Lessons Learned In The ENERGY STAR® Homes Program

Eric Werling, John D. Hall, Ph.D., and David Meisegeier, ICF, Incorporated
Sam Rashkin, Blaine Collison, and Glenn Chinery, U.S. EPA

ABSTRACT

In 1996, the U.S. Environmental Protection Agency (EPA) introduced its ENERGY STAR® Homes program. The purpose of this voluntary program is to reduce a major source of greenhouse warming gases: carbon dioxide emissions from energy use in newly constructed residential buildings. Under this voluntary program, EPA develops partnerships with builders who agree to build homes that are 30 percent more efficient than a similar home design that complies with the CABO Model Energy Code (MEC). This efficiency level is equivalent to a Home Energy Rating System (HERS) five-star home. Builders have complete freedom to make all the design choices on how to meet this performance threshold. EPA in turn provides marketing, sales, financing, and technical support, as well as use of the program's nationally recognized ENERGY STAR brand name.

Since the announcement of the program three years ago, over 500 builders and allies have joined the program. At the time that this paper was written, these builders will have completed construction of over 2,000 ENERGY STAR Homes. By the end of 1998, over 15,000 ENERGY STAR Homes are expected to be completed. The ambitious long-term goal of the ENERGY STAR Homes program is a complete market transformation of newly constructed homes to ENERGY STAR performance levels by the year 2010. There have been many previous efforts to promote energy efficiency in residential new construction programs. What makes this program different? This paper lays out the EPA's plans to achieve these aggressive goals, including the evolution of the design, implementation, and evaluation aspects of the ENERGY STAR Homes program over the last three years.

Introduction

Depending on one's perspective, there are many reasons to improve the level of energy efficiency in new homes. A superficial assessment of these perspective is summarized in **Exhibit 1** below.

These perspectives are diverse and difficult to readily satisfy with a single energy efficiency program. This raises the important question "When an energy efficiency program is being designed, which of these perspectives are most important to address?" Further, if a program is designed from an overly narrowly-focused perspective, it is unlikely that the program will receive a broad base of support. It is suggested by the authors that this may be a primary reason why many energy efficiency programs fail to achieve their goals.

Push or Pull?

In designing the ENERGY STAR Homes program, EPA looked hard at what has been done in previous and existing energy efficiency programs. In the most general sense, there are two general types of energy efficiency "programs": (1) those that are legally mandated, and (2) those that people voluntarily choose to participate in.

The motivating factor with legally mandated energy efficiency programs is fear. There are serious consequences for not taking the required actions. Legally required energy efficiency programs are often called "Market Push" programs.

The most common example of a compliance-based program is the implementation of the Model Energy Code (MEC) by state and local jurisdictions. These programs usually spell out a very specific set of mandatory actions that must be completed - in order to streamline the enforcement process.

In such programs, most participants only perform the minimum level of actions required without achieving a substantial understanding of why they are taking these actions. As result, market push programs are successful in achieving *modest* incremental improvements. These programs rarely lead to *substantial* improvements in energy efficiency, or lead participants to value energy efficiency on its own merits.

Exhibit 1
General Perceptions
of the Value of Energy Efficiency

Audience / Perspective	Perceived Value of Energy Efficient Homes
U.S. EPA	Pollution Prevention Resource Conservation
Home Builders	Increased Profits
Home Buyers	Lower Utility Bills Greater Comfort Better Quality
Realty Professionals	"Better" Homes Added Selling Features
Mortgage Lending / Banks	Reduced Risk of Defaults Easier Qualification Rules Larger Borrowing Pool
HERS Professionals	Performance Assurance
Product Manufacturers	Increased Product Sales
Utilities	Increase Competitiveness Retain Market Share Improve Customer Satisfaction Improve Load Factor

In contrast to "market push" programs, "market pull" programs are designed to encourage people to voluntarily take actions that are in their own best interest. Generally, people voluntarily take actions for four basic reasons: (1) survival or to satisfy basic needs, (2) financial incentives (e.g., greed), (3) it feels good , and (4) altruism (e.g., environmental concerns). Most voluntary "market pull" programs that promote energy efficiency usually offer financial incentives (i.e., rebates) to encourage participation. The most common example of a voluntary program is a utility-funded demand-side management (DSM) program. Similar to building codes, DSM programs are often focused on a very specific set of mandatory actions that must be completed - in order to streamline the enforcement process. Thus, most participants only perform the minimum level of actions required without achieving a substantial understanding of why they are taking these actions. As result, many DSM programs are successful in achieving only *modest* incremental improvements in the level of energy efficiency. Again, these rebate-based voluntary programs rarely lead to *substantial* improvements in energy efficiency, or lead participants to value energy efficiency on its own merits.

