Marketing Energy Efficiency to Commercial Customers - What Have We Learned?

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Various studies of DSM market penetration indicate that customers usually require a very high rate of return to make investments that reduce energy costs. Empirical experience from large commercial/industrial programs put a threshold on customer interest at a two year payback, and substantial participation requires a one year payback; this often translates to a 50% to 100% return on investment. This investment threshold seems oddly high as compared with other investment returns, and is usually blamed on lack of capital, lack of information, and generally short-sighted business decision making.

This paper explores an alternate theory of market penetration, using a customer model developed from observations as an implementor and seller of energy efficiency to the commercial/industrial sectors: the market for energy efficiency retrofit responds poorly to high rates of return not because it is unsophisticated in its life-cycle decision-making, but rather because it is more sophisticated than simply considering return. Energy costs are typically only one to three percent of operating costs, and therefore even major reductions affect operating costs only slightly. By comparison, actions affecting revenue, employee motivation, or process efficiency usually have a greater impact. Management time, therefore, may be better spent in these other areas. Building retrofits also may carry a perceived risk to building performance that outweighs the potential savings. If there is any perception of risk to employee efficiency by changing lighting or HVAC systems, for example, then a retrofit will be dismissed from consideration, regardless of payback.

Nevertheless, there is growing success in the marketplace by repositioning energy efficiency retrofits. The emphasis is often on modernization, not financial return. For example, T8's provide higher quality light (as measured by color rendering); electronic ballasts are "state-of-the-art", compact fluorescents reduce the nuisance and expense of changing incandescent bulbs frequently; HVAC controls bring greater comfort. These products are accepted not because they reduce costs but rather because they're "the best", and are viewed as a good deal because the utility is offering a subsidy.

The fact that energy costs aren't the main driver doesn't diminish the market therefore, it just requires that one change the "pitch". There is no payback to new carpet and fresh paint on the walls, but service facilities retrofit in these areas every 5 to 10 years. Quality lighting and greater comfort are similarly in demand; if it happens to lower utility bills, that's a plus, and if the utility is going to pay part of the cost, then that's the "clincher".

Utilities can apply this alternative model to improve their program offerings in several ways:

- Program characteristics can simplify and reduce the time requirement for management to investigate comprehensive DSM implementation.
- Utilities can mitigate risks by offering guarantees.
- DSM marketing should stress quality of performance of DSM products.
- Subsidies should recognize that value, rather than payback, is the basis of customer decision making.

Introduction

This paper develops hypotheses on important characteristics of DSM marketing, rather than report conclusions from a research study. The empirical evidence for these hypotheses draws upon the results of several utility programs designed to market conservation technologies to commercial customers, i.e., Con Edison's commercial customer audit and rebate programs, the New York Power Authority direct installation program, the Pacific Gas and Electric commercial direct installation programs, the Niagara Mohawk custom incentive and non-profit customer programs, the Northeast Utilities Energy Action Program, the Seattle City Light commercial incentive program, and the New England Electric commercial sector programs (Holt 1991; Nadel 1990).

Based on papers and participation in these programs, the authors will present empirical findings addressing the following questions on marketing DSM:

1. Are commercial customers rational buyers of efficient equipment? Is the short payback horizon of many customers a market failure due to lack of information, capital, or plain shortsightedness; or is the customer behaving rationally considering the time and risks of conservation investments?

2. What marketing strategies and timing work best? What is the relative importance of stressing energy cost reduction, vs. equipment performance, reliability, features, and service? When is the best time to sell? How does this vary by sector and customer type?

3. How do utility program design elements enhance the marketing of conservation? Do they reduce the time and effort required of the customer? Do they reduce customer risks? Do they provide adequate incentive? Or do program features and procedures present significant barriers to business customers?

4. What is the effect of utility subsidy design options on the market? Which measures are most encouraged by each design option?

Commercial Customers - Are They Rational Buyers of Efficient Equipment?

A common hypothesis is that DSM programs are necessary because of a market failure: cost-effective DSM technologies ought to be purchased by a rational consumer without additional incentives from a utility. The causes cited for this market failure are that the commercial electricity customer:

- lacks information,

- lacks capital, and/or

- lacks a long-term perspective.

The "lack of information theory" holds that a customer's lack of familiarity with DSM equipment options prevents their adoption; for example, business managers may not have heard of electronic ballasts or compact fluorescents. In addition, the customer may not be aware of the economics, or skeptical of the advertised claims.

