



National Home  
Performance Council

April 2013

# BRINGING ON THE BOOM AND BEATING THE BUST

A Framework for Developing a Roadmap to a Successful Home Performance Industry

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# Executive Summary

The home performance industry needs a roadmap to achieve profitability and scale. The need for a plan is widely recognized among industry experts, and a number of recent meetings and publications have made important contributions to proposing solutions to the challenges that the industry faces. However, these efforts have not yet resulted in a clear, broadly accepted vision of the tasks that need to be undertaken to get the industry to scale.

A home performance industry roadmap should accomplish three broad tasks:

- Identify and prioritize the key challenges that prevent the home performance industry from achieving scale and profitability;
- Describe strategies for addressing each of these key challenges; and,
- Outline a process for implementing the strategies in a coordinated fashion that allows for rapid testing and sharing of results.

A roadmap should be grounded in the recognition that there are two very different types of markets for whole-house energy efficiency upgrades: 1) consumer markets that value energy savings, comfort, and other benefits to the homeowner; and, 2) “resource” markets that value energy efficiency for its contribution to meeting capacity, energy, carbon reduction, and possibly other goals.

This paper does not provide such a comprehensive or definitive roadmap. Instead, its goals are to promote public discussion and debate about what should be in a roadmap and provide a framework for that debate to occur. Accordingly, this paper undertakes two projects: first, to identify a range of stakeholder-identified challenges and solutions that could be considered for inclusion in an industry roadmap, and second, to outline a process by which an industry roadmap could be developed and implemented.

It should be noted that these proposals are explicitly national in scope. Although there is an important role for local and regional creativity and experimentation, at this point in the industry’s development, it is important to recognize that the most significant problems that the industry faces are experienced across the nation, and that while different regions may experiment with different strategies to address these challenges, national communication and coordination regarding these efforts is crucial. Further, the lack of standardization has become a significant barrier to industry growth in its own right, and as a result, a successful roadmap needs a national perspective to support the appropriate level of industry-wide uniformity.

## The Consumer Market for Whole-house Upgrades

The most significant challenge that the home performance industry faces in developing a consumer market for whole-house upgrades is the lack of a compelling value proposition for homeowners. This is not to suggest that whole-house upgrades have no value to homeowners; on the contrary, they offer a wide range of sometimes very significant benefits. But for many homeowners, these benefits are not sufficient to offset the costs, both monetary and other, involved in upgrading a home. The industry’s first priority must be to enhance the value proposition, by increasing the benefits to homeowners and/or decreasing the costs.

This paper makes several recommendations for improving the value proposition:

- A significant and well-designed (ideally national) incentive, either in the form of a rebate or tax credit;
- A coherent strategy focused on a national “recognition system” for incorporating energy efficiency into the real estate value chain;
- Development of better and more accurate systems for measuring energy savings;
- Development of strategies to reduce homeowner costs by tapping reactive markets and staging upgrades over time; and
- Reduction of homeowner risk through rigorous quality assurance that also assists contractors in differentiating themselves from competitors.

This paper also makes a number of other recommendations for supporting the development of a robust consumer market for whole-house upgrades related to challenges other than the consumer value proposition. These include:

- Greater standardization of program requirements and operations to enhance contractor profitability;
- Reduction in the costs of data collection and transfer;
- Development of a national marketing and branding strategy developed by or in conjunction with the private sector; and,
- Development of appropriate financing programs, particularly on-bill repayment mechanisms and consumer products that can be originated rapidly and easily.

## **Markets for Energy Efficiency As a Resource**

Realizing the full potential of resource markets for energy savings or “negawatts” – including capacity, energy and carbon markets, and possibly other markets as well – is a challenging proposition and a longer-term project for the home performance industry. In accessing these markets, the industry faces challenges that include poorly designed cost-effectiveness tests, lack of appropriate financial incentives for utilities, the pressure of rate increases as efficiency programs gain traction, the lack of adequate consumption data, an array of technical challenges and, most generally, the absence of functioning markets for energy efficiency as a resource in large areas of the U.S.

The home performance industry does not have the capacity to address all of these challenges. However, there are a number of steps that the industry can take now to capitalize on existing market opportunities and lay the groundwork for creating new ones. These include:

- Research best practices in cost-effectiveness testing and advocacy for best practices in testing;
- Research rate impacts resulting from the growth of energy efficiency programs and ways to mitigate these impacts on vulnerable ratepayers;
- Advocate for performance obligations;
- Advocate for the redesign of utility compensation to incentivize energy efficiency;
- Improved access to utility consumption data, and streamlined data collection and transfer protocols;
- Share knowledge regarding programs’ or other intermediaries’ capacity to access existing

- resource markets; and,
- Advocate for the expansion of capacity, carbon, and other resource markets to new geographic areas.

## Process for Developing a Roadmap

As discussed above, this paper does not claim to be a definitive roadmap, but rather is intended to facilitate a broad stakeholder discussion towards creating one. This discussion would include analysis of key challenges and identification of solutions. It would also include prioritization of solutions, so that the industry could devote resources to addressing the most immediate challenges first while setting the stage for addressing the broader solutions in parallel.

Once action items (i.e. the “solutions”) have been identified and prioritized, the roadmap will need to undertake the following:

- Assign responsibility for carrying out action items to specific organizations;
- Inventory the resources available to implement action items; and,
- Ensure that the inventoried resources are matched with responsible organizations so necessary work can actually be carried out.

One organization (or a small group of organizations) should be tasked with providing overall coordination of implementation efforts to ensure that results are more – not less – than the sum of their parts. A clear plan for sharing progress and findings should be an explicit part of the implementation strategy.

Finally, the implementation of each strategy should include a clearly defined process for testing assumptions, including a way to ensure that implementers have some latitude to fail without repercussions. Approaches that are demonstrated to be unsuccessful should be rapidly modified or discontinued.

# Introduction

The home performance industry needs a roadmap that will guide it from promise to profitability and scale. Twelve years after the first Home Performance with ENERGY STAR® program was launched in New York State, home performance programs and contractors have demonstrated that they can significantly reduce the energy consumption of existing residential buildings, and that consumers - under the right conditions - are willing to pay for energy efficiency upgrades. Yet the industry is still very small, completing approximately 60,000 upgrades the U.S. each year. Although growth has been rapid during the past few years, much of that expansion has been due largely to the influx of ARRA funds, and observers are concerned that growth may slow as these funds are exhausted, and as the price of natural gas continues to fall.

Most participants in the home performance industry – contractors, program implementers, sponsors, and others – agree on three fundamental issues. First, the home performance industry should seek both to enable contractors to make attractive profits, and to “grow to scale” – a term used here to mean growth to the point that the industry is upgrading at least 2% of the existing U.S. housing stock each year.<sup>1</sup> Second, markets are key to achieving these goals; that is, profitability and rapid, large-scale growth are predicated on large numbers of buyers willing to pay prices sufficient to induce contractors to increase the energy efficiency of homes. And third, that current approaches, while valuable, are not sufficient in their current form to achieve scale in the foreseeable future.

Despite general agreement on these fundamental issues, there is no industry-wide consensus on how profitability and growth to scale should be achieved. In the past few years, several important proposals for moving the industry forward have been advanced, including RAP’s *Residential Efficiency Retrofits* (2011), the Energy Futures Group’s recent report to the BRIM Collaborative (2013), and DOE’s *Program Report on the Home Performance with ENERGY STAR® program* (2013). The Lawrence Berkeley National Laboratory’s well-known study, *Driving Demand* (2011), might also be considered in this context, although it is explicitly more restricted in scope than the other documents. Each of these publications makes many significant contributions to thinking through the challenge of how to achieve scale, but each, as discussed in the concluding section of the report, leaves several crucial issues unaddressed, and does not provide sufficient detail as to who will assume responsibility for which specific tasks.

This paper seeks to build on these papers’ recommendations by incorporating them into a somewhat different analytical framework. This approach is based on the premise that a roadmap needs to

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<sup>1</sup> Significant expansion of the home performance industry would generate many social and individual benefits, including the energy savings realized by homeowners and the replacement of higher-cost supply side resources with energy efficiency measures. The two most significant benefits are new job and profit opportunities in the home contracting industry, which has been severely affected by the post-2007 real estate crash, and reduction in the nation’s carbon footprint. The choice of 2% of the nation’s housing stock is represents the higher boundary of market penetration currently being achieved in areas with the most whole-house upgrade activity, and would allow meaningful reductions to be made to the energy consumption (and carbon emissions) of the U.S. building stock over several decades. Other documents have suggested more ambitious targets; Neme et al., for example, suggests that the whole-house upgrade industry in the U.S. needs to achieve a 5% market penetration to achieve the carbon reductions necessary to meet climate goals (Neme et al. 2020, 3).

accomplish three tasks:

1. Identify and define the key challenges that the industry faces;
2. Elaborate one or more strategies explicitly designed to address and surmount each of these challenges; and,
3. Describe a comprehensive process for implementing and testing strategies.

The document identifies a number of solutions to key challenges that have emerged in discussions with stakeholders. More importantly, it proposes a framework for prioritizing projects and allocating responsibility for undertaking them.

