

## Using Market Transformation to Achieve Energy Efficiency: The Next Steps

*As state regulation shifts from centralized planning to market-driven strategies, we should emphasize making energy-efficient choices more attractive in the marketplace.*

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**B**ecause competition in the electric industry is coming on fast, electric utilities and their regulators are taking a fresh look at demand-side management programs. These programs, designed to produce energy savings and reduce the need for future capacity, are now generally being cut back, along with other expenses, as companies pare down and prepare for wider competition. Electric companies and their state regulators are de-emphasizing demand-side management (DSM) programs, as companies streamline in preparation for the competitive era. Indeed, the states and regions would not need to design, implement and fund *any* additional DSM programs, if only Con-

gress would adopt: (1) stronger clean air standards, including carbon, nitrogen oxide and sulfur dioxide; (2) much stronger lighting and appliance efficiency standards; (3) stronger industrial motor efficiency standards; and (4) stronger code standards for residential, industrial and commercial buildings.

But Congress is focused today on using market forces to win its objectives and is not likely to support central planning approaches. Meanwhile, states have a long history of working to improve the environment and are not likely to abandon these efforts.

An impasse? Not at all. Today states are forming regional entities to develop market-driven

strategies to achieve efficiency goals. These strategies are designed to win the approval of environmentalists as well as market-focused leaders in Congress.

## I. The DSM Experience

According to the U.S. Energy Information Administration, from 1991 through 1995 U.S. utilities spent approximately \$12 billion on DSM, resulting in a peak demand reduction in 1995 of about 29,500 MW<sup>1</sup>—about four percent of peak U.S. summer load in 1995. Energy savings were also substantial, at 216,000 GWh over the 1991-95 period, including more than 57,000 GWh in 1995 alone (1.9 percent of total U.S. electricity sales). Still, in this age of free market worship, DSM (or energy efficiency, if you prefer) is often lambasted as an idea whose time has passed. Thus, depending upon one's value system, DSM has been either a huge success or just another way that regulators have distorted cost structures, encumbering utilities in the marketplace.

Part of the change in emphasis is due to regulators experiencing "sticker shock." As we were confronted with the rising cost and lack of precision in measuring results from some DSM programs, and because of concerns about inter-class and inter-customer subsidies, many regulators backed away from DSM programs that increased rates. They understood that the public does not distinguish between "good" and "bad" components of a rate increase.<sup>2</sup>

Utilities are often loaded with excessive costs such as administra-

tive costs and lost revenues when they implement traditional DSM programs. Moreover, when DSM programs interact with the marketplace, unintended consequences can occur. The District of Columbia once had a program that removed inefficient appliances at customer request. The utility's cost of removing a second refrigerator, freezer or room air-conditioner was \$225, including administrative costs and compensation to the utility for lost reve-

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nues (although Charley down the street might do it for \$40). A utility's discounted sale of a compact fluorescent (CF) bulb might only cost a customer \$5; but including all the utility's administrative and marketing costs—as well as lost revenues—would bring the total to \$30 or \$40. A customer can buy a CF bulb at around half this cost at a local hardware store. In a restructured environment, utilities can't afford to implement programs like these.

Marketing new lighting products has been a frustrating experience for utilities. Often the products needed improvement over a

time frame so long that we have barely begun to tap the full potential of efficient lighting.

There has always been a dissonance associated with utility DSM. Many customers had trouble understanding why a company would try to convince them to use less of its product. In fact, many in utility upper management never really bought into utility DSM and many still want no part of it—not now, and especially not in an environment in which customers are free to select their electricity suppliers.

## II. Market Transformation—A New Approach

Utilities and regulators have made significant progress up the learning curve toward more cost-effective program designs. Large-scale, shotgun-style, customer-rebate programs are disappearing. Customers who receive high-efficiency products and services from utilities are paying a much larger share or all of the costs for these products and services. Today, there is a greater emphasis on loans, lease-purchases, shared-savings agreements, and other innovative financing methods. Some commissions are considering discounted energy rates for owners of energy-efficient industrial, commercial and residential buildings.<sup>3</sup> As Amory Lovins, Director of Research of the Rocky Mountain Institute, has put it, "Traditional DSM was always a work in progress."

