ENERGY STAR Homes Success in the Northeast

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ABSTRACT

Builders are constructing and homebuyers are purchasing energy efficient, comfortable and durable homes in the Northeastern U.S. in record numbers. System-benefit charge-funded residential new construction programs in Vermont, Massachusetts, and New Jersey are approaching market-transforming levels under the ENERGY STAR Homes banner by offering comprehensive technical services and financial incentives to builders while marketing the homes' benefits to buyers.

In Vermont, nearly 14 percent of new homes built were labeled ENERGY STAR in 2001. In New Jersey and Massachusetts , 4-5 percent were labeled ENERGY STAR in 2001, with commitments in both states to build more than 16 percent of new homes to ENERGY STAR standards in 2002. All of these numbers have been increasing yearly and are on steep growth curves for the future.

This paper describes the ENERGY STAR Homes Program features in these three states, outlines elements that differentiate them from other ENERGY STAR Homes Program efforts, and highlights the reasons behind their success. Aggressive outreach and sales, quality home energy rating services, a focus on lighting, appliances and mechanical ventilation, incentive payments that get builders' attention, comprehensive site inspections, performance testing and commissioning, and success with the subsidized low-income housing markets are covered. The paper concludes with a discussion of applicability and transferability to other states and programs and suggests strategies for pulling back intervention efforts once these new construction markets are transformed.

National ENERGY STAR Labeled Homes Activity

ENERGY STAR has become *the* national standard for residential new construction programs. On a regional basis the Southwest is out front, leading the charge. The success of labeling completed homes in the Southwest with the ENERGY STAR has taken off, with almost 5 percent of all homes in this region (defined by the Environmental Protection Agency ("EPA") as Arizona, California, Nevada and Hawaii) built in 2001 to meet the standards. The 12,000 mostly tract homes in the region represent 45 percent of all 26,668 homes ENERGY STAR labeled nationally in 2001. In this market, ENERGY STAR has been successful because of the intense competition between a few large production builders desiring to differentiate their otherwise similar tract homes from their competition. Builders have been willing to pay for the ENERGY STAR labeling on completed homes and buyers have responded to their marketing and learned to seek out ENERGY STAR labeled homes. The Southwest seems to be supporting and growing a vibrant ENERGY STAR homes labeling initiative with

less intervention than is necessary in other regions due to its preponderance of few intensely competitive large tract builders.

In comparison, the Northeast states (as defined by EPA include Connecticut, Massachusetts, Maine, Rhode Island, New Hampshire, Vermont, New York, and New Jersey) labeled 2,718 homes (see Table 1).

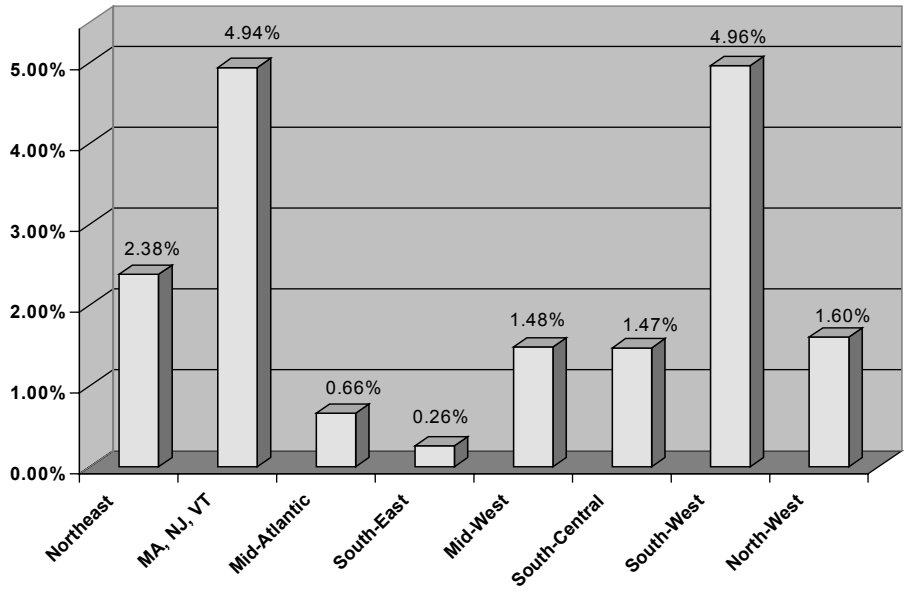
Table 1. 2001 Total ENERGY STAR Labeled Homes by U.S. Region

