

# Viewpoint

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## When Energy Conservation Doesn't Work Critique of a DSM program

Ranjit Lamech

*This Note is a contribution to an ongoing debate about the subsidies and rebates provided by power utilities to encourage consumers to adopt efficient end-use appliances. The argument presented here does not deny the need for demand-side energy conservation strategies (commonly known as demand side management or DSM). DSM programs can and do have a useful role in raising energy efficiency. This Note examines one particular "brand" of DSM which some in the energy industry believe is seriously flawed. This Note should not be construed as final FPD position on this debate, but it does represent a direction that this Vice-Presidency is increasingly comfortable with. The views expressed are those of the author.*

When governments urge consumers to save power by giving them special subsidies or rebates for more efficient appliances—special light bulbs, for example—the results can be quite perverse. This is the case with utility-managed appliance programs. For example, in the US, programs allow the utility to recover the cost of the rebate, as well as the revenue displaced by energy conservation. This translates

into a higher resource cost than merely the avoided cost of generation. Because these programs don't minimize costs, they are not a financially viable alternative to expanding supply.

The utility managed subsidies fail on an equity test too. Typically, the utility bears some or all the investment costs. The subsidy programs are targeted at only some consumers, while the burden of cost recovery is shared by all. Some consumers get a conservation service and an electricity service while others get only the electricity service though they pay the same price for each unit of electricity. The program penalizes conservation-minded consumers who have already made the switch. They are out of pocket twice because they pay full-price for their investment and then they pay higher rates to subsidize subsequent users.

A fuller case against the utility managed subsidy programs is outlined below:

### **Cost-effective conservation may not be achieved at all**

Energy conservation must be least cost to be viable. A simple example shows


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why the subsidies may not meet this test. Suppose electricity costs 7 cents (marginal cost) per kWh to generate. Assume a high efficiency light bulb costs \$30 but saves 500 kWh over its lifetime compared to a normal light bulb. Every kWh saved is worth 6 cents ( $30/500 = .06$ ). Program advocates argue that the utility should be willing to pay the 6 cents per kWh saved, as a rebate on the consumers bill or as a direct transfer to the consumer. This actually provides the consumer with an incentive equal to 13 cents per kWh to install high efficiency light bulbs—the 6 cents payment by the utility and the 7 cents electricity tariff saved. The total incentive is almost twice the avoided cost. Depending on whether the consumer chooses to install the light bulb with the rebate or not, the total resource cost could exceed avoided cost.

The best conservation signal is delivered when power is priced at marginal cost. By the same logic, if the actual price is below marginal cost, customers don't have the right incentive to save and it may be necessary to provide a subsidy payment to get them to do so. The rate increase through this subsidy will result in rates no higher than the marginal cost—the level that customers should be charged to achieve economic efficiency. But this is a poor (“second best”) way of improving efficiency. The best way is for the utility to align the electricity tariff with the marginal cost, rather than subsidize consumer purchases of efficient appliances.

### **The programs may entrench cross-subsidies between consumers**

Energy conservation should not produce or perpetuate cross-subsidies between consumers. The utility managed subsidies typically benefit some consumers while the costs are spread over them all. These are unfair and the longer they go on the more damaging they are to the economy and the harder they are to unwind politically. The right approach is for all utility transactions with all customers to be based on actual cost-of-service. This will lead to a financially sustainable and competitive environment for power utilities.

### **The programs can undermine competition**

Economic efficiency at the national level is achieved through reducing the cost of production and delivery. It is competition that provides the necessary incentives for utilities to pursue this low cost generation and supply.

The utility programs can undermine competition in the following ways:

- Energy conservation services get bundled with electricity supply services. Yet the characteristics of these two markets are very distinct. While there are natural monopoly characteristics in electricity supply services, energy conservation services can be delivered competitively. In other sectors, such as telephone services, anti-trust authorities have prevented the cross-subsidization of a competitive sector (such as long distance services) by the “natural” monopoly sector (local exchange services). When conservation services and electricity supply are provided by the same utility, there is clear potential for cross-subsidization. This can act as a barrier to competitive entry both for alternative low cost suppliers of electricity and for efficient providers of energy conservation services.
- The mere existence of subsidy programs can create powerful interest groups who may block evolution to a more competitive power industry. The most obvious interest groups include: incumbent utility owners and operators for whom subsidy programs represent protection from competition, and stakeholders providing conservation services for the utility.

