

Market Transformation for Residential Energy Efficiency Services

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Introduction

This paper is intended to provide a framework for the consideration of utility and government proposals for a shift towards residential market transformation and away from direct installation and rebates as strategies for achieving increased efficiency and limiting the growth of electrical demand. The comments are developed from a presentation made at the 1994 West Coast Regional Affordable Comfort Conference titled, "Market Transformation: Lessons for Affordable Comfort." The focus is on residential energy services.

Transforming Services not Products

Efficiency services such as quality HVAC installations, duct repair, weatherization, and blower door directed air sealing, require different market transformation approaches than discrete technologies such as light bulbs and refrigerators. Consumer barriers to the purchase of services are based on the purchase process. The process through which the consumer purchases these services includes:

1. Obtaining or receiving information about the impact or value of the product or service,
2. Trusting the information about the impact or value of the product or service, and deciding to act,
3. Locating and comparing providers,
4. Trusting the ability of a provider to deliver performance,
5. Obtaining internal or external financing,
6. Entering into a contract and taking some performance risk,
7. Evaluating the value or performance of the delivered service.

Efficiency services have also been difficult to effectively implement in utility program design, despite their large savings potential. A number of factors have enhanced the programmatic focus on plug-and-play efficiency technologies such as refrigerators and light bulbs.

These factors include:

- Infrastructure development costs,
- Transaction costs,
- Regulatory reporting requirements,
- Savings credits tied to a limited set of measures,
- Lack of savings algorithms for service-based measures,
- Measure interactivity,
- Evaluation complexity.

Yet the development and support of these service based technologies offers significant opportunities to improve the measured savings performance of installations and has the potential to pull in large amounts of consumer investment capital. Both of these impacts directly support the market transformation goal of achieving long term improvements in market behavior.

Effective residential market transformation is in the interest of the ratepayer because it can provide easier access to consumer value at lower price. Sustainable change in the market place will also reduce the net cost of achieving higher levels of efficiency and reducing the growth of demand. Cost effective changes in the marketplace can also be in the interest of the utility, if certain regulatory changes are made to provide proper incentives, as described below. If market transformation is going to be more than a return to the largely ineffective conservation information budgets of the early 1980's, it will require accountability for measured results.

These comments will examine three approaches to achieving long term measurable changes in service markets: creating a convergence of consumer value, assisting transactions, and creating and maintaining contractor infrastructure. Finally, the paper will outline a number of regulatory and program design barriers that stand in the way of residential market transformation for energy services.

Creating a Convergence of Consumer Value

Consumers will pay for products and services that provide them with value. We will assume that there is a relationship between the amount of value provided and the amount of money the consumer is willing to pay. There also can be barriers to accessing this value. It follows that if our goal is to attract consumer investment, we need to provide as much value as possible and then closely examine the barriers to investment. We can increase the sales of our service or product (i.e. attract consumer investment) by increasing value and by reducing barriers. The more we increase value, the less we need to decrease barriers.¹

A number of residential energy services are becoming focal points for consumer value. Building diagnostics and retrofit, new construction efficiency programs, home energy rating systems (HERS), and residential HVAC system commissioning, all provide significant sources of value outside of simple improvements in energy efficiency. These services represent significant opportunities to affect the residential energy efficiency market.

The increased understanding of buildings as systems has created a class of professionals who can diagnosis building performance problems and then improve comfort, health and safety, and building durability while usually enhancing energy efficiency. New construction efficiency programs bring this systems approach to new buildings and offer consumers an opportunity to purchase certified energy and comfort performance. A recent trend toward the commissioning (or performance certification) of new or improved residential HVAC systems offers similar opportunities. And a home energy rating system, when based on the use of diagnostic techniques, offers the opportunity to combine these sources of value and imbed them in the real estate value of the residence.

Other potential sources of consumer value include: resource conservation, water and sewer

¹Another concern for market transformation is the difference between the perceived value at the time of the sale and the long term realized value of the improvement investment. We can do a great sales job, but if we don't deliver value we will not create a long term market.

savings, reduced maintenance costs, and increased tenant retention and improved marketing for multifamily building owners.