The advantages and disadvantages of these types of energy efficiency programs are summarized in **Exhibit 2**.

Exhibit 2
Comparison of Two Common Types of Energy Efficiency Programs

Reason for Action	Advantages	Disadvantages
Legally Mandated Programs (Building Codes)	1. Requirements are clearly defined. 2. Participants are often forced to do same thing (i.e., prescriptive compliance path required). 3. May be easier to enforce.	1. Advantages are not seen or understood. 2. Only encourages minimum improvements. 3. Builders seek out loop holes.
Voluntary Programs (Rebate-Based)	1. Participant sees cash in hand. 2. Easy to entice participants.	1. Benefits often go to only one person (i.e., the builder or home buyer). 2. May be burdensome on company offering incentive. 3. May create impression that energy efficiency is not cost effective. 4. Only encourages minimum improvements.

How is the ENERGY STAR Homes Program Different?

The EPA's ENERGY STAR Homes program is a voluntary program that differs significantly from most existing voluntary programs. The ENERGY STAR Homes program is a market-based program that is designed to be more effective, and more sustainable than many other energy efficiency programs. Unlike rebate-based programs, the ENERGY STAR Homes program promotes energy efficiency on its own merits - without the need for financial incentives. Also, the program is designed to include the interests of a wide audience including: home builders, home buyers, realty professionals, mortgage lenders, Home Energy Rating System (HERS) professionals, and utilities. Specifically, the ENERGY STAR Homes program is designed to:

- Promote a high visibility **brand name** that is readily identifiable by consumers;
- Promote **energy efficiency mortgages** (EEMs) to provide improved financing options for energy efficient homes;
- Educate consumers and builders on the additional market **value** provided by energy efficient construction,
- Educate consumers on the true cost of home ownership, and that energy efficient homes **cost less** to own and operate;
- Educate builders on the opportunity to improve their **profitability** by selling energy efficient homes;
- Educate home realty professionals on **how to sell** energy efficient homes; and
- Encourage **high levels** of energy efficient performance.

The purpose of this paper is to highlight the "lessons learned" in the ENERGY STAR Homes program over the last three years, and the evolution of thought that has led to the current ENERGY STAR Homes program. In light of the "weaknesses" in other push and pull programs, the ENERGY STAR program was designed around the market for new home construction, and the market forces that drive all industry players (not just builders) to action. To reach this goal, the following program features were considered in the design:

- Assistance to ALL participants to increase profits: home buyers, builders, contractors, manufacturers and distributors, HERS raters, mortgage lenders, and utilities;
- Focus on Sales: provide tools and education for increasing the effectiveness of sales staff;
- Rely on the market for long term implementation: market provides incentives, implementation, certification, and evaluation, and
- Build in mechanism for program evaluation and the program flexibility to make appropriate adjustments.

To meet the needs of partners in the ENERGY STAR Homes program, a broad range of support services were developed. These support services are briefly described in **Exhibit 3**.

What is an ENERGY STAR Home?

An energy efficient home must meet two criteria before it can be certified as an ENERGY STAR Home:

1. The level of energy efficiency of the house must be assessed using the Home Energy Rating System (HERS) council's rating guidelines, and a HERS score of at least 86 must be achieved. This level of energy efficiency is equivalent to 30 percent more efficient than the 1992 Model Energy Code (MEC). Only HVAC and water heating end-uses are included in this energy assessment.

