Does Talking About Barriers Just Get in the Way?

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ABSTRACT

The identification of market transformation barriers by Eto, Prahl & Schlegel's *Scoping Study* (1996) established an economic justification for continued public funding of energy-efficiency programs, and offered a strategy for transitioning away from the need for such funding. The work has provided a major paradigm for the market transformation field and, as such, has also been criticized on a number of fronts. More recently, several jurisdictions have begun to distance themselves from what they perceive to be the constraints of the market transformation framework.

In light of these developments, this paper reviews the rationale for using public funds to promote energy efficiency and the implications related to sustainability. In that context, we identify (demand-side) market barriers as factors that reduce the demand for energy efficiency, either by increasing associated costs or by reducing the benefits felt by consumers. Thus, rather than seeing the mission of energy-efficiency programs as helping consumers to make more economic choices, we recognize market barriers as factors that affect what choices are economic. We then discuss why energy-efficiency programs involving both market transformation and energy-efficiency strategies remain valuable.

Introduction

The identification of market transformation barriers by Eto, Prahl & Schlegel's *Scoping Study* (1996) established an economic justification for continued public funding of energy-efficiency programs, and offered a strategy for transitioning away from the need for such funding. The work has provided a major paradigm for the market transformation field and, as such, has also been criticized on a number of fronts. Some economists have questioned the economic rationale in that the identified barriers, in many cases, are not technically market "failures." Others have struggled to fit particular market situations into the paper's taxonomy.

More recently, several jurisdictions have begun to distance themselves from what they perceive to be the constraints of the market transformation framework. California, which originated much of the development of this approach, has returned to a resource acquisition strategy for its energy-efficiency programs.

In light of these developments, this paper began as an examination of whether and how the "barriers" paradigm continues to be a useful structure for analyzing markets and developing strategies to increase their adoption of energy efficiency. In the process, it was necessary to confront a range of interrelated questions and to propose some alternative viewpoints related to market barriers and market transformation. The intent is not to overturn the *Scoping Study* framework, but to offer an integrated set of perspectives that may be useful to those attempting to apply that framework in the current environment.

The discussion that follows begins by reviewing the rationale for using public funds to promote energy efficiency, and the implications related to sustainability and exit strategies. In that context, we then discuss the meaning of a "market barrier" and suggest some new ways of thinking about the term. We then discuss why market transformation programs remain valuable. To make these discussions more concrete, we review the original list of barriers from the *Scoping Study* and view them through the lens

of this perspective. We also discuss how to identify the underlying barriers at work in a particular market.

Why Continue Public Funding of Energy Efficiency?

The view of market barriers offered in this paper is closely tied to the underlying rationale for public intervention to promote energy efficiency. The fundamental point is that it would be to the advantage of society as a whole if energy efficiency were adopted to a greater extent than consumers will choose on their own. Put another way, the private demand for energy efficiency, as expressed in natural adoption rates, is less than the socially optimal demand curve.

Pacific Gas and Electric's *Framework for Planning and Assessing Publicly Funded Energy Efficiency* (2001) offers as one reason for the gap between the private and societally optimal demand curves the externalities in the production of energy. As described in *Framework,* this rationale for public intervention will continue to exist so long as externalities in the energy markets are not addressed directly in those markets. An additional ongoing rationale for supporting energy efficiency not identified in the *Framework* report is that reliable energy supply and stable energy prices can be viewed as public goods in terms of national security and public order.

In the context of competitive electric retail markets, Eto, Goldman & Nadel (1998) offer as rationales two factors that contribute to the development of effective markets. One is that energy efficiency can reduce prices in these markets, providing benefits to all consumers. Another is that energy efficiency reduces supplier market power. A related benefit that is beginning to get attention is that energy efficiency can reduce not just the average price but also the price volatility, or the risk of extreme prices (Dickerson et al. 2002; Hirst 2002).

