The Evolution of Market Transformation in the Energy Efficiency Industry

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ABSTRACT

The energy-efficiency industry is in a period of transition--one in which a market transformation model is being widely embraced as a new approach to energy efficiency. But the experiences, frameworks, and perspectives that were used in the past will constrain and shape efforts to move toward more market-based approaches. In this paper, we first explore the historical context from which market transformation has evolved. We then consider the evolutionary experiences of two well regarded market transformation programs. Finally, we draw on these discussions to argue that the future success of market transformation is likely to require the continued evolution of new understandings, approaches and methods appropriate to the problem of securing energy efficiency in complex and changing market contexts.

Introduction

Much has recently been written about the market transformation approach to energy efficiency and market transformation as a new paradigm (Eckman, Benner & Gordon 1992; Feldman 1994; Goldstein 1994; Messenger 1996; Meyers, Hastie & Hu 1997; Nadel & Geller 1994; Prahl & Schlegel 1994, 1995; Vories & Rosenberg 1994). The term "market transformation" has only come into common use in the last half dozen years or so, and widespread interest in the approach is even more recent. At this time, market transformation thinking and market transformation-inspired market interventions are in the process of rapid evolution. As market transformation is variously conceived and implemented across the U.S. and elsewhere, it is being applied in different regulatory environments and program contexts, with different financial and human resources, and with various other constraining conditions. As a result (as is true of all evolving phenomena) the fates of market transformation efforts in various locales are likely to be highly variable, and the forms that market transformation will take in the future are likely to be quite different from those we see today.

In this paper, we first consider the evolution of market transformation in historical context, finding that, while some interest in "markets" and "transformation" has certainly been a part of energy efficiency thinking since the early 1970s, other concerns, perspectives and priorities were dominant for most of the past two decades. We then consider in some detail the evolution of two particular market transformation interventions that are widely recognized as being among the most successful--the Manufactured Housing Acquisition Program (MAP) and the WashWise efficient clothes washer program. Finally, we consider some of the implications from our review and propose one vision of how successful market transformation initiatives might be better crafted in the future and how we might achieve this vision. Our goal in this paper is to encourage new ways of viewing market transformation in order to stimulate dialogue about how to most effectively shape the evolution of market transformation efforts in the future.

Some History

To better understand the evolution of market transformation, it is useful to briefly explore the history of the energy efficiency movement and industry (Table 1). Our past experiences and the factors causing change in the energy efficiency movement helped to shape the policy and program options we are pursuing today.

Table 1. Simple History of the Energy Efficiency Movement

Phase	Period	Motivation	Approach
Energy Crisis	Late-70's to early-80's	Energy Scarcity and National Security	National Energy Policy
Integrated Resource Planning	Early-80's to mid-90's	Energy Efficiency is a Resource Option	Integrated Resource Plans/Regulation
Restructuring/ Competition	Mid-90's to current	Energy Efficiency Provides Market and Resource Value	Market Transformation/ Energy Services

The boundaries between these phases are not distinct, of course. But it is fair to say that the overarching concerns of each period are quite different from the others and that fairly distinctive analytic models and program approaches characterize each period. The purpose of this simple historical sketch is to identify some of the factors responsible for changes in the energy efficiency movement and their influences on the evolution of market transformation thinking and practice.

Energy Crisis

The energy crisis of the seventies created rising energy prices and fears of energy shortages and dependence on foreign sources of petroleum. In 1977, Congress created the United States Department of Energy to establish a strong national energy policy to meet the present and future energy needs of the nation (Schwartz 1996). Legislation developed during this period (Public Utilities Regulatory Policy Act of 1978, Natural Gas Policy Act of 1978, 1980 Northwest Power Planning Act) laid the groundwork for some of the developments that occurred in the integrated resource planning phase.

However, by the early to mid-eighties the sense of crisis had waned. Large projected energy price increases never materialized. A variety of market factors and technology advances reduced concerns about shortages and national security risks. The political landscape also changed. The Reagan administration did not support the agenda of the Department of Energy and many of the Department's policies were reversed and funding was cut. The Department of Energy continues to survive, although the policy assumptions and political support underlying its original creation no longer apply (Schwartz 1996).

