The Evaluation of Marketing Efforts: Tests for the Future

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The electric power industry is on the brink of radical change. In particular, the franchise utility is about to become a thing of the past. As a part of its status as a regulated monopoly, the utility took responsibility for implementing many programs that were judged to be in the common interest. Among these were demand-side management programs.

As the retail franchise evaporates, the willingness of utilities to act in the common interest is likely to be diminished. This paper examines the proposition that, in the fact of competition, unregulated retail power marketers could use efficiency services as a means to improve profitability. As a result, competition may improve overall energy efficiency rather than reducing it as is commonly assumed.

The paper focuses on three issues. First, the paper contrasts DSM and efficiency. This contrast is based on the distinction between the public-purpose focus of DSM and the customer focus of efficiency. Second, the paper discusses the customer attributes that are likely to make efficiency effective as a marketing tool. Third, the paper investigates the standards for evaluating the effectiveness of marketing programs relative to those that are used for evaluating DSM programs. This includes a discussion of the concepts of impact and free-ridership in the context of marketing. Two examples are discussed that illustrate the concept of profitable efficiency.

Two conclusions can be drawn. First, conservation opportunities can be exploited commercially in a competitive environment. Second, many of the methods of describing program impacts and profitability can be adapted from current DSM program evaluation.

INTRODUCTION

The enactment of the National Energy Policy Act of 1992 and the restructuring initiatives in California and throughout the U.S. are likely to bring about the end of the traditional electric utility. In the 1970s, 80s and early 90s DSM efforts were driven by the notion of minimizing total resource costs. Utilities were assured that they would be compensated for the direct investments in DSM as well as the associated lost revenues. With the competition that EPACT and other deregulation initiatives are likely to bring, the leaders of our industry no longer feel secure that regulators *can* make them whole.

The focus of DSM and other efficiency-related efforts has already begun to shift from resource acquisition to customer retention and expansion of the customer base. As we look around us, it seems every utility is re-thinking itself as it looks toward the competitive future. With DSM efforts withering, are conservation programs and program evaluation that go with them dead as well? Not likely. Energy efficiency can be an important part of the customer retention and recruitment effort. In addition, the absence of regulatory protection of investments make the need for effective planning and evaluation of marketing efforts more important than ever.

This paper examines the evaluation of retail marketing efforts that include efficiency services. The emphasis will be in describing the information processing required to assure that efficiency-oriented investments earn appropriate return. Specific contrasts between the evaluation of this effort as a DSM program and as a marketing effort will be made. The following issues will be addressed:

- How is DSM different from efficiency?
- How is marketing efficiency different from marketing DSM?
- What do we need to account for when designing marketing programs?
- What replaces the TRC test when we move to marketing?
- What do the concepts of free-riders, free-drivers, and net-to gross ratios mean in a marketing context?

EFFICIENCY AS A RESOURCE

The underlying philosophy behind demand-side management sees the utility as an instrument of the common interest. The objective of effective planning and management of a utility is to ensure that the aggregate cost of maintaining some level of energy service (air conditioning, heat, light, etc.) is minimized. In many cases this will imply the substitution of efficiency ''resources'' for the traditional combination of generating plant and fuel. Efficiency resources are financed by ratepayers at large and the benefits accrue mostly to program participants. The distribution of costs and benefits is largely ignored because the interest is collective.

Under this regime, the most popular measures of program effectiveness have been the Total Resource Cost (TRC) test and the Utility Cost (UC) test. The net TRC value of a DSM program is defined as the difference between the reduced cost of producing electricity (saved fuel, reduced capital cost, reduced levels of environmental degradation) and the total cost of delivered equipment relative to the less energy efficient alternative. The net UC value of a program is defined as the difference between the cost savings of the utility (saved fuel and capital costs) and the cost to the utility of running the program (incentives to participants, promotional expenses, and administrative costs). The main difference between the TRC and UC tests is that the UC test excludes the benefits associated with the reduction in environmental externalities and the portion of the cost of more efficient equipment borne by program participants.

