IssuesLetter

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Energy Efficiency for Reliability and Risk Management

For compelling reasons, energy efficiency, a vital element of electric service, is receiving renewed attention. Why is this? Over the last six years, policymakers have addressed reliability close calls in the West, the Northeast, and the Upper Midwest. They have also responded to concerns about the physical security of the electric grid and the need to reduce dependence on fossil fuels, slow peak demand growth, and attain air quality standards cost effectively. In short, faced with the task of managing risks, regulators have rediscovered the value energy efficiency investment.

In recent years, there has been a focus on demand-side measures to address peak load. Here, however, we expand on that vision and look at the fundamental role of "baseload energy efficiency" -- measures that are embedded into buildings, appliances, and industrial equipment that lighten loads on the grid whenever they are used. Baseload efficiency is "always on," saving energy across a wide range of hours without requiring advanced meters or real-time prices to deliver savings. Figures 1 and 2 on the next page demonstrate not just the significant effects of base load efficiency and demand responsive measures, but more importantly how they can work together to maximize the benefits of both.

Why Electric Consumers Should Pay for Energy Efficiency

Energy efficiency is just one of a number of ways utilities and their consumers invest in the electric grid.
Among the reasons to invest in the utility system - from generator to customer - are to

* react to changes in wholesale energy flows,
* shift the balance between where energy is used and where it is produced,
* maintain the system and replace aging facilities, and
* deploy new and superior technologies.

Regulators and ratepayers share an interest in minimizing the cost of electric service to society in a manner that is consistent with the high levels of reliability and security demanded by our sophisticated economy. Cost-effective energy efficiency is essential to achieving that goal. Central station power generation, transmission lines, power electronics (to add control to the free flowing AC grid), electricity storage, distribution lines, and small-scale generation located on the distribution system are places for investment in the electric system. Energy efficiency can be

substituted for each of these supply-side investments, and, with thoughtful planning, can substitute for several at once, thus multiplying its value. Energy efficiency is flexible; it can be deployed where it is needed, at the pace it is needed.
Planning for system solutions should include the range of tools and options, and all solutions should be evaluated in an unbiased way. Unfortunately, persistent market barriers to energy efficiency prevent sound decisions on energy efficiency investments that benefit all consumers. These barriers fall into four categories:

1. inadequate information in the hands of purchasing decision-makers,
2. inadequate financial capacity to make the upfront investment,
3. inadequate capacity to accept the payback duration, and
4. inadequate responsibility to make the decision.

Some of the best thinking on energy efficiency is taking place in the statewide organizations formed explicitly for the purpose of developing and delivering successful efficiency programs. Efficiency Vermont, serving all 22 public and private utility service territories in Vermont, has been chartered by regulators to address some specific public interests: a defined mix between programs designed to produce measurable energy savings and those focused on market transformation (i.e. reducing market barriers to change future decisions); a mix of programs addressing peak usage and total energy savings; and a charge to distribute services across all customer classes and across all counties. Efficiency Vermont has financial incentives to meet targets in these and other areas and in two years of operation has exceeded savings expectations at a cost of 2.5 cents per kWh.

The Energy Trust of Oregon assumed the responsibility for administration of utility rate funded energy efficiency programs in Spring 2002. It shares program principles with Efficiency Vermont, but has the added objective of deployment of renewable energy systems.

The Energy $mart program of the New York State Energy Research and Development Authority (nyserda) is the largest effort of its kind in the country. (nyserda works cooperatively with two other state authorities that serve retail customers and operate their own programs.) nyserda spends $150 million per year on energy efficiency, with reliability, especially in the New York City area, as a key program focus.

These statewide organizations focus on energy efficiency. They differ from programs delivered by utilities, where there remains the well-documented problem of financial conflict facing a company operating under traditional regulation. Delivering effective energy efficiency reduces a utility's sales and profits. This is known as the "throughput" incentive and it is a real barrier to the deployment of efficiency programs. Regulators need to understand this problem and adopt regulatory incentives that make a utility's deployment of cost-effective energy efficiency its most profitable course of action. rap has written elsewhere on this problem and regulatory solutions to it.[1]

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[1]Moskovitz, David. 2000. *Profits and Progress through Distributed Resources*. The Regulatory Assistance Project. December

How Much Energy Efficiency?

Energy efficiency is valuable for regulators to support with electric consumer dollars. But how much money should be set aside for these investments? The logical answer is that utilities should purchase efficiency as long as it is cheaper than supply-side and wires alternatives - a point no utility program in any state has ever reached.

In the early 1990s, states with aggressive energy efficiency programs allocated approximately 5 percent of gross utility revenues to efficiency programs. Today, the states with the most aggressive programs allocate only 3 percent, and most states are far below that level of support. (See <http://www.aceee.org>)

Like decision-making for investments in distribution lines, the energy efficiency investment budget should be based on a long-term plan that addresses system priorities. The plan should balance consideration for near-term rates with long-term total bill savings.
Forecasting electric demand and the resulting generation and transmission needs in the absence of consumer funded energy efficiency investments is a helpful exercise to fully appreciate and value the effects of the programs. The forecast should also include sensitivities for what happens if prices and customer demand vary significantly from the forecast.[2]

Funding every cost-effective activity at once, whether distribution line upgrades or energy efficiency, is as unlikely to be the right choice as doing nothing at all. An energy efficiency program designer can come up with a long-term plan of investments in the same way a power line planner can. In each, a steady investment flow that can be adjusted within a range, from time to time, captures the idea of long-term financial support. But what are the priorities? And how can line planners and energy efficiency designers merge their efforts?