It should be emphasized that this document is not envisioned as a roadmap itself. It is intended to encourage discussion and disagreement, both by proposing issues that have been raised by stakeholders as solutions to the industry's issues and, more importantly, to provide a framework for further conversations to take place in the most productive fashion possible by focusing on problems, solutions, priorities and responsibilities.

Before beginning this discussion, however, three assumptions that underpin the paper should be noted.

## **Two Different Markets for Whole-House Upgrades**

As noted above, the home performance industry works to advance whole-house upgrades: a seemingly unitary product that in fact has two very different forms of value. For homeowners, the whole-house upgrade provides a bundle of benefits, including utility bill savings, improved health and comfort, and enhanced home re-sale values. For utilities and ratepayers as a whole, the whole-house upgrade creates a capacity and potentially an energy resource – the “negawatt” – that can serve utilities as an alternative to traditional supply-side resources, and that can also serve as a resource in other markets (notably carbon markets, in areas where they exist). Because the upgrade creates these two different forms of value, there are two distinct and very different markets for whole-house upgrades: the homeowner market for a bundle of benefits, and the utility market for reduction in the energy requirements of its service territory.

The homeowner market is the most significant of these two markets; the home performance industry will not reach scale unless consumers are willing to shoulder a significant portion of the cost of upgrading their home. However, the market for efficiency as a resource has the potential to generate revenues that could be used for a range of supports that would enhance the consumer-facing market. Solving the problems of the homeowner market should be the industry's first priority, but development of the market(s) for energy efficiency as a resource should be an important second major objective.

The goal of a roadmap should be to chart a path to a situation in which robust markets for both of the “products” of a whole-house upgrades have been created. Depending on energy and carbon pricing, these markets might be “self-sustaining,” or require some direct subsidies. Programmatic infrastructure might be needed at this point on an ongoing basis, but programmatic activities would be relatively limited to setting the ground rules that allow the market to function through QA and other related

activities. Subsidies and programs, in other words, should be seen as means to achieving flourishing markets, not as ends in themselves, and should be evaluated on the basis that they contribute to market creation.

## National Scope

It should be noted that these proposals are explicitly *national* in scope. Although there is an important role for local and regional creativity and experimentation, at this point in the industry's development, it is important to recognize that the most significant problems that the industry faces are national in scope, and that while different regions may experiment with different strategies to address these challenges, national communication and coordination regarding these efforts is crucial. Further, the lack of standardization has become a significant barrier to industry growth in its own right, and as a result, a successful roadmap needs a national perspective to support the appropriate level of industry-wide uniformity.

## Markets and Programs

As noted at the outset, this discussion is premised on the assumption that the only way to grow the home performance industry to profitability and scale is by developing flourishing markets for whole-house upgrades. However, it also assumes that programs – the programmatic infrastructure that currently issues rebates, trains contractors, implements QA, etc. – will remain important to the home performance industry, and will assume the primary responsibility for many (although not all) of the action items recommended.

Some home performance practitioners have recently suggested that programs are getting in the way of market development, that programs have little capacity to develop markets, and that in a well-functioning market there would be little to no need for programs to perform more than a modest regulatory role designed to ensure fair business practices.

This line of argument makes two important points: first, that programs should not be responsible for all the activities they are currently undertaking, and second, that the final goal should be markets characterized by relatively modest programmatic involvement. However, the suggestion that programs should not by definition play a role in market development ignores the extent to which public and non-profit action has been crucial in the establishment of a broad range of other types of markets (including, for example, most renewable energy sources). Given current low – and falling – energy prices, a market for home performance upgrades is unlikely to emerge soon, if at all, without programmatic support. It also assumes that the home performance market can exist without oversight or market distortion, which is not the case for any energy market. Any industry that raises health and safety concerns requires oversight. And every American energy resource enjoys some level of subsidy, which necessitates at least some level of oversight to prevent fraud and abuse. But perhaps most importantly, while skepticism of government involvement in emerging markets has been on the rise, many citizens still see the government as an impartial third party that can provide guidance and support on complicated issues that have the potential to benefit society as a whole.

That said, there are roles that programs may not be well-suited to play. Some industry participants

have questioned the extent to which programs should be conducting energy assessments, influencing contractor selection, and/or marketing and generating leads example. Some of these roles may be best left to market actors in almost all cases; others (such as lead generation), might be appropriate programmatic activities in some contexts but not others.

The goal of a roadmap should be to chart a path to a situation in which robust markets for both of the “products” (for the consumer and energy markets) of a whole-house upgrades have been created. Depending on energy and/or carbon pricing, these markets might be “self-sustaining,” or might require some direct subsidies. Programmatic infrastructure might be needed at this point on an ongoing basis, but programmatic activities would be relatively limited to setting the ground rules that allow the market to function through QA and other related activities. Subsidies and programs, in other words, should be seen as means to supporting the advancement of flourishing markets, not as ends in themselves, and should be evaluated on the basis that they contribute to the dual market creation.



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## Section 1: The Consumer Market for Whole-house Upgrades

### The Consumer Value Proposition: Challenges and Strategies

The single most significant challenge to the development of a strong consumer market for whole-house upgrades is the lack of consumer demand. When home performance programs were first designed, their architects believed that whole-house upgrades would be compelling to consumers in large part because the monthly amortized cost of a typical job would be more than covered by utility bill savings. Rebates, tax credits or other incentives could turn a reasonable proposition into a very attractive deal. The other benefits of an upgrade, including improved comfort and elimination of health and safety concerns, were seen as further sweetening the transaction.

In practice, however, these inducements, even in combination, have not been sufficient to incentivize large numbers of homeowners to upgrade their homes; under current conditions, many homeowners do not appear to find the value proposition of a home performance upgrade compelling. The multiple reasons that consumers question the value of upgrades are not always fully understood or appreciated, but are crucial for determining how to chart a path forward for the home performance industry. The most important of these include:

- Insufficient financial incentives, in the broad sense of the term;
- Hidden costs, both financial and non-financial; and,
- Risk that savings will be significantly lower, or costs significantly higher, than projected.

It should be noted that addressing the consumer value proposition is not entirely the same thing as driving demand. Discussions of driving demand frequently assume that the value proposition exists

but needs to be revealed or explained to the consumer. This section, by contrast, assumes a more fundamental problem: that a whole-house upgrade is not necessarily compelling to a large number of homeowners even when they have a full understanding of its benefits.

## Challenge 1: Insufficient Financial Incentives

The projected monetary value of energy savings is typically relatively modest, particularly when considered in terms of a middle-income homeowner's budget. In 2010, homeowners spent roughly \$2,000 on energy costs (EPC 2009: 7). If an upgrade results in a 30% reduction in energy consumption – a high bar – the annual savings would be about \$600, or \$50 a month. If the upgrade costs \$7,500 after incentives, the payback period would be over twelve years – without any consideration for the time value of the homeowner's investment. If the project is financed, even with a very favorable rate, a long payback period, and incentives, the homeowner is likely to do little more than break even in terms of monthly costs. Further, savings estimates are only estimates, and in many individual cases an upgrade will result in lower savings than estimated. Rebates and other incentives can change these calculations significantly, but in some areas the rebate may need to be considerable if the customer is expected to derive a significant financial savings from the upgrade.

### Solution 1.1: Enhance Incentives Through Public Policy

The most obvious way to enhance the consumer value proposition is through rebates, tax credits or other similar incentives, supplied either by some level of government or by a utility. By effectively decreasing the total monetary outlay necessary to pay for an upgrade, the rebate or incentive can improve the value proposition in a simple and compelling fashion.

Some home performance experts have argued strenuously that the industry should seek to create markets for home performance upgrades in which subsidies are unnecessary. There are two main themes in this argument: that subsidies harm contractors because they are too transitory to allow for long-term planning, and that subsidies “distort the market,” which should “stand on its own two feet.”

The argument that subsidies distort the market does not take into account the extent to which the market is already heavily tilted in favor of supply-side resources. Current pricing of supply-side energy sources reflects decades of significant direct and indirect public support for these sectors. Moreover, the pricing of supply-side resources never fully takes into account the price of externalities, including carbon emissions. Public incentives for energy efficiency only help to redress this inherent imbalance in the market for energy.<sup>2</sup>

Public subsidies could play a crucial role in supporting rapid growth of the home performance industry by reducing the competitive advantage that supply-side resources enjoy. But while incentives are important, they need to be well-designed to have maximum impact. First, they need to be sized

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<sup>2</sup> There is also an important policy argument in favor of public support for energy efficiency. Energy efficiency is a public good, because it is not only the least expensive way to “generate” energy, but also has a number of collateral benefits, including reductions of carbon and other pollutants. Public goods should be supported by public funds – including energy resources from nuclear re-licensing to geological surveys for carbon-based fuel and the supportive tax policies. Considering the great potential of clean megawatts that can be “mined” from homes through whole-house retrofits, the home performance industry is justified in calling for increased financial incentive to consumers to upgrade their homes.

correctly so that they encourage homeowners who would not otherwise improve their homes to take action, but are not larger than necessary. Second, they should be designed to complement other strategic goals for advancing the industry; for example, through design that supports “reactive” upgrades, as discussed below, or by supporting the national standardization that enables contractors to work in different programmatic areas without having to change their operations significantly. Third, there must be adequate measurement and verification in place to ensure that public dollars are not abused.