The TRC and UC tests are a reflection of the centralized planning function of demand-side planning. A program that has positive net benefits added up *across all members of the population* is judged to be good. Although this is an extreme case, kidnapping people off of the streets and making them the subject of medical experiments does not necessarily fail a TRC test. In contrast, the Rate Impact Measure (RIM) test accounts for the distribution of costs and benefits. It measures the impact of a program either on rates, if the utility is offered the opportunity to recover lost margins, or on utility profits if it is not. In order to pass the RIM test, the cost reduction from an efficiency program should offset the sum of the implementation costs and the loss of revenue that it causes. In other words, the program will not cause rates to increase because of lost contributions to net revenue requirements. The RIM test is an extremely high bar to ask a program to jump over. In fact, a corollary to the statement that a program passes the RIM test is that the utility loses money on incremental sales (i.e., there are no lost margins to be allocated to remaining sales). Programs passing the RIM test in today's environment, where retail prices are anywhere from two to three times incremental cost, are generally programs such as dispatchable load curtailment that reduce load selectively during periods of particularly severe capacity constraints and not at all during typical periods.

The distributional impacts of DSM that is driven by TRC considerations are summarized in the first two rows of the ''Efficiency Program Satisfaction Matrix'' shown in Table 1. If utilities are not allowed to increase rates because of lost sales and margins, profits (and shareholder earnings) are reduced. Needless to say, they would rather not have this happen. If utility sponsors of DSM programs are allowed to recover margins on lost sales, sunk costs are spread across a smaller number of kilowatt-hours and ultimately borne disproportionately by nonparticipating customers. If they're aware of this, it probably makes them unhappy. The protection of the franchise utility from competition makes this sustainable because nonparticipating customers have no choice but to pay. If retail competition in its purest form becomes a reality, DSM as we now know it cannot survive. Nonparticipating customer will quickly migrate away from the sponsoring utility, leaving program participants left to pay for each other's efficiency improvements.

It is clear that the concept of ''conservation resource acquisition'' is not compatible with competition in the market for electricity. Let us now look at what will replace it.

EFFICIENCY AS A PRODUCT

In the new world order, marketing efforts will be subjected to what amounts to something very much like a RIM test. Although rates (or prices) will be set competitively rather than administratively in the future and there will be no ''recovery'' of lost margins, the principles underlying the RIM test clearly apply. In other words, the program will have to make a contribution to profit margin.

Table 1. *Efficiency Program Satisfaction Matrix*

	Participating Customer	Utility	Non Participating Customer
DSM-No Recovery of Lost Margins	☺	☹	😐
DSM-With Recovery of Lost Margins	☺	😐	☹
Energy Service Oriented Marketing	☺	☺	😐

This is not altogether a bad thing for efficiency or conservation. Until retail competition reaches us, the baseline for the consideration of conservation opportunities from the utility's point of view will continue to be the captive franchise customer. This handicaps efficiency because, with a franchise, the utility is faced with a clear choice: sell more or sell less. Recovery of lost margins through regulated rates has softened this choice somewhat, but the uncertain and cumbersome nature of the regulatory process has probably lessened the resolve with which regulated utilities pursue efficiency opportunities.

In a world with retail competition, the choice that the marketer of energy faces is equally clear, but completely different: sell some or sell none. In order to sell some, the provider will compete with other providers on the basis of the attractiveness of the overall package. Informed consumers are likely to be attracted to a package that reduces the overall cost of the energy services or adds energy services that deliver added value above cost. If the current thinking about the cost-effectiveness of energy-saving measures currently offered as utility demand-side programs is anywhere near correct, energy efficiency will be an important part of the energy service packages that are likely to be successful in a competitive environment.

There are, however, certain realities that will need to be recognized if conservation technologies are to compete effectively with generation technologies. Among them:

- The cost and impact of marketing efficiency will have to be closely examined. There is considerable evidence that the cost of DSM programs in the current regime is understated (Joskow & Marron 1992). There is also overwhelming evidence that the savings associated conservation measures (usually derived from engineering simulations) is overstated (Nadel & Keating 1990).