Today, market transformation programs are receiving increasing attention from regulators, energy

efficiency advocates and utilities. These programs appeal to traditional DSM advocates because they result in lasting efficiency improvements. They appeal to free marketeers because of their use of market forces to achieve energy efficiency objectives. Also, the industry has been moving toward use of state-wide system benefits or wires charges for funding efficiency activities, as well as the possibility of using non-utilities as program implementers. Market transformation initiatives—which often require the significant involvement of many different market actors across multiple utility jurisdictions—could work well in such an environment.

Market transformation programs are specifically designed to bring about *lasting* changes in energy-related decision making, by reducing or eliminating market barriers to efficient practices so that various market actors have a self-interest in making efficient decisions. There is evidence that results may be more enduring than with other approaches. As a recent study defined market transformation,

The reduction in market barriers is evidenced by a set of market effects that last after the intervention has been withdrawn or reduced.<sup>4</sup>

For example, a manufacturer's retooling costs may impede production of more efficient equipment in quantities large enough to take advantage of economies of scale. A market transformation program might target this market barrier by providing an incentive

such as low-cost financing to a manufacturer (or a group of manufacturers) specifically for retooling. Or the program could—perhaps through aggregating a large group of purchasers through procurement collaboratives or altering government purchasing rules—satisfy the manufacturer that a sufficient consumer demand for the more efficient

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equipment existed, so that the manufacturer would see less risk in making the retooling investment on its own. In contrast, when an individual customer receives rebates or low-cost financing, it may continue to make the more efficient purchases only when rebates are given.

Advertising or educational campaigns may work even better, as shown by these two non-energy examples of market transformation initiatives, carried out by the early public relations practitioner Edward Bernays for Lucky Strike

cigarettes and Venida (a leading maker of hairnets).

Women "saw green [the color of Lucky's cigarette pack] as an unfashionable color, and many avoided Luckys because the packaging clashed with their dress." Lucky did not want to change the packaging, so Bernays developed what became a "highly successful campaign to make green a fashionable color." The campaign was so successful that one of Lucky's competitors featured a woman wearing a green dress.<sup>5</sup>

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Similarly, when fashion trends resulted in "the dominance of cropped hair," leaving Venida with greatly reduced hairnet sales, Bernays convinced a labor expert to lobby regulatory agencies "to require hairnets as safety measures for women working with or around machinery."<sup>6</sup>

The lessons learned from these two examples are that the initiatives (1) identified and targeted a market barrier (fashion trends) and (2) created a campaign to overcome that barrier.

It is also true that some of the large-scale, customer-rebate style DSM programs have resulted in market transformation. Jim Gallagher, chief of the energy staff section of the New York State Department of Public Service, contends that "what seemed to be lost in the rush to jettison traditional DSM and embrace market transformation was any public recognition that many of the traditional DSM programs being implemented since the mid-1980s have indeed resulted in, to varying degrees, substantial long-term

market effects." This is certainly the case with T-8 lamps in commercial facilities as well as the comprehensive change in new construction efficiency codes in the Pacific Northwest. The challenge is to economically change the market and keep it changed.

### III. Why Is Market Transformation Promising?

Already we have seen examples that demonstrate that market transformation programs are working and that external stimulus is no longer needed. For example, prices for electronic ballasts and high-efficiency lamps have fallen and the incentives are unnecessary in some regions. Kathryn Conway, manager of the lighting transformation program in the Lighting Research Center at Rensselaer Polytechnic Institute notes that

market transformation articulates the needs and expectations of the user and purchaser first, and then responds with products designed specifically to meet those needs. The customer comes first. Instead of trying to persuade people that they ought to buy a light bulb to avoid pollution (when all they want is enough light to read their horoscopes or match their socks), a market transformation program should promote products that will first meet the users' visual needs, then offer good values such as being economical and long-lasting, and finally add the less tangible benefits of being environmentally sound.