Neither the externalities associated with energy production nor the public goods issues related to energy supply can ever be permanently corrected through promotion of energy efficiency. Likewise, energy efficiency can play a continuing role in competitive retail markets. As long as these issues are not resolved through other policy measures, there will be a continuing role for publicly funded support of energy efficiency. That support may take the form of short-term resource acquisition or long-term market transformation strategies, or other approaches that do not fall neatly into either category.

Thus, two key aspects of the market transformation paradigm are not required to justify energy-efficiency programs.

1. Energy-efficiency markets do not have to be flawed to justify directing public policy and public funds to promoting energy efficiency.
2. The public programs or interventions promoting energy efficiency also do not have to create sustained effects in order to be justified.

In other words, market transformation, which seeks to address market structures in a lasting way, is not the only viable or valid approach to promoting energy efficiency. At the same time, it is an approach that has an important role to play. These issues are discussed further below, as we examine the nature of market barriers and the ways that market transformation and other kinds of programs can address them.

What is a Barrier?

Barriers Classic

The *Scoping Study* defines a market barrier as "Any characteristic of the market for an energy-related product, service, or practice that helps to explain the gap between the actual level of investment in or practice of energy efficiency and an increased level that would appear to be cost beneficial." The

study emphasizes that a market barrier in this sense is not necessarily a technical market "failure" in economic terms. The authors also stress that the list of barriers provided in their study is intended to be useful, but not necessarily comprehensive.

The *Scoping Study* recognizes that "What is cost beneficial depends on one's perspective and is influenced by both energy and non-energy considerations." The Study goes on to clarify that the perspectives they consider are either the consumer's (organization or individual) or society's. (The present paper takes a similar perspective and considers end-user market barriers, or barriers that affect consumer decision making.)

This definition still begs the question of how we define what is cost beneficial from either perspective. While the authors point to sources of evidence for barriers in implicit discount rates or transaction cost analysis, there remains some circularity in the definition: barriers are factors that reduce investment in cost-effective energy efficiency, and cost-effective energy efficiency is that which consumers would adopt in the absence of barriers.

The California Public Purpose Test (PPT; California Public Utilities Commission 1999) was derived in part to address issues identified in the *Scoping Study*. The PPT counts the following benefits of energy-efficiency programs:

- avoided cost of energy saved;
- avoided externality value of energy saved; and
- non-energy benefits of energy-efficiency measures.

These benefits are then compared with the incremental costs of the measures together with the program administration costs (and any non-energy costs) to determine what is net beneficial.

From this perspective, a program is cost-effective from a societal viewpoint if the value of the energy saved (direct plus externality value) and the non-energy benefits exceeds the cost of the measures (including non-energy costs) and program administration. Implicitly, then, an energy-efficiency measure would be considered cost-effective to consumers if the private value of the energy savings plus non-energy benefits (less non-energy costs) exceeds the cost of the measure.

Barriers (on the demand side) are factors that reduce the demand for energy efficiency at a given price[1]. The fact that consumers value energy efficiency less than might be assumed if these factors weren't considered does not by itself mean that consumers are making economically inefficient or inappropriate choices. However, as noted, a rationale for intervention in energy-efficiency markets is that the private demand (consumer choices) for energy efficiency is lower than what would be cost-effective from a societal perspective. Mitigating demand-side barriers can therefore move private demand closer to the socially optimal level. For this reason, it is useful to understand what these barriers are and how they can be mitigated.

Market Barriers in Relation to Private and Societal Demand

The difference between the social and private value of energy efficiency has several components:

1. Externalities in energy production and delivery not reflected in avoided energy prices. Mitigating these externalities has value to society but not necessarily to individuals.
2. Public goods benefits associated with energy supply and price stabilization.
3. Market power mitigation in the energy supply market.
4. Imperfect information, which means that consumers do not necessarily know accurately the benefits and costs of energy-efficiency measures.

[1] Likewise, supply-side market barriers are factors that reduce the supply of energy-efficient products offered at a given price. In the interests of brevity, this paper, like most discussions of market barriers, focuses on demand-side barriers. A similar discussion applies on the supply side, but is not developed here.