To the extent that these sources of value can be cost effectively combined, the need to reduce barriers is diminished. One of the key constraints to serving residential customers is the relatively high transaction or sales cost per customer. An increase in the number of services provided in one visit has the benefit of reducing the transaction overhead for each service. This is reflected in an increasing trend towards combining services from multiple utilities into a single service package. Taking this trend another step into market transformation, we need to be encouraging the development of a class of contractors who can cost effectively provide multiple sources of consumer value in one visit, including non-energy benefits.

There is a tremendous potential for creating a sustainable marketplace that addresses consumer problems with comfort, health and safety, building durability, through the application of energy efficiency and related services. By focusing sales efforts on consumers who already know they have a problem with comfort, safety, etc., we can create the foundation for a marketplace that incorporates energy efficiency into its delivery system.

Assisting the Transaction

Market driven transactions have a typical pattern.² The consumer will receive information from some source, possibly neighbor, a contractor or a utility advertisement. The contractor and the consumer must meet, develop some level of trust, and then transfer money. If the market is to continue to grow, the work provided should consistently meet or exceed the consumer's expectations. This is essentially the seven step purchase process listed above.

²Market driven activity is defined as installation work that has little or no subsidy. The transaction process for subsidized installations will vary with the placement and size of the subsidy. Heavily subsidized utility installation programs may not contribute to creating a sales infrastructure that can survive the removal of the subsidy.

The seven steps identify a number of points where leverage can be applied to the market. The proactive strategies described below outline possible approaches to applying that leverage. However, it is important to remember that reducing one barrier or applying one strategy may not be sufficient to improve the operation of the process. Similar to a poorly designed fish ladder, another steep step upstream or downstream in the process may represent a barrier that eliminates too many of the surviving potential customers. The consumers have to want to fight their way upstream and must also be able to make it over each varying step (or market barrier) in the ladder.

The process by which products move to market is also a system. Most service delivery is currently accompanied by the delivery of a product, such as a replacement air conditioner. This process typically has the following steps:

1. a manufacturer designs and sells a product,
2. a distributor stocks the product,
3. a contractor buys the product,
4. a customer provides the money,
5. and someone lives with the product's performance,
6. a contractor provides follow-up service,
7. a manufacturer pays for some of that service as a warranty claim.

This marketing process is sorely lacking in performance feedback to all levels. The process also provides insight on potential partners for market transformation efforts.

There is a severe lack of understanding of the market driven sales process in the utility industry, as evidenced by the rush to hire telephone industry executives to prepare for the threat of retail wheeling. More market research on consumer attitudes and values regarding the market driven purchase of energy services is necessary, and will probably be a result of the current utility restructuring underway. The resulting information will help us prioritize our market transformation efforts.

Contractors also have transaction costs. Utility support for the process such that those costs are reduced can make the transaction more profitable for the contractor. If the transaction is made more profitable, contractors will be

incentivized to create a market. Utilities should consider contractors their sales staff and ask them what they need to help sell these services. Contractors should be supplied with marketing assistance and materials. And in the process, we must be careful not to impose any significant additional barriers to transactions or to the creation of a sustainable marketplace.

Transaction based strategies can be evaluated based on their impact on the process and by how proactive the strategy is in reducing the barriers. A direct endorsement of a new service, such as duct sealing, blower door assisted air sealing, or installing high density cellulose will have more market impact than an indirect endorsement that simply encourages consumers to save energy. Some strategies are complicated by the fact that a market does not already exist. How do you inspect to certify a contractor's experience in a new skill area, such as blower door assisted air sealing or duct sealing, when consumers are not yet aware of the service and are not ready to purchase?