Conway cites other successful examples, such as the U.S. EPA's Green Lights and ENERGY STAR programs. Green Lights is a voluntary program to

encourage building owners to retrofit and install highly efficient lighting products. It is operated on a partnership basis with managers of many Fortune 500 firms and public facilities. Green Lights reports on average a 49 percent lighting energy saving for completed upgrades.<sup>7</sup>

The ENERGY STAR program is a voluntary product labeling pro-

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gram designed to stimulate manufacturing of highly efficient appliances, lighting products and even homes. The ENERGY STAR computer program developed by EPA and manufacturers has become the standard for federal procurement. For example, for office equipment the ENERGY STAR program has achieved a 50 percent energy savings.<sup>8</sup> Many foreign countries have joined ENERGY STAR as well.

Suozzo and Nadel's recent study lists several successful market transformation activities that

target the supply side of the distribution chain.<sup>9</sup> For example, through a joint effort by the New York Power Authority, Consortium for Energy Efficiency (CEE) and manufacturers, the purchase of a super-efficient apartment-sized refrigerator has reached at least 40,000 units each year.<sup>10</sup> Two other successful examples cited by Suozzo and Nadel are geothermal heat pumps (GHP) and Wisconsin high-efficiency gas furnaces. GHP sales almost doubled from 1994 to 1995. For the Wisconsin gas furnaces, by the early 1990s more than 90 percent of the replaced furnaces were already high-efficiency, even though rebates had been terminated. This market had been transformed. Lovins cites B.C. Hydro's high-efficiency motor program as another successful example.<sup>11</sup>

Rebate programs are only market transformation programs when they produce lasting market changes. David Morse, Chief of Energy Resources at the California PUC, notes two successful market transformation programs in California: (a) rebate financing for insulation and other weatherization measures, and (b) solar water heating for swimming pools. Both have moved well beyond the rebate stage and are no longer in need of subsidy. "We have created an industry that is sustainable on its own without the utility's financial assistance," Morse says.<sup>12</sup>

Another success story is NUTEK, a non-profit organization funded through taxes and charged with implementing en-

ergy efficiency initiatives for Swedish citizens. NUTEK aggregated groups of buyers who purchased equipment for rental buildings and developed the desired specs for refrigerator-freezer which included an efficiency at least 30 percent higher than available products in the Swedish market. The winning manufacturer, Electrolux, introduced high-efficiency models into both the Swedish and German markets, and market shares of these products have increased consistently, stimulating other manufacturers to introduce high-efficiency products.

**K**en Keating, coordinator of market transformation programs at Bonneville Power Administration says,

The Northwest has been something of a laboratory for market transformation. For example, the Northwest spent hundreds of millions of dollars on residential weatherization and new construction programs. One result of this was the encouragement and development of a market for more efficient windows. A corollary effect was driving single pane and inefficient aluminum storm windows out of the market.<sup>13</sup>

In short, we have many market transformation success stories, even at this early stage. What has made these programs successful and what should we avoid doing? A review of the theoretical foundation for market transformation provides some clues.

#### **IV. NARUC's Guidebook, a Starting Point**

The National Association of Regulatory Utility Commission-

ers recently published a report on market transformation<sup>14</sup> which addresses several key issues:

- the types of program delivery mechanisms that can be used in market transformation programs;
- program features regulators should require to maximize chances for success;
- selection between utility and non-utility implementers;
- changes regulators should make to facilitate development

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and implementation of market transformation programs in their jurisdictions; and

- guidelines for evaluating market transformation programs.

Definitional problems, conflicting signals from regulators, and uncertainties over evaluation methods have hampered market transformation efforts to date. The guidebook is intended to help commissions and other stakeholders clear these hurdles.<sup>15</sup>

#### **A. Steps Taken Toward Market Transformation**

For this article, we contacted regulators in a dozen jurisdictions

to see if any had taken concrete actions to initiate market transformation activities.<sup>16</sup> Regulatory staff from four of the states contacted—California, Massachusetts, Rhode Island and Wisconsin—reported that market transformation programs are a priority of the commission or its staff, and some reported having taken concrete steps to facilitate such activities. For example:

- The California PUC has authorized \$5 million per year 1996-98 for Pacific Gas & Electric Co. to implement market transformation programs.

