

How Did a Small Voluntary Program Transform the \$.3 Trillion U.S. Housing Industry?

Sam Rashkin, U.S. Environmental Protection Agency, ENERGY STAR for Homes

ABSTRACT

The quick answer is it didn't; not by itself. The team of professionals at the U.S. Environmental Protection Agency (EPA) working on ENERGY STAR® Qualified Homes had the privilege to be part of a broader effort promoting energy efficiency to the housing industry. This includes effective dissemination of knowledge and marketing outreach by building science experts; other federal agencies; state and local governments; utilities; product manufacturers and their associations; and national and regional housing associations. Nonetheless, with over a million labeled homes on the ground and over one-in-five homes nationwide earning the ENERGY STAR in 2009, many industry experts acknowledge ENERGY STAR Qualified Homes has had a profound impact transforming the housing market to high-performance homes. Compared to homes built fifteen years ago, new homes utilize substantially more building science technologies and practices including more effective thermal envelopes with tight construction, properly installed insulation, complete air barriers, and high-performance windows; substantially improved HVAC systems including tight ducts, high-efficiency equipment, and right-sizing; and quality assurance with a nationwide infrastructure of Home Energy Rating System (HERS) raters. Without getting distracted by the impossible and nonproductive process of trying to attribute credit among all the players, now is a good time to examine how a small program with six staff and a \$1.7 million annual budget program substantially contributed to such impressive change, and what lessons are transferrable to other market transformation efforts. This paper will examine five critical lessons learned regarding corporate culture, technology diffusion, development of technical specifications, leveraging the right people and message, and continual improvement. These lessons continue to inform program decisions as ENERGY STAR targets transforming the nation's housing industry to net zero homes.

This Is Not Your Typical Research Paper

This paper is a soul-searching examination of how a little program that could, got there. During fifteen years of directing ENERGY STAR Qualified Homes, the author has constantly searched for a better understanding of what drove program success. Beyond depending on good instincts, it was important to understand the underlying principles so they could be repeated in other endeavors. This exploration led past traditional research and academic studies. Instead, the most critical insights come from five seminal resources on success with a general business perspective. These references should be on anyone's reading list who strives to deliver effective market transformation. They include:

- *Inside the Tornado* (Moore 1995)
- *The Tipping Point* (Gladwell 2000)

- *Good to Great* (Collins 2001)¹
- *The Art of Innovation* (Kawasaki 2007)
- *Made to Stick* (Heath 2007)

ENERGY STAR Qualified Homes Background

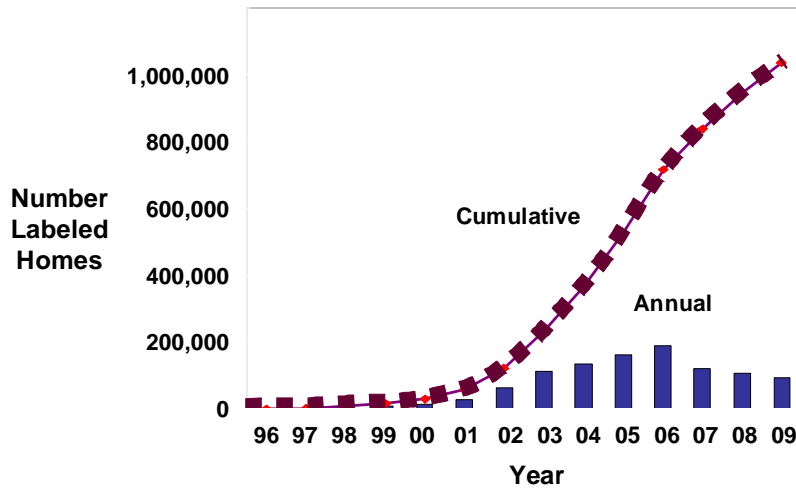
For those not familiar with ENERGY STAR, it is a government-backed label administered by the U.S. Environmental Protection Agency. It is now offered on more than 60 different product categories. A consistent set of core principles are strictly enforced for all labeled products including significantly greater energy efficiency than minimum standard, cost-effectiveness, and overall product performance that meets or exceeds consumer expectations. These principles are non-negotiable and a critical driver behind the long track record of success for the ENERGY STAR program.