Other proactive strategies for assisting transactions include:

- creating new Yellow Pages listings for building performance contractors,
- pre-installation verification of consumer needs,
- providing a direct referral service linking customers with up to three local contractors,
- supplying standard specifications for new services,
- supplying standard form contracts,
- providing a hot line or fax line for supporting the technical review of bids,
- providing loan subsidies,
- speeding up the approval of loans and reducing loan paper work using liens at the meter and/or internal credit checks,
- supplying or subsidizing a post inspection prior to final payment,
- providing post-installation verification of savings.

All of these strategies are designed to either reduce the effort required to complete the transaction or reduce the risk taken by the consumer that the work will perform as expected.

A number of other innovative strategies are under development around in other parts of the country. In Austin, Texas, trained and certified contractors, selected on a rotating basis from a pool, supply an evaluation of the energy and comfort needs of a home. The same contractor that provides the evaluation is prevented from bidding on the subsequent work.

In California, the Energy Commission is developing a multi-state proposal to improve the quality of HVAC installations. A key component of the proposal is the development of a billing analysis feedback mechanism that lets consumers evaluate the relative energy performance of a list of certified contractors.

In various areas across the country, progressive HVAC contractors are beginning to pay to receive training in blower door guided duct sealing, as a way to increase profits and provide better home comfort performance. A similar movement is occurring around the commissioning of residential HVAC systems as a way to certify comfort and energy performance. These trends are just beginning to receive trade press attention.

Creating and Maintaining Infrastructure

Achieving changes in the market often requires enhancing the current contractor infrastructure. The skills required to provide the four primary high-value services identified above (building diagnostics, new construction, HERS, and commissioning) are not currently available from your typical contractor. In fact, the contractors that can provide these skills are few and far between. If we are to realize the savings opportunities provided by market transformation, we will need to provide these contractors with an incentive to be trained, ready access to training, and pathway for professional development.

The incentive for training is profits. Contractors that choose not to compete on price must find another way to differentiate themselves from their competition. Many contractors are not aware of how to differentiate themselves or how this can improve their profits.

Many consumers are not aware of the benefits of receiving a quality installation, and even if they are aware of the benefits, are still not comfortable in evaluating contractors based on quality. Homeowners may be faced with this

type of rehab or remodeling type decision only two or three times in a lifetime. If they are going to make decisions based on quality, not price, they need to be provided with very explicit information on how to choose a contractor based on quality and how to verify installation quality and performance. Standardized contracts and installation specifications support that decision.

A consumer is very good at looking at the price quote and then comparing dollars to dollars. It is much more difficult to sit in your living room and listen to a stream of contractors tell you that you should fix your problem six different ways. Without explicit information on what to expect in a quality bid, consumers will tend to resort to selecting contractors based on price. Contract comparisons and awards based on solely on price, work against our efforts to incentivize contractors to do better work and spend time and money on training.

High efficiency equipment loses market share as a result of poorly trained contractors. (Poorly performing installations work against the creation of the market for the equipment.) Equipment manufacturers are very aware of this problem and are very interested in efforts, such as the California Energy Commission proposal noted above, that will improve the quality of installations, increase sales of high efficiency equipment, and reduce warranty costs. They have documented that the vast majority of warranty costs arise from improper installation, not from equipment failure. Such manufacturers are potential partners for service-based market transformation efforts.

Contractors have significant increases in overhead that occur when trying to provide a quality based service. These include:

- cost of training and lost work time,
- salary increases necessary to retain trained staff,
- increased installation labor hours and materials costs,
- cost of marketing plan development and marketing materials.

Contractors can also save money and increase profits, by focusing on quality, comfort and efficiency. Savings include:

- better referrals resulting in larger, more comprehensive sales,
- lower cost of sales as a result of higher closing rates,
- fewer warranty service calls.

Differentiation is more effective when substantiated or supported by a certification process or performance feedback.

Consistent and timely access to training is another common market barrier. Individual contractors find it expensive to access training. A contractor would need to be extraordinarily enlightened in order to put in the effort necessary to bring in an outside trainer and coordinate a training workshop that would also then be cost effectively offered to their competition.