	Pre-1997	**1997**	**2000**	**1999**	**2000**	**2001**	**Total**
Northeast	0	67	694	1,486	2,604	**2,718**	7,569
Mid-Atlantic	0	204	1,176	1,067	718	**845**	4,010
South-East	0	24	138	518	759	**1,159**	2,598
Mid-West	288	431	1,114	1,621	2,731	**4,680**	10,865
South-Central	0	141	313	191	1,115	**2,830**	4,590
South-West	0	339	320	2,129	4,609	**11,912**	19,309
North-West	213	495	1,784	1,482	1,451	**2,524**	7,949
Totals	501	1,701	5,539	8,494	13,987	**26,668**	56,890

Source: U.S. Environmental Protection Agency, ENERGY STAR Labeled Homes Program

When viewed as a percentage of housing permits (U.S. Census 2002) instead of absolute numbers, the difference between the Southwest and the Northeast is somewhat less dramatic (4.96 percent vs. 2.38 percent). These two regions of the country lead all others, as is demonstrated in Figure 1. However, when comparing the Southwest to the three states with maturing ENERGY STAR Homes Programs in the Northeast (Massachusetts, New Jersey and Vermont), the percentage of housing permits labeled as ENERGY STAR is almost exactly the same (4.96 percent in the Southwest vs. 4.94 percent in these three Northeast states.)

Figure 1. 2001 ENERGY STAR Labeled Homes as a Percentage of Housing Permits[1]



[1] Completed ENERGY STAR homes are compared to permit data because this information is most readily available, even though permits generally exceed completions and understate market share due to attrition.

Where markets are dominated by many smaller builders and demand for homes is strong, a larger and more sustained market intervention strategy is necessary in order to 1) get builders' attention to consider and then build to ENERGY STAR homes standards, and 2) encourage buyers to select ENERGY STAR labeled homes. Northeast states are dominated by many builders, each constructing fewer homes annually than other U.S. regions[2]. As a result, initiatives to encourage energy efficient residential new construction in the Northeast have used aggressive market intervention with a dual focus on builders and homebuyers.

Successful ENERGY STAR Homes Programs in the Northeast

The Northeast has had a relatively long history with demand-side management ("DSM") energy efficiency programs. For the most part, these have transformed into systems benefits charge ("SBC") funded initiatives. In most cases in the region, lost opportunity programs, including residential new construction, continue to be offered under the SBC structure in order to attain market transformation in the new homes sector. Incorporating EPA's successful ENERGY STAR label into Northeast new homes programs caught on early and has become the uniform banner for all regional and statewide programs.

