Market Transformation: Hot Topic or Hot Air?

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The costs and uncertainties of achieving sustainable and effective markets for energy-efficient goods and services have led many DSM professionals to examine mechanisms other than customer rebate programs as ways of removing market imperfections. This paper argues that evaluations of these programs against short-term objectives of market penetration or savings of energy or demand will be counterproductive. Following such a course, we will not learn which market barriers are most critical, which programs are best able to remove or overcome those barriers, or when market transformation has been successful and the intervention completed. Instead, the emphasis should be upon: (1) the process of market transformation and the effect of a program upon the size and composition of the set of actors in the market, (2) the mix of products and services available, and (3) the rules of exchange involved. This latter approach will enhance our understanding of market transformation and prove less expensive than a focus on impact analysis.

The paper further argues that consideration of the overall market, rather than the penetration of specific technologies, is particularly compatible with a customer-service orientation on the part of utilities. A focus on customer needs also suggests that market transformation programs follow models such as that pioneered by NUTEK, in which the specifications for new technologies are developed more by potential buyers than by engineers focused on the technical potential for energy or demand savings.

Introduction

I suspect that most of the readers of this paper believe that, other things being equal, a free market offers the most efficient means of providing goods and services—including those featuring energy efficiency—to those who need or want them. I further suspect that many readers believe that various barriers have limited the success of the free market for energy efficiency.

Among the market barriers suggested as affecting customers are the following.

- Lack of awareness regarding energy-related issues
- Lack of knowledge of energy-efficient options to standard products and services
- Lack of access to efficient technology
- High first cost of efficient technologies
- Unreliability of new products

Exacerbating these barriers are the failure by regulators and utilities to internalize the costs of energy production and use, resulting in ineffective price signals, and governmental subsidies that bias fuel choices.

At the same time, would-be producers and distributors of energy-efficient options encounter barriers to entering the market that pose problems complementary to those of customers. Demand for efficient technologies is limited; advertising and promotional activities are costly; the willingness to pay premium prices is constrained; and confidence in current suppliers is high.

As a result, the range of actors buying and selling energy efficiency is limited, as are the products and services involved. Furthermore, decisions to market or purchase appliances and other energy-using devices tend to omit consideration of norms and values relating to efficiency.

The logic for change that derives from this analysis is straightforward and appealing.

- Identify the barrier(s) limiting the efficiency of the market

- Construct and implement a program that removes the identified barrier(s)

- Allow the newly transformed market to operate freely

Implicit in this model are the assumptions that we can, in fact, identify the important and salient barriers, develop effective programs that result in the permanent removal of those barriers, and then withdraw from the market without negative consequences. In other words, we would like to find a way to perfect or free up the market and then allow it to provide energy efficiency without further intervention.

Customer Rebates as a Stimulus to Market Transformation

Clearly, then, for all its appearance as a "hot topic," market transformation is not a new concept in DSM activity. Most utility programs over the past two decades have, in fact, been directed towards transforming the market. Many early programs were based on the assumption that increases in customer awareness and knowledge regarding energy efficiency would suffice to stimulate large gains in energy efficiency. The limited success of those early programs was diagnosed as the result of inadequate price signals and the unwillingness of customers to meet the first costs of increasing efficiency. While continuing some effort to educate customers as to the superiority of life cycle costing as a basis of investment, most DSM-oriented regulators and utilities took the tack of providing rebates or other financial incentives to customers who would purchase energy-efficient technology.

The underlying rationale has been that reducing the first costs of efficient technologies would jump start the market. Customers would come to recognize the virtues of the more energy-efficient products, and would demand them when it came time to replace the items purchased with the rebates. Moreover, customers participating in financial incentive programs would tout the new technology to their friends and neighbors, multiplying the demand through word of mouth. And stimulated by the increased demand, suppliers would provide more and more of the energy-efficient units, realizing economies of scale and offering price reductions that would further increase consumer demand.

What is relatively new is the recognition that market transformation through customer rebates is quite expensive, and that it is also a highly uncertain way of achieving the objectives sought. The typical rebate program requires considerable paperwork by customers or retailers, as well as significant administrative effort by utilities who must process a myriad of individual applications and payments. Utilities also undertake much of the burden of promoting the program, in addition to evaluating its success. Program costs are also magnified by evaluations that net out the savings that could be attributed to naturally-occurring conservation.