Two bills introduced during the 112<sup>th</sup> Congress, the Cut Energy Bills at Home Act (S. 1914) and the Home Owner Managing Energy Savings (HOMES) Act, would have created a nationwide incentive for whole-house upgrades in the form of a tax credit or rebate, respectively. Both of these bills received bi-partisan introduction, however neither saw movement due to the current stagnation within tax writing committees and a general anti-spending sentiment in Congress. Passage of legislation modeled after either bill would provide crucial support for the industry and would be aligned with the aforementioned guidelines.

More research can be done to educate policymakers on the benefits of advanced incentive programs, including:

- Support research on the many public benefits that the public dollars provide: jobs, carbon savings, consumer cost savings;
- Support research on methods to determine the “right” size for an incentive in a particular market context;
- Support careful development of incentives that support the other strategies for enhancing the value proposition discussed below; and,
- Support industry standards and data access to advance measurement and facilitate reporting requirements.

## **Solution 1.2: Incorporate the Value of Energy Efficiency Into the Real Estate Value Chain**

The second strategy for enhancing the value of whole-house upgrades involves the development of a way to accurately value energy efficient homes. In theory, an energy-efficient home should be more valuable than a similar, but less efficient counterpart, because the efficient home costs less to operate and is likely more comfortable. Demonstration of this theory, which would give homeowners reasonable certainty that energy efficiency adds to the resale value of their home, would serve as a powerful incentive to homeowners to pay for an energy efficiency upgrade.

Proving this theory, however, requires data. Lenders and appraisers, in particular, want to see empirical studies demonstrating that an efficient home can command a higher resale price than a comparable non-efficient home, or that price is correlated with relative efficiency. A handful of studies have suggested that such relationships exist, but the data required for such research is not currently available in most markets.<sup>3</sup>

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<sup>3</sup> A recent study released by the Institution for Market Transformation found that new homes built to ENERGY STAR® standards default at a rate one third less than that of comparable non-efficient homes, indirectly supporting the argument that efficient homes have more value. See Quercia et al. 2013, Home Energy Efficiency and Mortgage Risks.



Photo: 123RF

One important step towards incorporating the value of energy efficiency into the real estate value chain is to ensure that lenders and appraisers use energy costs as a factor in assessing the value of a home. The Sensible Accounting to Value Energy (SAVE) Act of 2011 (S. 1737) received bi-partisan introduction in the 112th Congress and would ensure this value was recognized. Energy efficiency is often invisible and thus difficult to value in a home sales transaction. Requiring all federal lenders to consider projected energy efficiency when underwriting mortgages would provide lower rate mortgage financing for cost effective energy improvements and enable better federal mortgage underwriting while lowering utility bills for American households.

A second step is to develop and promulgate a coherent, national “recognition system” for identifying a home’s energy consumption that consumers can understand and relate to. A nationally recognized and accepted recognition system would enable homeowners to understand their homes’ energy consumption and provide a tool for advertising a home’s efficiency at the time of resale. It would also provide the necessary data to allow study of the relationship between resale price and efficiency. At present, several such systems – notably the HERS rating, HEScore, and Energy Performance Score – are competing in the marketplace. Although limited progress can be made in the absence of a single recognition system, the current patchwork of labels and scores creates confusion in the marketplace and discourages otherwise supportive professionals in real estate-related professions from engaging with the home performance industry.<sup>4</sup>

The third step towards capturing the value of energy efficiency in the real estate value chain involves incorporating the information about a home’s efficiency into the information systems used by the participants in the real estate transactions, including real estate agents, appraisers, and lenders. This

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<sup>4</sup> It should be noted that although the primary value of a recognition system is to facilitate the valuation of energy efficiency in the real estate sales process, recognition systems may also support behavioral change outside of the real estate market. By providing a metric by which a homeowner can measure the impact of his or her efforts to make the home more energy efficient, a recognition system may support more upgrading activity than would take place in the absence of such a system. Similarly, a recognition system may drive upgrades as homeowners, newly equipped with a metric to compare the efficiency of their homes compared to those of their neighbors, have a competitive motivation to make their homes more energy efficient.

involves working to ensure that the Real Estate Transaction System (RETS) and local MLS databases have the capacity to capture the most relevant information about a home's efficiency, and to promote and coordinate use of the Appraisal Institute's Green and Energy Efficient Addendum. A single number (or set of numbers) denoting a home's relative efficiency would be easier to incorporate into such systems. Conversely, the current confusion in the market between competing labels and ratings makes real estate professionals hesitant to engage with the issue. Regardless of whether the goal is to capture one or several recognition systems, however, developing the capacity for the real estate profession to capture information about the value of energy efficiency will take coordinated effort and a period of several years.

The fourth step involved in capturing the value of energy efficiency in resale transactions involves isolating the "contributory value" of energy efficiency – the value it adds to the home – through empirical research. As discussed above, such research has been difficult to conduct because of the challenges involved in linking sales prices and energy efficient homes. A national label or rating system would make an important contribution to providing this data, although even if a label was in widespread use it would still be necessary to collect and analyze data. Absent a national label, the necessary research could (and should) still be undertaken, although the findings will be less broadly applicable. Findings that energy efficiency does in fact have a contributory value, even if only in certain markets, has the potential to effect a profound long-term change in the home performance industry, because only then will homeowners really be able to have confidence that an energy efficiency investment will add value to their home in the same way installation of granite countertops would.

A fifth step involves the education and training of a number of actors involved in the real estate sales process, including appraisers, lenders, home inspectors and, of course, real estate agents themselves. To the greatest extent possible, these trainings should be able to point to the empirical data demonstrating that energy efficiency has a real empirical value.

Implementation strategies:

- Develop a pathway towards acceptance of either a single national recognition system or a way in which existing systems can be presented as complementary to reduce consumer confusion.
- Develop strategies to integrate a label/rating system with the other proposals discussed in this paper (e.g., a national measurement system with an incentive system based on improvement relative to that home's baseline rather than to absolute savings).
- Enable access to utility data that could support label rating systems and make them more accurate.
- Support and expand efforts to incorporate information about energy efficiency into the real estate transaction standard (RETS) and real estate (MLS) databases.
- Undertake statistical research to determine the contributory value of energy efficiency.
- Support training for appraisers and underwriters regarding the contributory value of energy efficiency.

### **Solution 1.3: Predict and Measure Savings More Accurately**

Although energy savings may be less important to a homeowner than the other benefits of a whole-house upgrade, the opportunity to lower bills is still a strong motivation for many homeowners,

particularly those with high energy costs. The argument that an upgrade can “pay for itself” is compelling for some consumers, particularly if financing is available so that the consumer’s net monthly bills are lowered immediately as a result.

Selling homeowners – or policymakers – energy savings, however, requires a reasonably accurate prediction of what the energy savings will be. There is widespread agreement within the home performance industry that more should be done to test the accuracy of existing energy modeling tools and support increasingly accurate modeling. To the extent that deemed savings are being used in place of modeling tools, it is important that these savings estimates be as accurate as possible. For contracting firms that offer savings guarantees, accuracy is particularly significant.

A number of approaches to improving the accuracy of modeling tools have been proposed, such as comparisons between the predicted and actual savings of large numbers of jobs to determine the average accuracy of specific contractors and/or programs, and tests of software systems’ ability to model a specific home’s actual consumption. Use of existing methods to support software accuracy, such as BPI-2400-S-2011, should be expanded. Identification of an approach to testing accuracy that has broad support from a range of stakeholders – including contractors, software developers, programs, and resource markets – and delivers accuracy without imposing undue burdens on developers and contractors, is crucial.

One potentially promising approach to addressing the prediction and measurement issue is to develop strategies to remove some of the burden of modeling from the contractor to the program, particularly if contractors choose not to make quantified energy savings a major part of their sales pitch. The program (or other responsible entity) would then quantify savings, primarily for the purpose of delivering them to one or more resource markets. Quantification methodologies could focus on comparison of pre- and post-upgrade consumption, with consideration of actual measures installed. To the extent that contractors want to sell quantified energy savings to the customer, however, they would still need tools to ensure the reliability of their predictions.

One of the primary barriers to assessing savings more accurately is the difficulty involved in obtaining the billing data necessary to impute the savings that resulted from an upgrade. President Obama’s Green Button initiative has provided tools to make this data available on a voluntary basis, but a tremendous amount of work still needs to be done to develop ways to provide the information reliably, consistently, rapidly, and at a low cost to homeowners, contractors, and program administrators. The Electric Consumer Right to Know Act (S.1029), or “eKNOW Act” was introduced in the 111<sup>th</sup> and 112<sup>th</sup> Congress to establish the right for consumers to have access to their own electric consumption data, including direct access to the meter. The legislation would have allowed homeowners to designate a third party to access the data on their behalf and then use it to help them become more energy efficient, thus allowing private sector companies and home performance contractors to provide products and services to homeowners and help them reduce their electricity costs.

Home Energy Management systems can serve as another important tool for helping consumers understand their energy consumption. Some of the most sophisticated devices can provide very detailed energy consumption information as well as information about a range of other issues such as occupancy and humidity.