- The Massachusetts DPU has "proposed that [industry] transition programs include participation in market transformation efforts sponsored by private industry, regulatory agencies, or other entities that aim to develop new energy efficiency technologies or upgrade building codes and standards."

- The Rhode Island restructuring law provides a systems benefit charge as a funding source for DSM and renewable energy programs during a five-year transition to competition. It also gives the commission authority to increase the amount spent and to extend the time during which programs would be funded.

- The New York Public Service Commission organized a market transformation workshop to encourage utilities to jointly implement market transformation programs.

#### **B. Lingerin Questions**

Regulators and others who would like to see market transfor-

mation programs in operation must first answer a few basic questions.

### **1. Who should implement market transformation programs?**

Regulators have often questioned whether utilities have made a good-faith effort to implement DSM programs. As Morse points out:

Many traditional DSM programs had market transformation effects. However, they are loaded with utilities' excess costs or quasi-governmental type of costs such as brochures, publicity, program design, planning, administrative costs and lost revenues. If a third party or ESCO conducts DSM, these excessive costs may be reduced and programs will be more market driven.<sup>17</sup>

Implementation by a third party, whose financial viability is not so closely tied to increased energy sales, should eliminate a number of regulatory concerns. For example, if shareholder incentives are tied to evaluation results (based on specific market indicators), utilities are likely to have a stronger financial interest in demonstrating success than would non-utility implementors.

### **2. How should programs be evaluated?**

Evaluating market transformation programs will be challenging. Planners debate how long it will take to determine when an intervention has made a lasting change in consumer and vendor behavior. Dynamic estimates of market indicators over time will be more useful than static estimates.

Impact evaluation can focus on measuring changes in market in-

dicators. Eto et al. listed potential market effects grouped by market actors—e.g., government's changes in building codes and appliance standards; retail and wholesale providers' changes in stocking and distribution practices, and in wholesale and retail prices and quantities; market actors' (including retail and wholesale providers, non-financial intermediaries and financial intermediaries) changes in promo-

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*Programs that take longer to transform markets might include a savings bonus with a payment-for-services arrangement.*

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tional practices, and manufacturers' changes in retooling rates.<sup>18</sup> Impacts measured by these market transformation indicators will depend upon the baseline values chosen, which should be agreed on by all program sponsors at the outset of the program. Indicators that signal when the subsidized portion of program should end should also be agreed on. Overall, market transformation programs must rely more on macro-economic measures, such as changes in supply and demand, than the micro-economic measures of individual DSM implementation that have been used over the years.

In addition to impact evaluation, process evaluation can help interpret results and determine the best strategy to overcome market barriers. Such qualitative research, conducted among the stakeholders and potential customers, helps explain the program's effects on market indicators. Process evaluation also plays a significant role in improving program design, ensuring effective communication and coordination among stakeholders and enabling mid-course adjustments.

### **3. Should payment be based in part on savings achieved?**

When payments for market transformation services are linked to results, short-term energy savings may be emphasized at the expense of lasting reform. Still, some linkage of payment to energy savings would be possible for programs designed to alter markets in the short term.

A strategy for programs that will take longer to transform markets might include a mechanism that combines a savings bonus with a payment-for-services arrangement. The initial implementation contract would define the basic services to be provided for a specified fee, with metrics to ensure that the program funds are being spent prudently. In addition, the implementing organization can receive a bonus payment based on achieving a minimum level of savings, as estimated (and paid) at the end of the program's implementation, or after a specified amount of time.

### C. Jump-Starting Market Transformation Initiatives

Regulators could use the following activities to help jump-start market transformation activities in their jurisdictions, though many of these activities imply or suggest actions that can be taken by utilities, energy efficiency advocates and others:

1. Work with other interested parties to develop and communicate a clear understanding of what is a "market transformation program"—an especially important step when a regulatory body mandates energy efficiency expenditures on market transformation.