ENERGY STAR Qualified Homes is one of these product categories. Cumulative growth today now exceeds over one million labeled homes as shown in Figure 1. Over recent years, the annual number of labeled homes has declined with an inextricable link to the historic housing industry slow-down. However, the growth in terms of nationwide market penetration has been increasing significantly during the soft market as shown in Figure 2. Most recently, market penetration has increased from 12 percent in 2007 to 17 percent in 2008 (e.g., a 40 percent increase), and then to more than 22 percent in 2009 (e.g., almost another 30 percent increase). Thus, more than one-in-five of all homes constructed last year in the U.S. were labeled ENERGY STAR. And this does not account for indirect impacts where regional market transformations occur for significant ENERGY STAR component requirements.² For instance, one study examining the impact of ENERGY STAR Qualified Homes in Phoenix found substantial adoption of tight duct sealing program specifications in non-participant homes. (Blasnik, Calhoun, Swanson 2005)

¹ Companion piece is *Good to Great and Social Sectors*, 2005.

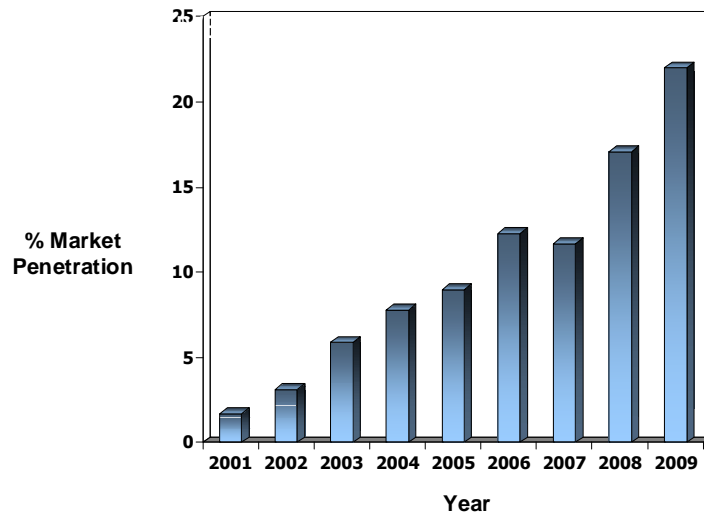
² This is commonly referred to as '*free driver*' impacts which are unintended program benefits not counted in baseline metrics for evaluation.

Figure 1: ENERGY STAR Qualified Homes Growth: Labeled Homes



Source: U.S. EPA ENERGY STAR for Homes Tracking Data

Figure 2: ENERGY STAR Qualified Homes Nationwide Market Penetration



Source: U.S. EPA ENERGY STAR for Homes Tracking Data

Lesson Learned Implementing ENERGY STAR Qualified Homes

Substantial credit is given to ENERGY STAR Qualified Homes for transforming the housing industry based on empirical program accomplishments. There are six full-time staff and an approximate annual budget of 1.7 million dollars used to fund another six consultant staff along with small purchase orders and grants. This is an extremely small amount of resources to promulgate a national program, no less one committed to transforming a .3 trillion dollar industry.³ And we like it that way. This is because energy efficient new homes offer builders and consumers a compelling value proposition where innovative market-based solutions can deliver

³ The housing industry has obviously undergone substantial contraction. This value represents the approximate value of new home construction at the peak in 2007.

the same results as large incentives, and doing more with less is simply better government and better business. Evaluating this effort has revealed five lessons learned that best explain the program's viral growth. A discussion of each follows.

Lesson number 1: corporate culture trumps everything else. The author defines success for market-based programs as substantial and persistent market transformation that maximizes limited resources. The right corporate culture is the critical first ingredient. It begins with a dedication to getting and keeping “the right people on the bus.”⁴ Arriving at EPA's Climate Change Protection Division in fall of 1994, it was impressive to observe a staff with an extraordinary high energy level, passion for mission, and diversity of backgrounds in environmental, business, and technology disciplines. This was the perfect cast for success.

But good casting alone is not enough. Once you have the right people, the right corporate culture must have the sense to get out of their way and allow for learning by doing (a.k.a., making mistakes). This facilitates business-paced decision-making critical to public-private partnerships. It requires empowering staff to make many of the decisions that keep the trains running on time while reserving more management oversight for key policy decisions that could disrupt the program. You can't take a year or even months for upper management to approve a brochure, technical guidance, or program specifications. A “deer in the headlights” fear of making mistakes paralyzes market-based programs. Cultures immersed in regulatory, standard setting, and enforcement processes don't have the luxury of making routine mistakes, and therefore, can often be the wrong venue for market-based programs. One of the most significant decisions made at the beginning of the ENERGY STAR program was to physically and psychologically locate it away from corporate EPA headquarters where a regulatory culture was the order of the day.