Implementation strategies:

- Develop a national working group on software accuracy tasked with developing a model that delivers accuracy without imposed undue burden on stakeholders.
- Require “true-up” methodologies, such as BPI-2400, that calibrate models with actual billing history.
- Educate decision-makers regarding the importance of making billing data easily available in a way that respects consumer privacy.
- Convene a national working group to develop a strategy for developing an accurate, cost-effective way to test the accuracy of energy modeling.
- Explore the extent to which “smart” devices could provide information about home performance.
- Build on existing efforts to ensure that consumer privacy issues are respected as billing data is accessed.

#### **Solution 1.4: Provide Mechanisms for Making the Other Benefits From an Upgrade More Visible**

Residents of a home that has been upgraded often experience a range of benefits beyond lower energy bills. Increased comfort resulting from elimination of drafts and more balanced circulation of conditioned air is one important benefit of a whole-house upgrade that occupants notice immediately. In fact, in some cases increased comfort may be the homeowner’s primary motivation for the upgrade. Whole-house upgrades may resolve significant health and safety issues in the home. And an upgrade may increase a home’s durability.

Strategies to make these benefits more comprehensible and more visible to homeowners would benefit contractors by providing additional points to sell whole-house upgrades. The most obvious approaches would involve ways to quantify and present to the consumer the wide range of health and safety benefits that an upgrade generates.

Implementation strategies:

- Additional research to quantify the health, safety and other benefits of a whole-house upgrade for consumers.
- Development of systems to communicate health, safety, and other non-energy improvements in a consumer-friendly format.
- Incorporation of the full range of benefits from an upgrade into the “recognition systems” discussed above.

#### **Challenge 2: Reducing Costs to the Homeowner**

Major renovations in a home impose significant financial and non-monetary costs on the homeowner. Home renovations require the homeowner to take time to understand what is involved with the upgrade and to provide some oversight of the contractor’s work. Preparing the home for the contractor, particularly for renovations that touch multiple areas of the home, also requires the homeowner to commit time and effort. As one obvious example, a home performance upgrade is

likely to require the homeowner to clean out an attic that may be piled with boxes. The time and effort required from the homeowner can be a significant deterrent even if the opportunity cost is not monetary. If the homeowner must take time off work, the loss of income creates an additional disincentive. Low- and moderate-income households can be particularly sensitive to these costs – an important consideration for reaching scale.

This section proposes two closely related strategies for approaching homeowners when they are at a “decision moment” at which energy efficiency could be incorporated into other improvements. The first involves developing ways to tap “reactive” purchases. The second involves spreading a whole-house upgrade out over time through a series of “staged” energy efficiency improvements.

### **Solution 2.1: Tapping Reactive Purchases**

As discussed in the previous section, the time and hassle, as well as the monetary cost involved in overseeing a contractor’s work and prepping a home for an upgrade, can be a very significant deterrent to homeowners. The homeowner’s cost-benefit calculation can change significantly, however, if energy saving improvements are incorporated into work that she or he was already planning to do. A homeowner typically makes a number of changes and improvements to their home over time: kitchen and bathroom remodels (particularly likely within the year following purchase of the home), HVAC replacement (either because of equipment failure or obsolescence), and roof repair or replacement, are all common modifications. Energy efficiency measures can be incorporated into this work in a variety of ways: HVAC replacement, for example, offers not only the possibility of replacing an inefficient system with a high-efficiency one, but also sizing the unit correctly, as well as insulating and sealing both the ductwork and the entire home. Similarly, rehab work that results in walls being opened creates an ideal opportunity to insulate and air seal, even if such work is conducted only in a part of the home.

Incorporating energy efficiency measures into other planned improvements can reduce costs in several complementary ways. First, the contractor is already on site, and as such does not have to make extra trips to the home to address energy-specific concerns. Second, the work that the homeowner would have “done anyway” may make installation of energy efficient measures easier. Extensive re-plumbing that requires walls to be opened up creates opportunities for insulating. Third, if a homeowner was planning to replace a system, the cost of a more efficient model is likely to be only incrementally higher than a less efficient model that the homeowner may have otherwise have purchased. Finally, this approach can significantly reduce the hidden costs of time and hassle to the homeowner because the work had to be done anyway; the energy efficiency component requires very little additional effort from the homeowner.

Finally, the thousands of HVAC contractors, insulators, remodelers, and other contractors across the U.S. are potential salespeople for energy efficiency upgrades. Many contractors build longstanding customer relationships through maintenance contracts; these relationships could be used to leverage many more whole-house energy efficiency upgrades.

Despite these obvious advantages, there are some significant barriers to incorporating whole-house energy efficiency work into other home improvements. To make money by upselling energy efficiency improvements, a contractor needs to alter their business model or develop an effective strategy for partnering with a firm with complementary skills. Some firms may believe that energy efficiency



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improvements go against their business interests, as in the case of an HVAC contractor that doesn't want to install a right-sized furnace because it costs less, or to take the time to install equipment correctly.

Moreover, a homeowner may want to deal with the immediate issue at hand – the HVAC failure or remodeling work – but not embark on the other aspects of a whole-house upgrade. Promoting whole-house upgrades, in which all energy improvements are conducted at the same time, goes against the way homeowners generally implement improvements. Many of the measures included in a typical whole-house upgrade – HVAC upgrades, window replacement, improved insulation and air sealing – would “normally” be undertaken over many years, and generally happen either because a system fails or clearly needs replacement, or because an opportunity presents itself.

### **Solution 2.2: Staging Upgrades Over Time**

To take into account the way homeowners “normally” conduct improvements, a “staged” approach can be coordinated with the “reactive” approach. This approach encourages homeowners to plan for the long term and implement energy efficiency improvements over time in such a way that they would eventually achieve a certain level of energy savings (i.e. a specified decrease in energy consumption), which might qualify them for a rebate and/or a certificate or label.

This staged approach has several significant advantages. It reflects the way homeowners typically undertake home improvements. It can keep costs low because energy efficiency measures can be bundled with other work that would be done anyway. It can be incorporated into existing contractor business models. Depending on the program design, it could reduce the need for modeling software, if the impact of energy efficiency measures is determined following installation. And it reduces the need for financing, as improvements are paid for over time.

One challenge to implementing this approach is that it requires infrastructure to establish. The program and/or participating contractors must be able to create and maintain a relatively sophisticated

database capable of maintaining information about a very large number of homeowners. Among other things, the program must store “baseline” data accurately so that improvements can be tracked and measured over time. The program must also have the capacity to provide planning and consultation services at the outset and again periodically over time. Finally, the program must have either have confidence in its modeling software or ability to predict how different measures, implemented over several years, will add up to a given level of savings, or the ability to collect data to measure actual savings retroactively. The approach would benefit tremendously from a nationally or regionally recognized certificate or label.

Implementation strategies:

- Work with contractors to reconfigure both program designs and business models in ways that address the structural barriers (i.e., business design barriers) and perverse incentives contractors currently experience.
- Identify the program supports – marketing, branding, QA, incentives, etc. – that would provide real support for participating contractors’ efforts to educate customers about the value that their approach adds.
- Launch local pilot programs designed specifically to support the approach, and encourage information sharing between participants.
- Work with contractors so that the approach complements and supports their existing business models.
- Develop the IT and other program infrastructure to support upgrades conducted over time.
- Develop strategies to address and test the technical problems that arise as a result of phasing in improvements over time, such as the challenge of right-sizing HVAC equipment prior to insulation and air sealing.
- Undertake the steps discussed in the previous section to ensure that a range of contractors can participate and contribute to the phased retrofit.

As discussed earlier, these strategies should be designed to complement existing contractor businesses, rather than to create new business models. As such, contractors should be centrally involved in both the planning and development of all implementation steps.

### **Challenge 3: Risk to the Homeowner**

A home performance upgrade entails some risk to the consumer that they will pay a significant amount of money and get relatively little return. Consumers face this danger any time they retain any type of contractor, and significant numbers of consumers are sensitive to it as a result of previous experiences with shoddy work or outright dishonesty. The risks may be perceived as particularly serious for a home performance job because the “product” of the work is relatively intangible. When a home remodeler installs a new kitchen or bath, the homeowner can inspect the work and make a basic determination as to whether the work was done well. But most homeowners find it more difficult to determine whether their air conditioner was properly installed, or whether the air sealing in the attic is effective. Moreover, the bill savings benefits, one of the primary outcomes of the upgrade, are realized over an extended period time, and may be offset by occupant behavior. Comfort benefits, by contrast, are typically immediately obvious to the consumer – one of the reasons that they are a major selling point for whole-house upgrades. Again, the risk issue is most significant for low- and moderate-

income households, for whom the \$5,000 to \$15,000 outlay for an upgrade is a very significant amount of money.

### Solution 3.1: Reduce Risk Through Quality Assurance

A third major strategy for enhancing the consumer value proposition involves reducing the perceived and real risks associated with home performance upgrades. Selecting and overseeing a contractor is a daunting task for many homeowners, and these challenges are compounded in the case of a home performance job, which involves items that the average homeowner is unfamiliar with. It is much easier for a homeowner to determine whether a kitchen upgrade has been carried out according to scope, for example, than to determine whether an HVAC system has been installed correctly or that all appropriate air sealing and insulation work has been completed.