2. It must be field inspected by an independent third party to confirm that all of the energy-efficient features are fully and properly installed. This inspection includes two diagnostic tests: a blower door test to confirm the level of envelope air tightness achieved, and a duct leakage test to confirm the level of duct tightness achieved.

Examples of the types of energy efficient features that are required to achieve minimal ENERGY STAR performance levels are identified in **Exhibit 4**. Note that these examples are provided for demonstration purposes only and due to regional climate variations, a careful plan review is recommended before constructing "candidate" ENERGY STAR Homes. Plan reviews ensure that the appropriate energy efficiency measures are identified and installed - thereby ensuring successful certification as an ENERGY STAR Home after construction is completed.

Assistance To Program Participants

When the ENERGY STAR Homes program was first conceived, a marketing strategy and a technical strategy were needed. A key goal was to keep the program simple and to ensure that it did not to interfere with the way that builders conduct their business. After getting out and talking to builders, EPA realized that their were a number of mis-perceptions about energy efficiency.

Exhibit 3
Summary of Support Services Provided to Partners in the ENERGY STAR Homes Program

Type of Support	Services Offered to Partners by EPA
Marketing Support	ENERGY STAR Branding PSA Campaign Marketing Toolkit Consumer Seminar Consumer Fact Sheets
Sales Support	Sales Training HomeCalc Software
Financing Support	ENERGY STAR Mortgages Financing Toolkit
Technical Support	Builder Guide Roadmap List of HERS Providers
Account Management	Regional Account Managers
Communications Support	Newsletter Web Page

Common concerns expressed by builders included:

- Energy efficiency costs too much;
- Customers would rather spend their money on other features (e.g., kitchen upgrades, Jacuzzi, decks, etc.); and
- Everyone "claims" that they build energy efficient homes.

Fundamentally, EPA determined that builders are most concerned with their profitability. Thus, the ENERGY STAR Homes program was designed to help builders to:

- Make more money per home, by selling a home with more added value;
- Sell each home more quickly, by training builders to sell energy efficiency more effectively;
- Sell more homes, by differentiating their homes as a better value than the competition; and
- Thereby, become more profitable businesses.

To fulfill this concept, EPA developed the following four critical tools targeted at builders.

Exhibit 4
Example Characteristics of an ENERGY STAR Home

Building Component	Units	Required Performance Level		
		Hot Climates	Moderate Climates	Cold Climates
Thermal Insulation Levels				
Exterior Walls	R-Value	13	13	13
Sheathing	R-Value	Not required	2	4
Rim Joists	R-Value	11	11	11
Attic	R-Value	30	38	38
Exterior Floors	R-Value	19	19	19
Basement Walls	R-Value	Not required	6.5	6.5
Slab	R-Value	Not required	6	6
Ducts (Unconditioned spaces)	R-Value	4	6	8
Windows	U Value SHGC	0.42 0.44	0.30 0.74	0.30 0.74
Doors	R-Value	5	5	5
Envelope Air Tightness	Air Changes per Hour (ACH)	0.35	0.35	0.35
Mechanical Ventilation	Whole House Ventilation	Minimum: continuous operation bath fans		
Mechanical Equipment				
Thermostat	Type	Programmable	Programmable	Programmable
Duct Efficiency	Percent Leakage	5%	5%	5%
Central Air Conditioning	SEER	12	12	10
Gas Furnace	AFUE	80%	80%	90%
Water Heater (Electric)	Energy Factor	0.88	0.88	0.88
Water Heater (Gas)	Energy Factor	0.56	0.56	0.56

Builder Guide. The Builder Guide provides an introduction to the *value* offered by a variety of energy efficiency measures that may be included in an ENERGY STAR Home. This document is a compilation of one-page fact sheets on the impressive *benefits* of energy-efficient technologies and practices. The tool is designed to help sales staff and Realtors *sell* these benefits to their customers. A list of references is also provided that enables builders to find more detailed technical information on these measures.

Sales Training. A three-hour training module has been prepared on effective sales techniques for ENERGY STAR Homes. This training, provided directly to builders' sales staff and/or Realtors, teaches the benefits of energy-efficient technologies and explains how to leverage the ENERGY STAR Brand label for product differentiation. It also provides instruction on using the "Home Calc" sales software and the "More for Less" sales message.