In the effort to justify program expenditures, utilities are trapped into focusing upon estimates of the net savings achieved through the rebate route. They tend to ignore the question as to whether or not the market has been transformed according to the model proposed above.

Can rebate programs transform the market as promised? I believe the answer is that they are indeed sometimes successful in doing so, but not always.

Let me turn to some examples from a study recently completed for the Wisconsin Center for Demand-Side Research (1994).[1] We sponsored a statewide telephone survey to identify and interview purchasers of new residential appliances (during the period of April, 1992, to March, 1993) regarding the role of energy efficiency in their purchase decisions. Among our findings were the following.

- A substantial segment of customers say they consider energy efficiency when purchasing appliances.

  - Twenty percent (20%) of refrigerator purchasers (20/100) say they wanted an energy efficient unit or that their previous unit was using too much energy.

  - Twenty-two percent (22%) of gas water heater purchasers (13/60) indicate similar sentiments.

  - Thirty-two percent (32%) of forced air furnace purchasers (18/56) also do so.

- Almost all purchasers believe they bought an energy-efficient unit, regardless of whether or not efficiency was a key motivator.[2]

  - Ninety-six percent (96%) of the refrigerator purchasers (108/113) believed that the unit they selected is a high efficiency unit.

  - Ninety-five percent (95%) of gas water heater purchasers (59/62) reported buying a high efficiency unit.

  - A similar percentage of gas furnace purchasers (94%, or 33/35) believed they had obtained a high efficiency unit.

As part of the study, we obtained brand names and model numbers of the items purchased from most respondents. Thus, we were able to check customers' perceptions against manufacturers' ratings in a large proportion of these cases.

- Wisconsin residents are purchasing appliances that are relatively efficient, but sellers do not appear to be taking advantage of customers' interest in seeking increased efficiency.

  - The overall mean expected consumption for the refrigerators purchased was 868 kWh/per year (with a very high standard deviation, ± 194 kWh). (This consumption level is 18 percent lower than the 1990 federal standard, but approximately 15 percent greater than the 1993 standard .)

    The units purchased by customers seeking high efficiency are expected to consume less than those purchased by other customers (860 kWh ± 146 kWh, vs. 885 kWh ± 212 kWh), but this difference is not statistically significant.

  - Similarly, the overall Efficiency Factor for gas water heaters was 58.1 (& 2.4), and the difference between the units for customers seeking efficiency and others was not statistically significant.

  - Only in the case of gas furnaces did the large majority of customers who reported purchasing energy efficient units obtain significantly greater efficiency (AFUE of 91.7 ± 2.9, vs. AFUE of 84.0 ± 12.7).

The apparent difference between the market for energy-efficient gas furnaces and that for other appliances was also described in several interviews with Wisconsin HVAC dealers and distributors.[3] Participants noted that, although customers are "hard sells" with respect to high SEER levels for air conditioners, relatively few will accept "standard" efficiency furnaces-despite the relatively long-term direct payback for *either* investment.

We appear to have both examples of relatively successful and relatively unsuccessful market transformation through rebates, but the differentiating factors are far from obvious. From a theoretical point of view, the main problem is that by failing to focus our evaluations on the transformation question we remain ignorant as to the conditions under which rebate programs do or do not succeed in changing the market.

Other Efforts to Stimulate Market Transformation

The recognition of the expense and uncertainty of successfully using financial incentives to customers as the royal road to market transformation has sparked a search for other approaches, and it is these that have captured the attention and imagination of many DSM professionals over the last few years. Table 1 summarizes a few of these initiatives.

These programs are designed to stimulate technology improvements, enlarge the set of aware and knowledgeable buyers and specifiers, and reduce first costs early in the manufacturing and distribution chain. They share two key characteristics. (1) Most are not addressed to end-use customers but to manufacturers or to distributors and dealers. (2) Even the one program that directly involves customers—the EPA Green Lights program—does not include financial incentives to customers.

So, the excitement is that we have a new and intriguing set of programs to consider, and these programs offer the promise of allowing the market to provide the energy efficiency we seek at a lower total cost than customer rebate programs. Given the current atmosphere of skepticism regarding the costs and achievements of DSM, it is no wonder that the prospect of such programs is alluring.

Evaluation and Market Transformation

What should be the role of evaluation in the study and development of market transformation?