Most home performance programs have a quality assurance (QA) system in place. These systems typically involve both “desk checks” of reports on job completions and site visits of a proportion of a contractor’s jobs. However, the national approach to QA as a whole would benefit from standardization, and from identification of processes that achieve quality work while supporting (rather than burdening) contractors.

Implementation strategies:

- Study extent and ways in which consumers see a value in QA, and develop protocols, particularly those related to customer interactions, accordingly.
- Study extent to which contractors see a benefit in QA and design both QA and complementary marketing/branding systems that maximizes benefit to contractors while addressing the needs of consumers.
- Convene stakeholder group for developing strategies to make QA quicker and easier through standard protocols and better data transfer.

Together, these factors – the modest nature of the financial savings, the hidden costs of “hassle” and lost time, and the risks involved for any single homeowner in realizing projected savings – result in a dubious value proposition for the homeowner. Until the value calculus is significantly reconfigured, it is unlikely that a market for whole-house upgrades will develop in the near future.<sup>5</sup>

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<sup>5</sup> It should be noted that LBNL’s excellent *Driving Demand* study identifies a wide range of strategies for educating consumers and developing a compelling message about home performance upgrades, but only addresses the underlying issue of the value proposition tangentially.

# Section 2: Developing a Consumer Market for Whole-house Upgrades

## Issues Other Than the Consumer Value Proposition

The consumer value proposition is central to the industry because without strong consumer demand, there is no real possibility for the number of upgrades a year to reach a meaningful scale. However, there are other issues slowing the expansion of home performance. The factors that influence contractor profitability are second in significance only to the consumer value proposition. Lack of strong messaging and branding, as well as inadequate sources of appropriate financing are also significant barriers to the industry's expansion.

## Challenge 4: Contractor Profitability

Contractor profitability is crucial to the success of the whole-house upgrade industry. Contractors are the engine of the industry; unless they are motivated by sufficient profits to make sales and carry out the work, no jobs will be completed at all. The potential to make profits will attract the highest-quality contractors necessary to achieve real energy and other savings. Conversely, if there the profits to be made in home performance jobs are marginal, few contractors, and even fewer high-quality firms, will want to carry out such projects.

Strong consumer demand is probably the most important driver of contractor profitability, which is why it was addressed first in this paper. However, there are a number of other factors beyond effective customer demand that affect contractor profitability, and these should be addressed systematically to make the home performance industry as profitable and supportive of high-quality contractors as possible. Strategies to reduce unnecessary contractor costs are particularly important. Contractors who work within programmatic contexts to provide whole-house upgrades frequently face challenges with reporting and other bureaucratic requirements that drive up labor costs and reduce profit margins.

For contractors who work in areas covered by several programs, costs are typically further increased, and profits correspondingly diminished, by different reporting and other program requirements. Contractor training and certification is also expensive: some training is clearly necessary to provide the contractor with the skills to carry out a whole-house upgrade, and is valuable in differentiating a home performance contractor from competitors, but there is a question as to optimal amount of training to transmit the necessary skills without imposing an undue cost burden.

Actions to address these issues would play an important role in supporting the development of markets for home performance upgrades by reducing cost that contractors need to charge for an upgrade.

### Solution 4.1: Standardize Program Requirements and Operations

Many contractors work in multiple program areas and have to deal with different and sometimes conflicting program requirements. The effort required to address these differences can be a significant business cost, and may make the difference in a contractor's decision to engage in the whole-house

upgrade business.

Stakeholders have identified a number of areas of programmatic work that would benefit from national standardization and application of best practices. Although none of these are crucial to the operations of a program, together they can make a significant impact on a program's ability to deliver high-quality energy efficiency upgrades in a cost-effective way. National standards for file and on-site field inspections, for health and safety testing and measure implementation, and for quantifying the impact of measures would all enhance programmatic effectiveness.

Implementation strategies:

- Develop a comprehensive, prioritized list of all standards necessary for the industry and conduct a gap analysis to identify those that still need to be completed.
- Develop an implementation plan for creating all standards in order of priority.
- Develop a national working group of program administrators to develop strategies for standardizing program operations.
- Support national outreach efforts to promote adoption of national standardization in a wide range of program areas.

#### **Solution 4.2: Make Data Collection and Transfer Quick and Easy**

One of the most important factors affecting program efficiency and ability to reduce cost burdens on contractors is information technology (IT). IT is central to program operations, which rely on the communication and analysis of large amounts of data. Contractors use software to capture data about a project, generate reports and proposals for consumers, and model energy savings, among other business purposes. Program administrators typically use software to manage a range of functions, including storage of program-related data in a database and reporting to program sponsors (states or utilities) and Federal agencies. Contractors and program administrators may also be working to obtain data from utilities for EM&V purposes.

The many software programs needed to fulfill these different functions may be integrated or interoperable, but they frequently are not. The recent trend to encourage market competition among software providers is exacerbating the problem by engaging more interacting systems rather than fewer. In this context, good software, and integration and standardized data reporting, have the potential to generate very important cost savings for both programs and contractors. Without high-quality IT systems, gathering data, reporting, and carrying out other related activities are extremely expensive and labor-intensive propositions.

At present, however, programs do not have access to IT systems that would allow them to realize these efficiencies. Current data standards, including the Federal Green Button initiative and the BPI data collection and transfer standards, will contribute to progress in this area, but need to be supplemented by additional work. This is an area in which collaboration among programs and efforts to coordinate on specific projects could be beneficial, although IT is an area in which potential economies of scale needs to be balanced by the need to promote a healthy competition among vendors in the marketplace.

Implementation strategies:

- Complete development of initial versions of national data standards and make periodic revisions to reflect lessons learned through implementation.
- Convene a working group of program administrators to support standardization, and identify and develop strategies to deal with emerging data-related problems and issues.

## **Challenge 5: Lack of a Strong Message and Brand**

Energy efficiency is a complex field, and lack of homeowner understanding is often cited as a key impediment to growth of the field. While not as significant as some of the barriers discussed above, a broader and better public understanding of the benefits of whole-house upgrades would undoubtedly support growth to scale.

### **Solution 5.1: National Branding and Marketing Campaign**

Although the consumer value proposition is a more significant problem than marketing and consumer education, the home performance industry would benefit tremendously from a well-designed, well-executed national marketing campaign, possibly modeled along the lines of a Public Service Announcement (PSA).

A marketing campaign could be designed around a national recognition system, as discussed in Section 1.2 above. The campaign could develop a broad public awareness of the system and educate consumers about the details of what it means, thereby supporting integration of the system into the real estate value chain in a way that enhances the value of homes that receive upgrades.

A national marketing campaign should be designed to benefit contractors by making lead generation easier and reducing the cost of customer acquisition. This effect will be indirect, but it could nonetheless be significant. Manufacturers, contractors and distributors should be centrally involved in creating the campaign, and could even take the leading role in creating it.

It should be noted, however, that the benefits for a large-scale marketing campaign will be greater to the extent that the other infrastructure designed to support the success of the home performance industry is in place.

Implementation strategies:

- Identify the resources to launch a national marketing/branding campaign.
- Retain a professional firm to design the campaign.
- Ensure adequate stakeholder engagement and buy-in in the effort, with contractors being major if not primary stakeholders.
- Test the campaign in target markets before a national roll-out.



## Challenge 6: Financing

Financing, as noted earlier, has been widely seen as a major barrier to the growth of the home performance industry, yet - at this point in the industry's development - is probably much less significant an obstacle than most of the issues discussed above. Given that financing on extremely attractive terms has been made available in some areas without significantly driving uptake suggests that the consumer value proposition, not lack of financing, is the more important problem.

The reactive and staged approaches could significantly reduce the need for financing programs designed specifically to cover the costs of whole-house upgrades, partly because the staged approach allows the homeowner to pay for upgrades over time (a "payday upgrade" approach), and partly because contractors can partially support the upgrades through their existing financing mechanisms.

The challenges involved in financing hundreds of thousands of upgrades are not irrelevant, however, and are likely to become more important over time. As the industry moves from relatively affluent and motivated early adopters to the broader population of homeowners, convenient financing mechanisms will be necessary for consumers who have limited cash and financing options. And financing tools could play an important role in attracting quality contractors to the home performance field. Accordingly, developing appropriate financing products that can support whole-house upgrades is an important medium-term goal for the home performance industry.

### Solution 6.1: On-bill Financing and Standardized Unsecured Loans

Recent experience with financing programs indicates that products that can be originated rapidly and without extensive paperwork, and that carry rates around that of a traditional mortgage, are attractive to consumers willing and able to incur debt. The early experiences of on-bill finance and collection programs suggest that incorporating payments on energy efficiency loans into the utility bill payment process is a promising approach. The infrastructure for a secondary market for unsecured energy efficiency loans generated through the WHEEL program is a financing strategy with long-term

potential. Loan pools for both the on-bill and consumer loan products could be funded by state or Federal bond issuances.

Much of the work to develop infrastructure for these programs has already been conducted. At the point, the industry needs time to implement the strategies, and mechanisms for sharing information about what is and is not working.

Implementation strategies:

- Support the development and standardization of unsecured consumer loan products, with the goal of developing a strong secondary market for them through the WHEEL initiative.
- Support the development and expansion of on-bill financing and repayment programs.
- Disseminate best practices in establishing and administering on-bill programs.