5. Societal time horizons being longer than those for private investments. An energy-efficiency investment is expected to provide benefits to someone for the physical life of the measure in place, but these benefits might not accrue to the household or business that made the investment. This difference in planning horizon is one factor that can lead to high implied discount rates for consumers.

Figure 1 illustrates the factors that affect private demand, as expressed by consumer choices, and the socially optimal demand. Non-energy benefits increase private demand. Some market barriers reduce the energy and/or non-energy benefits felt by consumers. Non-energy costs decrease private demand. Some market barriers increase non-energy costs. All these factors affect what choices are economic for consumers.

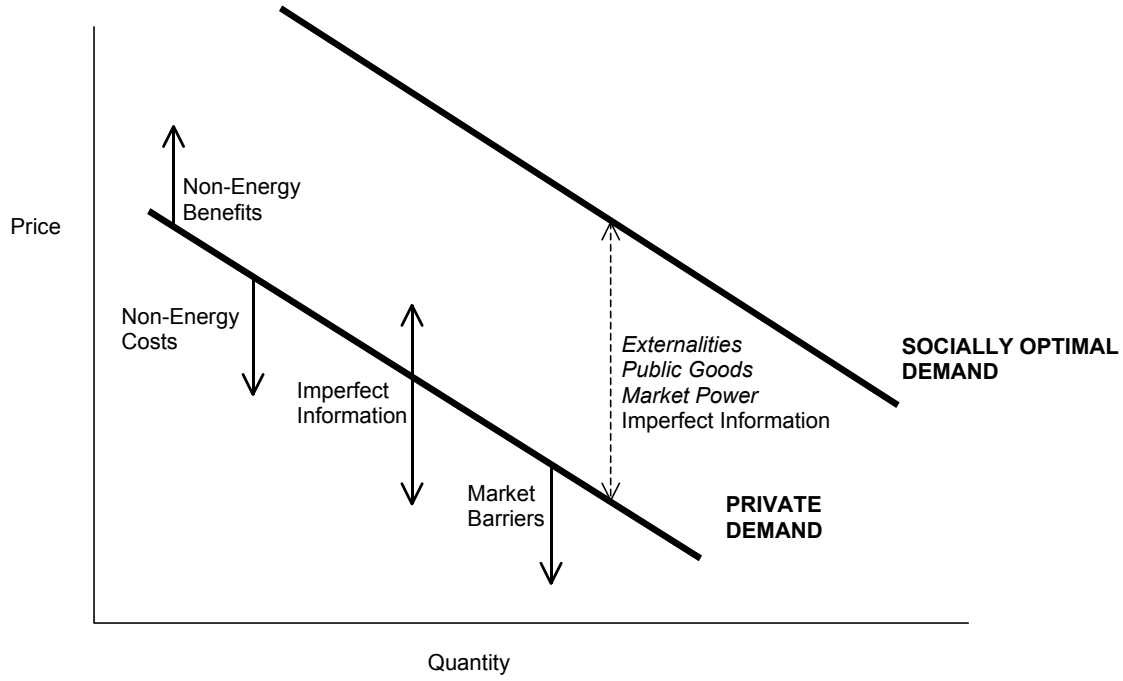

Figure 1. Factors Affecting Private and Socially Optimal Demand

Imperfect information causes non-economic decision making from the perspective of society as a whole. From the perspective of consumers, the effect could be to increase or decrease demand, depending on the nature of the misinformation. In the context of energy efficiency, the effect is generally assumed to be related to lack of awareness of measure benefits, resulting in a reduction in demand.

The gap between private and socially optimal demand is created by the technical market failures. The first three listed, externalities, public goods, and market power, are the failures in the energy markets that contribute to the rationale for intervening in energy-efficiency markets. The last market failure listed, imperfect information, is a failure in the energy-efficiency market itself. As described above, this failure is, in many cases, at the heart of an observed market barrier.