The utilities business is selling a commodity called “electricity” not the “end-use” value of electricity. Energy conservation services are different in kind from these supply services. Conservation services require special skills. For example, knowledge of: HVAC systems, building insulation and design standards; interior lighting and the interplay of ambient light and surface textures; and energy use in industrial processes such as cement making, chemicals,

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paper and pulp. All involve a skill and knowledge base different from operating electricity generating plants and associated high voltage transmission and distribution systems. In these qualities, power utilities have no competitive advantage. The assumption that the electricity utility is the appropriate provider of energy conservation services is misleading. Energy conservation service requires market research, marketing, and managing a customer-oriented agenda. Here again, the power utilities have no inherent edge. Most utilities in developing countries are not yet able to restructure their operations along these lines.

### **Intrusive regulatory behavior may occur**

The public interest obligation of the electricity regulator is to ensure equitable and economic electricity service to all consumers. However, these programs may confuse the regulators role so that the regulator starts making decisions about investment strategies and consumer choices. To avoid this, regulators can operate by the following principles:

- Utility regulation is economically and conceptually different from the sector planning function. Regulators should ensure that utilities make low-cost decisions from a consumer's perspective, but not prescribe an investment strategy such as a specific conservation program.
- Regulation should allow consumers to choose between a subsidized program and lower rates. A regulator can ask for greater cost transparency, but cannot make inequitable and uneconomic choices on behalf of the consumer.
- Regulation should protect consumers from the monopoly power of public utilities. Regulation that allows the utility to make decisions on behalf of consumers offers no protection from monopoly abuse.

### **The programs distort internalized environmental costs**

Where environmental costs are not accounted for, there is a market failure or distortion. Governments

can regulate or provide incentives to correct this distortion. When they do, they must apply two principles: the proposed measures need to be as broad-based as possible to have a beneficial rather than cosmetic effect, and the corrective action should not induce fresh distortions.

On both counts, the utility programs fail: they are neither broad-based nor neutral:

- They make no allowances for the differing environmental impacts of hydro, gas, coal, oil, wind or solar electricity. They affect all sources of generation and do not necessarily result in environmentally benign decisions.
- They may encourage self-generation by large consumers who might opt for coal or oil-fired generation technologies to circumvent higher utility tariffs.

### **The energy conserved may not justify the costs**

Utilities in the U.S. have frequently relied on theoretical engineering estimates of energy savings to justify their first outlays. This practice was reasonable in the initial stages. However, as the programs mature and related expenditures increase, regulators and utilities alike have to justify expenses related to verifiable program results.

Attempts to do so have shown poor results. The higher-than-estimated costs and lower-than-expected load effects seen in some recent electric utility program evaluations indicate that some programs may not be as attractive in fact as they looked on paper.

However, evaluation is very difficult. Impact evaluation might seem to be a routine statistical sampling and data collection exercise. In reality, impact evaluation encompasses complex statistical problems, with a great number of interacting factors: it requires establishing customer consumption characteristics, and estimating what would have happened in the absence of the subsidy. It is difficult to estimate the low magnitude of individual customer load

impact, particularly for residential programs that must sometimes be measured in fractions of a kilowatt hour. The impact on long-term consumer behavior (i.e. the persistence of such programs) makes even reasonably accurate estimates extremely difficult or expensive.

### **Future Direction**

None of the above arguments detract from the central need to pursue demand-side energy conservation strategies. Conservation services and efficient appliances can be provided by energy services companies (consultancy and audit firms) and manufacturers, assisted by intermediaries such as leasing companies, banks etc. But government ought to

restrict its role to areas of clear comparative advantage, such as supporting the development of these service and intermediation entities, improving information dissemination and public awareness and setting appliance efficiency standards. In this vein, electric utilities should not be instruments of government policy but operate as competitive firms that optimize their asset values and exploit their comparative advantage. If such an environment can be nurtured, conservation efforts will be self-sustaining and have the maximum real impact.

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Ranjit Lamech, Restructuring Specialist, Finance and Private Sector Development

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Comments are welcome. Please call FPD Note line to leave a message: 202-458-1111. Suzanne Smith is the editor and production manager. Her address is Room G8105, The World Bank, 1818 H Street, NW, Washington, DC 20433.