Technical and marketing training opportunities must be provided on a regular basis in an industry with high rates of turnover in both staff and companies. One estimate is that 20% of HVAC contractors go out of business each year. Turnover rates for staff are also very high. Conducting a single training session at the start of a program will not meet the long term need for infrastructure development. The Affordable Comfort Conference has been nationally recognized as a primary training resource for residential retrofits, but offering training for one or two weeks a year, in a hotel in another state, is not by itself an adequate training resource for significant market transformation.

Professional development and continuing education are also important and have been recognized as keys to infrastructure development by organizations such as Affordable Comfort Inc. (ACI) and the New York State Department of State Weatherization Assistance Program (NYS DOS WAP).

The NYS DOS WAP is working with US Department of Energy and the NYS Energy Research and Development Authority and NY-Star to develop a certification program that will identify skills necessary for various positions within the new construction and building retrofit industry. The training builds on NY-Star's current builder training curriculum and manual. This skills certification will provide recognition and hopefully increased compensation for those workers who demonstrate a commitment to professional development.

ACI is developing plans to create linkages with vocational educators as a way to bring building science into vocational classrooms around the country. ACI is also beginning to coordinate with other groups to improve access to training, including the California Energy Commission, the NYS DOS WAP and NY-STAR, and the US Environmental Protection Agency and the US Department of Energy.

Subsidization and coordination of local and national training efforts is an important role for utilities and government.

Barriers to Market Transformation

A number of factors in the current regulatory and program design process actually interfere with market transformation efforts. This occurs in ways that reduce or eliminate any anticipated market transformation impacts from programs and in ways that interfere with the market so as to make sustainable change more difficult. The following points detail a number of these interactions.

Rapid variations in program funding - When program budgets and savings goals increase rapidly, program managers are often faced with the lack of a local infrastructure to provide services. When program budgets drop rapidly, businesses that have grown in response to the cash flow are often left high and dry.

These variations in budgets create situations where the successful outside contractor must base its business strategy on size elasticity, i.e., the ability to move in and ramp-up overnight and then, in response to a drop in budgets, shut down the local office quickly before incurring any losses. This strategy is directly at odds with any utility or regulatory desire for the development of infrastructure and the creation of a sustainable market. Contractor investment in training must be minimized under such a strategy, as there is no anticipation that there will be a sustained local market, and training investments must be returned very quickly.

Local contractors typically do not have the capital to finance rapid growth, are not skilled in the utility bidding procedures, and do not have ready access to training. Locally-based business growth strategies are typically based on establishing a positive reputation, resulting in

incremental and sustainable growth of sales. This type of growth is very much in keeping with the goals of market transformation efforts. The issue becomes how to move quality-based contractors to grow sustainably in areas that match the market transformation goals.

Too often DSM programs are cut off without an adequate phase out. Program phase-outs need to be closely coordinated with the local infrastructure that has based business growth on the program. As the budgets drop, cost effective opportunities for long term support of the new infrastructure may emerge.

Evaluation timing and criteria - Program improvement and evolution is based on feedback. Most residential programs must wait two to three years from the beginning of the program until the first measured savings results are available. First year measured savings results are often reduced by implementation issues, and costs can be increased by investment in infrastructure development. Programs that attempt to push the envelope of what the current infrastructure can provide are particularly at risk for cancellation.

Installation evaluations should incorporate interim short term savings measurement methods in order to speed program evolution towards effective delivery. Instead of reducing savings estimates, it is possible, given adequate and timely savings information, to increase the quality of the delivery system and focus on system approaches to enhance measured savings performance.

Longer evaluation time frames and accountabilities need to be established for measuring market transformation. A program whose sole accountability is a large number of units installed over the next year will naturally resort to marketing methods that disrupt the existing market systems without providing a sustainable alternative market. Infrastructure development costs should be amortized out over the life of the investment. Significant long term accountabilities are in order. The EPA Green Lights program is an example of a successful market transformation program developed in response to the longer term evaluation accountabilities of the Global Climate Change Action Plan.