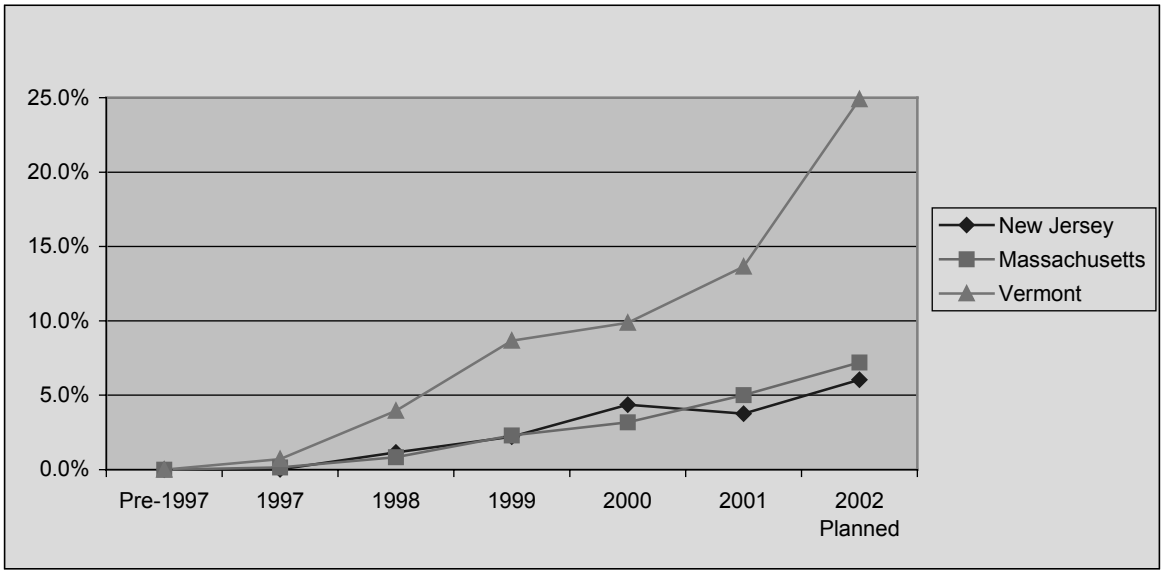
Three Northeast states have been working aggressively at ENERGY STAR labeled homes programs since the mid-90's; Massachusetts, New Jersey and Vermont. All three states have focused on a dual approach of recruiting builders and marketing to homebuyers. These efforts have paid off, as can be seen in Figure 2. Market penetrations (measured as the number of ENERGY STAR labeled Home completions divided by the number of housing permits) will be between 6-8 percent in Massachusetts and New Jersey in 2002, and more than three times that in Vermont.

However, the real indication of success to come over the next year or two is in terms of builders' signed commitments[3]. Through aggressive outreach and sales to builders, program sales staff sign up to construct future homes to ENERGY STAR Homes Program standards. In New Jersey and Massachusetts, previously-signed and anticipated builder commitments for 2002 ensure that more than 14 percent of homes built over the next two years will be ENERGY STAR. In New Jersey, it is likely that these numbers are low given recent success in signing on the state's largest builder (K. Hovnanian) to build all of their new homes (approximately 2,000 per year) to ENERGY STAR Homes Program standards. There are also at least two other top-20 New Jersey builders watching closely and considering doing the same. Given the trajectory of Vermont's program to date and that there will be an additional utility joining the statewide ENERGY STAR Homes Program, the number of commitments for 2002 is expected to exceed one third (34 percent) of the planned new homes for the year statewide. Specific program details follow.

[2] Data from the National Association of Home Builders indicates that in 2001, there were .080 NAHB member builders per housing start in the Northeast, more than twice as many as the .038 builders per housing start in the Southwest.

[3] "Enrollments" and "commitments" are used interchangeably for those homes that have been signed up for a program and have a commitment to complete a home to program standards within two years. In general, more than 95 percent of enrolled homes end up being completed and labeled as ENERGY STAR Homes.

Figure 2. Market Penetration of MA, NJ and VT ENERGY STAR Labeled Homes



Sources: Environmental Protection Agency, 2002; U.S. Census Bureau, 2002

Program Descriptions

Massachusetts

Massachusetts' ENERGY STAR Homes Program has demonstrated impressive results since it's inception in 1998. At that time, Massachusetts transitioned from the Energy Crafted Homes Program, which had been in place since 1991 as a relatively under-subscribed program (1,000 homes over six years) with very high standards, to ENERGY STAR Homes. ENERGY STAR Homes changed the program focus to one that was achievable by more builders and included a focus on consumer marketing to create homebuyer demand. The program sponsors' goals aligned closely with the EPA's ENERGY STAR Homes Program and so they adopted EPA's standards (86 home energy rating), logo and market-based philosophy. The number of labeled and enrolled ENERGY STAR Homes is shown in Table 2.

Table 2. Massachusetts ENERGY STAR Homes Program Labeled Homes and Enrollments

Year	Housing Permits	Labeled Homes		Enrolled Homes	
		Number	% of Permits	Number	% of Permits
1997	17,186	26	0.2%	-	0.0%
1998	19,254	163	0.8%	539	2.8%
1999	18,967	438	2.3%	787	4.1%
2000	18,000	571	3.2%	2,085	11.6%
2001	16,817	841	5.0%	2,718	16.2%
2002*	18,045	1,300	7.2%	2,500	13.9%

* Expected

Sources: EPA, 2002. U.S. Census Bureau, 2002. Conservation Services Group, 2002.