Home Calc Computer Program. Home Calc was developed as an very easy to use, highly graphical, interactive computer program that can help builders and their sales staff to communicate the benefits of ENERGY STAR Homes and ENERGY STAR Mortgages to home buyers.

ENERGY STAR Branding and Marketing Toolkit. A key message in the ENERGY STAR Homes program is the ability to differentiate using the **ENERGY STAR** brand name. The marketing toolkit provides builders with creative ideas on how to promote and sell energy-efficient homes using the ENERGY STAR Logo . The toolkit includes: copies of the ENERGY STAR Logo, camera ready drop-in ad modules, ENERGY STAR Homes sample ads, recent press coverage, and other promotional ideas.

All of the tools described in this paper are available to the Builder Partners by calling the ENERGY STAR Hotline (1-888-STAR-YES).

Focus On Sales

All builders consider themselves to be energy efficient builders. Surprisingly, many builders don't know how to sell energy efficiency effectively. Thus, although the technical aspects of energy efficient home design are complex, many builders are more concerned with their ability to successfully sell an energy efficient home than their ability to build one. To meet this need, the ENERGY STAR Homes program developed a set of services to meet the needs of both individual home buyers and a builder's sales staff.

Home Buyer Needs and Expectations

Home buyers need simplification of the home purchase process, not more information. They are also interested in minimizing the risk associated with a new home purchase. One significant risk home buyer's perceive is that the added cost of an efficient house is not reflected in the house's value, because they have difficulty understanding the value of energy efficiency. Examples of consumer confusion include:

- The perception that home buyers have to choose *between* energy efficiency features and many other non-energy related features (i.e., kitchen upgrade, Jacuzzi, deck, etc.);
- Difficulty in understanding the in-use and resale value of numerous complex new energy efficiency technologies; and
- Difficulty in differentiating the level of energy efficiency in one builder's home relative to another builder's design.

Fundamentally, EPA determined that home buyers are most concerned with value - getting the most for their money. Thus, the ENERGY STAR Homes program was designed to help home buyers to:

- Realize the increased value (e.g., comfort, quiet, quality, warranty, resale) provided by energy efficient homes;
- Realize that ENERGY STAR Homes cost less to own - based on the actual cost of home ownership (i.e., sticker price, operating cost, and maintenance costs);
- Educate home buyers that energy savings can provide other non-energy related home features effectively for "free";

- Be aware of and look for the ENERGY STAR Brand;
- Be aware of the value of and use the ENERGY STAR Homes Mortgage; and
- Thereby, get "more home for less cost".

To fulfill this need, EPA developed the following four tools targeted at consumers:

Consumer Fact Sheets. Similar to the Builder Guide, the Consumer Fact Sheets provide an introduction to the *value* offered by a variety of energy efficiency measures that may be included in an ENERGY STAR Home. This document is a compilation of one-page fact sheets on the impressive *benefits* of energy-efficient technologies and practices. The tool is designed to help home buyers and Realtors to recognize these benefits.

Consumer Seminar: A one-hour module has been prepared that presents the impressive "more value for less cost" ENERGY STAR Homes message to potential home buyers. It is designed so that consumers can easily understand benefits and cost advantages of buying ENERGY STAR Homes. This presentation can be provided at home shows and other forums attracting groups of prospective home buyers.

ENERGY STAR Mortgages. Home mortgage lenders have agreed to offer energy efficient mortgages (EEMs) to buyers of ENERGY STAR Homes with preferred terms (e.g., higher qualifying ratios, cash back at closing, etc.). These ENERGY STAR Mortgages can eliminate any additional up-front costs and qualify more home buyers.

ENERGY STAR Brand Campaign and Public Service Announcements (PSAs). EPA has developed a large-scale national public awareness campaign including TV, radio, and print public service announcements for the broad group of ENERGY STAR programs, and local public awareness campaigns specifically for the ENERGY STAR Homes Program.

These services, targeted at home buyers, are also available to all potential home buyers by calling the ENERGY STAR Hotline.