As in the resource acquisition model, evaluation can be used both to study program impacts and to study the processes involved. But I believe the lessons from process evaluations can and should provide the driving force for exploration and development of the new models for market transformation. Although we cannot fail to consider the impacts of our programs, I would contend that many of our evaluations have been impoverished by a narrow focus on the purely mechanistic function of assessing end results.

The Focus Upon Program Impacts

In the long run, as DSM professionals, we have been interested in achieving energy efficiency, not market transformation. For this reason, our bottom line with regard to appliances, building practices, and related

Table 1. Some Recent Market Transformation Programs

Organization	Program/Technology	Program Synopsis
EPA	Green Lights/Commercial Lighting	The agency created a partnership program in which participating businesses agreed to retrofit their premises with higher efficiency lighting products within a specified time period.
EPA/EPRI/ ACEEE	Energy Star Computers	A consortium convened manufacturers of office equipment to educate them regarding opportunities for enhancing energy efficiency in new generations of their products, and identified key buyers who would use efficiency as a selection criterion.
SCE	Manufacturers Buydown/Compact Fluorescent Lamps	A number of utilities are considering the example developed by this utility, in which funds are provided to manufacturers for providing energy-efficient lighting products to the distributors and dealers of their service territory.
SERP	Golden Carrot/Refrigerators	To develop a more energy-efficient refrigerator, and one without CFCs, this consortium held a competition and awarded more than $30 million dollars in incentives to the winning manufacturer.

determinants of energy use has been the market penetration and saturation of energy efficient technologies and practices. Our concern has not generally been an understanding of the market, but rather the relative proportions of appliances found at different efficiency levels. Indeed, Millhone has described the objectives of energy efficiency programs with explicit reference to such frequency distributions (cf. 1994) as that shown in Figure 1, below.

In Millhone's analysis, programs are designed to move the overall distribution of available models to higher and higher levels of energy performance over time. (1) Codes and standards are used to eliminate the bottom end of the curve. (2) Efficiency metrics, education and accelerated commercialization of efficient technologies increase the penetration of good and leading edge equipment. And (3) support for research leads to the development of even more efficient models and products.

The problem is that defining our evaluation concerns simply in terms of what ends up in the customer's home, business, plant or farm does not make us any smarter about which barriers are in fact most pertinent and pernicious, which interventions work and which do not, and when it is appropriate and safe to leave the market. Furthermore, we have generally studied the market only as it is perceived by the end-use purchaser (and by the utility), and have paid for our naiveté regarding the practices, strengths and concerns of other components of the market.

Let me cite a few lessons about trade allies learned from our collective experience.

- Rebates may shift the availability of stock without changing the long-run market.

  Anecdotal information suggests that large rebate programs for certain appliances do influence stocking practices for the service territory involved–but only temporarily, and at the expense of the efficiency levels in neighboring areas.

- Dealer and distributor comfort with new technology matters.

  A large Northeastern utility sought to reduce the home heating resistance load at peak hours by promoting and rebating electric thermal storage units. After two years of extremely disappointing sales, they

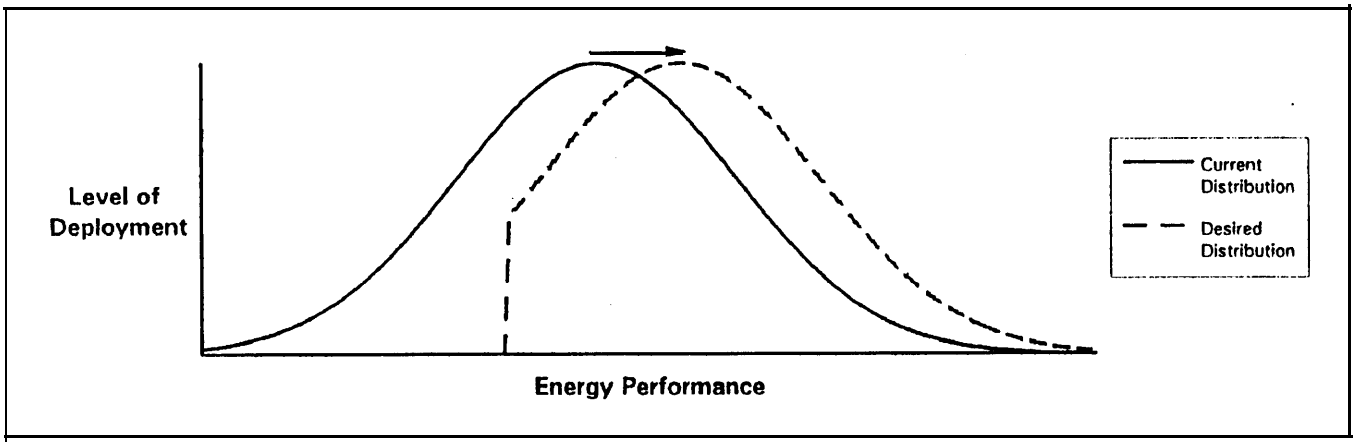

Figure 1. Desired Changes in the Distribution of Energy-Efficient Technologies Over Time (Source: Millhone, 1994)