- Program planners will need to understand that the cost of delivering and marketing efficiency matters. Much of the debate surrounding the issue of energy conservation has been centered around the issue of how close we are to meeting the ''technical potential'' of energy conservation. In the marketplace, the best (most profitable) level of conservation will be influenced not only by the cost of the technology but also by the cost of overcoming the lack of product awareness and consumers' reluctance to adopt new technologies. In this sense, the TRC and RIM tests are really the same. Rebate payments made to program participants and financed by nonparticipants represent real costs associated with overcoming consumer reservations and simply cannot be ignored as ''transfers.''

- Program planners can no longer base incentive levels on what is necessary to achieve arbitrary conservation goals. Instead, incentives or inducements will be balanced against potential margins and set at a level that maximizes profitability. This doesn't necessarily mean that they are lower. In fact, it is entirely possible that a consumer might be brought on-line at higher rates by offering a large incentive (in fact a loan against future margins) to purchase more efficient energy using equipment.

- Program planners will need to understand that consumers are, on average risk, averse. Energy service providers hoping to compete will need to be prepared to accept a large part of the risk associated with the performance of efficient equipment. This may involve offering to install and power equipment at rates that are not tied to energy usage. For instance, the utility may offer to provide lighting service on a per square foot basis rather than energy on a kilowatt hour basis.

CONSUMER PREFERENCES AS A GUIDE TO MARKETING

The first step in designing effective marketing programs is to understand what consumers want. Another way of looking at this is to try and understand what they don't like about the way that electricity is sold or the way that high-efficiency equipment is marketed. In today's world, the marketing of electricity (in this context pricing and the nature of the arrangement between the buyer and seller) is driven by the principles of cost recovery. Although great pains are made to ensure that prices are as low as they can be, very little attention is paid to whether or not customers are happy with other terms and conditions of the transaction. Regulated rate schedules are, by definition, one size fits all. In contrast, consumers have a wide range of preferences toward the various attributes of commercial arrangements. There are three particularly interesting customer attributes that can serve as a guide to tailoring marketing programs:

- ***Time preference.*** Most customers are willing to pay extra to have something now rather than later. Some are willing to pay more than others.

- ***Attitudes toward convenience.*** Most customers are willing to pay extra for an arrangement that makes their life simpler. Again, some are willing to pay more than others.

- ***Risk aversion.*** most customers are willing to pay extra to avoid worrying about how much they'll have to pay. Again, some are willing to pay more than others.

All of these traits are important and all of them can be used to market energy and efficiency.

Individuals generally have less regard for the future than institutions. More directly, electricity consumers are likely to have higher rates of discount than electric utilities or other large corporations. The DSM community acknowledges this when it speaks of first cost as a ''market barrier'' and the need to calculate TRC values based on ''social'' rates of discount (usually very close to the utility's cost of capital) rather than the consumer's rate of discount.

Consumers' preferences toward time value and discount rates can have an important impact on the best way to market electricity and energy efficiency. One way that value can be added to the customer's relationship between the electric utility (or other energy provider) is for energy to be combined with financing of energy using equipment. The utility of the future could offer financing at favorable rates to customers purchasing electricity to power them, much as automobile manufacturers and dealers bundle financing services (often at rates that they advertise as below-market) as a means of gaining access to the customer and the profit margin on the vehicle. This arrangement has two advantages:

- It is a means of overcoming consumers' resistance to large first cost.

- It is a means of exploiting the unique position of the utility in America's credit markets.

In fact, the utility might consider offering direct cash gifts or free equipment to customers willing to sign long term energy purchase agreements. In effect the utility would be loaning money against future profit margins. This approach is similar to one that the cellular telephone industry has finally discovered. Service providers frequently offer ''free'' telephone equipment to customers who sign new service contracts.

An extension of this strategy arises from the fact that we also live in a world where consumers are increasingly willing to trade money for time. This means that competing effectively will involve more than simply offering the lowest price. Firms selling energy can add additional value by combining energy with energy using equipment so that the customer's total cost of seeking out and paying for energy services is minimized. This may involve consolidating appliance financing with the electric bill as well as providing services related to selection of equipment or design of systems. Presumably, companies offering more efficient equipment (with respect to total cost, not necessarily with respect to energy use) should find themselves at a competitive advantage. The consolidation of equipment costs and energy costs should make the advantages of efficient equipment more apparent to the customer.