# Section 3: Accessing Markets for Energy Efficiency as a Resource

Whole-house energy upgrades have the potential to create value for a range of other stakeholders in addition to homeowners. Most obviously, utilities can benefit from energy efficiency in a variety of ways: meeting capacity needs, meeting EEPS goals, and possibly reducing their long-term need for new supply-side resources. Energy efficiency also has value in nascent carbon markets, as demonstrated by the northeast Regional Greenhouse Gas Initiative (RGGI). And there is a possibility that over the long term other actors, such as insurance firms, might find value in the health benefits generated by whole-house upgrades.

A small number of programs have begun to work towards strategies for monetizing these other values generated by energy efficiency measures generally, and whole-house upgrades specifically. The regional capacity and carbon markets have been the easiest places to explore selling energy efficiency as a resource. A more ambitious goal would be to sell energy efficiency as a resource to utilities, possibly through a program with a generic similarity to “white tag” initiatives.

However, efforts to tap these opportunities are in the very beginning stages. To fully realize them, the home performance industry needs to address five challenges.

## Challenge 7: Cost-effectiveness Tests

At present, cost-effectiveness tests impose limits on the creation and expansion of some home performance programs. Most whole-house programs find it difficult to clear several of the tests, notably the Total Resource Cost test (TRC), as commonly implemented. Failure to clear the bar on one or more tests has prevented new programs from being created, constrained the design of programs that are launched, and in some cases threatened the future of existing programs.

### Solution 7.1: Change Test Implementation to Incorporate Best Practices

In the immediate term, it is important for the home performance industry to support the reform of cost-effectiveness test implementation through the application of best practices. At present, most tests are implemented in ways that are not consistent with the underlying goals and rationales of the tests – which leads to test results that are meaningless at best and highly misleading at worst.

Implementation strategies:

- Encourage industry-wide support for best practices in test implementation as recommended by Synapse Energy Economics, RAP, NHPC and others.
- Continue development of research into best practices.



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#### **Solution 7.2: Encourage Abandonment of Tests If Adherence to Best Practices Cannot Be Achieved**

The challenge of implementing best practices, particularly in the case of the TRC, is that proper implementation can be extremely complex and expensive. The TRC also introduces an unusual level of paternalism into market dynamics that would be particularly inappropriate in the face of robust consumer demand for upgrades. Finally, cost tests are not applied to supply-side energy resources, and are increasingly inappropriate in a context in which energy efficiency is emerging as a potentially significant resource.

In the longer term, the home performance industry, utilities, and (most importantly) consumers would be best served by elimination of the cost-effectiveness tests as they are currently implemented. The logical alternative would be a system in which the utility values energy efficiency primarily in terms of its cost relative to the cost of other resource options, and secondarily in terms of broad policy benefits, such as bill reduction for low-income consumers. It should be noted that the Program Administrator Cost test (PACT) is the current test that comes closest to supporting decision-making based on such principles.

Implementation strategies:

- Encourage elimination of cost-effectiveness testing if best practices cannot be adhered to.
- Promote treatment of energy efficiency as a resource, with evaluation made primarily in terms of its cost relative to other resource options.

#### **Challenge 8: Utility Obligations and Incentives**

Although a serious problem, cost-effectiveness tests are only a manifestation of a larger problem that would remain even if all cost-effectiveness testing were abandoned. The nature of typical utility

compensation structures creates material dis-incentives to promote energy efficiency, in that utility compensation is determined in part by the volume of energy sales. Some means is thus required to encourage utilities to support energy efficiency in the face of this material disincentive.

The challenge of utility incentives could be addressed by legislated requirements that utilities achieve a certain level of energy efficiency. However, over the long run, providing utilities with a positive incentive to consider energy efficiency in the way they would any other energy resources is likely to have profound benefits.

### **Solution 8.1: Energy Efficiency Portfolio Standards and Performance Obligations**

Energy efficiency portfolio standards (EEPS) are important tools for increasing energy efficiency. Requiring a certain portion of the energy demand to be met with energy efficiency forces utilities that may have been reluctant to advance energy efficiency measures to advance those measures. Data collection is again crucial in advancing an EEPS so that the relationships between energy efficiency measures installed and actual energy savings can be analyzed and understood.

Another mechanism to support whole-house upgrades is to impose an obligation to achieve a specific level of energy savings through efficiency measures. Historically, performance obligations have often driven single-measure rather than whole-house upgrades, but they could be structured to support a whole-house approach. Many different types of entities could be responsible for implementing and achieving the performance obligations.

Implementation strategies:

- Work with other organizations to support and promote the implementation of Energy Efficiency Portfolio Standards and performance obligations

### **Solution 8.2: Decoupling Utility Profits from Energy Sales**

For decades, energy efficiency advocates have struggled with the fact that traditional utility incentive structures allow utilities to generate more revenues and profits by selling more energy – a disincentive to promoting energy efficiency programs that will reduce energy consumption. Strategies for eliminating this perverse incentive are generally termed “decoupling mechanisms”; they function by severing the direct connection between utility revenues and the volume of energy sales. Decoupling is an important first step towards creating a market in which utilities have a real stake in energy efficiency programs. The political environment may be more supportive of decoupling in jurisdictions in which energy efficiency or carbon reduction standards are in place, because these standards give utilities a reason to consider the traditional incentive structures.

Implementation strategies:

- Work with other organizations to support and promote existing efforts to support decoupling.

### Solution 8.3: Providing Utilities with Incentives for Creating Energy Efficiency

Even in jurisdictions in which this disincentive has been eliminated through decoupling mechanisms, most utilities still have no positive financial incentive to support energy efficiency. In general terms, utilities can generate income from investments in supply-side, but not demand-side resources. This obvious imbalance is a fundamental deterrent to strong utility commitment to realizing all cost-effective energy efficiency resources.

To really drive utility engagement in energy efficiency, utilities should be given a positive incentive to invest in efficiency, in the way that they have incentives to invest in supply-side resources.

Proposals to incentivize utilities to invest in energy efficiency have been circulated for years, but have not been widely implemented. However, the few jurisdictions in which such incentives have been implemented, notably Massachusetts, suggest that they can serve as a powerful incentive to encourage utilities to support energy efficiency.

That said, the politics of altering utility compensation are complex and involve a range of powerful vested interests. This is not a project that the home performance industry should expect to take on by itself. However, the industry can and should look for ways to promote dialogue on this issue and to collaborate with other organizations and sectors in promoting change.

Implementation strategies:

- Support implementation and expansion of performance incentives that are structured to support whole-house upgrades.
- Support continued research on the issue of restructuring utility incentives, such as that conducted by LBNL and RAP.
- Collaborate with utilities supportive of energy efficiency to press for change in incentive structures.
- Identify other organizations and sectors with a stake in changing utility incentives, and develop strategies for partnership.

### Challenge 9: Rising Rates

The larger goal for energy efficiency programs is to replace the need for supply-side resources, through retirement of older, dirtier and inefficient plants, and/or reduction in the size or number of new ones. However, the growth of efficiency programs will impact rates, and the larger the efficiency programs, the greater the impact on rates. Investor-owned utilities' rates are, in general terms, derived through a formula that divides the utility's "revenue requirement" by the anticipated quantity of energy (therms or kilowatt hours) required by the utility's customers. If energy efficiency programs significantly decrease the quantity of energy required by the system, the utility's fixed costs will be divided by the smaller number of therms or kilowatt hours that the utility delivers, resulting in higher rates per unit of energy. The increase in rates will not pose a problem for the consumers who have had their homes upgraded, because the savings realized by the reduction in energy consumption will more than compensate for higher rates. Consumers who still have energy inefficient homes, however, could end up paying considerable more for energy. Commissions and utilities are extremely sensitive to

rising rates, even if energy efficiency results in a net lowering of expenditures on energy for all utility customers.

### **Solution 9.1: Address the Rate Dilemma Through Scale**

Given current utility compensation structures, significant growth in energy efficiency programs will result in rate increases, even if bill savings fall for consumers who participate in efficiency programs. This “rate dilemma” represents a significant challenge for the energy efficiency industry. One important, if counter-intuitive, strategy for addressing this dilemma is to expand programs rapidly and ensure that they are designed to reach large segments of the population so that any person or business that suffers as a result of rising rates has the opportunity to realize bills savings through participation in an energy efficiency program. Support for weatherization programs that assist low-income homeowners could also be extremely significant in this context.

Implementation strategies:

- Commission research on rate impacts and strategies for mitigating the impact on vulnerable ratepayers.
- Support broader knowledge and understanding of scale as a solution to rate impacts.

## **Challenge 10: Technical Challenges**

Selling negawatts involves a number of significant technical challenges. Forward capacity and carbon markets exist only in some areas of the country, and both are still in relatively early stages. At present, energy efficiency is not sold as an energy resource anywhere in the U.S.

Moreover, even in the markets that exist, potential sellers of energy efficiency need to clear significant technical hurdles to be able to sell energy efficiency, and the forward capacity markets in particular entail some financial risks. To take advantage of these markets, programs need technical expertise and access to capital.

### **Solution 10.1: Knowledge Sharing**

A relatively small number of organizations are working through the technical challenges of selling energy efficiency to capacity and carbon markets. Existing efforts to share the nuts and bolts of how to tap these markets should be supported and encouraged.