recognized that not only were limited numbers of units being manufactured or imported into the U.S., but that dealers and installers in their service territory were relatively unfamiliar with the units and advising customers against them.

- Utilities are not the only actors concerned about competition.

  Manufacturers and dealers regularly complain about the variety of utility program designs that impose different efficiency cutoff criteria in adjacent service territories. But other manufacturers have threatened suit over proposed utility cooperation to set common efficiency levels and a statewide manufacturer buydown program.

  In another example, an association of Georgia LPG dealers intervened with the state to halt an electric cooperative's carefully designed program to give away efficient electric water heaters as replacements for inefficient, failed units.

- Dealers occupy different niches and will resist threats to their hold on those niches.

  In Wisconsin, air conditioner dealers in some of our focus groups have described their efforts to be perceived as trusted recommenders and suppliers. They have also told us how they sell against high efficiency units, fearing that customers will be disappointed with the payback and blame *them* for encouraging overinvestment in the technology.

Market Transformation as Hot Air. So long as we fail to understand the actors in the market other than the end-use customer, we are likely to remain relatively ineffective, inefficient, or both. We are unsure of where to invest our resources and when to reduce or remove that investment. Under these conditions, the promise that market transformation projects will overcome the imperfections of the market and produce DSM more cost-efficiently than rebate programs is doomed to failure. And such a failure in the current atmosphere of skepticism about the costs and achievements of DSM programs may be fatal.

A Successful Market Transformation Effort: The National Lighting Product Information Program. Let me turn, for contrast, to an example of a program that seems to have been effective, and the types of measures that can be applied to such a program.

The National Lighting Product Information Program (NLPIP) was developed in large part to provide objective, product-specific information on new lighting technologies to "partners" in the U.S. Environmental Protection Agency's Green Lights Program (cf. Kwartin 1992).[4] Program personnel noted that participants were unsure as to which lighting technologies purporting to be energy-efficient were effective and economically justified, and which particular brands and models were best for their applications.

The NLPIP program was designed to meet the user needs identified above. In addition, it was structured to include the input of independent professionals who are experienced in working with manufacturers and distributors of lighting technologies and those who have worked with lighting designers and other specifiers. External advisors to NLPIP identify a specific lighting technology or problem important to the Green Lights Partners or to customers of utility sponsors. NLPIP researchers then collect manufacturer data and conduct tests to assess the relevant products available in the market. The research staff then prepares a *Specifier Report* which includes an introduction to the technology and the criteria—including, but not limited to, energy efficiency-against which products should be judged, along with the results of the

product-specific tests.[5] The report is distributed to all Green Lights Partners by EPA, and to other lighting specifiers through utility account representatives.

How effective is the NLPIP program? If we attempt to evaluate it by the increase in energy savings achieved or the increase in the penetration of energy-efficient lighting products, we are doomed to frustration. Obviously we can, at *some* level of certainty, estimate the gross savings of Green Lights Partners and others, as well as the sales of certain lighting technologies (see, e.g., Figure 2, from EPA 1994). But how much of this can we attribute to NLPIP, and with what certainty? Absent some defensible estimate of the effect, how will utility executives and regulators determine that utility expenditures in support of this program are an efficient and effective use of DSM funds?

Evaluating Market Transformation Processes

Another way of looking at NLPIP's effectiveness is to focus on the *transformation of the market* ***qua*** *market.* We will first provide the example and then go back and define our terms.

When NLPIP began, some lighting manufacturers and industry associations were skeptical as to the ability of this program to fulfill its mission. This skepticism was demonstrated not only in statements by key managers and executives, but more concretely in spotty cooperation with requests for information and samples for testing. It was also shown in threats of lawsuits and in inappropriate use of quotations by manufacturers. Early sponsors also voiced concerns about the program's failure to attract a wide base of funding and the relatively slow growth of sales for the informational materials produced.