The "lack of capital theory" states that businesses fail to make high-return investments because they can't finance them. Many DSM options have a two year payback, and a 50% return on capital. A customer without the ability to borrow or invest cannot participate in the opportunity.

The "short-sighted customer" theory suggests that businesses choose to forego quality investments to maximize short-term profits. It is argued that, in the United States, businesses who are capable of, and would benefit from, DSM returns of 50% or higher choose to not participate because their operating strategy is to maximize short-term finances; in effect, these customers have a hurdle discount rate in their decision-making that is above 50%.

Numerous empirical surveys and evaluations have been used to defend these assertions. Utility program design is often based on the assumption that these characteristics are, in fact, the case. DSM information programs are built on the assumption that awareness is the problem. DSM finance programs, and ESCO shared savings programs, for example, are built on the assumption that customers lack sufficient capital. Many utility rebate programs are designed to reduce payback to the customer to two years; on the assumption that a 50% hurdle rate must be reached for the customer to act (EPRI 1987).

While these effects are observed in small companies and companies with a distressed financial status, there is evidence that these models aren't telling the whole story. The plateau of indifference in customer discount rate shows that rate of return does not affect penetration within a wide band on DSM measures. Marketers of DSM technologies, in their effort to be efficient at sales, have found that often none of the theories above are the blockage to

DSM. In larger industrial facilities, for example, there are often resident engineering staffs that have fully researched the measures, have available capital, and work with discount rates well below 50%, yet DSM's most popular measures such as compact fluorescents, electronic ballasts, and high efficiency motors have not been done.

This DSM sales experience is exposing an alternative customer model; one that suggests that commercial customers are, in fact quite rational to forgo highly cost-effective DSM measures. The customer decision not to purchase may be rational because these investments hold liabilities including:

- conservation investment requires investment of management time that may have a high opportunity cost;

- conservation investment has risks that the new equipment will perform differently in a manner that is detrimental to operations; and

- available conservation technologies in the near future may improve, offering lower price and improved performance, providing a positive value to delaying action.

The Cost of Management Time

The time requirement for DSM investments may represent a high cost in relation to the benefit. Management time has a marginal cost for the time actually spent, but also has an opportunity cost, since attention to achieve the potential benefits of DSM will reduce available time for cost reduction in other areas, and perhaps draw away from investments that increase productivity or revenues. Energy costs typically account for 1 to 3% of operating costs in commercial and industrial businesses. While a potential reduction in these costs of 20% to 40% is not insignificant, the potential reduction in total operating costs from DSM investment is therefore typically in the range of 0.2% to 1.2% of total operating costs (XENERGY, 1982).

The time requirements of DSM include:

- appraisal of options,

- appraisal of suppliers,

- negotiation with suppliers, and

- dealing with the utility.

The Perceived Risk of DSM Investments

The installation of DSM equipment may have, or be perceived as having, a risk of negative impacts on operations as compared with standard equipment. These risks represent a cost to DSM investment.

Examples of DSM risks include:

1) Esthetics will change in a manner detrimental to operations. The management may fear that lighting, for example, will seem less attractive. Fluorescent lighting replacing incandescent lighting is such an example. If the business needs esthetic quality for its viability, then this risk may be significant. For example, a manager of a retail facility or a hotel ballroom may see a risk of reduced customer satisfaction from installing lighting DSM technologies that will change the appearance of the space.

2) The equipment may change the function of the operation. Most current compact fluorescent lamps are not capable of operating on a dimmable circuit. Where dimming was a desirable quality, such as in a ballroom, this replacement creates a loss of function. In reality, the loss is often feared, but the fear is unfounded. For example, replacing a motor with a high efficiency model rather than the original equipment will usually work equally well, but time is required to ensure that this is the case.

3) The equipment may fail prematurely. Early models of electronic ballasts were advertised as having 20 year life but many failed in 3 years or less. While they are much more reliable now, the early consumer of new technology lacks empirical evidence of product lifetime claims.

4) The customer may need to change suppliers from ones where he has an established, efficient relationship and low risk. Repeat purchases of standard equipment from familiar suppliers are the most efficient transactions from the customer's point of view. Changing suppliers creates a time requirement. Further, if the new supplier or producer is less established, there is a risk that the customer with new DSM technologies will find himself abandoned.