Builder Sales Staff and Realty Professionals

As introduced above, builders are in need of more effective methods to sell their energy efficient homes. Thus, EPA developed the Sales Training and the HomeCalc software to meet this need.

As an indication of the need for these services, these are the most well received and highly valued aspects of the ENERGY STAR Homes program. These tools help to train the builder's sales staff and realty professionals on each of the three core messages in the program:

- An ENERGY STAR Home offers more value (e.g., comfort, quiet, air quality, warranties, resale);
- An ENERGY STAR Home costs less to own; and
- To buy an ENERGY STAR Home, simply look for the ENERGY STAR Logo.

These services are only available to the sales staff and realty professionals working with an ENERGY STAR Homes Builder partner.

Rely On The Market For Long Term Implementation

The ultimate goal of the ENERGY STAR Homes program is market saturation. To achieve this long term goal successfully and cost-effectively, EPA must develop "*Ally*" partnerships with several of the key players in the building construction industry, including HERS professionals, manufacturers and contractors, and utilities. These Ally partners may choose to provide one or more of the following services: financing support, recruiting support, marketing support, and technical support (e.g., certification of ENERGY STAR Homes).

Mortgage Lenders

One of the key messages in the ENERGY STAR Homes program is the lower overall cost of home ownership (i.e., first cost, maintenance costs, and operating costs) relative to an home built to minimum standards (i.e., current building code). There are three key variables in a mortgage transaction: (1) the home buyer's gross income, (2) the down payment, and (3) the monthly payment. The ENERGY STAR Homes program has developed a set of ENERGY STAR Mortgages to assist home buyers in the initial purchase of an ENERGY STAR Home.

The mortgage lenders understand the concept that the overall cost of home ownership of an energy efficient home is lower. They understand that the benefit of lower utility bills is increased consumer cash flow and increased ability to manage their monthly payments. Accordingly, mortgage lenders recognize that ENERGY STAR Mortgages are an attractive and growing market for low-risk loans.

ENERGY STAR Mortgages are offered by several lenders, each of which includes a set of preferred terms. Some of the loans allow for higher qualifying ratios (i.e., ratio of monthly mortgage payment to buyer's monthly income), as large as a 5 percent stretch. For example, a family with a 50,000 dollar annual income can qualify for as much as 15,000 dollars in added mortgage principle. These loans are particularly attractive for builders of low income or entry level housing.

Some of the ENERGY STAR Mortgages offer cash back at closing, as much as $500. The average cost of ENERGY STAR features in a new home ranges from $2,000 to $3,000. Thus, for a 20 percent-down loan, this cash back bonus often completely offsets any additional down payment (up-front cost) associated with the purchase of an ENERGY STAR Home.

These features indicates how attractive ENERGY STAR Mortgages are to mortgage lenders. Combined with lower monthly cash flow, the ENERGY STAR Mortgages offer a very attractive reason for home buyers to purchase an ENERGY STAR Home.

Manufacturers and Contractors

The ENERGY STAR logo is the centerpiece of all of the ENERGY STAR programs. It is critical to the success of these programs that the public is educated as to the meaning and value of the logo. The ENERGY STAR brand name is being increasingly promoted by EPA as a simple (yes/no) means for consumer's to determine if a product is environmentally friendly. Further, it is a brand name that is backed by the U.S. Environmental Protection Agency. Thus, rather than relying on a builder's potentially biased view of their own product, consumers can rely on the EPA endorsed ENERGY STAR label to assist in the selection their new home and making an informed purchase decision.

However, EPA's ability to get the ENERGY STAR message out to the public is limited due to its inability to use taxpayer money to buy advertising. The most effective way to broadcast the ENERGY STAR message to the public is with the support of various program Allies. These Allies, including manufacturers and contractors, can build the ENERGY STAR logo and its compelling message into their

current advertising programs. The obvious benefit to these companies is to be active participants in a rapidly growing segment of their market.

HERS Professionals

An important aspect of the ENERGY STAR Homes brand name is the third party certification process. This certification process provides consumers with a means of quality assurance for their new home purchase that exceeds the builders "good word". The HERS industry is well positioned to provide this third party service to builders. Further, the HERS industry can provide the building industry with a broad range of related services including pre-construction design services, and on-site construction quality assurance services.