In the last year, the program has nearly doubled its budget through attracting new sponsors (growing from six organizations to eleven), and has shown a significant take-off in publication sales. Moreover, manufacturers now regularly call to volunteer new products for testing, seek opportunities for dialog regarding test procedures, and feature favorable reviews in their advertising (while adhering carefully to guidelines for use of quotations). In addition, several manufacturers have responded to negative reviews by withdrawing certain products from the market and by developing new products. Finally, sales have been reduced for several lighting products that remained on the market after they were found not to be energy-efficient. (This assessment updates the report of Leslie and Conway 1993.)

While I am happy to tout the program itself, my point is that any evaluation that looks exclusively at the penetration of energy efficiency products or net savings—and particularly any evaluation that is focused on a relatively brief time period—would miss the significant achievements of this program in changing *the market.*

Defining **The Market** ***and*** **Market Transformation.** So what is the market, and how can we go about evaluating it?

I suggest that, for the purposes of this paper, we define *the market* as

> A system for the voluntary exchange of certain economic goods and services between individuals or groups, according to rules[6]

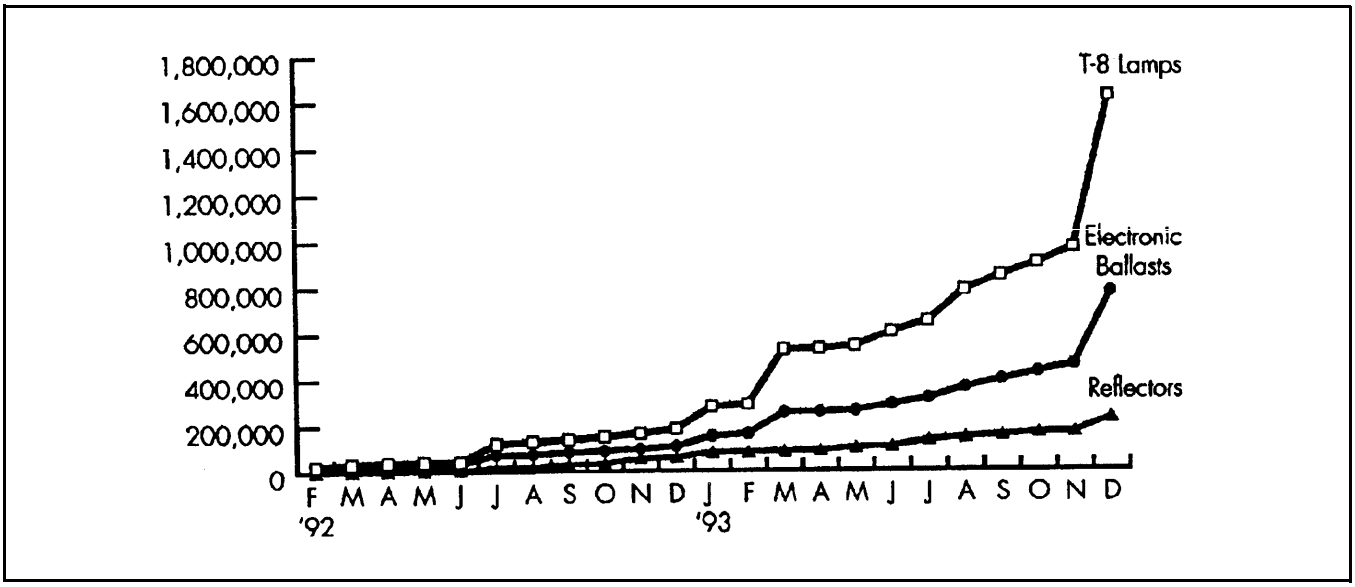

Figure 2. Energy-Efficient Units Installed by Green Lights Participants 2/92 - 12/93 (Source: EPA. 1994)

Measurement of baseline conditions thus requires a specification of the goods and services involved and the mix of options available, a characterization of the individuals and groups acting, and the rules according to which exchanges occur.