Market Barriers as Factors that Reduce Demand for Energy Efficiency

The private demand curve reflects the value household and business customers assign to energy-efficiency measures. The value is based on the avoided energy bills, the tangible non-energy benefits

and costs associated with the measures, and the intangible tastes and preferences also represented in non-energy benefits and costs.

Market barriers reduce the demand for energy efficiency by either increasing the costs or decreasing the benefits perceived by consumers or decision makers. In some cases, the perceived added costs or reduced benefits are, in fact, real. In other cases, they are only perceived and reflect lack of accurate information about the products or the process of obtaining them.

Understanding market barriers as factors that reduce demand means that rather than seeing the mission of energy-efficiency programs as helping consumers to make more economic choices, we recognize market barriers as factors that affect what choices are economic. Below, we expand on how this view applies to specific market barriers.

Thinking of barriers as factors affecting economic decision making on the part of consumers is not to suggest that most consumers make decisions based on life-cycle cost analysis or other benefit-cost calculation. Rather, consumer demand is the expression of consumers' values, tastes, preferences, and understanding. Included in these values, tastes, and preferences may be the avoidance of certain kinds of formal analysis. To the extent that consumers' understanding involves misperceptions or ignorance, this imperfect information is a technical market failure leading to non-economic decision making.

Why Barriers and Market Transformation Still Matter

Market Barriers and Program Strategies

The discussion above indicates that many of the factors commonly referred to as market barriers are not necessarily flaws that need to be corrected in markets, or can be. Neither can the barriers themselves necessarily be mitigated in a lasting way. However, understanding the factors that reduce the value of energy efficiency to decision makers can lead to strategies to mitigate the added costs or reductions in benefits of energy efficiency, thereby increasing its adoption.

Identifying a factor as a "market barrier" also does not necessarily mean that a market transformation strategy is required to address it. If the goal is to increase the demand for energy-efficiency products, that goal can be achieved by basic resource acquisition strategies. Lowering the cost to consumers via direct subsidies is the simplest way to accomplish this. The subsidies could take the form of direct installation, technical assistance, or rebates. Any of these forms of assistance effectively lowers costs and increases consumption of energy efficiency.

Conversely, identifying a program's goal as resource acquisition does not necessarily make market barriers irrelevant to program design. For example, if perceived risk is understood to be a major reason for slow adoption of a new technology, subsidies will help, but promotional efforts directly addressing reliability can make the effort more effective.

Why Not Just Go Back to Subsidies?

Increasingly today, programs recognize a need for both short-term accomplishments and long-term cost-effectiveness. Whether to use some form of direct short-term subsidies or to work more indirectly on market barriers, or both, is not a choice between short- and long-term goals, nor a dichotomous choice between resource acquisition and market transformation, but a question of what combination of approaches can be most cost-effective in the long run.

Reasons to address market barriers rather than simply to subsidize increased energy-efficiency adoption include the following.

1. **Economies of scale.** Some of the factors that increase costs to consumers can be addressed more efficiently through centralized processes than by subsidizing individual consumers to

overcome these costs. Examples include centralized delivery and information services to mitigate transaction costs and information search costs.

2. **Opportunities for lasting change.** Any strategy designed to produce lasting changes in a market needs to address market structures. A lasting change has the potential to provide greater benefits over the long run than does resource acquisition alone. Whether producing this change is a more cost-effective approach compared to ongoing direct subsidies depends on the relative costs.
3. **Leveraging opportunities.** While short-term benefits may be sufficient to justify a subsidy program, the temporary boost to demand generated by the subsidy also provides an opportunity to work with suppliers to make changes that will result in increased availability or reduced cost, even after the end of the subsidies. Suppliers will be more likely to make these investments if they have more certainty as to what support the program will provide over what period of time.
4. **Changing legal structures.** Some market barriers can be addressed by changing laws and regulations. Examples include providing regulatory support (or removing regulatory barriers) for performance-contracting programs or for energy-efficient financing.