5) Utility programs add their own element of risk. In some cases, the customer needs to commit to the project before the utility provides a firm commitment to paying an incentive. In other cases, the customer may perceive a chance that incentives will increase in

the future, and purchasing now will create a lost opportunity for a larger utility incentive.

The Value of Delaying Action

Finally, the customer may perceive, and at times correctly, that future DSM technologies may be worth the wait. In motors, controls, ballasts, and lamps, for example, features are being added, reliability is improving, and prices are dropping. Buying now creates savings sooner, but also a lost opportunity if technology options improve.

Effective Marketing of Efficient Equipment

This understanding of customer purchase behavior is being used in DSM product sales by vendors, utilities, and energy service companies. Their strategy is to place less emphasis on cost effectiveness, and more on product attributes that directly affect operations. Fortunately DSM equipment, such as lighting, motors, and control systems, offers many positive attributes in addition to energy savings.

We would like to suggest that the strategic thrust of DSM sales needs to be on defending the functional superiority of efficient equipment. While payback is relevant, the majority of purchases related to facilities in commercial customers are driven by product attributes. Important product characteristics include:

- performance;

- reliability;

- guarantees and service;

- extra features.

A T8 and electronic ballast lighting system, for example, provides higher quality light as compared with standard fluorescent lighting as measured by its color rendering index (CRI). High efficiency motors and heat pumps, as another example, are often constructed with more windings, better heat exchangers, and higher quality materials that are packaged in the so-called *premium* product line. Control systems such as lighting dimmers, HVAC controls, and variable speed drives may provide esthetic and comfort features that help the sale.

Energy savings are not irrelevant to selling DSM; energy savings can be positioned as one of many quality features of a product. However, since it is not the only one, it isn't always critical whether the payback is 2 years or 4 years.

Clearly the least effort is required during the replacement cycle; at this time, a business needs to invest the time to make equipment decisions whether or not high efficiency is being considered. Also, the economics are much improved, since only the incremental cost of high efficiency needs to be invested (Dethman et al. 1991; Jenkins and Hobble 1991).

The Implications of the Rational Customer Model on Utility Program Design

Designing a utility program with this customer behavior model in mind should accomplish the following:

- The program should save customers time and effort.

- The program should reduce customer risks.

- The program should increase the customer value of selecting high efficiency options.

Time-saving elements can include any of the following:

1) The utility can provide energy audits or direct installation programs where the utility manages some or all of the steps required for implementation. These steps including analysis, design, bidding, general contracting, equipment purchase, installation, acceptance, monitoring, and maintenance;

2) The utility can prequalify equipment and vendors to simplify the purchasing effort required by the customers;

Utility program risk-reducing elements can include:

- Equipment guarantees backed by the utility;

- Maintenance services backed by the utility;

- A price risk guarantee, protecting customers from future price reductions in the technologies they purchase by offering to refund the difference (this is now an important marketing technique in electronics);

- A rebate or incentive risk guarantee, protecting customers from future incentive increases by offering to provide the difference of the higher incentive (this is now a feature of many automobile rebates).

Utility Subsidy Design Options

What, then, is the advantage of the utility rebate or incentive? Since it provides selective discounting of high efficiency equipment, it increases the customer perception of value in choosing the option. A 50% discount, for example, indicates to the customer that, among options with similar relationships of value to cost, the discounted item provides much more value for the cost. In a customer's value-based analysis, it is the percent of purchase price discounted that will drive his decision-making, rather than the years of payback after rebate. This has important implications for rebate strategy development, as will be discussed below: (EPRI 1988)

Figures 1 and 2 compare three utility subsidy design options:

- payment of a fixed percentage of avoided cost;

- paydown to a specified customer payback;

- payment of a maximum percentage of the installed cost.

These figures show the comparative impacts of three subsidies: a subsidy equal to a 50% discount, a 25% of avoided cost subsidy, and a buydown to 2 years. The impacts are shown for measures based on their pre-incentive payback, with measures from 0 to 8 years payback along the base of the graphs.

Figure 1 shows the effect of pre-incentive payback on the percent of installed cost subsidized under the three approaches. It is important to observe that the three forms have dramatically different, almost inverse relationships between pre-incentive payback and percent of installed cost subsidized. This is particularly important to utilities running programs of two types; often a rebate program is based on a buydown, while a custom program may be based on avoided cost.