In turn, it follows that *a market transformation* is any change in a market such that

- *The set of individuals or groups is modified in its nature or its size*
  - ✓ New buyers or sellers may enter the market; e.g., customers who previously could not afford efficient technologies or distributors who did not stock efficient units.
  - ✓ Entrepreneurs may enter the market to provide previously difficult-to-obtain services, such as ensuring the functional effectiveness of building systems (commissioning).
- *The mix of economic goods and services exchanged is altered*
  - ✓ New technologies may be developed or inefficient products may be phased out as demand changes or competing options are introduced.
  - ✓ Supplies of new products increase and become more readily available.
- *The rules of exchange are reconstructed*
  - ✓ Customers may come to ask suppliers about the energy efficiency of the technologies offered for sale.
  - ✓ Sellers may promote energy efficiency as an expected attribute of their products or services.
  - ✓ Prices of energy-efficient products decline.

Some specific characteristics of the market that may provide insight into these issues may be found in an extremely useful paper by Prahl and Schlegel (1993).[7]

I would argue that the NLPIP program is a successful example of market transformation. The researchers are now accepted actors in the market. The product mix is being altered in response to program outputs. The increase in requests for NLPIP reports suggests that at least some lighting specifiers are becoming more knowledgeable and thus altering the rules under which product purchases occur.

But again, the analysis of the NLPIP program is less important for the purposes of this paper than the point that the indicators of market transformation are specifiable and measurable. We can, in fact, determine whether our efforts alter the set of actors, the mix of products and services, or the rules of exchange.

Let us consider some other programs and outcomes. In one of the early examples of market transformation in energy efficiency markets, Central Maine Power (CMP) stimulated the sales of compact fluorescent lamps (CFLs) through the provision of money-off coupons to residential customers. CMP's evaluations of their effort (e.g., Kaherl 1993) emphasize the number of lamps sold, which is impressive and heartening-but, I would argue, not necessarily any more sustainable than the sales of Excedrin when a cents-off coupon goes out in the mail. What impresses me more is the fact that one of the participating retail chains lowered the mark-up on their own in an effort to capture market share for CFLs from their competitors.

I am similarly impressed by the report from Madison Gas & Electric that their CFL program has markedly increased the number of retailers who are stocking the product. These results seem to indicate that *the marketplace is* changing with respect to the rules of exchange and the number of actors, and it is doing so to support energy-efficient product in a sustainable manner.

In the services area, we might consider the effort to increase the use of commissioning in the construction and renovation of buildings. The objective of commissioning, from the standpoint of energy efficiency, is to ensure the reliability and persistence of DSM savings from the installation of high efficiency equipment. Several utilities, stimulated in part by the experience of the Bonneville Power Authority, as described in their evaluations of the Energy Edge program, have recognized the consequences of a lack of attention to such issues at the time a commercial building is accepted from the contractor by the owners. Commissioning offers a way to improve upon current practices.

Discussions at the first national conference on this issue (PECI 1993) were based on the assumption that utility funding would be required to stimulate the market for commissioning. The 1994 conference featured a rich diversity of experiences gained in the intervening year. New reports also indicated significant progress in broadening the set of actors to include building operators, owners and members of the insurance/liability industry. Moreover, the mix of services was demonstrated to include not simply quality assurance at the time of building acceptance, but also involvement in building and system design, and in training operating and maintenance staff.

Some Benefits of a Process Focus. The proposed definitions of markets and market transformations permit us to evaluate programs and determine whether or not they have achieved market transformation. But how does this approach improve upon other definitions?

First, it helps to structure our assessment of the barriers limiting the efficiency of the market. The definition guides us to examine the set of actors included, the products and services exchanged and the rules involved. It provides us with an algorithm for examining any given market and developing a strategy to eliminate the key barriers to energy efficiency in that market. Finally, because of the emphasis upon evaluating the market itself, it offers a direction for determining when our objectives have been reached and it is time to withdraw.

Second, evaluations using the proposed definition are likely to be cheaper than those focusing on market penetration or savings. Consider the EPA Energy Star computer program (Johnson and Zoi 1992). It is surely enough proof of market transformation to note that computer manufacturers now routinely include the logo for Energy Star computers in their advertising, that magazine reviews describe the energy use of new models and that manufacturers police one another's claims for energy efficiency. The mix of products and the rules have changed. It is unnecessary to collect detailed sales information or meter samples of computers in use.

Remaining Problems

Questions remain as to the cost efficiency of utility support for market transformation efforts and the optimal design of such programs. Process evaluations of market transformation programs can help address these problems, but the full answers are beyond the scope of these assessments. We address each of these issues in turn, below.

Utilities as Agents of Market Transformation. What about assessing the cost-efficiency of the spending required to achieve market transformations through the mechanisms described? How can we determine how much to spend on a program and how much credit to allocate to the funding agencies? Normally, benefit-cost ratios are based in large part on a comparison of program impacts to program costs: Can process evaluations provide estimates of benefits achieved?