The next step is to get the right people doing the right work. This requires a cultural discipline to obsessively focus on what makes its program or product the ‘best in world’ and not get distracted by many opportunities for actions that don't contribute directly to this objective. Eventually, this discipline leads to a “flywheel” effect where the performance numbers and results explode exponentially.⁵ Figures 1 and 2 above evidence how a similar flywheel effect was realized with ENERGY STAR Qualified Homes with very slow growth until it ‘tipped’ in 2001. This exponential growth trajectory was made possible by delivering substantial value propositions to both the builder and consumer. However, no one working on the program could pin down the moment the flywheel effect took hold. This was identical to the experiences cited for many of the most successful companies featured in *‘Good to Great.’*

It is also critical that management embraces a long-term perspective. Under a ‘Wall Street’ quarterly performance culture, ENERGY STAR for Homes would have been shut down after two or three years as it struggled to achieve any traction while nurturing the prerequisite HERS industry. There was no short-cut for the time needed to build this critical sales/verification infrastructure along with other outreach efforts. The right corporate culture understood the program was delivering critical value and had the patience to let it succeed.

The last point about culture may be one of the most important. Working at the speed of business is much more critical than being perfect. Guy Kawasaki in the *Art of Innovation* talks about his experience releasing the first generation Macintosh computer for Apple. It was by all objective judgment far from a perfect product. It had a very small screen, limited software, and

⁴ ‘Right people on the bus’ is parlance of *Good to Great*.

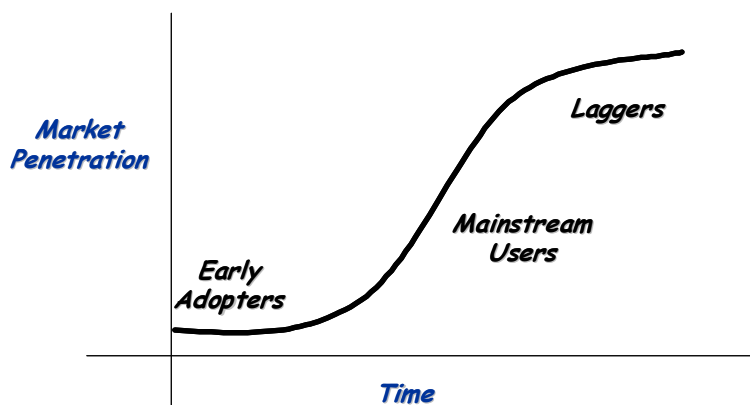
⁵ ‘Best in world’ and ‘flywheel effect’ are parlance of *Good to Great*.

no compatibility with more traditional business applications. However, it had the most innovative user interface and product design of any computer on the market. That ‘best in world’ core competency continues to serve as a basis for Apple’s success.

When ENERGY STAR Qualified Homes was launched, it was similarly far from perfect. There were significant gaps in building science; data tracking and reporting processes were substantially undeveloped; and as mentioned, the HERS rating process pivotal to certification was barely a nascent industry. But ENERGY STAR offered a unique approach to labeling the largest consumer purchase with simple processes and cutting edge marketing that have continued to serve as the foundation for long-term success. The corporate culture understood perfection was the enemy to long-term carbon reduction objectives (e.g., innovation) and that incremental improvements would address shortcomings.