Specific features of Massachusetts' ENERGY STAR Homes Program are highlighted below in Table 3.

Table 3. Massachusetts ENERGY STAR Homes Program Features

Program Name	ENERGY STAR Homes Program
Territory covered	Massachusetts, Rhode Island and parts of New Hampshire (except for municipal utility territories)
Program sponsor(s)	Electric and gas utilities and non-utility parties (energy office, advocates, environmental groups, etc.) collectively known as the Joint Management Committee (JMC)
Funding source	System Benefits Charge funds (through 2007)
Program contractor	Conservation Services Group (CSG)
Program history	Energy Crafted Homes Program trained hundreds of builders but resulted in few certified homes and little market demand; Transitioned to ENERGY STAR Homes Program in 1998.
Technical differences from baseline 86 point standard[4]	Mechanical ventilation requirement CO detector requirement
Value-added services offered	Extensive marketing campaign (billboards, parade of homes events, newspaper ads and earned media stories, educational signage, marketing materials, etc.); Dedicated outreach and support to affordable/multifamily sector; Home energy rating plan review and recommendations to achieve program standards; On-site training of builder, employees and subs and on-going technical assistance; Pre-drywall inspection to ensure insulation subs performed; Energy efficient lighting design and selection assistance; HVAC commissioning; including verification of proper operation of mechanical ventilation, heating and cooling systems and ductwork; Blower door and duct blaster testing and house inspection to certify subcontractor work and energy efficiency performance; ENERGY STAR Homes Program labeling; and Code compliance documentation.
Participation costs	$75 application fee (refundable upon home certification)
Incentives offered	$500 single-family home rebate $200 multi-family unit rebate Up to $900 in rebates for ENERGY STAR lighting, mechanical ventilation (required, $100), refrigerators ($100) and dishwashers ($100) $100 for HERS score of 87 (single family) or 88 (multifamily) Additional gas utility rebates for high efficiency gas heating and water heating equipment

[4] EPA's ENERGY STAR Homes labeling standards require only a minimum 86 point rating on the Home Energy Rating System (HERS) scale without any additional specific requirements. Since HERS ratings are performance based, the tested and inspected performance of energy systems is used in determining the rating. However, in order to ensure builders do not fail final inspections and in order to deliver the Program's comfort and health and safety promises, the Northeast Programs enforce some additional required program elements.

New Jersey

In 2001, New Jersey moved from a state with two of its electric utilities offering an ENERGY STAR Homes Program to one with all four of its electric utilities (Public Service Electric and Gas Company ("PSE&G"), Conectiv, Jersey Central Power and Light and Rockland Electric Company) and four gas utilities (PSE&G, New Jersey Natural Gas, South Jersey Gas and NUI/Elizabethtown Gas) jointly offering a single statewide new homes program. The New Jersey ENERGY STAR Homes Program has built on the successes of the earlier programs (Conectiv's and PSE&G's) and the experience of its contractors to deliver a program that continues to exceed its goals as it makes large strides towards a transformed new homes market in the state.

As the program transitioned from that offered by just Conectiv and PSE&G to the statewide effort, delays on the part of the Board of Public Utilities (BPU) caused a temporary dip in program completions in 2000. Once given the green light by the BPU, builder commitments have taken off, and labeled homes followed a number of months later. Progress is shown in Table 4.

Table 4. New Jersey ENERGY STAR Homes Program Labeled Homes and Enrollments

Year	Housing Permits	Labeled Homes		Enrolled Homes	
		Number	% of Permits	Number	% of Permits
1997	28,018	6	0.0%	1	0.0%
1998	31,345	364	1.2%	1,347	4.3%
1999	31,976	711	2.2%	1,707	5.3%
2000	34,585	1,506	4.4%	2,564	7.4%
2001	28,455	1,068	3.8%	4,555	16.0%
2002*	26,500	1,600	6.0%	4,771	18.0%

* Expected

Sources: EPA, 2002. U.S. Census Bureau, 2002. Public Service Electric & Gas Co., 2002.