Let us first admit that questions remain as to the appropriateness of large utility-funded programs such as the Golden Carrot. Even under a rationale strictly limited to resource acquisition, problems arise with respect to those utilities that are long on capacity and those that act as free riders.

In contrast, programs such as NLPIP seem attractive insofar as they provide service directly to key customers, and may be justifiable from that perspective alone. In other words, opportunities for some utilities appear to reside in championing market transformation as part of their customer service. When airlines advertise tie-ins to certain hotel chains or car rental agencies, for example, they are attempting to gain market share by transforming the rules of the existing market. Moreover, positive effects may be realized in customer satisfaction and customer retention. Utilities can model the value to their customers of the information provided and changes they achieve in the market with standard value of information techniques.

The shift away from the resource acquisition rationale for DSM activities frees utilities from requiring highly precise impact evaluations to justify market transformation activities. Utilities can and should determine the level of investment that is justifiable to achieve the other benefits provided, however. The key is to tie program value to changes in the products and services available, the number of actors, the ease of acquiring efficient technologies, etc., rather than to metered demand or consumption. This approach is likely to entail a wider error band than utilities and regulators have commonly used, but the wider applicability and lower cost of the effort is likely to be worth the tradeoff.

We will return to the questions of whether and when the pertinent costs are justified in the concluding section of this paper.

Determining the Objectives of Market Transformation Programs. But if customer service is to be the key motivator of future DSM efforts, we may be perpetuating a flawed model in developing our programs according to current methods.

Most market transformation efforts in the U. S. have come about through an engineering analysis of the technical potential available for particular appliances. Thus, we have stimulated programs to capture the opportunities for reducing energy consumption in refrigerators by using better insulation and changing compressor designs. Similarly, we have noted that horizontal axis clothes washers, long standard in Europe, use less water and hence require less energy for water heating and for the spin dry cycle and decided to push this technology. We have also pushed CFLs, occupancy sensors and other new lighting technologies because they *can* save energy. What we are not doing is beginning with customers to determine where *they* want someone to contribute to meeting their needs through energy efficient technologies or services.

It may be argued that, in recent years, utilities have indeed paid significant attention to customer needs. For example, the Electric Power Research Institute has sponsored the development of useful tools to identify and assess customer needs in both the residential and commercial sectors (EPRI 1989, 1990). Differing levels of concern with these needs have been used to classify customers into relatively homogeneous groups for the purpose of target marketing. Using these tools, utilities are evolving from a role in which they market energy efficient technologies strictly on the basis of value to the utility and the direct financial incentive they are therefore willing to provide to the customer. Utilities are now recognizing the importance of promoting energy efficient technologies and services as meeting other customer needs as well, such as resolving environmental compliance requirements, lowering maintenance needs, and improving product quality.

Without question, these changes in utilities' awareness of customer needs is salutary and should result in improved relationships. Utilities are indeed moving away from a strictly technology-based push marketing strategy. But what most are moving toward is still a push strategy, albeit a far richer one. They are not yet promoting a market pull strategy, one in which changes in the market derive from customer needs for energy efficiency being communicated to manufacturers and distributors.

Examples of the alternative approach may be found in technology procurement projects organized by NUTEK, a Swedish enterprise (Westling 1991, Nilsson 1992, NUTEK 1993). The NUTEK model is one in which a knowledgeable facilitator brings together customers with a problem and forward-looking suppliers. The customers define the problem and the functional solution they seek, and indicate their willingness to purchase new technologies that meet the agreed-upon criteria. To the degree that the issues include energy efficiency, NUTEK will provide a subsidy to help entice supplier participation, but one that is limited in amount and time period. No supplier is guaranteed exclusivist y of the market.

This model differs from many of the efforts currently in progress in the U.S. Most important, the *customers* define the product required; the promoters of energy efficiency do not. In addition, the customers constitute the market that sellers must address; NUTEK is a facilitator, not the purchaser or guarantor of sales, and not the promoter to customers. The added value of NUTEK lies in helping customers articulate their needs, communicating these to manufacturers, and organizing the purchaser group.

As Nilsson has argued,

- The purchaser of equipment must be directly involved in the process and to a reasonable extent share the risk for the new products. It is the existence of purchasers and the prospect of large deliveries that makes the supplier interested.