Integrated Resource or Least Cost Planning

During the 1970s and early 1980s, the electric utility industry was plagued by an oversupply of capacity (due to a falloff in load growth) and power plant cost overruns. This required sharp rate increases, ending a decades-long run of declining real electricity costs. Marginal costs for new

electricity resources exceeded average retail electricity costs. With the support and involvement of some public interest groups, state utility commissions began requiring utilities to apply a comprehensive planning process. This process, referred to as least cost planning or integrated resource planning, required that demand-side and supply-side resources be analyzed on an equivalent life cycle basis (Marritz 1988).

Between the mid-1980s and early 1990s, the majority of state public utility commissions adopted rules that required electric utilities to implement IRP processes. However, the advent of restructuring has diminished the role of IRP and changed the way resource planning will be conducted in the future (Hirst 1996). IRP has left a legacy of processes, methods, and concepts that will continue to play a role in future energy efficiency programs.

Restructuring and Competition

A number of institutional, political and market forces are creating change in the energy efficiency industry and influencing the pursuit of a market transformation approach.

- Competition and restructuring have created a great deal of uncertainty for the utility industry. Utilities can no longer count on a fixed customer base to pay for these programs nor can they accurately predict the value of these programs given the uncertainty of energy costs (Messenger 1996).
- New supply-side generation alternatives are much less costly and are relatively easy to implement. Marginal electricity costs are less than average rates. The flip in the relationship between marginal and average costs from the eighties makes it more difficult for demand-side resources to compete.
- Regulators are looking for alternatives to traditional demand-side management programs due to concerns about the costs of these programs, lack of precision in measuring results, inter-class and inter-customer subsides, and impacts on rates (Meyers, Hastie & Hu 1997). IRP as a regulatory mechanism for achieving energy efficiency is falling out of favor (York & Narum 1996).
- There is a movement to limit the size and scope of government. Customer choice and allowing the market to respond with limited regulation is the ideology behind this movement (York & Narum 1996).
- Partnership organizations have emerged to promote collaboration between utilities, public interest organizations, government, and industry to encourage energy efficiency. These efforts provide a way to leverage resources and influence national markets and industries (Goldstein 1996).

There are a variety of potential policy approaches to energy efficiency in a restructured environment (Baxter 1996). The use of market-based or market transformation programs for achieving energy efficiency has been widely discussed (Eckman, Benner & Gordon 1992; Feldman 1994; Goldstein 1994; Messenger 1996; Meyers, Hastie & Hu 1997; Nadel & Geller 1994; Prahl & Schlegel 1994; Prahl & Schlegel 1995; Vories & Rosenberg 1994). While the concept of market transformation emerged independently of electric utility restructuring, it has come to be viewed by many as a key approach for achieving energy efficiency in a competitive, market-based environment. A number of examples of market transformation programs are commonly cited (Nadel & Geller 1994, 1995; Suozzo & Nadel 1996). Examples of regional and state level market transformation efforts include the Northwest Energy Efficiency Alliance, the Northeast Energy Efficiency Partnership, and the California

Board for Energy Efficiency. Organizations such as the American Council for Energy Efficiency and the Consortium for Energy Efficiency are actively promoting national market transformation efforts.

Creation of a Definition of Market Transformation

An indicator of the evolution of a concept like market transformation is the terms and definitions that emerge to explain the concept. The definition of market transformation emerges from our experience with energy efficiency programs and the factors influencing change in the energy efficiency movement. A variety of explanations for market transformation have been proposed and work continues on developing the theoretical basis for market transformation. The work by Eto, Prahl, and Schlegal (Eto, Prahl & Schlegal 1996) has pulled a lot of this experience together into a definition that illustrates widely accepted concepts for market transformation today. They define market transformation as " a reduction in market barriers due to a market intervention, as evidenced by a set of market effects, that lasts after the intervention has been withdrawn, reduced, or changed."

This definition seems consistent with historical perspectives in the energy efficiency movement regarding the failure of the market to adopt energy efficiency that is cost beneficial (in terms defined by the energy efficiency movement and regulators). However, we wonder whether this definition really reflects how markets consider and adopt energy efficiency. While this definition may meet the historic needs of the energy efficiency industry, it may not provide a solid foundation for developing effective market transformation programs. Does this definition encourage us to better understand the markets we are trying to influence or does it attempt to impose our "energy efficiency" viewpoint on markets? In the next section we consider several examples of market transformation programs and what they can tell us about the emerging market transformation model.