What It All Means for Specific Barriers

To make the above discussion more concrete, we consider the commonly discussed market barriers. For each, we describe how that barrier can be viewed as part of a consumer's rational economic decision. We also consider what would be required to mitigate the barrier in a short- or long-term way.

Table 1 lists the barriers identified in the *Scoping Study*, grouped into five general categories:

- risk
- benefits realized
- availability
- transactions
- market failures.

With the exception of the technical market failures, each of these barriers is a factor that either reduces the value of an energy-efficient product to the buyer, or increases the cost of adopting it. The market failures add costs to society that may or may not be felt by the buyer.

Any of these barriers can be mitigated by providing direct subsidies for energy efficiency. For many but not all of these barriers, there are also short-term strategies that can mitigate the barrier instead of or in combination with subsidies.

For each of the barriers listed, the table indicates the ways the barrier reduces demand. Also indicated are conditions that could mitigate the barrier in a sustained way without further public support and how easily this might be accomplished. These ratings are intended to be illustrative, not definitive. Different strategies, conditions, and potential may apply in different markets.

Risk

It is rational and economic for a consumer to devalue a product based on risk factors such as performance uncertainty, mistrust of information provided by vendors, anticipated hidden costs, and irreversibility. However, if these risk factors are more a matter of perception than reality, interventions that overcome that misperception (whether through education or subsidies to promote experience) can mitigate these barriers. Changing a misperception about risk can be viewed as mitigating a problem of imperfect information, which is a technical market failure.

Table 1. Barriers and Strategies

Barriers from the *Scoping Study*	Effect on Demand	Strategies for Short-Term Change	Needed for Sustained Effect Without Further Support	Potential for Developing Conditions to Support Sustained Effect
Risk				
Performance Uncertainties	Reduces value of EE measures to purchaser	Warrantees, certification, demonstrations	Extensive market experience with product	High
Asymmetric Information & Opportunism	Reduces value of EE measures to purchaser	Warrantees, program certification, demonstrations	▪ Extensive market experience with product ▪ Change in standards ▪ Ongoing certification or licensing	High
Hidden Costs	Increases cost to purchaser		Extensive market experience with product	High
Irreversibility	Increases cost to purchaser			Medium
Benefits Realized				
Misplaced or Split Incentives	Reduces value of EE measures to purchaser	Target messages and services to upstream affected parties	Changes to supply chain relationships	Possible in some contexts
Organizational Practices or Customs	Reduces value of EE measures to purchaser		Changes to business decision-making practices	Low
Bounded Rationality	Reduces value of EE measures to purchaser		Changes to household decision-making practices	Low
Availability				
Product or Service Unavailability	Increases cost to purchaser	Provide products	Supply chain development	Medium-high
Inseparability of Product Features	Increases cost to purchaser	Provide more product options	Supply of more varied products	Medium-high
Transactions				
Hassle or Transactions Costs	Increases cost to purchaser	Direct install, design assistance, technical services	Expanded supply infrastructure	Medium
Access to Financing	Increases cost to purchaser	Offer financing support	Private financing companies find opportunities in EE financing	Possible in some contexts
Market Failures				
Externalities	Adds cost to society, not felt by purchaser		Create legal requirements that internalize externality costs	
Non-Externality Pricing	Adds cost to society		Change electricity pricing structure	Depends on regulatory environment
Imperfect Information/ Information or Search Costs	Increases cost to purchaser	Information services, E&T	▪ Better educated suppliers and consumers ▪ More private information sources ▪ Energy-efficiency curriculum in trade schools	Medium

A short-term strategy to mitigate risk-related barriers could be to provide warrantees or certification by an independent agency. Overcoming the risks in the long run would require sufficient experience with the product in the marketplace that the public certification or warrantee is no longer needed. This is in effect the ENERGY STAR® products strategy, and it has proven effective.

Different strategies are appropriate depending on whether the risk is real or only perceived. If the product is reliable but unfamiliar, the program has only to convince buyers to begin to acquire it. If the product is unreliable, either because it is not fully developed or because there is uneven quality offered in the marketplace, certification and even product development may be needed to overcome the risk problems.