The next logical step in this arrangement is for the energy company to entirely relieve the customer of the burden of making tradeoffs between initial cost and efficiency. In order to do this, the provider would offer pure energy service. For a residential customer, this might mean offering a monthly bill, which would be a combination electric bill and equipment lease that doesn't vary or varies with weather. This is an interesting arrangement for a number of reasons. First, customers will be attracted because their bill will be more predictable. Second, this type of arrangement creates a mechanism for the commercial aggregation of energy efficiency improvements. If a provider has a constant revenue stream, they have a strong incentive to bundle equipment and efficiency measures with electricity in a way that would mimic the combination of energy and efficiency that is suggested by a TRC-driven Integrated Resource Planning process. Whether or not this type of arrangement is successful will depend on:

- Whether or not behavioral changes can be controlled. Much of the appeal of a flat service fee is that the customer no longer has to adopt cost-reducing habits. Just as we expect diners at an all-you-can-eat restaurant to eat more, we would expect resident's in an all-you-can-heat home to turn up the thermostat. Some combination of periodic readjustment of the monthly rate and automatic controls could mitigate this.

- Whether or not consumers will pay more to compensate for these effects.

- Whether or not consumers will concede enough control over energy use decisions (equipment choice, thermostat settings, etc.) to energy vendors to make this arrangement profitable.

- Whether or not the energy efficiency gains are large enough to make this all worthwhile.

ASSESSING PROGRAM EFFECTIVENESS

The objective of any marketing program is to convince some consumer (or group of consumers) to purchase a product. In the case of a newly competitive electric utility, this involves getting a homeowner, renter or commercial tenant to enter into an agreement to purchase electricity, electricity plus equipment, or energy service for some length of time. In many ways, selling electricity or energy services is analogous to selling magazine subscriptions, cellular phone service, cable television or any other product that involves an

ongoing relationship between the buyer and seller. Substantial effort is expended to ''sign up'' the subscriber who produces revenue and gross profit margin (revenue less cost of printing magazines) over time. The key in determining whether or not the customer is profitable (another way of defining whether or not the marketing program is effective) is whether or not the customer generates sufficient gross margin over the life of the subscription (or its extensions) to cover the cost of recruitment. We will analyze the sale of electricity in a similar framework.

Assessing profitability (program effectiveness) has several steps:

- First, the expected revenues are calculated using the best estimate of the customers load profile and the rate (price) schedule to which the customer is expected to subscribe. If we are marketing a new end use to an existing customer, the expected revenues will be calculated using the customer's aggregate load profile with and without the end use.

- Second, the cost of providing power to the customer is calculated for the new customer, or the existing customer, with and without the end use.

- Third, the difference between incremental revenue and incremental cost is calculated.

This process, which is shown in Figure 1, yields what we call a ''gross'' margin. The gross margin is the profitability of a new customer or a new end use if that customer were to subscribe without the intervention of the salesman or marketer. It is unlikely that in a competitive environment marketers will be successful at recruiting customers without costs. It is entirely possible that customers or end uses yielding gross margins, might be unprofitable in the sense that marketing cost may overwhelm gross margins.

In order to calculate the true or ''net'' margin, the cost of customer recruitment is estimated. These costs can include the cost of sales commissions and salaries, advertising, financing and direct cash or in-kind incentives to customers. These costs can be characterized in one of two ways. The costs can be amortized over the expected length of the customer agreement or the expected number of kilowatt hours sold and the net margin calculated on an annual or per-kilowatt hour basis. Alternatively, the costs can be characterized as an initial investment with the gross margin on sales the return. A rate of return can be calculated and compared to a threshold rate of return. The contrast between net and gross margin is illustrated in Figure 2.