With substantial rebates being offered ($2,000 on average), program enrollments have soared. This popularity has caused some impending budget concerns for the smaller utilities. Incentives will be ramped down as enrollments grow over time. Program features are highlighted in Table 5 below.

Vermont

Vermont has a long history of residential new construction initiatives. Since the early 1980's, Vermont has recognized the lost opportunities in new construction and has taken a multi-pronged approach. The State has required utilities to offer demand-side management programs, enforced a strong development law (Act 250), supported one of the country's first home energy rating systems (HERS) programs, and, finally, in 1997 passed a residential energy code. Despite the fact that Vermont was late in adopting an energy code, the long emphasis on energy efficient building has reaped benefits that are still being realized in the penetration of ENERGY STAR labeled homes (expected to result in about 25 percent of all new starts being built to program standards in 2002). In 2000, the State of Vermont combined all of its efficiency programs under one "efficiency utility" (i.e. Efficiency Vermont, a project of the Vermont Energy Investment Corporation) with a strong commitment to tying programs to

the ENERGY STAR label. Program history in terms of labeled and enrolled homes is presented in Table 6.

Table 5. New Jersey ENERGY STAR Homes Program Features

Program Name	New Jersey ENERGY STAR Homes Program ("NJESH")
Territory covered	New Jersey
Program sponsor(s)	New Jersey electric and gas investor-owned utilities (Public Service Electric and Gas Company, Conectiv, Jersey Central Power and Light, Rockland Electric Company, New Jersey Natural Gas, South Jersey Gas and NUI/Elizabethtown Gas) and the Natural Resources Defense Council (NRDC)
Funding source	System Benefits Charge funds
Program contractors	EAM Associates MaGrann Associates
Program history	Electric utilities have a history of standard offer programs; Gas-only utilities have no prior new construction program experience PSE&G and Conectiv had been offering an ENERGY STAR Homes type program since late-90s; NRDC settled with utilities in 2000 and the Board of Public Utilities (BPU) ordered them to proceed with a slate of programs, including NJESH in May 2001.
Technical differences from baseline 86 point standard	HVAC proper sizing, charge and air flow; Ductwork must be fully ducted (not building cavities) and sealed; House air sealing to ensure passing blower door test upon completion.
Value-added services offered	Marketing campaign (newspaper and real estate guide ads, home shows and conventions, open houses, signage, marketing materials, etc.); Dedicated outreach and support to affordable/multifamily sector; Home energy rating plan review and recommendations to achieve program standards; On-site training of builder, employees and subs and on-going technical assistance; Pre-drywall inspection to ensure insulation subs performed; Blower door and duct blaster testing and house inspection to certify subcontractor work and energy efficiency performance; ENERGY STAR Homes Program labeling; and Code compliance documentation.
Participation costs	None
Incentives offered	Single-family: $700 + $.60/sq. ft. Townhouse: $200 + $.60/sq. ft. Multifamily: $50 + $.60/sq. ft. ENERGY STAR gas furnace/boiler: $300 13 SEER/11 EER CAC: $370 14 SEER/12 EER CAC: $550 13 SEER/11 EER Heat Pump: $460 14 SEER/12 EER Heat Pump: $710 Ground Source HP: $580/ton ENERGY STAR washing machine: $175 ENERGY STAR light fixtures: $30 for recessed, $20 for others Mechanical ventilation system: $100/system

Table 6. Vermont ENERGY STAR Homes Program Labeled Homes and Enrollments

Year	Housing Permits	Labeled Homes		Enrolled Homes	
		Number	% of Permits	Number	% of Permits
1997	1,831	13	0.7%	36	2.0%
1998	2,198	87	4.0%	85	3.9%
1999	2,600	225	8.7%	181	7.0%
2000	2,506	247	9.9%	411	16.4%
2001	2,490	340	13.7%	469	18.8%
2002*	2,325	579	24.9%	790	34.0%

* Expected
Sources: EPA, 2002. U.S. Census Bureau, 2002. Efficiency Vermont, 2002.

The details of the Vermont ENERGY STAR Homes Program are listed in Table 7.