Benefits Realized

Barriers related to the benefits realized also reflect rational and economic decisions on the part of consumers. Misplaced incentives mean that the decision maker does not in fact have an economic incentive to make the investment in energy efficiency. Bounded rationality on the part of individuals or organizational practices or customs describe rational decision-making strategies that reflect values and priorities.

These barriers have to do with customers not perceiving the value of energy-efficiency products. Mitigating these barriers is challenging in either the short or long term.

Availability

We classify inseparability of features as well as outright product availability as "availability" barriers. Feature inseparability means that the more tailored product that might be of greater interest is not available. The availability issues reflect suppliers' perceptions of demand. These choices by suppliers reflect rational responses to market conditions, unless their understandings of the markets are imperfect. In that case, correcting that understanding would be addressing a problem of imperfect information.

Expanding product availability in a sustained way is one of the key goals of market transformation efforts. Accomplishing such a transformation is by no means a trivial feat, and typically requires subsidies to boost demand in conjuction with incentives and/or negotiations with suppliers, possibly culminating in changing standards. If suppliers see or have reasons to anticipate adequate demand for the products in a broad enough area for a long enough period of time, production facilities may be retooled in ways that result in greater product availability and/or product cost without continued demand-side subsidies. This approach is in some ways the most clear-cut path to market transformation. Examples of success stories include changes in lighting, refrigerators, and clothes washers.

Transactions

Transaction costs and access to financing are part of any market, and are rational factors in any consumer's decision making. Spulber (1999) provides a detailed analysis of transaction costs. This analysis is useful to anyone interested in developing program strategies to reduce transaction costs. However, the spirit of this analysis is not that this is a problem requiring public intervention, but that "Incurring transaction costs is simply the means to an end, which is carrying out the highest value-added exchanges…By centralizing and managing exchange, firms reduce transaction costs for buyers and sellers."

Developing self-sustaining market services that will mitigate hassle factors, information search costs, and lack of financing for energy-efficiency products has been something of a holy grail for market

transformation. Ultimately, the ability of such businesses to sustain themselves depends on an active market for their services.

Market Failure

As noted, externalities, non-externality pricing, and imperfect information are technical market failures. Only imperfect information directly affects consumer decision making in the energy-efficiency market.

Mitigating problems of externalities or inefficient energy pricing requires regulatory change. Imperfect information is a sustained problem in all real markets. Providing education and training to end users and supply-side actors will have some sustained effects. However, mitigating consumers' lack of information will require ongoing efforts, because

- technologies evolve,
- training needs to be refreshed to keep skills up and as trained staff turn over in organizations, and
- for many purchase decisions, end users will not have an interest in education or training except every several years when they need to replace a major piece of equipment.

Identifying Barriers at Play for a Particular Market

While understanding the barriers is important to designing effective strategies to approach a market, it is often challenging to identify the barriers at play in a particular market. One reason is that any set of categories will have some ambiguities and overlap. The *Scoping Study* describes a number of relationships among the barriers listed there.

In practice, a further reason barriers are not all easily assigned into any set of categories is that it is not always clear what underlying market problem is targeted by a stated barrier. Closed-ended surveys designed to assess the presence of barriers or track related indicators need to describe barriers in the kind of terms that end users might use to describe why they have not taken actions. This approach makes it easier to relate end-user statements to stated barriers. However, to understand what underlying problem is indicated by common phrases such as "lack of time" or "lack of capital," it is necessary to probe further.

For example, competition with other investments could be viewed as a barrier. However, if the end user is making rational economic decisions not to pursue more energy efficiency in the context of competing investments, there is no underlying problem to be addressed. On the other hand, if the end user is rejecting energy efficiency in favor of other investments that appear to be less favorable by some reasonable criterion, the reason for this choice could be the underlying market barrier. The notion of competition with other investments does not tell us what problem needs to be addressed.