- The major costs for development should be carried by the manufacturers and the products should be made available to the market without lengthy delay. It is the ability of the supplier to deliver and to take responsibility for the function of the products that makes the purchaser interested. (1992, p. 179)

Moreover, the effort is designed to influence the entire market, so that many suppliers remain as actors, and the product mix is changed along with the rules of exchange. The intent is not to provide

> support for one, or a group of, manufacturers but support to the customer to get good value for the money (1992, p. 187)

Cases reported by Nilsson and others suggest that the value of energy efficiency to customers is high, and that customers will invest to achieve it. At the same time, however, once the focus is on the customer, it becomes clear that energy efficiency is seldom sought in and of itself.

The Wisconsin Center for Demand-Side Research is currently exploring the applicability of this model to the market for motor and drive systems in the Midwest. In a project sponsored by the U.S. Department of Energy, we are working with stakeholders to create a structure for improving motor and drive systems, as a follow up to earlier calls for action (cf. U.S. DOE 1993). Specifically, we have been holding a series of individual and group meetings with motor manufacturers and distributors, drive system designers and consultants, utilities and large motor system users. The initial meetings have focused upon identifying the unmet needs of the stakeholders, and their identification of the market barriers they face. With assistance but not direction from DOE and the Center, stakeholders are now developing a strategy to overcome those barriers as well as a steering committee to oversee the effort.

Concluding Remarks

The value of efforts designed to assist customers in stimulating market transformations can and should be assessed with respect to the changes that are achieved in the characteristics of the market. Moreover, insofar as the expenses of facilitating a market pull strategy are likely to

be lower than those of creating an effective market push program, the cost side of the equation should become rather less vexing. Nonetheless, the appropriate agency for such efforts-utilities, regional organizations, or the federal government-remains an open question.

Utilities can use market research and evaluation methods to assess the value provided to customers by their cooperative involvement in market transformation.[8] They must still determine whether or not such projects are consistent with their vision of the niches they will occupy in the nation's economy. This decision is more an issue of utility strategies and the expectations of society than it is a strictly evaluation question. Some questions are necessarily beyond the reach of evaluation studies.

Acknowledgments

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Endnotes

1. This research was conducted by HBRS, Inc., under the direction of the Center's Appliance Efficiency Working Group, chaired by Dale Brugger of Wisconsin Electric Power Company.

2. This perception may arise, at least in part, from the often-noted tendency of customers to interpret Energy Guide labels as endorsements of efficiency.

3. The interviews were part of a Tailored Collaboration with the Electric Power Research Institute conducted by National Analysts, Inc., and directed by the Center's Market Shaper Working Group, chaired by John O'Connell of Wisconsin Public Service Company.

4. The program is also supported by state research centers (Iowa Energy Center, New York State Energy Research and Development Authority, and Wisconsin Center for Demand-Side Research) as well as individual utilities (Hydro-Québec, New England Electric Companies, Northern States Power Company, PSI Energy, and Southern California Edison) and by the U.S. Department of Energy.

5. Example *Specifier Reports* include issues devoted to electronic ballasts, power reducers, specular reflectors, occupancy sensors, cathode disconnect ballasts and exit signs. The program also publishes *Lighting Answers* to provide educational information about specific topics, or summaries of available information without test results or with limited test results. Sample topics have included T8 fluorescent lamps, multilayer polarizer panels and task lighting for offices.

6. We intend by this definition to include not only the proximate buyers and sellers, but all members of the entire chain from manufacture to distribution to end-use customer, including consulting engineers, builders and other technology specifiers. We also believe that the concept of voluntary exchange is critical, not only in distinguishing the market we seek from one exhibiting direct coercion, but also in emphasizing the need for *informed* decisions—absent which volition cannot be assumed. Finally, we emphasize that the free market assumes mutually accepted rules that define the conditions under which exchange will or will not occur. The notion of rules is also meant to encompass the norms and values that buyers and sellers use to determine the acceptability of proposed exchanges.

7. Prahl and Schlegel offer a very stimulating analysis of market transformation strategies, focused on what options, incentives, knowledge and norms are changed, among which market participants. They also note the importance of "targeting those characteristics of the market for which change is expected to be the most important and/or the most documentable" (p. 475).

8. It is unlikely that individual utilities can either act effectively in this capacity, given the relatively limited size of even the largest utility's service territory, or justify the expenditure required on an individual basis.

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