Figure 2 shows the relationship of pre-incentive payback to subsidized payback for the three subsidies.

Incentives are offered with the objective of increasing the value of choosing the high efficiency option. Incentive design, therefore, should create a value improvement to a customer in a manner proportional to the value to the utility. The capability of the three methods to accomplish this objective is discussed below:

Basing Incentives on Measure Avoided Costs

Measure incentives of this type are calculated by determining the value of energy savings in terms of the avoided cost per unit for each measure to be incentivized, and then setting a policy of the percent of avoided cost to be paid. This method is popular in DSM bidding and in custom measure programs.

As shown on Figure 1, a payment of 25% of avoided costs produces dramatically decreasing percentages of installed costs as the unsubsidized payback of the measure increases. Measures with a one year payback will be more than 100% subsidized, while measures with a 6 year payback would receive a rebate less than 20% of the purchase price. In the customer model described earlier, market penetration is impacted by the percent of cost subsidized by the incentive. As a result, these payments strongly favor the quick payback measures.

This was observed in the 1989 Energy Initiative program at New England Electric, where payments of 30% of avoided cost resulted in dramatically higher market response for quick payback measures.

Figure 2 illustrates the effect of a subsidy of 25% of avoided cost on payback; in effect, it slices about a year off the payback of measures across the board; a 7 year payback measure drops only to 6 years, while a one year payback measure drops to 0 years (free).

Basing Incentives on Customer Payback

Many utilities seeking to establish the rebate level required to induce the customer to purchase calculate the incentive required to buy down the measure to a specified customer payback. With this strategy, measure incentives are designed to have a consistent value to the customer, assuming that the customer's interest in purchasing a measure is defined by its payback.

Advantages of the buydown strategy are that:

- incentives are targeted to measures the customer was unlikely to purchase by himself, reducing the potential for free-ridership. Specifically, quick payback measures are completely excluded from the program.