Table 7. Vermont ENERGY STAR Homes Program Features

Program Name	Vermont ENERGY STAR Homes Program ("VESH")
Territory covered	Vermont
Program sponsor(s)	Efficiency Vermont (statewide efficiency utility and project of Vermont Energy Investment Corporation, "VEIC") Vermont Gas Systems Washington (County) Electric Cooperative
Funding source	System Benefits Charge funds
Program contractor	Energy Rated Homes of Vermont (ERH-VT), a project of VEIC
Program history	ERH-VT issued first ratings in 1987; Issued more than 6,000 energy ratings to date; Focus on upgrading existing homes through Energy Improvement Mortgages initially; Delivered utility DSM new construction and existing homes programs since 1995; Teamed with outreach/sales firm when VEIC selected as Vermont's efficiency utility in 2000.
Technical differences from baseline 86 point standard	Mechanical ventilation system; Minimum 4 "high-use" ENERGY STAR light fixtures; Hard-ducted returns above first floor deck instead of interior wall stud cavities, which has been conventional practice; Combustion safety (direct-vent, sealed-combustion, power-vented or sealed boiler room for combustion equipment and air-sealed attached garages).
Value-added services offered	Marketing support (cooperative newspaper and real estate guide ads, home shows, signage, marketing materials, etc.). Home energy rating plan review and recommendations to achieve program standards; One-on-one builder and subcontractor training and on-going technical assistance; Blower door testing and house inspection to certify subcontractor work and energy efficiency performance; ENERGY STAR Homes Program labeling; and Energy code compliance certificate (for builder signature).
Participation costs	None
Incentives offered	ENERGY STAR labeled home: $100 ($500 additional for Vermont Gas Systems and Washington Electric Cooperative) Qualifying light fixtures: $15/surface mounted; $25/recessed. (20 max.) Appliance bonus: $700 for 10 qualifying light fixtures *and* three ENERGY STAR labeled appliances

Elements of Successful ENERGY STAR Homes Programs

There are a number of common elements among the Massachusetts, New Jersey and Vermont programs that can be credited for the success of these programs.

High quality. Professionalism in dealing with customers, dedicated, well-trained, experienced and competent staff, state-of the-art systems and equipment, professional marketing materials and high quality in all aspects of the program has been key. Strict quality assurance standards within each provider organization have been critical.

Strict standards. Playing by a firm set of rules while making very few exceptions provides a consistent message to program participants and staff which is important in order to establish and maintain credibility and consistency in the eyes of participants and regulators. Basing all standards and rules on sound building science and economics provides a foundation on which solid program decisions can be grounded and upheld.

Infrastructure foundation. In addition to strict standards, a successful program needs to be built on a solid infrastructure. One of a program's most important assets is its staff and delivery contractors. Program delivery staff and contractors in Massachusetts, New Jersey and Vermont are all well-established, nationally-accredited, experienced and respected organizations, which is critical for the foundation on which to establish and grow an ENERGY STAR Homes Program.

Single or coordinated delivery contractors. Instead of multiple uncoordinated independent service providers, Massachusetts, New Jersey and Vermont all have just one or two primary contractors overseeing all program elements. This single coordinated communication channel to builders makes enrolling as easy as possible. There is nothing that will turn a builder off quicker than getting multiple sales people calling in a seemingly uncoordinated fashion in shotgun attempts at recruitment. With single or coordinated delivery contractors responsible for program sales and technical services, there can be a coordinated effort at approaching target builders in a manner that builds relationships from the first sales call right through final inspection.

Sales staff. Strong sales skills are not always bundled in individuals with strong technical skills. Attempting to use energy raters as a program's primary means of recruitment can be a mistake. The most successful programs tend to utilize separate sales and technical rating staff while still maintaining a close working relationship between the individuals. In this way, sales people and raters can each focus on what they do best.

Incentives. Programs that are designed to gain market share need to start out with incentives that get builders' attention. In combination with a strong marketing campaign, a new ENERGY STAR Homes Program can leverage significant market share in a short period of time given the right incentives. However, offering just marketing without healthy incentives or incentives without a strong marketing campaign will not guarantee success. Over time, as the market learns to recognize the value of ENERGY STAR Homes Program, incentives can be diminished and marketing can theoretically carry a program, although this has not been

demonstrated anywhere yet. But for the first three to five years, both elements need to play a role in the program offering. Massachusetts, New Jersey and Vermont have all started out offering incentives approaching the incremental cost of building to the ENERGY STAR Homes Program standards over baseline new construction. These will diminish (and already have in Vermont) as standard building practice becomes more efficient or as codes ratchet up. Alternatively, increased HERS scores and greater savings could be required in order to earn the incentives.