2. Assure utilities of cost recovery for cost-effective, prudently implemented market transformation programs.

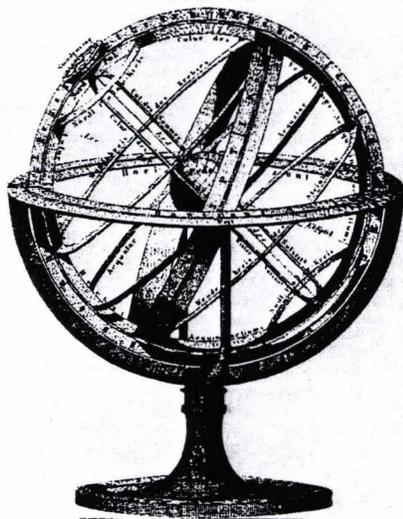
3. Encourage utilities and other stakeholders to identify specific markets that might be amenable to market transformation efforts. Where feasible, collaborations should be encouraged between utilities and non-utility organizations, such as energy efficiency advocacy organizations and energy service companies.

4. Consider—but only in some cases—pilot programs to test program feasibility. But note that a pilot may not provide enough indication of a program's cost-effectiveness due to its limited scale or scope.<sup>19</sup>

### D. Market Transformation Requires Integrated Efforts

Neither state public utility commissions nor utilities acting alone can accomplish market transfor-

mation by themselves, except in the rarest of cases. Whenever feasible, all major stakeholders should be involved in achieving market transformation: end users, utilities, other industries, apartment and office building coalitions, construction firms, builders, architects, vendors, building code officials, manufacturers, distributors, realtors, banking and lending institutions, trade allies, retailers, contractors, real estate developers, DOE, EPA, Congress,



PUCs, state legislatures, state energy offices, and others.

In addition, the geographic scope of market transformation will most often extend beyond state boundaries. For that reason, state regulators should encourage regional collaboration to implement market transformation programs. Even at that, market transformation may not materialize if only a few scattered states pursue elimination of a market barrier. Without strong regional cooperation, market transformation efforts may fail in many cases.

Recently, following publication of its Guidebook, NARUC has

embarked on a new project that focuses on evaluating market transformation activities in two regions: the Northeast and Northwest.<sup>20</sup> The project's goal is to compare and contrast regional market transformation programs (1) to assist regulators in setting priorities for energy efficiency funding and (2) to evaluate the cost-effectiveness of market transformation strategies. Initially, NARUC's evaluation will target residential compact fluorescent lighting fixtures programs in both regions. This project will also address policy implications beyond lighting, such as building codes, standards for appliances, industrial motors, and HVAC systems.

The Northeast and Northwest regional efforts are led by the Northeast Energy Efficiency Partnership and the Northwest Energy Efficiency Alliance, respectively. EPA has funded the Northeast efforts through a two-year grant covering (1) market transformation outreach, education and development; (2) energy-efficient residential lighting fixtures and (3) energy-efficient lighting in commercial remodeling projects. The Northwest market transformation efforts have already achieved success in upgrading building codes and improving efficiency in manufactured homes. As experience is gained through the Northeast and Northwest market transformation efforts, we can look forward to the expansion of activities to new regions and technologies.

The nation today should be exceeding by significant margins its

goals for clean air, conservation of natural resources, and reduced dependence on foreign energy supplies. Implementation of strong lighting standards—and ultimately replacement of the incandescent light bulb—could, by itself, save many gigawatt hours of energy use. Congressional action on stronger equipment and building envelope standards, stronger appliance standards, and on tighter emission ceilings for various pollutants, might persuade regulators to look to the marketplace to meet energy needs in an efficient manner.