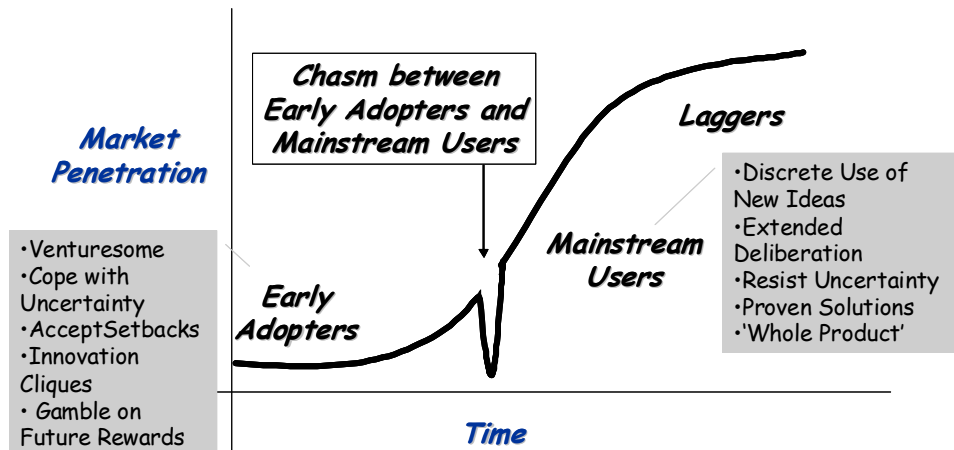
Lesson number 2: you have to cross the chasm. One of the biggest mistakes made depicting technology diffusion is assuming market transformation is a continuous process as shown in Figure 3. Geoffrey Moore dispels this myth in his book, *Inside the Tornado*. The reality pointed out is that there is no relationship between early adopters and mainstream users that enables this smooth transition. Early adopters are unique customers. They are venturesome where mainstream buyers discretely use new ideas and go through extended deliberation before committing to a new technology. They cope with uncertainty where mainstream buyers resist uncertainty. They accept setbacks with performance where mainstream buyers are looking for proven solutions with little to no risk of problems. They form innovation cliques that share a passion for working through the inevitable kinks of new technology where mainstream buyers simply want to use a product that works. And they are willing to gamble on future rewards where mainstream buyers simply want proven ‘whole product’ solutions before engaging. Since there is nothing remotely similar between these user segments, Geoffrey Moore suggests a huge chasm must be crossed for market transformation to be successful as shown in Figure 4.

Figure 3: Technology Diffusion Curve – Old Model



Source: Moore 1995

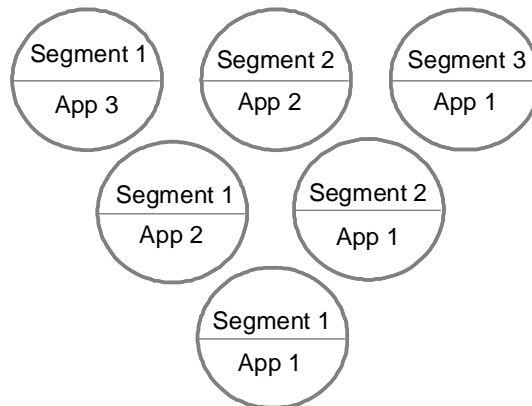
Figure 4: Technology Diffusion Curve – New Model



Source: Moore 1995

So how did ENERGY STAR for Homes cross the chasm? Effectively it used an approach very similar to the ‘bowling alley’ strategy outlined in Geoffrey Moore’s book. New technologies commonly confront an ‘800 pound gorilla’ that already dominates the market. This could be an old established technology or a competing enterprise entrenched as the industry leader. The bowling alley strategy views the market as a series of segments with applications in each segment as shown in Figure 5. The challenge is to establish presence one pin at a time by providing complete solutions much more customized for each application than generic leading products.

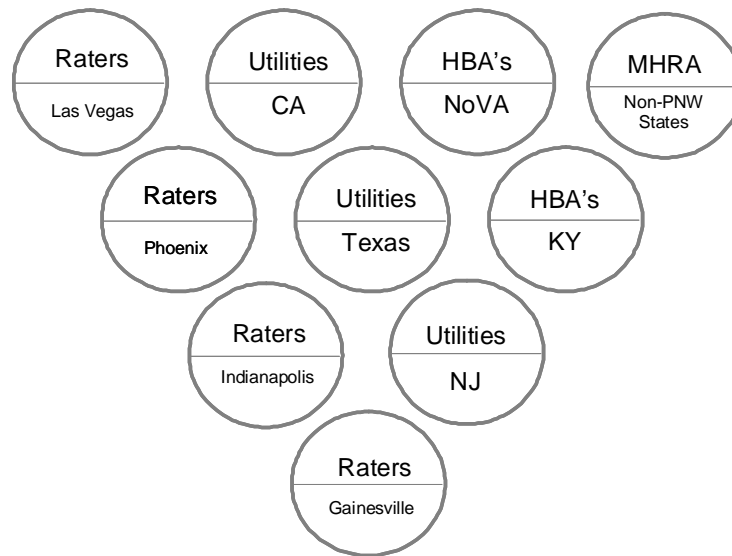
Figure 5: Bowling Alley Strategy



Source: Moore 1995

In the case of ENERGY STAR Qualified Homes, the 800 pound gorilla was the business-as-usual perception that minimum code homes provided adequate energy efficiency. The bowling alley strategy employed by ENERGY STAR Qualified Homes is shown in Figure 6.