Implementation strategies:

- Establish a national stakeholder working group for all programs and other entities currently selling or seeking to sell energy efficiency as a capacity, carbon or other resource to promote knowledge-sharing.

## **Challenge 11: Data Collection and Transfer**

Because both capacity and carbon markets rely heavily on evaluation, measurement and verification

of actual savings, strategies to facilitate the collection and flow of data are crucial. Unless savings are accurately and reliably measured, they cannot be sold. The risks involved in overestimating efficiency savings when selling into some markets are significant enough that, in the absence of good data, sellers of energy efficiency make conservative projections, thus effectively underselling their product.

Access to accurate data, particularly energy consumption data, is thus a fundamental need for the development of markets for energy efficiency. The need for reliable consumption data from utilities is particularly important, but making the collection and transfer of data about the specifics of whole-house upgrades easier for contractors and program administrators and program sponsors will also be important.

### **Solution 11.1: Data Access Policies and National Data Standards**

The need for the data necessary for advancing evaluation, monitoring, and verification is clear and could be addressed through national policy measures, including the proposed eKNOW legislation. National standards, including those discussed above in previous sections, could also support the collection and transfer of data, particularly upgrade-related information.

Emerging “smart” technologies may provide an alternative path to accessing some of this data (e.g., from a monitoring device in the home rather than at the meter). While this emerging field may provide an alternative path for data access, it does not alter the importance to ensuring the availability of meter data.

Implementation strategies:

- Support policies that facilitate transfer of energy consumption data to customers and relevant third parties.
- Support integration of “smart home” technologies into home performance programs to allow for collection of detailed consumption and occupancy data.
- Advance data standards designed to facilitate the collection and transfer of data that support quantification of energy savings for resource purposes.

## **Challenge 12: Absence of Markets for Energy Efficiency As a Resource**

One of the most obvious challenges to the goal of selling energy efficiency realized through whole-house upgrades is that, even if the significant issues concerning incentives were addressed, capacity and carbon markets do not yet exist in many parts of the country. New England and the Mid-Atlantic have operating capacity markets, and several regional carbon markets are in different phases of development, but there are areas of the country where home performance programs have no obvious outlet to sell any megawatts that they generate.

### **Solution 12.1: Support for Market Development**

The development of new capacity and carbon markets is a project considerably beyond the existing resources of the home performance industry. However, because the industry could benefit so significantly from these markets, the development of ways to support their creation and/or expansion

should be considered, and should be a part of the industry's long-term plan.

Implementation strategies:

- Document the success of existing resource market mechanisms, including regional capacity markets and carbon initiatives, in supporting goals including both use of energy efficiency as a low-cost resource and achievement of climate goals.
- Support policies that replicate these market structures in other areas.
- Explore other market approaches, such as quantification of health benefits or enhanced building durability, for insurance purposes.



## Section 4: Implementation

The identification of key challenges, as well as strategies to address them, is essential for the development of a roadmap for the home performance industry. The other indispensable component of the roadmap is a clear description of a process through which strategies can be implemented.

This process should include:

- Agreement on the strategies that need to be implemented for the industry to reach scale.
- Prioritization of strategies, from ones that must be worked on immediately to ones that can be deferred or that can be pursued according to a slower timetable.
- Assignment of responsibility for implementing strategies to appropriate actors.
- Identification of the resources necessary to implement each strategy.
- Explicit procedures for testing strategies so that they can be modified or discarded based on results.
- A strategy to coordinate and share knowledge about efforts on an on-going basis.

### Agreement Regarding Strategies

In previous sections this paper has recommended the following strategies to bring the home performance industry to scale.

To develop a consumer market for whole-house upgrades:

1. Expand well-designed incentive programs at a national level, if possible.
2. Develop a national recognition system (or develop a strategy for coordinating multiple recognition systems if a national system is not possible).
3. Support more accurate prediction and measurement of energy savings.
4. Develop systems to integrate energy efficiency into reactive purchases.
5. Develop systems for implementing whole-house upgrades over time.
6. Reduce homeowner risk through quality assurance programs.
7. Standardize incentives and program operations nationally.
8. Make data collection and transfer easy and inexpensive.
9. Launch a national marketing and branding program.
10. Develop appropriate financing programs.

To develop a market for energy efficiency as a resource:

1. Promote best practices for the implementation of cost-effectiveness tests;
2. Promote the elimination of tests if they cannot be implemented according to best practices;
3. Promote strategies to support development of performance obligations.
4. Promote changes to utility incentive structures that remove perverse incentives and provide positive incentives that encourage utilities to treat energy efficiency as a resource.
5. Promote growth of efficiency programs to a scale that can resolve the rate increase dilemma.
6. Share knowledge and best practices regarding the sale of energy efficiency as a resource.
7. Make data collection and transfer easier.

These lists draw from numerous conversations and meetings with stakeholders, and as such are designed to capture many of the leading proposals and ideas within the industry. However, as previously mentioned, this list is not intended to be definitive. It is designed to start the conversation, not finish it. A stakeholder process that completes the work of identifying relevant strategies is essential for the industry to move forward.

## **Prioritization**

Prioritization among the strategies listed above is difficult, since most home performance experts would probably identify all of them as important. However, since the industry does not have the resources to undertake all strategies well simultaneously, broad agreement on which projects should be implemented first would benefit the growth to scale.

This paper advocates prioritization of five consumer market development strategies:

- Expansion / development of incentives, particularly at the Federal level.
- Development of a coherent, national recognition system.
- Development of processes to support reactive and staged upgrades through programs.
- National standardization of program operations and requirements.
- Improvement in data collection and transfer mechanisms.

A significant national incentive would be a game-changer, and, as such, is worth pursuing even if the passage of legislation authorizing it is relatively unlikely in the near term. A national incentive should be designed to support other programmatic changes, and could help to drive program improvements and standardization along the lines discussed above.

A national recognition system could significantly change the industry's prospects, although over a longer time frame than would a new incentive program. Because of the length of time required to roll out a recognition system and integrate it into the real estate value chain, work on this strategy should be a high priority for the industry.

The processes to implement staged and reactive upgrades and to improve data collection and transfer have the advantages of being strategies that can support growth of the home performance industry even in the absence of major incentive programs. Work on these two strategies should be prioritized, both because they will make significant contributions to the industry in their own right, and because they offer an alternative path to scale if it is not possible to secure significant new incentives for the industry. Both strategies would be supported and enhanced by successful implementation of a national recognition system.

To achieve a robust market for energy efficiency as a resource, this paper recommends a short-term focus on supporting best practices in cost-effectiveness testing, including movement to simpler tests such as the Program Administrator Cost test if the financial and technical demands of conducting the TRC correctly prove excessive. Work on the rate impacts of energy efficiency programs is also crucial.

Over the longer term, strategies to alter utility compensation structures in a way that incentivize investment in energy efficiency need to be developed and implemented – with the recognition that the home performance industry cannot do this work alone.

Again, it should be emphasized that this prioritization is intended only to encourage further discussion, not to provide a definitive statement. However, this paper strongly encourages stakeholders to continue a discussion that identifies and results in a consensus on priorities, because the available resources do not permit work on all promising strategies simultaneously.

## **Identification of Resources**

In a post-ARRA context, resources to implement the strategies that the home performance industry needs to pursue to achieve scale are relatively scarce, but not non-existent.

The Federal government could be a source of significant funding for a national incentive program and other measures to enhance the industry, either through an energy bill or through stand-alone legislation. However, there is no guarantee that this Congress will act on any energy efficiency-related measures.

In the absence of new Federal legislation, the Department of Energy will have limited funds. That said, the department might be able to access some resources to support implementation of strategies to bring the field to scale. The most likely candidates for such support would be initiatives that have national implications, such as the development of standards or systems.

Programs – whether utility, state, municipal or non-profit based - have budgets that allow major investments in large-scale strategies designed to help the industry. Most, however, are making expenditures in areas related to some of the key strategies, or have limited discretionary funds available. These resources might be pooled together to support at least one or two projects, if common agreement regarding priorities and sufficient coordination can be achieved.

Many of the national foundations that have historically supported energy efficiency have expressed interest in supporting a strategy that would enable the industry to grow to scale, as per the recent report by the Energy Futures Group commissioned by the BRIM collaborative. These resources might be used to support one or more of the key strategies.

If existing resources are not sufficient to support implementation of all the strategies identified in the report – and they almost certainly are not – they should be directed first to ensuring effective implementation of the five strategies identified in Section 8.3.

## Assignment of Responsibility for Implementation

The strategies listed above fall into several groups. First, a number of strategies could be dealt with most effectively by organizations focused on shaping national policy (i.e. through Executive or Congressional action). A second set of strategies involve national standards and tools, which could be created by a national entity - either a federal agency (DOE or EPA) or a non-profit organization with national scope (BPI and RESNET, NHPC, Efficiency First, etc.). A third set of strategies could be designed and implemented by local programs – with the caveat that such efforts should be incorporated into a larger process so that program development at a local level can be shared. Finally, contractors need to be actively engaged in all of these processes, particularly those involving program design activities, such as developing strategies to tap reactive markets and stage retrofits over time.