Examples of Market Transformation

The literature on market transformation cites a number of energy efficiency programs as examples of market transformation (Myers, Hastie & Hu 1997; Nadel & Geller 1994, 1995; Suozzo & Nadel 1996). We would like to briefly explore the evolution of two market transformation programs, the Manufactured Housing Acquisition Program (MAP) and WashWise, as examples of programs that are widely considered to be successful. Each of these programs provides an interesting story about evolving markets and programs. These two programs have been widely reviewed. In our process review of the evolution of these programs, we highlight some perspectives we believe are important for increasing our understanding of and ability to influence the evolution of market transformation.

Manufactured Housing Acquisition Program

The purpose of MAP was to increase the energy efficiency of manufactured homes in the Pacific Northwest. MAP had its beginnings in the energy crisis and matured as a demand-side resource program that ultimately transformed the market for manufactured homes in the Northwest. For the examination of MAP, we will apply a technology diffusion process model as noted by the headings for the different phases of the evolution.

Research and Development. MAP has its roots in the Pacific Northwest Electric Power Planning and Conservation Act which specified as one of many tasks the development of Model Conservation

Standards (MCS) for residential buildings. Before the Bonneville Power Administration began an energy-efficient manufactured housing program, it had already spent several years researching and marketing energy-efficient site-built homes through the Residential Standards Demonstration Program, Residential Conservation Demonstration Program (RCDP), and the Super Good Cents (SGC) Program. In the mid-1980s, Bonneville began studying construction practices and energy efficiency in manufactured homes. This included two research and demonstration projects where approximately 40 manufactured homes were built to the MCS. A study of current practices in the manufactured housing industry was also conducted (Onisko & Lee 1992).

Demonstration and Technology Transfer. In 1987, the energy-efficient manufactured housing program was integrated with the existing RCDP for site-built homes. This demonstration involved the region's manufacturers in building 150 electrically heated, double-wide manufactured homes to the MCS. Eight of the region's 17 manufacturing plants eventually participated in this demonstration. The region's state energy offices implemented RCDP and provided technical assistance to the manufactured housing industry to incorporate MCS practices into manufactured homes. The RCDP also included energy monitoring of the homes, cost data collection, set up requirements, financial incentives to manufacturers, dealers and consumers, and interviews with manufacturers (Riewer & Lee 1990). The results of the RCDP demonstrated the technical feasibility of upgrading the thermal performance of manufactured homes to MCS levels.

Marketing and Initial Commercialization. The manufactured housing program was also integrated into the Super Good Cents (SGC) Program for site-built homes in 1988. This marketing program was coordinated by Bonneville and participating utilities to promote adoption of the MCS in electrically heated homes. The program provided financial incentives for the purchase of SGC homes (utilities were able to divide the incentives between the dealer, buyer, and manufacturer as they determined). It was a voluntary program that achieved approximately a 20 percent market share in the manufactured housing market. Less than half the manufacturers and dealers participated in the program. There was a training program for dealers, but manufacturers felt that dealers were not involved enough in the program from the very beginning. Likewise, the marketing program was slow to reach the public and manufacturers felt more could have been done with regional promotional efforts (Riewer & Lee 1990).

Market Transformation. In the summer of 1990, one Washington State public utility decided to level a $2,000 hook-up fee on all electrically heated homes in its service territory that did not meet the MCS. The utility believed this fee was justified to offset its costs for additional electrical service to supply inefficient homes. Given this threat and the somewhat disappointing market penetration of MCS manufactured homes, utilities and manufacturers recognized it was in their mutual best interest to come up with a better way of increasing the market share of energy-efficient manufactured homes. By April 1992, the manufacturers reached agreement with the regions utilities to build all electrically heated manufactured homes to SGC standards and MAP was officially born. This agreement included a direct incentive ($2,500) to manufacturers for each MAP home and a "one-size-fits-all" specification (in contrast to the 3 zone specification used in SGC) with unlimited glazing (limited glazing was identified as a key market barrier)(Onisko & Lee 1992).

In the 40-month life of the program, between 50,000 and 60,000 homes were built to SGC standards at a cost to the utilities of $100 million. The program was considered a great success because the verified cost of the resource was less than two cents/kWh.

Post Market Transformation. MAP was originally designed to last 48 months, but was terminated eight months early in the summer of 1995 when two of the largest investor-owned utility participants withdrew from the program. At this time, there was no plan to ensure that the gains in market share for manufactured homes built to SGC standards was not lost. In response to this situation, the manufactured housing industry and the state energy offices were able to pull together a certification and marketing program to help carry-on the MAP standards. Roughly 75% of the market continued to meet MAP standards (Eklund 1996).