It should be recognized that some marketing effort is wasted. Just as customer may walk into a grocery store and purchase

Figure 1. *Calculation of Gross Margin*

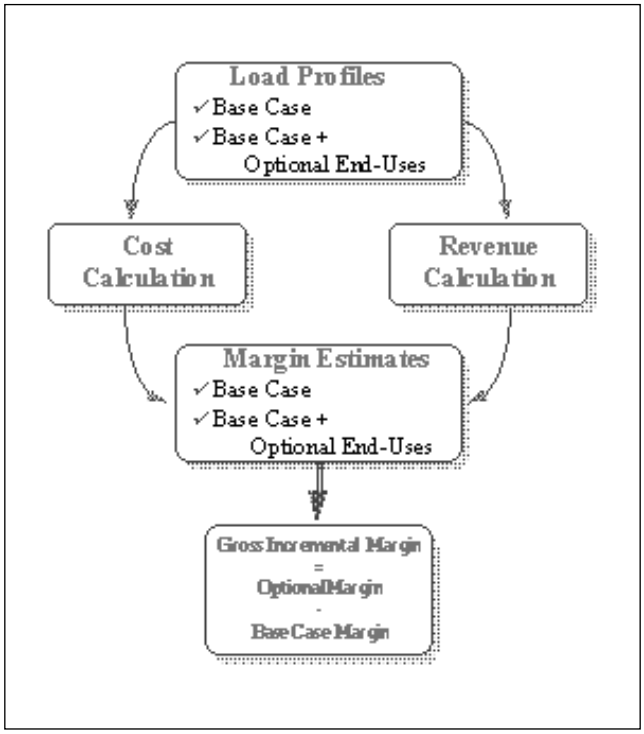
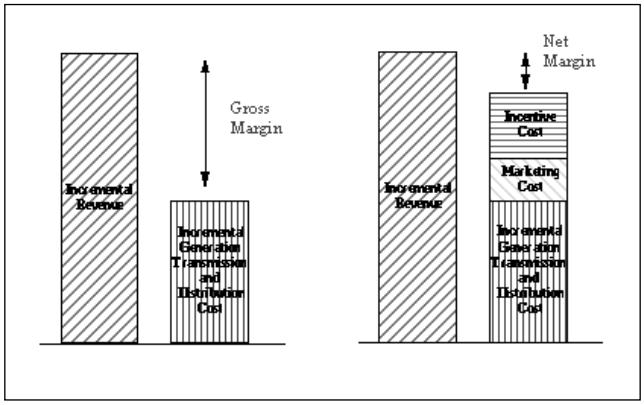


Figure 2. *Gross and Net Margin Concepts*



certain brands of soda or cereal uninfluenced by the marketing efforts of Pepsi or General Mills, some customers will subscribe to electric power service unimpacted by a particular marketing program.

This evaluation framework for marketing program evaluation has underpinnings that are very similar to those of demand-side management program evaluation. They are:

- Knowledge of the energy consumption patterns of the existing or new customer at the end-use level including load shape,

- A thorough understanding of the company's incremental cost structure, including fuel and capacity costs,
- Awareness of the revenue implications of increases and decreases in loads,
- A reasonable accounting of the costs associated with administering the program, and
- An appreciation of the problems associated with free-ridership.

Understanding how customers use energy will be even more important in a competitive environment than it is now. When recruiting new customers, understanding the size and profile of the customer's load will help the marketer understand the cost of serving the customer and aid in pricing or in assessing profitability. In the case where a marketer is trying to convince the customer to add an end use or convert it to electricity, knowing how the customer's load shape will change will aid in the assessment of cost, profitability pricing and intensity of marketing effort.

When evaluating demand-side management programs, program planners calculate avoided costs based on the company's best estimate of the incremental cost of serving new load. This includes fuel that is not burned and capacity that is not built. Assessing the value of foregone capacity is problematic because, in the very short term, most utilities are not capacity constrained. Assessing avoided capacity cost usually entails projecting future capacity needs and placing a value on the deferral of new capacity. Historically, avoided cost calculations have been somewhat unreliable. Fuel costs are notoriously unpredictable and assessments of future capacity needs rarely prove to be very accurate. In a competitive environment, with power pools and deep and liquid spot markets for electricity, such judgments will be unnecessary. The wholesale market will tell the retailer what the opportunity cost of serving new load is on an hourly basis.