Figure 6: Bowling Alley Strategy for ENERGY STAR Qualified Homes



Source: original graphic

The market segments were classified by critical program champions who could deliver ENERGY STAR for homes (e.g., HERS raters, utility or state program sponsors, regional home builder associations, and manufactured housing organizations). The applications were regions of the country where one or more of these champions were considered viable based on market research and recruiting efforts. ENERGY STAR staff kept the ‘eye-on-the-prize’ with a strong focus on developing target markets that effectively established a national presence ‘one pin at a time.’ A broader national delivery process would have diluted efforts needed to establish the critical beachheads that ultimately led to viral growth.

Lesson number 3: you have to get the program technical threshold right. When it comes to program threshold requirements, there is no room for error. Over shoot what the market is willing to bear and you have no participants for a very good specification. Provide an entry level that is too easy, and your label achieves numbers without being relevant. This is the slippery slope setting program requirements that explain why many programs failed to achieve market transformation. For instance, the R-2000 energy efficient home label in Canada and the Passivhaus label in the U.S. are so rigorous they have yet to get past niche market acceptance after decades of existence. On the other side of the equation, the Good Cents energy efficient home label program developed by Southern Company in the 1990’s was so easy to achieve, it got strong numbers (approximately 70,000 homes at its peak), but was cancelled in 2000 because it didn’t deliver a meaningful performance advantage for builders and buyers.⁶

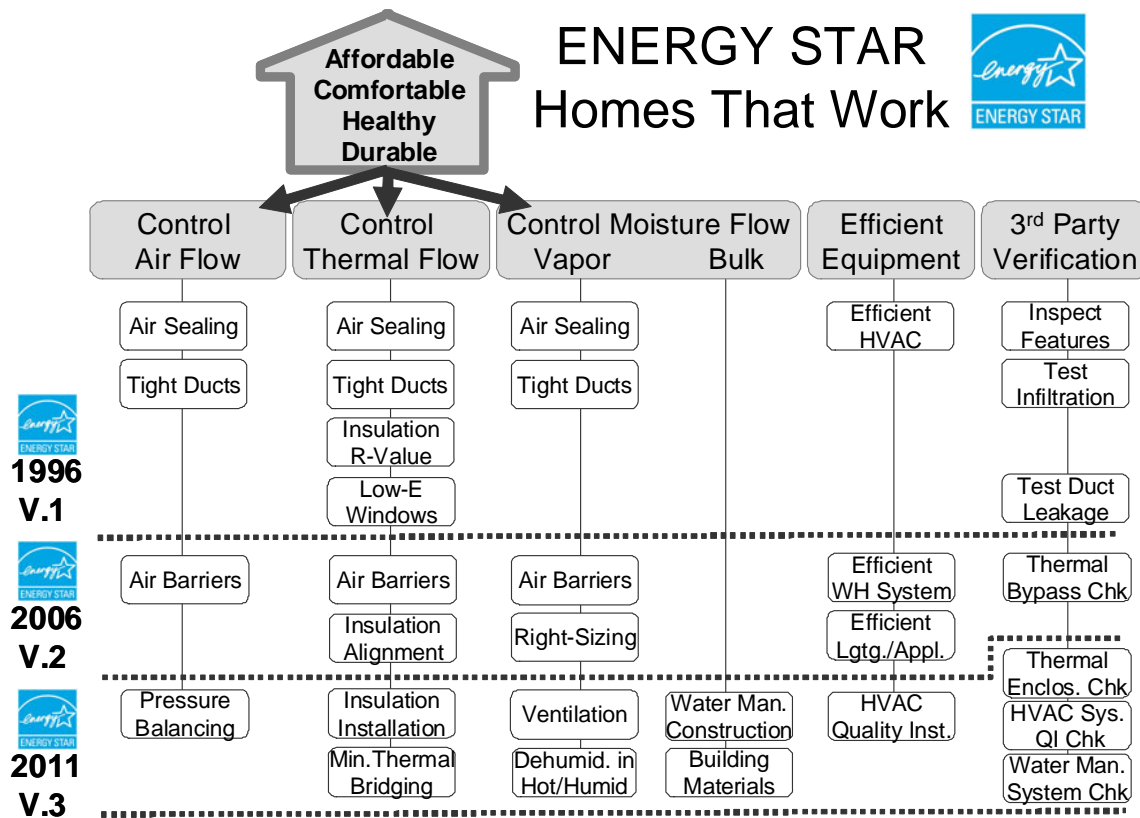
Thus, after establishing a long-term market transformation goal for ENERGY STAR Qualified Homes, the hardest task was to gauge how high the housing industry would or could jump. We would like to say the specification determination process is a science, but it’s much more of an art. Nonetheless, an art based on extensive pounding the pavement talking to industry and comprehensive knowledge based on market research and experience. However, in the end you are still depending on feel, gauging the limits of builders’ willingness to change. There is no