Energy Efficiency Policy in Florida and New York

"Over the next 20 years, Florida will have to greatly expand its energy capacity and supply to meet increasing demand. Yet the cheapest, easiest and fastest kilowatt we generate is the one we can save through efficiencies. There is a consensus on conservation and efficiency, so let us start there."
--- Governor Jeb Bush, August 19, 2001

"The State of New York is committed to promoting energy efficiency to protect our environment and our state agencies and authorities are leading by example."
-- Governor George Pataki, March 1, 2002

Energy efficiency programs tend to address different niches - a type of customer (residential, with a distinct low-income subset; small commercial and industrial, including farms; and large commercial and industrial) or an opportunity (new construction,

[2]Electric demand is driven by the economy and by the efficiency of new electric products. Energy efficiency may not change customer demand for service as much as it can reduce the amount of electricity needed to serve the demand.

equipment replacement, renovation). Some programs focus on expanding use of commercialized technologies and others focus on developing newer technologies. There is also a more subtle distinction between emphasis on measurable energy savings and efforts to support market transformations. A jurisdiction needs to define its priorities, design and implement programs consistent with those priorities, and evaluate the programs so they can be improved and/or used to complement air pollution mitigation plans. Emphasis can be reset from time to time.

Priorities can be set by focusing on opportunities for long-term investments, needs of particular customer classes, or technologies. Policymakers will want programs to be available fairly across customer classes and across the jurisdiction. Some level of "cherry picking" - targeting early year dollars to programs with the largest savings - makes sense.

Because there will always be new technologies, a low-income population, barriers to energy efficiency, and system values from efficiency, society's need for consumer-funded energy efficiency will continue indefinitely. And energy efficiency will play a role in helping the US reach 1990 emission levels of greenhouse gases; levels that could only be reached otherwise with dramatic and disruptive conversions in the energy system. While there should be no sunset plan, energy efficiency programs should not remain static either. Successful market transformation programs and branding efforts, such as Energy Star labels that seek to marry efficiency with product quality, will enable program funds to be retargeted where values and barriers are most significant. Key efficiency opportunities change from year to year, and programs must be actively managed to take advantage of opportunities as they arise.

A System Benefit Fund for Efficiency Short-circuits Regulatory Battles

Some of the fiercest regulatory battles in the 1990s concerning energy efficiency revolved around how to screen worthy programs. Competing tests were offered that looked at society at large (including environmental and planning risks), individual consumers (the rate impact test), and utility finances. The battles were often proxies for the real dispute: How much should be spent and what should the effect on rates be?

Policymakers interested in stabilizing energy efficiency programs have developed a way to short-circuit the arguments. By deciding up front how much will be spent on energy efficiency, attention can focus on the best ways to use the funds. In many states, a specific dollar amount is accumulated through rates (embedded or broken out as a system benefit charge) for energy efficiency. In these instances, the screening method has been far less important.

High Cost Areas a Profitable Target for Energy Efficiency

Many states make it a priority to spread energy efficiency dollars evenly across a service area in order to promote fairness. But this may not be the most cost-effective way to invest the money. This spending rule is, of course, not applied to power lines, which are built where the need is (i.e., where planners see they have high value). This same approach can be applied to energy efficiency.

The challenge is to restructure utility system planning to actively consider energy efficiency (and

customers) as a resource and to implement programs that focus energy efficiency programs on customers in high value areas. High value is measured similarly to power lines, with two twists. In addition to reducing line losses and other system attributes, energy efficiency may also add financial value by delaying or eliminating the need for a power line and may add societal value by avoiding taller poles or wider or new cleared rights of way. Further, with new grid technologies under development, a power line need postponed ten years could lead to a totally different and far superior grid solution.
For energy efficiency to add long-term value, the planning horizon must be significant - five to seven years. Fortunately, system planning is increasingly able to accommodate this criterion.

One approach to targeting efficiency investments is explored by rap in its 2001 Distributed Resource Policy Series. A state or utility can create Distributed Resource Development Zones based on the results of its planning. Then, credits based on the value of avoided construction, t&d loss reduction, and other factors can be made available to customers who invest in qualifying resources, including energy efficiency. In this way, system planners and energy efficiency program managers can marry their efforts. nyserda is taking the first step by preparing a study of high value areas in New York.

Energy Efficiency and Wholesale Markets

State regulators are addressing big changes in wholesale electric markets. Generation-only companies and affiliates of utilities, transmission companies, isos, rtos - all new entities - have assumed key roles in the industry in a short time. Constant amidst these changes is a regulated utility responsible for grid reliability.

Anecdotes reflecting difficulties in permitting and siting transmission lines have led to pressure to have state siting processes produce more and faster permits. Whether or not the siting process can be improved, energy efficiency offers a way to delay the need for new power lines. For this connection to work, the transmission planning process and the way to pay for grid solutions need reform to identify and value demand-side alternatives. Included in this is valuing what energy efficiency offers to wholesale markets and making sure there are sufficient occasions to deploy opportunities with merit.

Conclusion

Barriers to energy efficiency prevent worthwhile investments. If they are allowed to persist and worthwhile energy efficiency investments are not made while growth continues, consumers will have to support more capital to serve increasing demand, air emissions will be greater and/or more expensive to control, and the system will be more vulnerable to reliability and security challenges. These factors will tend to raise electric prices and challenge reliability, especially in the short term when supply margins shrink. Reliability close calls have not been worse because of the margin provided by the energy efficiency programs we already have. Consumers benefit from broad-based energy efficiency programs, and this is why regulators should sustain them during times of high and low growth rates.