECONCILING AN EE GAP AND RATIONAL CONSUMERS

Energy consumers who do not invest in seemingly cost-effective EE can be acting rationally. To understand why, we must keep in mind three additional factors.

First, consumers have difficulty verifying energy savings claims. And even if the energy savings are verifiable, future energy prices are not. Past energy prices have varied dramatically; they were much higher in the 1970s, then low from the mid-1980s through the early 2000s, high again in the mid-2000s, and now they are low again. Thus, consumers have reason to balk at making EE investments because of uncertainty over whether those investments will pan out.

The second factor is consumer heterogeneity—the simple fact that different people use energy differently. Although the average consumer may find an EE investment economically attractive, some may not because of differences in preferences, the level of energy usage, and the cost of borrowing.

The third factor is the need to consider costs borne by consum-

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ers themselves. These include transaction costs (e.g., the time spent by households in searching for energy-efficient appliances), poor appliance performance (e.g., dishwashers and clothes washers that do a poor job on especially soiled loads), and so forth.

ACADEMIC VS. UTILITY EVALUATIONS OF EE PROGRAMS

Another problem is that supposedly objective analyses of specific EE initiatives often reach very different conclusions. Utility-sponsored studies of EE proposals often yield results that are much more optimistic about energy savings than subsequent academic, peer-reviewed studies of the programs once they are in place. Why does this happen, and whose results should regulators believe?

Academic reviews of EE programs conclude that such programs are not the "low-hanging fruit" that many people believe. Academic reviews find that utilities grossly overstate energy savings from EE programs because they rely on *ex-ante* engineering estimates. The reviews also note that utilities often fail to consider "hidden costs" for consumers from the time and effort spent on both energy audits and investments. The combination of these factors, according to some academic studies, has led to utilities understating the costs of EE programs by as much as 50% or more.

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Academic research on utility studies has also found "rebound effects" that reduce anticipated energy savings. A "rebound" occurs when energy consumers use their air conditioners and heating systems more intensively because of lower operating costs for the EE technologies. This reduces the actual energy savings relative to those predicted by engineering possibilities.

Academic studies also find "free riders." These are individuals who would have purchased lower energy-use appliances or HVAC systems regardless of the existence of the EE programs and thus their energy savings should not be counted as benefits created by the policy. The subsidies they receive for purchasing their EE products are pure transfers from other utility customers, many of whom are low-income households. For instance, a 2016 *Energy Journal* paper by Anna Alberini, Will Gans, and Charles Towe document this effect in a heat pump subsidy program.

EE building codes have also produced less-than-expected energy savings. For instance, a 2016 *American Economic Review* article by Arik Levinson found that California's strict EE building codes have resulted in much less energy savings than projected.

The common perception is that residential weatherization programs have produced large and cost-effective savings to low-income households. But a 2015 *American Economic Review: Papers and Proceedings* article by Meredith Fowlie, Michael Greenstone, and Catherine Wolfram and a 2016 *Energy Journal* paper by Joshua Graff Zivin and Kevin Novan provide empirical evidence to the contrary. They find *ex-ante* energy savings projections to be grossly high and the overall net benefits to participating households in many instances to be negative.

Most utilities fail to apply the best analytical tools to their evaluations of EE programs. These tools include randomized trials and quasi-experimental designs to measure energy savings and understand consumer behavior. The problem with other approaches is that they do not reliably measure the actual energy savings from individual EE programs.

WHY ARE EE PROGRAMS SO POPULAR?

Despite the negative evaluations of EE programs by academics, these programs are politically popular. Legislatures, governors, and state public utility commissions (PUCs) want utilities to promote EE. Some utilities initially balk at this, but PUCs then offer support to ensure the utilities' profitability isn't hurt by reduced energy sales. For instance, about half the states have adopted "revenue decoupling" for gas utilities; that is, the PUCs permit utilities to raise their rates in order to offset lower sales. These initiatives have been instrumental in mitigating utility opposition to EE programs. Instead, the utilities release reports (arguably both biased and technically flawed) showing that EE initiatives are cost-beneficial.