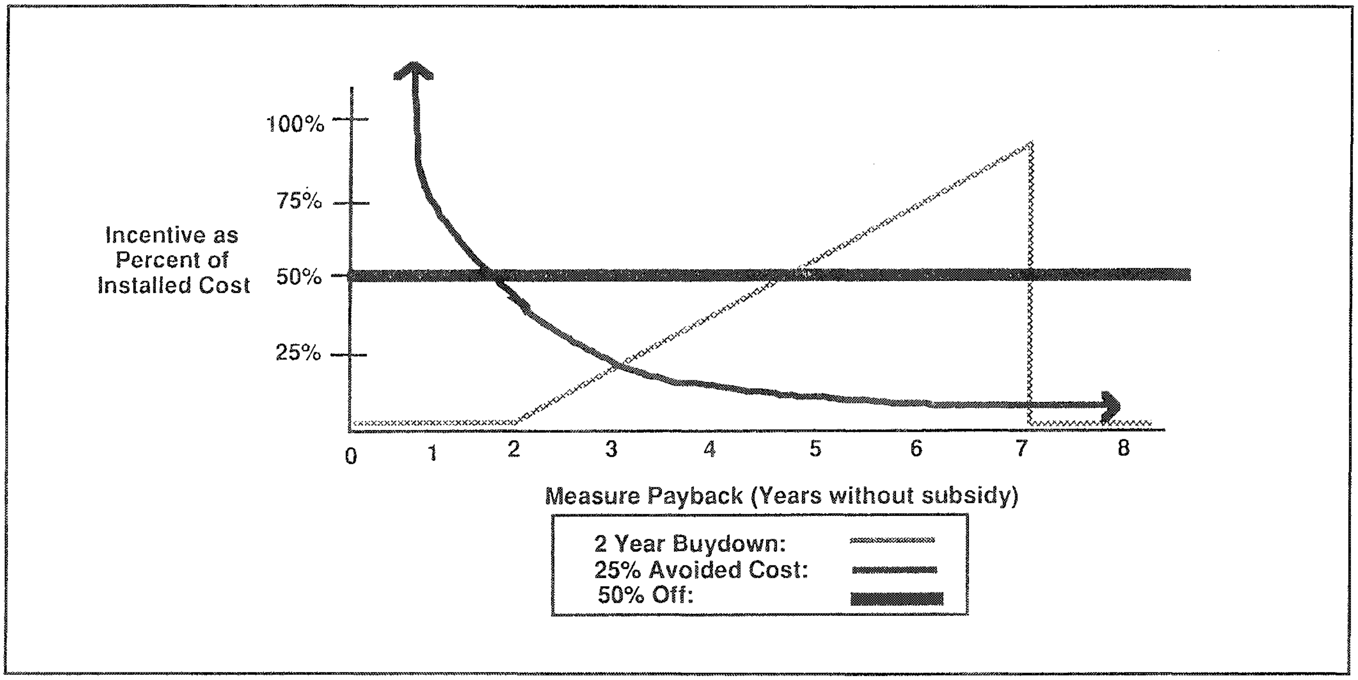

Figure 1. Incentive as % Installed Cost Versus Unsubsidized Payback

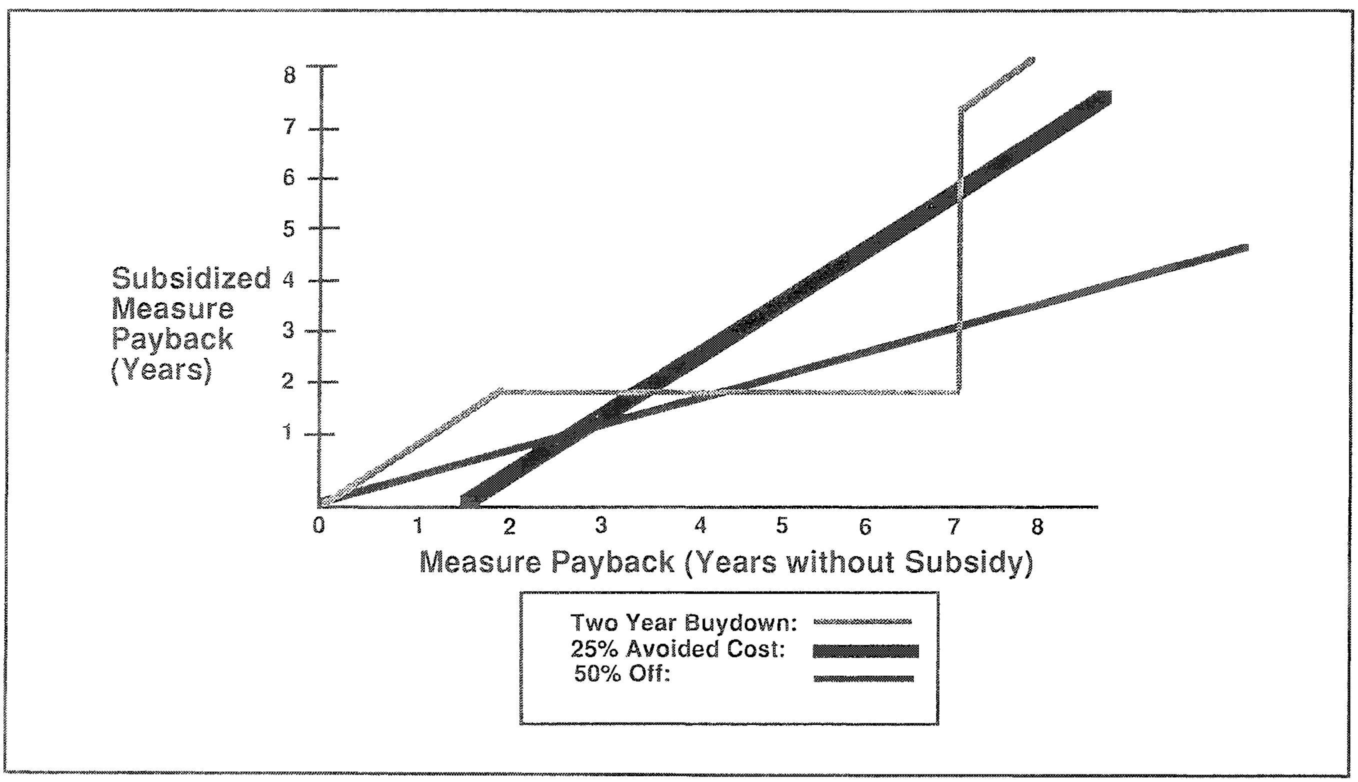

Figure 2. Subsidized vs. Unsubsidized Payback

- payments are just enough to meet the theoretical investment threshold of the typical commercial customer.