⁶ This is the author’s opinion and not an established industry conclusion.

way to satisfy all stakeholders, so that shouldn't even be a goal. By example, many building science experts have criticized EPA guidelines as too weak at the same time many builders complained program requirements were too difficult. Figure 7 shows the iterative process EPA used to ramp up program requirements through three versions of the specifications.

Although each generation of specifications fulfilled EPA's 'brand' promise of significantly greater energy efficiency than minimum code (e.g., typically between 20 and 30 percent), it effectively took fifteen years for ENERGY STAR Qualified Homes to mature as a comprehensive building science label. This is accomplished with the Version 3 specifications that include a full suite of measures needed to address air flow, thermal flow, and moisture flow (e.g., both vapor and bulk) along with energy efficient equipment (e.g., heating, cooling, water heating, lighting and appliances) and third-party verification. Without question this calculated and gradual market transformation process would not have been possible had we got the technical specifications wrong any step of the way.

Figure 7: ENERGY STAR Qualified Homes Specification Development



Source: EPA 2009

Lesson number 4: you must leverage the right people and right message. A common question about the success of ENERGY STAR Qualified Homes is why some markets tipped while others didn't. After careful scrutiny, three 'change agents' were identified as key drivers to successful market transformation: a viable HERS infrastructure, experts who could effectively communicate the benefits of building science, and a local 'Champion' who effectively inspired key players into action. This is totally consistent with Malcolm Gladwell's thesis in his book,

The Tipping Point, that not every person in the social system is equally important. He identifies three critical agents for change: the *salesman* who translates messages embedding them with meaning (e.g., think Ron Popeil); the *maven* who is a recognized expert able to sway consumer preferences (e.g., think Oprah); and the *connector* who inhabits many worlds bringing diverse players together (e.g., think Broadway producer). The ENERGY STAR Qualified Homes change agents inhabited each of these critical roles.

The decision was made to require HERS rater certification for ENERGY STAR Qualified Homes before its official launch in fall of 1995. It was not immediately obvious that this was a smart move, especially when initial growth was limited to a crawl with a barely nascent HERS infrastructure. In hindsight, this decision proved critical to success. After a slow start, ENERGY STAR for new homes proved to be an effective growth catalyst for the rating industry, even though it was originally conceived to serve existing homes. Once established in a market, HERS raters served as highly motivated *salesmen* for ENERGY STAR. This is because their compensation was substantially tied to how well they sold ENERGY STAR to builders since few if any other programs were tied to their services.

Leveraging the HERS infrastructure was a unique opportunity because it has since become much more diverse. HERS ratings are now used to certify 'green' labeled homes; other EPA voluntary labels for indoor air quality (Indoor airPLUS) and water efficiency (Water Sense); support an increasing array of existing home programs including many forthcoming stimulus funded initiatives; and provide code compliance services in a number of markets. Thus, any other labeling program tapping into the HERS industry today would not have the same dedicated sales force advantage ENERGY STAR for Homes enjoyed for many years. That does not mean HERS ratings should not be leveraged to sell other programs. It just means a compelling business case will be required to attract their attention or some other individuals or groups also need to be considered as salesman.