Everyone's happy, right? Well, someone has to pay for these initiatives, and it is almost always the utility's customers. But is it equitable and good public policy to compel utility customers to pay for EE initiatives? Many of these initiatives benefit only a relatively few customers, most of whom can afford to pay for higher EE without any financial assistance. Besides, these consumers are quite capable of making rational decisions, just like they do when they invest in other activities. So, why should utilities offer these customers subsidies and why should other customers bear the costs?

ARE SOME EE PROGRAMS NOW UNECONOMICAL?

An especially relevant question for gas utilities today is, should they have eliminated or downsized some of their EE programs over the course of the "fracking" era? After all, shale gas has greatly increased the supply and lowered the cost of gas, thereby altering the energy efficiency calculus. Yet, gas utilities now spend

about $1.5 billion annually on EE programs, up from $320 million in 2007.

It seems that the rationales for EE programs of both electric and gas utilities are less valid today than when they were first implemented. Their customers have better information on EE programs, and natural gas prices are low and expect to remain so for the next several years. Presumably, the most cost-effective actions have already been exploited. Thus, market failures for EE have decreased over time, lessening the need to have utility or government intervention to advance EE.

Over time (we are talking about decades), we should expect to see a continual erosion of market problems, as well as consumer-behavioral ones, warranting fewer utility/regulatory ("bureaucratic") programs. That is, society should rely more heavily on the marketplace to influence EE investments, or the role of utilities should be increasingly displaced by better-functioning market mechanisms that rely on the self-interest of individual customers to reduce their energy bills.

THE PUSH FOR ELECTRIFICATION RESEMBLES THE PUSH FOR ENERGY EFFICIENCY

"Electrification" refers to the enactment of policies to induce consumers to use electricity rather than natural gas and other fossil fuels for specific end-use applications. Electrification can include conversion from natural gas heating to an electric heat pump in an existing home, or conversion from gasoline to electricity for transportation.

Electrification, according to its advocates, would reduce carbon emissions, lower energy costs for at least some consumers, and increase EE by reducing the primary energy use per unit of energy service (e.g., the full-cycle energy usage per mile of driving or gallon of heated water). These advocates assume that an "electrification gap" exists—that is, there is a deviation between socially optimal electrification and actual electrification.

Electrification advocates inevitably push for additional subsidies and out-of-market incentives to accelerate electrification. (Both electric vehicles and electric heat pumps presently receive subsidies from both the government and utilities.) Advocates have referred to electrification as "strategic electrification," "smart electrification," "beneficial electrification," "efficient electrification," and "policy-driven electrification." I would add to this lexicon "bad electrification" and "artificial or subsidized electrification."

Studies have shown electrification to be technically feasible in many end-use applications and economically feasible in at least some applications. Technological advances and public policy (e.g., digitization and the focus on clean energy) seem to favor electricity over fossil fuels in the future. Electrification proponents champion policies that would accelerate electrification. Before committing to such policies, should we not have more precise calculations of the costs and benefits, instead of referring to them in qualitative terms (which so far has dominated the analyses)?

Lacking today is evidence that market and behavioral problems are severe enough to warrant additional government intervention to hasten the pace of electrification. There is a more-than-remote chance that subsidized electrification will have a negative effect on society.

The question at present for policymakers is how fast electrification should develop. We should expect the electrification advocates in the coming years to employ many of the same justifications that are now used to advocate EE.

CONCLUSION

The best available evidence—peer-reviewed studies conducted by disinterested analysts using sophisticated methods—suggests that EE initiatives funded by utility customers should be scrutinized rather than reflexively praised by policymakers. Even if EE programs were ever cost effective, the "shale gas" era has made many of them ineffective now. The best available evidence suggests that EE programs transfer money from some utility customers to others with no gains in efficiency.

Regretfully, this evidence has had little effect on these programs because the public is unaware of the transfers, energy efficiency is culturally popular, and utilities can enjoy their support without suffering any financial consequences. Despite that, many of these programs would fail a benefit–cost test and should be called into question. *R*

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