The Total Resource Cost Test - The TRC is a double-edge sword. At the same time that the TRC allows the inclusion of non-energy benefits, the parameters of the calculation drive programs toward direct installation and away from incorporating consumer investment into energy services. There is a significant transaction cost in getting significant levels of consumer participation in an efficiency investment. This transaction cost is applied to the cost side of the equation, without a market transformation benefit being applied to the benefit side of the equation.

It is extremely important for effective market transformation that non-energy benefits be included in the cost benefit analysis. Unfortunately, it is much easier to account for the costs than for the benefits, particularly benefits such as comfort, health and safety, and building durability. Yet these may be the primary providers of consumer value in the transaction. DSM program marketing and installation infrastructures developed to provide primarily energy benefits will have little chance of surviving outside the pure oxygen atmosphere of a DSM program.

The Department of Energy Weatherization Assistance Program has contributed immensely to the development of a residential energy retrofit industry. Because comfort, health and safety and building durability have also been important goals of this program, we are now ready to talk about transforming the broader new construction, remodeling and HVAC industries by meeting the full range of needs of consumers. Much of widespread adoption of the technical advancements in residential energy efficiency over the past fifteen years can be traced to Weatherization Assistance Program involvement. This broader set of goals have resulted in the development of systems solutions and have promoted the creation of building performance solutions that offer more consumer value than just energy savings.

Incentivizing more than widget installations - The tendency to base evaluations and program goals on the number of widgets installed creates a barrier to the development of programs based on the increasing quality of services instead of installing products. Similarly, information based programs, such as operations and maintenance training, have had a difficult time getting funding despite the potential for producing measured

savings. Effective market transformation efforts can face similar barriers despite a desire for accountability.

Other systems type approaches have had difficulty being included in residential retrofit programs because of a lack of savings algorithms, despite the demonstrated effectiveness of the measures. Systems type approaches have had particular difficulty integrating with retrofit programs driven by computerized energy audits.³ For example, lack of savings calculations for measures such as duct leakage and bypass sealing has limited adoption of these technologies.

Other barriers to residential market transformation include lack of easy contractor access to pre and post billing data as diagnostic and performance evaluation tools, and the impact of free utility information audits on the marketing of diagnostic installation audits.

Conclusions

A number of key initiatives are suggested by this analysis. First among these is the need to establish accountability for utility investments in market transformation. The development of measurement systems and criteria will drive the design and success of market transformation programs. Regulators should reward the development of largely self-supporting infrastructure and apply the cost of infrastructure development to the benefits generated over a longer term than just the program start-up year.

Investments in market research on approaches to selling unsubsidized energy services and on combining energy efficiency services with other related services can provide important information on how to package and present energy efficiency with other services.

Quality-based local contractors form the basis for an infrastructure that can deliver energy efficiency along with the other services they provide. The development of technical and marketing support for these contractors is an

important component of residential market transformation.

As we proceed with market transformation efforts, we should attempt to identify key leverage points for market intervention. These points could eventually signify areas where long term utility support of the market could be crucial and cost effective. Potential leverage points include information distribution, contractor marketing support, contractor training, contractor certification, and contractor performance feedback.

Market transformation concepts can and should be incorporated into the design of current direct installation and rebate programs. Program design and evaluation should acknowledge the full life cycle of programs, from start-up, through implementation, to eventual market transformation. Strategic planning concepts offer a strong model on how to design programs for success in market transformation.

A functioning marketplace is a fragile ecosystem serving all its members. Interventions into the ecosystem by players with the ability to radically change the landscape must be carefully considered. It is important that we develop an understanding of how unsubsidized markets function and how we can cost effectively improve the functioning of these markets and enhance consumer investment in energy efficiency and related services.

There is a large potential for market transformation efforts to be very cost effective in the long run. There is an equally large potential that market transformation efforts will fail to be held accountable for measured savings and will provide little impact.

³See Thomas, "Incorporating Documented Savings Into Program Design" in the ACC 1994 Selected Readings for a discussion of the impact of computerized audits on diagnostic or system type treatments of buildings.