In examining the ultimate success of this program, we would like to highlight a few issues.

- The relationships and social interactions between individuals and organizations that occurred throughout the history of this program were key factors for success. An example was the relationship established between the energy offices that implemented the program and the manufactured housing industry. In interviews, the industry "reported that the professional relationships that developed while working with the four state energy offices resulted in concrete and practical advantages in designs to meet MAP standards. Through MAP, energy office staff became known for helping to solve practical technical problems and for raising the value of manufactured housing product offered in the market" (Peach 1996). The leaders in the manufactured housing industry also recognized the business advantages of MAP. They became champions throughout the negotiation and implementation process that produced MAP.
- MAP helped the industry improve its competitive position. "MAP became a signature for housing quality at a time when the industry was going through a particular maturation. With this signature, it was much easier to communicate to buyers that some manufactured housing meets or exceeds the quality standard of site built housing, a competitive advantage for the industry." (Peach 1996). During the period of MAP, the manufactured housing industry had an 18% gain in market share of single family housing (Eklund 1996).
- A significant amount of time and effort was spent on research, demonstration, technology transfer, and initial commercialization before the introduction of MAP. Note that most of this research focused on technology development and contained very little "market research." However, the manufactured housing energy efficiency program learned a lot about the market for manufactured housing while implementing the program. This experience was very beneficial when developing MAP and the transition phase of the program after the incentive was removed.
- Sustainability was not an issue when MAP first started. MAP was a resource acquisition program. However, it was clear to all those involved that some kind of limited program after the manufacturer incentive ended was necessary to avoid the erosion of market share that had been gained. Clearly it takes ongoing involvement to achieve market transformation.
- There are some benefits that are very difficult to quantify. For example, MAP had a significant influence on the Federal standards for manufactured housing that were adopted in 1994. The manufactured housing industry also acknowledges that the energy efficiency programs enhanced the image of manufactured homes and increased their market share against site built homes. These benefits have value.

WashWise Efficient Clothes Washer Program

The aim of the WashWise program is to transform the market for clothes washers to more efficient models. The WashWise program has its roots in the integrated resource planning era and evolved to a full-fledged market transformation program. It is instructive to note how the process headings we use for this case differ from the MAP example, due to differences in the activities associated with program delivery. In particular we highlight the regional and national collaboration and consumer and market research that lead to the development of new products.

Technology Assessment. Like many demand-side resource programs, the effort to improve the efficiency of washing machines began with technology assessments in the late eighties and early nineties (Lebot, Turiel & Rosenquist 1990; Pope & Slavin 1992). These studies suggested that horizontal axis washers offered a promising opportunity to improve residential appliance efficiency and provided the foundation for the energy efficiency community and electric and water utilities to initiate efforts to promote these washers.

Regional and National Collaboration. The Northwest Regional Appliance Efficiency Group, a consortium of Northwest utilities, was the vehicle in the Northwest for promoting more efficient appliances like the horizontal axis washer. There were other utilities on the West Coast interested in promoting more efficient washers, notably Pacific Gas & Electric. In 1992 the Western Utility Consortium formed with the goal of developing a framework of consistent efficiency standards for clothes washer programs across the region. The Consortium for Energy Efficiency joined this effort in 1993, taking the framework to a national scale and involving a number of utilities and partners nationwide (deLaski and Pope 1996).

Consumer and Market Research. Some of the key individuals involved in this effort recognized the need for consumer and market research to identify effective strategies for transforming the U.S. clothes washer market. In 1993, the High-Efficiency Laundry Metering and Market Analysis (THELMA) brought together the Department of Energy, a group of electric, gas, water, and wastewater utilities led by Seattle City Light, and the Electric Power Research Institute for a tailored collaborative research project. This extensive four-year project included laboratory tests of washers, consumer focus groups, a large phone and mail survey, a demonstration center, field tests, and a distribution system analysis (Kesselring & Gillman 1997).

Product Development. In the early nineties there was only one domestic manufacturer (Frigidaire) of horizontal axis washers and this model was removed from the market, partly due to reliability problems. There were some European models available, but these machines were expensive and the market research showed they did not meet U.S. consumer needs. The threat of more stringent efficiency standards for washers and the concerted effort on the part of the utilities to push for more efficient clothes washers helped spur manufacturer interest in developing horizontal axis washers for the U.S. market. In early 1992, EPRI began a partnership with Maytag to develop a high-efficiency residential washer. The horizontal axis machine introduced by Maytag in 1997 has a number of unique features to address concerns about ease of access, capacity, vibration, and excess sudsing (Lamarre 1997). Frigidaire and Amana have also introduced new horizontal axis models.