ENERGY STAR also leveraged strong relationships with a broad array of building science experts (e.g. Joe Lstiburek, John Tooley, Mark LaLiberte), research programs (e.g., U.S. Department of Energy's Building America Program and its consortia members), and other building science programs (e.g., Masco's Environments for Living) who proved critically important in the *maven* role. As prominent and skilled spokesmen, these experts were highly effective commanding the attention of housing industry stakeholders and linking them to ENERGY STAR Qualified Homes. This social group was particularly significant during the early years when Building America teams in particular were able to recruit and verify a large number of labeled homes while the HERS infrastructure was still developing.

Lastly, EPA staff and its consultants committed significant resources to recruiting 'champions' in each target market to serve the *connector* role. A champion could be a charismatic HERS rater or group of raters, a local utility program, a state program, or a regional home builder association. Some of these champions provide resources for incentives and marketing, but most importantly they were highly effective bringing disparate stakeholders together and leveraging synergistic actions for recruitment, consumer education, training, and quality assurance.

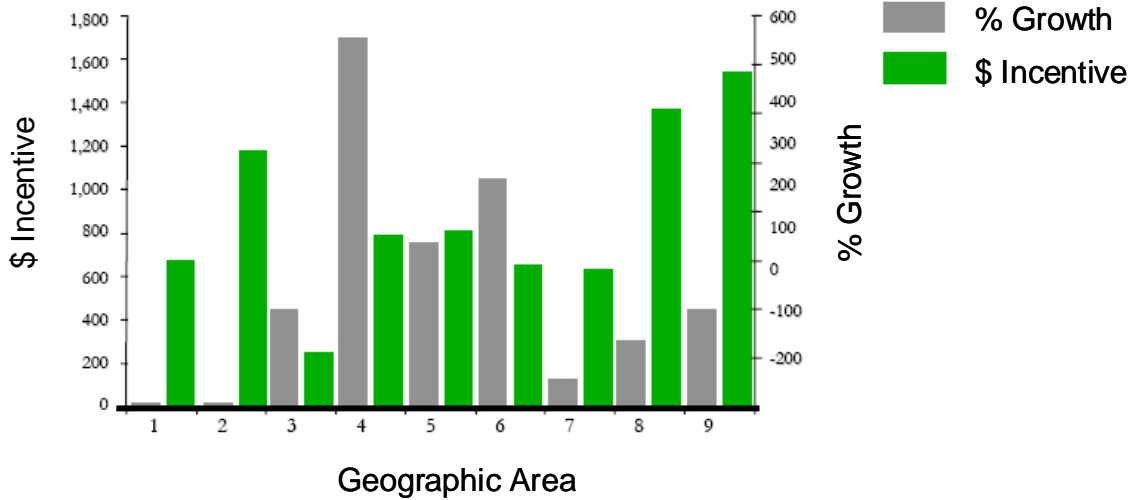
EPA staff and consultants would take on any role needed to fill in the gaps. Thus, we were like the utility player on a baseball team who could play many positions. This included providing recruitment presentations, building science and sales training, facilitating participation in consumer outreach campaigns, coordinating sponsors at annual meetings to leverage lessons learned and implement new policies, and being prepared to provide a wide array of other assistance on an as-needed basis.

In addition to securing agents for change, the *Tipping Point* highlights the importance of ‘sticky messages.’ The critical elements are that messages have to be sticky to a target audience; audience and action specific; memorable once advice becomes practical and personal; and move us to action. In their book *Make it Stick*, Chip and Dan Heath present examples of effective campaigns employing the sticky message concept. One features a Texas program to reduce highway litter. After developing a traditional ‘brute force’ police enforcement program entailing large amounts of resources, a small amount of funding was left over for marketing. A public relations firm was brought in and developed a cutting edge advertising campaign. Their research revealed that most highway trash could be attributed to a demographic commonly associated with hard-living, truck-driving males (e.g., think ‘Bubba’). In response, they developed a now famous sticky message campaign featuring popular Texas celebrities, sports superstars, and entertainers on billboards and television commercials saying “*Don’t Mess with Texas*” to admonish highway litter. This sticky message strategically reached the target audience with straightforward testimonials from their heroes conveying it wasn’t cool behavior to litter. This campaign was so effective, target reductions in litter were exceeded before the millions of dollars allocated for police enforcement could be fully implemented. If some ‘chump change’ had not been left over for advertising, the benefits of a strong market-based solution would have been lost.