Depending on the utility and the state, lost revenue considerations have a varying degree of importance in DSM cost-benefit analysis. In states with automatic revenue adjustment mechanisms, revenue impacts are generally ignored. In other states, utilities and regulators are sensitive to the impact of reduced sales on profitability and rates. Understanding the revenue impact of changes in load will take on new importance in a marketing environment. Estimates based on average effective rates and kilowatt hours may not be sufficient. The ability to model the revenue impacts of subtle changes in load profiles with high degrees of precision may become critical.

As mentioned previously, the cost of reaching the customer and convincing (or paying) the customer to enter into a service agreement also must be accounted for when evaluating marketing programs. This parallels the evaluation of DSM programs where the cost of administering the program is subtracted from the program's net resource value (if the calculation is done correctly). As with DSM programs, discovering the ''true'' cost of a marketing program may be difficult. Personnel are almost always assigned to multiple programs and it might be tempting to assign those people and other shared resources to ''overhead.'' In the interests of accurate decisionmaking, this temptation should be avoided.

When evaluating DSM programs, program planners take great pains to distinguish between the ''gross'' and ''net'' impact of a program. Gross impacts are defined as the total energy savings of all program participants. Net impacts are defined as the energy savings for participants who would have not adopted the efficiency measure without the program. These concepts have an analogy in the assessment of marketing program profitability. The gross number of subscribers to an energy service plan is the total number of customers with agreements. The net number of subscribers is the gross number less those customers that we would have recruited without trying very hard.

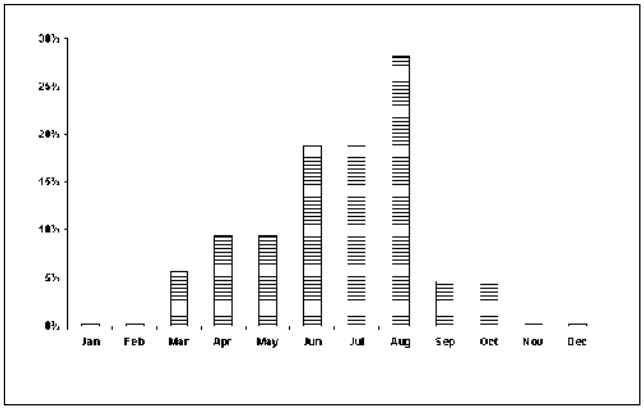
Estimating the difference between net and gross participation or ''free-ridership'' will be as difficult as ever. For DSM programs, this has usually involved calculating self-reported rates of free-ridership, comparing rates of technology adoption between program participants and nonparticipants or constructing discrete choice models of technology adoption and program participation decisions. Deciding which of these techniques to use in a marketing context will involve a tradeoff between the value and cost of precision and accuracy. Only time will tell where the industry will want to be on that tradeoff curve.

The remaining sections of this paper review two high-efficiency technologies that might be profitably marketed as part of an energy services package in a competitive environment. For both of these scenarios, we make several assumptions about the cost of serving electric load. These cost data are entirely hypothetical and are not intended to represent any service area or region. We assume that capacity cost is approximately $100 per kilowatt, including generation and distribution capacity. Capacity costs are allocated to hours based on hypothetical loss of load probabilities. The monthly allocation of capacity costs implied by this schedule is shown in Figure 3. Fuel costs are assumed to be 1.5 cents per kWh for winter off-peak periods, 2.0 cents winter on-peak and summer off-peak and 3.0 cents for summer peak periods.