Market Transformation. As of May 1996, utilities serving roughly 8 percent of U.S. customers were planning or implementing efficient washer programs (deLaski & Pope 1996). In the Northwest, the Northwest Energy Efficiency Alliance (NEEA) approved funding for the WashWise program in late 1996. The program was publicly launched in May 1997. WashWise provides instant cash rebates for eligible washers (initially $130, currently $75), dealer incentives (initially $20/unit), dealer training, and marketing. There are currently 15 models from 8 manufacturers available on the market that meet WashWise efficiency standards. Over 500 appliance dealers are participating in the program. In addition to program sponsored advertising, there has been a significant amount of dealer and manufacturer advertising of WashWise machines. As of early 1998, monthly market penetration of eligible washers was approaching 15 percent. There is evidence of competition at work (Gordon 1998).

There are a variety of factors that collectively contribute to the success of this program. The absence of any of these factors would likely significantly diminish the success of this program.

- *Regional and national collaboration* brought together a critical mass of organizations with similar goals that more effectively were able to influence product manufacturers and national standards and move the project forward.
- *Market and consumer research* provided valuable information for product and program design.
- *New products* were developed by domestic manufacturers that adopted the efficiency of horizontal axis technology and incorporated features that U.S. consumers demand. Perhaps most importantly, these new products offer consumers improved washing performance relative to the existing product.
- There are a number of *market oriented success indicators* that the WashWise program exhibits such as increasing market competition which are early indicators of market transformation. These indicators help shape the program and differ from the success indicators used for a traditional demand-side resource program.
- The WashWise program takes a *market based approach* by working directly with market players, by being flexible and tailoring the program to the needs of market players, and by actively collecting a variety of market information to track and guide program direction.

However, there are a few caveats to keep in mind about this program.

- First, the program could become a victim of its own success. Sales have significantly exceeded initial projections. Because this is a rebate program, initial budgets were exceeded and additional funding from NEEA had to be approved. A potential danger is cutting funding for activities like marketing to cover cost overruns for rebates or even cutting funding for the program before the market for efficient washers has matured. Ultimately, non-rebate activities like marketing may be more important for the long-term transformation of the market. How to effectively use rebates in market transformation programs needs further research and discussion.
- Some of the initial program success may be largely due to early adopters. Caution should be exercised in making projections based on initial trends. In an initial survey of purchasers, 76 percent said they would have or probably would have purchased a tumble action washer without the rebate. According to the evaluation, "this largely reflects the predisposition of these initial purchasers to buy front loader machines" (Pacific Energy Associates 1998). It may be more difficult and may require different strategies to penetrate the market beyond the early adopters.

- This program is funded by utilities. As a result, water and energy efficiency are key issues. However, it is important that the energy and water efficiency messages the program delivers do not overshadow issues that may be more important to consumers like the improved washing performance of these machines. Consumers purchase a product to provide a service and to meet their needs, rather than to save energy and water costs. Retailer advertising is stressing consumer service attributes. However, it is important to note that early adopters placed high value on energy and water savings (Pacific Energy Associates 1998).

Implications for Innovation

So what does this review of the evolution of market transformation tell us? Can it help us create a useful vision for the next generation of market transformation programs? Our intention has been to suggest that the perspectives and tools appropriate to particular problems and periods (e.g., energy shortage, controlling the expansion of generating capacity, or deregulating electricity markets) can limit our vision and constrain our action when circumstances change. At the same time, innovation within paradigms can occur as the result of creative action and the evolution of programs in ways we may not have expected. Recognition of this is important for creating an environment that supports innovation.

The MAP program had its roots in the energy crisis and matured as a demand-side resource program that ultimately transformed the market for manufactured homes in the Northwest. The WashWise program began in the integrated resource planning era and evolved into a market transformation program with unique market-oriented characteristics that significantly distinguish it from other demand-side resource programs. The WashWise program illustrates the continuing evolution of market transformation efforts by showing how collaboration combined with consumer and market research can lead to the introduction of new energy-efficient products that meet market needs and have the potential to transform markets outside of the control of efficiency advocates. At the same time, these improved products would not have been made available in the near term without the market intervention of efficiency programs.