Supplemental measures. Successful programs recognize that there is more to an energy efficient, comfortable, healthy, durable, quality and valuable home than just an 86 point energy rating. Massachusetts, New Jersey and Vermont have all incorporated standards and incentives that either encourage or require mechanical ventilation, specific combustion safety standards and efficient lighting and appliances in order to ensure occupant health and safety and greater efficiency.

Commissioning. Ensuring that what is installed actually performs as designed will ensure satisfied customers, less builder callbacks and optimal energy savings for the utilities. Having the contractor document proper HVAC sizing and installation (i.e. refrigerant charge and airflow) or enabling the rater to test and adjust the performance of the equipment to achieve as-designed performance is a service that can add great value to the rating process.

Marketing materials. Marketing materials with an appealing look will convey the professionalism of the program and more easily enable enrollment. The Northeast states have all put significant efforts into producing high quality marketing materials.

Technical assistance. A key component to a successful new construction market transformation program is builder and subcontractor training. This is often best accomplished on-site using the home as one of the best training facilities, in addition to classrooms or at builder meetings. Each plan review is an opportunity to move builders up the energy efficiency competency ladder, and all Northeast ENERGY STAR Homes Programs use this opportunity quite effectively to improve not only the home being rated, but also all of that builder's or subcontractor's future homes.

Affordable/multifamily. A significant number of the ENERGY STAR labeled units in Massachusetts, New Jersey and Vermont are in low-income/affordable multifamily projects. The project owner's goals of low long-term operating expenses, state and federal low-income program priorities and requirements and the programs' energy efficiency goals align well, thus providing a willing market for ENERGY STAR Homes Program participants.

Applicability & Transferability to Other States/Markets

The successful elements from the Massachusetts, New Jersey and Vermont ENERGY STAR Homes Programs can be integrated into any other program. However, certain elements such as the availability and level of incentives would obviously be based on the interest of the program sponsors and the availability of program funding. ENERGY STAR Homes

Programs can be a flagship market transformation program and, with its lost opportunity characteristics, serve as a sound justification for SBC funding.

In markets dominated by a few larger production builders, there may be effective opportunities at achieving high penetrations of ENERGY STAR labeled homes without the degree of financial support and intervention put forward in the Northeast. However, in markets such as those in the Northeast dominated by more smaller builders, efforts without all the elements of these successful programs have not faired nearly as well. The lesson seems to be to tailor your program elements to the needs and expectations of the market.

Transitioning to a Market-Based Initiative

As the Massachusetts, New Jersey and Vermont ENERGY STAR Homes Programs achieve anticipated penetration rates over the next several years of approximately one third to one half of the residential new construction market, scaling back program offerings will be necessary in order to both protect budgets and to wean the market of its initial subsidies. Although none of the Northeast programs have yet begun pulling back, planning has already begun, as program budgets have become the victims of their own success. The anticipated steps to be taken in order to allow the number of ENERGY STAR labeled homes to continue to grow while locking in energy savings and transitioning to a more sustainable market-based structure with reduced utility/SBC incentives include:

- supporting the improvement of energy codes;
- working to incorporate lighting and appliances (in addition to space heating, cooling and domestic hot water, which are the only end-uses currently included) in energy ratings;
- increasing the energy rating score for program compliance;
- encouraging EPA to increase the compliance threshold for ENERGY STAR Homes; and
- enlisting a much greater degree of financial support from manufacturers and suppliers with an interest in seeing more of their energy efficiency products being sold.

Nowhere in the U.S. has an ENERGY STAR Homes Program successfully transitioned from one with significant incentives to one that is fully market-based. The Southwest may be the closest model. However, with market conditions very dissimilar in the Northeast, the transition strategies and approaches will necessarily be quite different. Given the success of the Northeast programs, it will not be too long before program managers and consultants have a good deal of experience shepherding this transition.

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