If there is no other underlying cause, competition with other investments does indicate a reason some end users might not pursue energy efficiency on their own. To change this type of barrier—that an end user for sound economic reasons would not choose more energy efficiency—requires either that we change the economics the end user faces, or that we change the end user's decision making and/or values system.

What then would be a fundamental barrier? While it may be tempting to reject "competition with other investments" as not a "real" market barrier because it doesn't reflect any underlying problem, in fact most of the barriers listed in the *Scoping Study* are also characteristics of the normal functioning of a market. The key exceptions are the barriers that are market failures in the technical economic sense: Imperfect information, externalities, artificially set energy prices, and public goods.

Are There Real Market Barriers?

Market Barriers as Factors That Reduce Demand. The above discussion does not mean that market barriers are not real. This paper has suggested a definition of demand-side market barriers as factors that reduce the value or increase the total cost of measure implementation from the consumer's perspective. By this definition, competition with other investments is not a market barrier, but a rational economic decision-making framework. However, bounded rationality or organizational practice are barriers that may be at work in a given context, making energy efficiency come out worse in that competition.

Likewise, "high cost," or "not cost-effective" are not market barriers by this definition. High cost does not reduce the value to the consumer; other factors that reduce the value affect whether the cost is viewed as too high. Not being cost-effective doesn't reduce value, but reflects the value the consumer attaches to the product. The barriers are the factors that contribute to the cost being seen as too high for the value.

In general, then, the definition of market barriers as factors that reduce demand for energy efficiency will lead to identification of barriers consistent with the description and list offered in the *Scoping Study*. The important exception is the technical market failures, discussed below.

Technical Market Failures. Barriers identified in the *Scoping Study* that don't fit the description as factors reducing demand for energy efficiency are the other market failures besides imperfect information. These other failures include imperfections in the energy markets related to externalities, public goods, and regulatory pricing.

These factors do not lower the value of energy efficiency or increase its costs to consumers. Nor would they directly affect consumer decision making. Rather, these are factors that increase the value of energy efficiency to society above its direct value to consumers. For completeness and consistency with the existing definition, we include these factors as well in what we call market barriers.

The technical market failures, other than imperfect information, are in the energy market rather than in the energy-efficiency market. As a result, they can be addressed only indirectly by changing the markets for energy efficiency. Directly addressing the energy market failures would require changes to the rules and pricing structures in those markets.

Probing to Identify Market Barriers

With this view, probing to understand end-user market barriers needs to address the following questions:

- What are the factors that reduce the value or increase costs of energy-efficiency measures to consumers?
- To what extent does each of these factors represent lack of information or misperception on the part of consumers?
- What are the opportunities to mitigate this factor in the short term and in the long term?
- What lasting effects in the market can be expected from a limited term intervention that mitigates the factor for a specified period of time?

Clearly identifying the nature of the barriers at work contributes both to program design and program evaluation. This inter-relationship has been described by numerous authors (e.g., Herman et al. 1997; Mast 1999; Rufo & Goldstone 2000).

Conclusions

This paper has argued that most market barriers are neither technical market failures nor market flaws that require remediation. Rather, on the demand side, they are factors that appropriately affect consumers' economic decision making, lowering the demand or desire for energy efficiency. Neither are these barriers necessarily amenable to permanent mitigation.

At the same time, there remains a strong economic and policy rationale for ongoing public expenditures to promote energy efficiency. The most cost-effective means to accomplish this goal in the long run is likely to involve a combination of resource acquisition and market transformation efforts. For both types of effort, clearly identifying and understanding market barriers can help us find the opportunities and strategies that can provide the greatest long-run energy-efficiency gains. As evaluators, this understanding enables us to track the progress and cost-effectiveness of programs in serving these long-run objectives.

Clarifying the language with which we talk about markets can help program managers develop and implement effective tactics. Likewise, this clarity can help evaluators assess the effectiveness of program approaches for both short- and long-term goals. Moreover, the terms that help in understanding markets for market transformation-oriented programs can continue to be useful as program objectives shift. The language of barriers will no doubt remain with us; we need to be sure that language continues to help us communicate.

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