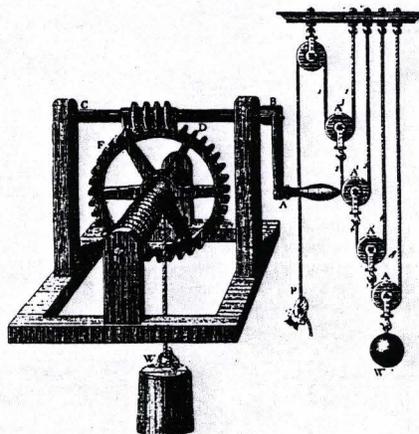
In the absence of such national efforts, state regulators are continuing their work to achieve efficiency improvements through cost-effective strategies such as market transformation. It's time for regulators to take concrete steps toward transforming markets in a comprehensive, lasting manner. As we shift at the state regulatory level from centralized planning to market-driven strategies, we must place more emphasis on making energy-efficient choices more attractive in the marketplace. By helping to create regional models for the mutually beneficial collaboration of key market actors, market transformation efforts may reduce the need for publicly mandated market stimuli in the future. ■

#### Endnotes:

1. ENERGY INFO. ADMIN., U.S. ELECTRIC UTILITY DEMAND-SIDE MANAGEMENT 1995, 3-4 (Jan. 1997).
2. Customers tend to groan at a greater strain on the family budget,

and low and middle income customers do not take advantage of DSM program offerings to nearly the same extent as the more affluent. Therefore, if DSM is funded through rates, lower and middle income ratepayers simply subsidize the affluent ratepayers.

3. Edward M. Meyers, *Making the Right Energy Choices in America*, PUB. UTIL. FORT., July 15, 1993, at 15.
4. Joseph Eto, Ralph Prael and Jeff Schlegel, A Scoping Study on Energy Efficiency Market Transformation by California Utility DSM Programs, July 1996, at 11 (prepared for Calif. DSM Advisory Committee).



5. Shel Feldman, How Do We Measure the Invisible Hand?, Aug. 22-25, 1995, at 3-8 (Conference on Energy Program Evaluation: Uses, Methods, and Results) (1995 International Energy Program Evaluation Conference Proceedings). See also EDWARD L. BERNAYS, BIOGRAPHY OF AN IDEA (Simon and Schuster, 1965).

6. *Id.*
7. Conversation with Kathryn Conway and Maria Tikoff, Director of Green Lights, Evtl. Protection Agency, Feb. 12, 1997.
8. Conversation with Linda Latham, Chief of Energy Star Labeling Branch, Evtl. Protection Agency, Feb. 12, 1997.
9. MARGARET SUOZZO AND STEVEN NADEL, WHAT HAVE WE LEARNED FROM EARLY MARKET TRANSFORMATION EF-

FORTS? (Am. Coun. for an Energy-Efficient Econ., Aug. 1996).

10. *Id.* at 8.
11. B.C. Hydro's big mine and mill customers used inefficient but huge motors, each of which used its own capital cost's worth of electricity every few weeks. B.C. Hydro simply subsidized the carrying and warehousing costs of stocking only efficient motors. In a few years, practically nothing else was available. The inefficient motors became a rare, special-order item. Amory Lovins, fax to authors, Nov. 6, 1996.
12. Conversation with David Morse, Nov. 26, 1996.
13. Conversation with Ken Keating, Feb. 15, 1997. Another well-known example is changing the building codes in the Northwest.
14. STEVE HASTIE, STEVE MCDONALD, MIKE KING AND RICHARD SMITHERS, MARKET TRANSFORMATION IN A CHANGING UTILITY ENVIRONMENT: A GUIDEBOOK FOR REGULATORS (NARUC, May 1996).
15. In September 1996, a Massachusetts utility issued a request for proposals calling for identification of pre-program market conditions in preparation for the final design and implementation of a set of market transformation programs. The RFP specified the use of the NARUC guidebook as the basis for the research.
16. Regulators interviewed represented California, Colorado, District of Columbia, Maryland, Massachusetts, Michigan, Montana, New York, Oregon, Rhode Island, Vermont and Wisconsin.
17. Morse, *supra* note 12.
18. Eto, *supra* note 4, at 20.
19. For example, regional efforts require many stakeholders to pool resources and cooperate to create a critical mass.
20. EPA provided grant funding for this new project and DOE has continued to provide support to NARUC on ways to achieve energy efficiency in a restructured environment.