Case Study 1: Marketing of Electric Heat Pumps

The electric heat pump is an example of an efficient technology that is actively marketed by electric utilities and has

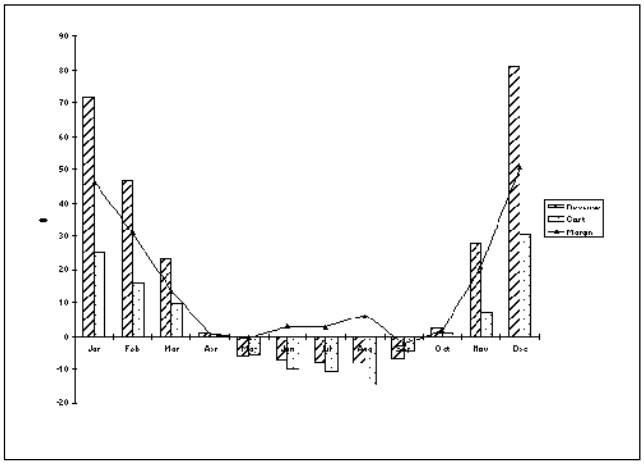
Figure 3. *Allocation of Capacity Costs*



had dual benefits to utilities in the form of increasing load during low-cost periods (if the existing equipment is gas-fired) and decreasing load during high-cost periods. Because of these benefits, marketing the high-efficiency technology can be profitable to the utility in the current regulated environment.

Suppose that the home in question is currently heated with gas with current air conditioning usage of 4000 kWh and a projected space heating use of 5000 kWh. The rate that the customer has subscribed to has a summer rate of 5 cents per kWh and a winter rate of 7 cents per kWh. The heat pump improves the efficiency of the air conditioner by 15 percent. The heat pump is assumed to have a life of 10 years. The monthly profiles of revenues and cost of service are shown in Figure 4. Incremental profits (changes in revenue minus changes in cost) are positive even during the summer when electricity consumption is reduced because of capacity cost reductions (i.e., cost savings exceeds revenue loss).

Figure 4. *Monthly Profile of Gross Margins*



The present value (using a 10% interest rate) of the gross margins over this lifetime is slightly more than $1,100. The implication of this result is that if the customer can be convinced (through direct cash payments, advertising or other sales activity) to adopt the heat pump technology for less than $1,100 the program is a win-win.

The wildcard in this scenario is not the efficiency of heat pumps, it is the effectiveness and efficiency of utility marketing efforts. To the extent that marketing representatives are unable to convince consumers (or builders) that the cost and quality of service is superior to the gas alternative, the high-efficiency technology will fail. In addition, the high-efficiency technology will fail if the incremental margin of electricity sold fails to offset the cost of marketing efforts.

Case Study 2: Marketing of Lighting Under Retail Competition

High-efficiency commercial lighting has been a staple of conservation-based DSM. In spite of the fact that it is highly cost-effective, it is also clearly a set of technologies that would have struggled for acceptance in the absence of utility-sponsored DSM programs since the barriers of first-cost are a significant factor in the consumers decision to adopt.

This scenario examines the prospects of profitably offering lighting service, separate from the standard electric bill and using high-efficiency equipment to customers who have the option of purchasing electricity from competing suppliers. In this scenario, the customer is a 10,000 square foot office building with a lighting intensity of 6 kWh per square foot. The customer is currently served under a standard commercial rate with an $8.00/kW demand charge and a 4 cent per kWh energy charge. This customer currently pays $3,757 per year for lighting, or 38 cents per square foot.

If the customer can be sold lighting at a price of 30 cents per square foot per year, or $3000 per year, using lighting that uses 33% less energy we obtain the following results:

- The incremental cost of providing energy for lighting is $2,153 per year.
- The gross margin on this sale is $847 per year.
- Using a discount rate of 10%, the present value of the gross margins over a 7 year contract is $4,123.

The upshot of this is that if the total cost of customer recruitment and equipment installation (beyond the cost of the standard efficiency equipment that the customer would have bought) is less than $4,123, this arrangement can be profitable for the customer and the provider.

CONCLUSIONS

Demand-side management, as we know it, may not survive the electric utility industry's transition to a competitive market. This does not however mean that importance of efficiency programs that deliver efficiency or the evaluation of those programs will be diminished. This paper has attempted to outline, in general terms, the shape of energy efficiency programs in the new marketplace and the methods that will be used to evaluate those programs. We have shown that energy efficiency can be profitable and attractive to consumers and that competition between service providers can enhance rather than diminish efficiency. We have also shown that much of the knowledge base that has been built in support of utility demand-side management can be adapted to the evaluation of competitive marketing efforts.

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