So what will future market transformation programs look like? We suggest a few characteristics that the next generation of market transformation programs could possess. But it is important to recognize that the targets of market transformation--markets for energy-using goods--are moving ones. They will continue to undergo significant change and evolve in directions that may (or may not) be complementary with the goals of the energy efficiency movement. As we have noted, changes in the utility industry, energy and technology markets, regulation, and the role and scope of government create uncertainty, limitations and constraints, as well as influence our future direction.

With that said, we offer one optimistic scenario as an example of what might be (and what could be) the future of market transformation in an energy efficiency industry that (1) takes into account the complex and dynamic nature of markets, (2) does not view the challenge of market transformation strictly through the lenses of earlier energy problems, and (3) takes the sort of creative approach to the market transformation problem that has been demonstrated to be possible by the MAP and WashWise programs. In this scenario, market transformation interventions would have the following characteristics:

- Consumer Driven. Programs would look for areas where energy-efficient technologies and practices respond to real consumer needs or desires. These may have little to do with energy efficiency. This means that market transformation programs would be

would be concerned about the realities of consumer life and the nature of choices faced by consumers. In WashWise, extensive consumer research was used to identify consumer preferences. In contrast, many early market transformation programs like MAP did little consumer research.

- Product Solutions. Energy-efficient technologies and practices would be used to produce new and innovative products and procedures that provide solutions to market problems and needs. These new products and procedures would incorporate new design approaches that offer superior performance. In the case of WashWise, more efficient horizontal axis washer technology was used to develop tumble action washers that research showed could wash clothes better and meet American market requirements. The result seems to be real changes in market expectations. Another example is the use of energy-efficient fixtures to produce both a safer and more efficient alternative to halogen torchieres--securing efficiency gains by solving a serious safety problem for consumers and firms.
- Embedding Energy Efficiency in Quality. As a result of paying attention to consumer and market needs and using efficiency advances to improve overall product design, energy efficiency would become an embedded attribute of product quality. Products with, for example, an energy efficiency symbol would be perceived as higher quality products. Energy savings would not be relevant or necessary for selling an energy-efficient product. There is some evidence that the Maytag Neptune tumble action washer is being positioned as a high-end, high quality product that justifies its cost on the basis of features, performance, and quality--including, but not limited to, energy efficiency. Likewise, MAP homes were able to gain market share in the single-family housing market by using energy efficiency as a way to emphasize the quality of their product relative to site-built homes.

So what do we need to do to most effectively shape the continuing evolution of market transformation so that a scenario of this sort is possible? We suggest the following:

- Broader perspectives on influencing and acting in markets. The social interactions between individuals and organizations are important to the functioning of markets, as are the dynamics of relationships between organizations. There is a need to understand markets in terms that go beyond conventional energy efficiency. The perspectives of the social sciences, marketing, and creative market transformation implementers need to be included in the mix.
- Alternative ways of measuring success and justifying intervention. The traditional energy industry approach to measuring success involves the application of cost-effectiveness criteria in a resource acquisition framework. This approach is not adequate for market based approaches, however, nor is it adequate to justify market intervention. Because the context for market transformation differs from that of traditional demand-side resource programs, different criteria for measuring success are needed. Rather than measuring the resource acquired or number of efficient units sold, we might identify market success indicators that suggest that the behavior of market actors is changing.
- New methods and models for characterizing and understanding markets. Traditional technology assessment models and simple market characterizations now dominate market transformation practice. Unfortunately, these tend not to adequately reflect how markets really work and, as a result, they ultimately limit our understanding of markets.

It is necessary to develop approaches that help us better understand the motives and behaviors of markets actors (whether these are consumers, vendors, distributors, manufacturers, financiers, or regulators). To do so, we need new multidisciplinary understandings of markets and the market transformation problem, and we need to apply the methods of the social sciences. This will provide the underlying theory necessary for effective market transformation program development and supply a framework for quality assurance and continuous improvement (for a more technical development of these ideas see Blumstein, Goldstone & Lutzenhiser 1998).

In conclusion, we believe that our current practices may not provide the support necessary for the development of effective, lasting market interventions. Our past experiences and perspectives have shaped the evolution of market transformation to date. New understandings and approaches can help the next generation of market transformation programs fully take advantage of the opportunities for energy-efficient products and practices that 21st Century markets, with all of their complexities and uncertainties, will offer.

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