Division of responsibilities might look something like the following:

National policy/Research/Trade organizations

- Incentives
- Branding and marketing
- Data collection and transfer
- Financing

Department of Energy and national organizations working closely with stakeholders

- Development of a standard, high-quality QA process
- Standardization of program requirements
- Recognition systems
- Software accuracy
- Data collection and transfer

### Programs and contractor organizations

- Development of supports for reactive purchases and staged upgrades
- Development of financing tools (on-bill and securitize-able unsecured loans)
- Knowledge-sharing regarding sale of energy efficiency as a resource

Development of specific plans to address some of the challenges involved in developing energy efficiency as a resource, particularly those that require research and broad recommendations, are best implemented by national organizations. However, the strategies that require policy changes at the state or local level require stakeholders who have the capacity to interact with state legislatures and commissions and press for the necessary reforms. As a result, significant progress in developing markets for energy efficiency is most likely to occur as the result of strong partnerships between national research-policy organizations and local policy-advocacy organizations. Specific strategies that could be implemented through coordinated national and local stakeholder work include:

- Promote best practices in the implementation of cost-effectiveness tests.
- Promote elimination of tests if they cannot be implemented according to best practices.
- Implementation of performance obligations.
- Promote significant changes to utility incentive structures.
- Promote growth of efficiency programs to a scale.

## Coordination of Activities

Coordination of implementation efforts is one of the most important features of an industry-wide effort to grow to scale. A coordinating process will be required to frame the broad contours of the roadmap and fill in the details. It will also be required to coordinate the implementation of key strategies in a way that ensures that the most vital tasks are being carried out.

Conversations related to the development of a home performance industry roadmap - both formal and informal - have been occurring for years, but have a new sense of urgency as ARRA funds dwindle. At this point, conversations need to be focused and debates about issues where there is genuine disagreement need some structure. A coordinating organization could facilitate the evolution of conversations into an actual roadmap by:

- Creating and circulating documents designed to focus discussion by synthesizing the state of conversation and encourage comments and critique, possibly through a public, online document.
- Convening public forums for debate about specific issues once there is broad agreement regarding the outline of a plan.
- Developing and circulating a consensus document.

Coordination at the implementation phase is required to ensure both that organizations assume responsibility for implementing projects, that implementation stays on track, and that lessons learned are circulated rapidly.

All implementation efforts should be coordinated with policy initiatives. New and existing legislation should incorporate and advance the strategies identified in the roadmap. New incentive programs, for example, should be structured to support staged upgrades.

Not all of these coordinating functions need to be provided by the same organization, but coordinating bodies should communicate closely among themselves.

## **Testing of Implementation Strategies**

All implementation efforts should include a detailed plan for evaluating and testing results. Feedback loops should be designed to be short, so that course corrections can be made and lessons shared as soon as possible.

Both the implementation and evaluation plans should be designed to avoid creating disincentives to report subpar performance or failure; poor results are inevitable in a testing process, but nothing will be learned if they cannot be honestly reported and discussed.

To the greatest extent possible, strategies should be implemented in several different geographic areas to ensure that they can perform well in a range of conditions, or to verify that they can perform in at least some circumstances.

# Conclusion

There is a lot at stake for the home performance industry in coming together around a plan for the next decade. Realizing the energy efficiency potential of residential buildings is notoriously difficult. In a period in which funding is likely to be limited, it is crucial for the field to agree on the most important projects, and to explain them convincingly to potential supporters and allies.

Broad agreement on many issues among the participants at recent meetings designed to address large strategic issues suggest that the home performance industry is close to agreement on many of the essential points of a roadmap for the next few years. In this context, a process for developing and strengthening consensus around key goals and strategies is crucial.

This paper is intended to help serve as a starting point for discussion. As discussed above, the work to develop a roadmap involves:

- Key challenges/barriers.
- Solutions to the challenges, framed as action items.
- Prioritization of action items.
- Assignment of responsibility for implementation of key action items.
- Identification of resources available to support implementation.
- A process for coordinating activities and maintaining communication throughout the process.
- Clear processes for testing strategies and abandoning ones that don't work.

A range of online tools, from Google Docs and Google Chat to Basecamp could allow broad stakeholder discussion. Active moderation of these conversations would be helpful to ensure that they remain productive. If online tools can be used to support a general consensus, details, particularly regarding contentious issues, might be resolved through in person stakeholders meeting.

The home performance industry is at a critical stage. It has a constituency, a leadership, and purpose. It has proven that it can save significant energy from the notoriously difficult to tap energy waste in the existing residential market. If home performance can grow to a sustainable and profitable field, it can be a game-changer for a nation in desperate need to reduce its energy consumption.

# Appendix A: Other Roadmap Documents

## The DOE HPwES Program Report

DOE's Home Performance with ENERGY STAR® Program Report, issued in January 2013, is designed as a multi-year plan that works toward “scalability” of the program (DOE 2013: 1).” The plan identifies three workstreams, the first focused on achieving greater standardization of the Home Performance with ENERGY STAR® program, the second focused on testing a set of approaches through pilot programs, and the third focused on more significant program and policy changes. The areas to be standardized as part of the first workstream include development of minimum criteria for a home energy assessment, health and safety testing, and performance testing, as well as standardization of performance and prescriptive approaches to upgrading the home, and science-based guidance regarding workscope development. In their general support of standardization and the specific work on areas identified as priorities in this report, such as QA, the DOE plan is consonant with the recommendations in this document.

The second workstream identified in the program report is designed to test pilot programs in the areas of:

- Standardization of data collection
- Ventilations requirements
- Systems and trades-based opportunities
- Performance metrics and evaluation tools
- Delivery models

The standardization of data collection corresponds to the emphasis in this paper on the importance of data collection and transfer. And this paper recommends development of systems and trades-based opportunities, specifically within the framework of reactive programs and staged upgrades.

The third workstream includes several policy and program activities, including:

- Interagency collaboration and coordination
- Workforce certifications and standard work specifications
- Asset ratings
- Labeling and branding
- Evaluation of energy modeling tools

The asset rating, labeling and branding, and evaluation of energy modeling tools in particular are clearly closely aligned with this report's recommendations.

Despite these broad areas of agreement, there are some significant areas of difference between the Program Report's recommendations and those contained in this report. First, the Program Report understandably does not allocate direct responsibility to any parties except DOE, although it indicates that responsibility for a number of pilot projects will be assumed by third parties, nor does it identify ways to engage other stakeholders apart from soliciting comments. As DOE cannot (and should not) undertake all the work necessary to advance the home performance industry, this leaves a need to. Second, the Program Report does not address resource markets in any significant way, leaving this

important area of action largely unaddressed. Third, some of the key projects identified in the Program Report, including labeling, branding and modeling issues, are staged relatively late in the timeframe; this report suggests that the significance of these issues for moving the home performance industry forward is such that work on them should begin as soon as possible.

## The BRIM report

The Building Retrofit and Industry Collaborative (BRIM) funder collaborative commissioned a report to follow up on the stakeholder process held during the summer of the previous year. The report, completed in January 2013, identifies three particularly significant areas for the industry: 1) development of state roadmaps, 2) development and promotion of new models for utility cost-effectiveness, and 3) development programs to drive consumer demand. It also proposes a specific research agenda involving case studies of programs, research into non-energy benefits (NEBs), and research on consumer decision-making.

Many of the key challenges discussed in this support should be addressed through national processes, and for this reason the development of state roadmaps could be premature. Given the importance of standardization, a proliferation of state roadmaps could create problems for the industry. However, much of the policy work that will drive the industry, including energy efficiency portfolio standards and policies governing utility programs, will occur at the state level, and in this context a state-by-state focus is important. However, it is important that state roadmaps be coordinated with national research and implementation processes and support national standards whenever possible.

Regarding utility cost-effectiveness, the BRIM report observes that the utility cost-effectiveness challenge is multi-faceted: noting that shareholder incentives are an important issue, and recommending evaluation based on climate goals, for example. The research recommendation that addresses this area, however, is focused on quantification of non-energy benefits (NEBs). Although this could be a useful project, it does not address the more significant challenges of developing markets for energy efficiency as a resource, which include addressing utility incentives.

The BRIM report's specific proposals to support driving demand – including benchmarking or rating (discussed herein as a “recognition system”), supporting access to and analysis of utility data, and national branding / marketing initiatives – mirror some of the recommendations in this document. Again, the key research proposal related to this area focused on a relatively limited issue – consumer decision-making. This paper's argument that the consumer value proposition is central to taking the home performance industry to scale suggests that such research could be important, but will need to be supported by actions that actually enhance the value proposition.

In general, the BRIM report touches on many of the same issues as this report, but apart from the tripartite research agenda, does not lay out a clear series of action items or assign responsibilities to any actors except the funders. This is appropriate in the context of the report's scope, but it leaves important roadmapping needs unmet.

### **White Paper - Bringing on the Boom and Beating the Bust (April 2013)**

The National Home Performance Council, Inc. (NHPC) encourages the implementation of whole-house retrofits for increased home energy performance and facilitates coordination among federal governmental agencies, utilities, state energy offices, contractors and others to achieve improved whole-house energy performance. NHPC is a registered 501(3)(c) organization. Further information about our firm can be found at [www.nhpci.org](http://www.nhpci.org).

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