Disadvantages of the buydown strategy are that:

- market research shows that many of the quick payback measures, which receive no subsidy with this technique, have very slow implementation without a utility incentive. In most economic potential studies, utility rebates for these measures prove most cost-effective despite possibly high levels of "free riders".

- the approach promotes measures with costs near the incentive ceiling, since regardless of measure cost the incentive reduces the customer's effective cost to a fixed payback. This effect is often referred to as "gold-plating".

- the transaction costs are substantial, due to the requirement to calculate customer costs and avoided energy costs for each measure.

- although apparently an objective standard, applying the "buydown " principle turns out to be subjective in many cases.

Figure 1 illustrates the effect of a buydown to two years on the percent of installed cost subsidized. The percent subsidy grows steadily as unsubsidized payback grows longer, until a measure ceiling is reached. If customers respond to the percent paid, rather than the payback, one would expect the highest payback measures to be most incentivized by such an incentive form.

This has been observed in programs of this type, such as the Energy Action Program for large industrial customers at Northeast Utilities, where businesses favored measures with the highest cost and highest percent incentive. Meanwhile measures below the two year threshold were almost never selected, despite being identified by the utility-sponsored audit, even though they had the quickest payback. Program participants identified the lack of subsidy for the customer's lack of interest.

Basing Incentives on Measure Cost

The customer value model defined above suggests that customer interest in purchasing a measure is defined by its discount; i.e., market penetration is more a function of discount from full cost than of payback. This can be implemented by setting incentives at a standard percentage of the installed cost.

The advantages of measure cost discounting as an incentive strategy are that:

- the percent of installed cost is a relatively uniform method from the perspective of the customer. It is easy to explain and understand.

- the impact of this method is about in the middle of the earlier two strategies. It doesn't favor the quick payback measures excessively (as does a fixed avoided cost), nor does it favor the long payback measures or "goldplating" strategies encouraged by the buydown method.

The disadvantages are that:

- the incentive calculation isn't aligned formally with any of the cost-effectiveness strategies, making it appear arbitrary from the utility perspective.

- the strategy requires validation of utility cost estimates and customer receipts. The definition of installed cost is in fact quite ambiguous, and therefore definitions must be precise (Michaels et al. 1991).

Figures 1 and 2 illustrate the effect of a 50% subsidy. If customers are motivated by value as reflected in the percent discount, then as shown in Figure 1 this form of subsidy creates a uniform incentive across measures of all types. If customers are motivated by payback, then the 50% subsidy should create less impact on long payback measures, since their payback, while shortened, remains in proportion to unsubsidized measures. One would expect primarily "cream skimming."

Evidence from programs at Con Edison and Seattle City Light indicate that a percent-based subsidy results in long payback measures being installed, even though the post-incentive paybacks were above 2 years. It is clear that for many customers, paying a fixed percentage provides an across-the-board stimulus.

Program Design Conclusions

This paper, as previously described, presents hypotheses supported by empirical observation, rather than conclusions from a research study. These hypotheses should be the basis for such research. In particular, the following should be tested, as they have great importance to future program designs.

How can the utility effectively promote DSM technologies? The utility should offer comprehensive services to the business customer that provide it with information demonstrating the quality of high efficiency equipment, and that reduce the time, effort, and risks associated with implementation. Guarantees against future price drops or subsidy increases will simplify the decision making.

What form of incentive will prove the most efficient promoter of high efficiency equipment in the market? Payback, while important, is not the primary motivator for many commercial customers, especially larger businesses not under financial stress. The empirical hypothesis is that a discount to purchase price will have more impact at less cost over the full spectrum of measures, as compared to calculating incentives based on buydown or avoided energy costs.

How much incentive is required to dramatically impact customer choice? Clearly, the higher the incentive levels the less marketing expense required by the utility to propose the measure. The level will also vary by market. However, customers clearly take notice of discounts in the range of 25-50% of purchase price, which may prove to be the band of effective market inducement.

Incentive form and amount should be investigated through carefully controlled experiments supplemented by further market research into customer decision making.

What other utility program characteristics are critical? Most clearly, the utility needs to create an environment for its customers, as well as the DSM industry, that mitigates risk by promoting stability. Utilities can improve the perception of the industry to its customers by showing a long-term commitment to at least some level of DSM, and reasonable stability to programs and incentives offered.

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