Unfortunately, the effectiveness of sticky messages is lost on too many energy efficiency initiatives that go straight to ‘lazy’ brute force techniques such as rebates, incentives, and tax credits. To this point, data was collected on the growth of ENERGY STAR Qualified Homes from 2001 to 2006 in nine different geographic areas compared to the incentives offered.⁷ The results are shown in Figure 8 with programs and geographic areas intentionally not identified to not impugn any specific program. They indicate there is little or no correlation between growth and amount of incentive. In fact, many areas with no or minimal rebates significantly outperformed those with large rebates. Plus, the participants in non-incentive driven programs are likely to be more committed with greater retention since their participation is not linked to a ‘bribe’.

⁷ ENERGY STAR for New Homes Sponsor and Utility Partner Guide, EPA ENERGY STAR Web Site, October, 2007

Figure 8: Cash Value of Incentives Compared to Percentage Growth 2001 - 2006



Source: EPA 2007

An effective sticky message strategically delivered helps explain how ENERGY STAR Qualified Homes was able to succeed with or without incentives. The message to builders was that ENERGY STAR reduces risk, increases customer satisfaction, and can substantially differentiate their product. The message for consumers is that by simply looking for the blue ENERGY STAR logo, they can get a better performing home (e.g., comfort, health, and durability) at lower ownership cost (e.g., monthly utility savings far exceeding small increases in monthly mortgage attributed to energy efficiency improvements) and a ‘badge of honor’ (e.g., recognition their homes contribute to environmental protection). Over fifteen years, we have been committed to this message, albeit with many refinements along the way.

Lesson number 5: operate like a business by demanding continuous improvement. Six Sigma is a well-known management program based on the concept of continuous improvement. There are various certification levels up to ‘black belt’ that require progressively more rigorous levels of statistical analysis to minimize defects in complicated processes. A highly effective market transformation program normally requires much less rigor to minimize defects than precision manufacturing operations, but still demands continuous improvement. This was especially true with ENERGY STAR Qualified Homes because exponential growth had to be managed with no increased resources. As a result, every aspect of ENERGY STAR Qualified Homes has experienced dramatic improvements in quality at significantly lower cost. This includes managing partnerships, developing and disseminating technical and marketing resources, providing regional support, and communicating to partners and stakeholders. These improvements were achieved by optimizing the use of information technologies, web-based information and tools, automatic e-mail notices, and online reporting and partnership agreements. This takes dedication and coordination from the entire team to collaborate extensively and maintain focus on most critical areas for improvement and opportunities for innovation. As a result, continuous improvement is substantially linked to getting the corporate culture right because it demands the ‘right people on the bus’ and a willingness to empower them.

Conclusion

The current specifications for ENERGY STAR Qualified Homes dramatically improve energy efficiency, comfort, indoor air quality, and durability compared to minimum code homes. New Version 3 specifications that take force next year will complete a long road to comprehensive building science that makes performance of used and minimum code homes obsolete. Forthcoming Version 4 specifications being released as ENERGY STAR Concept Home will provide specifications for ‘net zero’ ready homes that have very small residual energy loads easily offset by renewable energy power (on-site or purchased from a utility). Thus, ENERGY STAR has been on a long and successful market transformation path to carbon neutral homes, now with over a million homes on the ground. There are many factors that have contributed to the success of this program, but the author considers five as most critical: getting the corporate culture right; crossing the technology diffusion chasm with a target market strategy; setting program requirements at the right level; leveraging the right people and right message; and demanding continuous improvement. *These lessons can be applied to market transformation programs targeting cost-effective technologies that are market-ready* (e.g., reasonably developed supply and installation infrastructure). In these cases, the author believes limited resources will be maximized and the need for common ‘brute force’ energy efficiency initiatives (e.g., rebates, incentives, and tax credits) can potentially be mitigated or substantially reduced. Programs targeting technologies that need significant cost reductions and market delivery solutions should be part of a *sustained orderly development* process where more resource-intensive initiatives (e.g., incentives, bulk purchase agreements, golden carrot competitions, and technology incubators) are fully appropriate.⁸ But, that’s the subject of another paper.

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⁸ ‘*Sustained Orderly Development*’ is a term coined by Donald Aitken when he was a Senior Staff Scientist for Renewable Energy at the Union of Concerned Scientists in 1991. It refers to a thoughtful process for facilitating market transformation of emerging technologies with staged commitments to industry that would enable them to safely make needed investments in R&D to reduce costs, invest in manufacturing capacity, and develop distribution and installation infrastructure.

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