To fulfill this concept, EPA developed the following two critical tools targeted at HERS Providers/Raters:

Builder Guide. A marketing tool that can be used by the HERS industry to help builders to understand the value of energy efficient home design and the potential to improve their profitability, as described above.

Roadmap. The Roadmap provides a step by step description of how to successfully participate in the ENERGY STAR Homes program. It includes a description of the initial plan review and the subsequent on-site third party certification process.

As a further indication of the compelling synergies between the EPA and the building industry, the ENERGY STAR Homes program will provide the HERS industry with a new and growing market of highly motivated customers (i.e., builders).

Utilities

Most electric utilities have been involved in promoting energy efficient new homes at some time in the last ten years. Some of these programs have been very successful, other not so successful. Recent trends towards utility deregulation have caused utilities to reevaluate the cost of energy efficiency programs. These types of programs enable a utility to better compete with other utilities by offering their customers better "value" - lower utility bills, improved comfort, better indoor air quality, higher quality, higher resale, etc. But the cost of these energy efficiency programs is hard to justify.

The ENERGY STAR Homes program offer a low cost alternative to conventional utility-funded energy efficiency programs. This program has been successfully working with utilities across the country using one of two approaches. Some utilities have wholly adopted the ENERGY STAR Homes program. These utilities have been looking for a new approach to meet their customer's expectation of lower utility bills and improved overall utility services. The ENERGY STAR Homes program provides these utilities with a complete fully developed program that does not require any costly rebates or incentives.

Other utilities have chosen to co-brand with the ENERGY STAR Home program. These utilities typically have successful on-going energy efficiency programs with established name brand recognition. By co-branding with the ENERGY STAR Homes program, these utilities can get the added value of the ENERGY STAR brand name (with its highly valued EPA endorsement) and other support services - without diluting their existing successes.

Clearly, utilities can play a key role in raising the visibility of the ENERGY STAR Logo (to simplify the purchase of all energy efficient products) and the Homes message that energy efficient homes offer

significant value for less cost. This message will prove extremely valuable to utilities (in terms of improving customer satisfaction with utility services), as well as to the success of the ENERGY STAR Homes program.

Mechanisms For Program Evaluation And The Program Flexibility

An extensive evaluation plan for the ENERGY STAR Homes program has been developed, and is in the early stages of implementation. In order to proceed with a formal evaluation of the ENERGY STAR Homes program, an Information Collection Request (ICR) must be submitted to and approved by the Office of Management and Budget (OMB). EPA has submitted the ICR request to OMB and is expecting approval in late summer of 1998. When the ICR approval is received, EPA will immediately begin a full scale evaluation of the Homes program for the calendar years 1997 and 1998.

What are the Key Evaluation Issues?

The evaluation effort is focused on three primary evaluation questions:

1. How much energy is saved by an ENERGY STAR Home relative to a typical new home?;
2. How much pollution is being prevented nationally by the ENERGY STAR Homes program?; and
3. Are the builders' and home buyers' expectations being met by the ENERGY STAR Homes program?

In an effort to achieve these goals, a detailed evaluation plan, including four surveys, and a utility billing analysis procedure, have been prepared. A small market research survey and several in-depth case studies are also planned. A Strategic Tracking and Recruiting (STAR) database is also being developed to maintain centralized and readily accessible data to assist in the program evaluation.

One of the most difficult evaluation issues is how to define the control group (or baseline reference) against which the program will be assessed. Three types of control groups were considered:

1. Regional Average New Homes;
2. National Average New Homes; and
3. Homes built to Model Energy Code (MEC)

The most realistic control group is the first. Using this reference case, the energy saving and pollution prevention benefit can be assessed on a regional basis. A second challenging evaluation issue was how to cost-effectively measure only the HVAC and water-heating-related energy savings. The current approach is based on a comparison of weather-adjusted total utility billings from ENERGY STAR Homes versus control homes. Several stratification variables are being used to enable "clustering" of similar homes. Details of the evaluation process will be provided in a future paper.

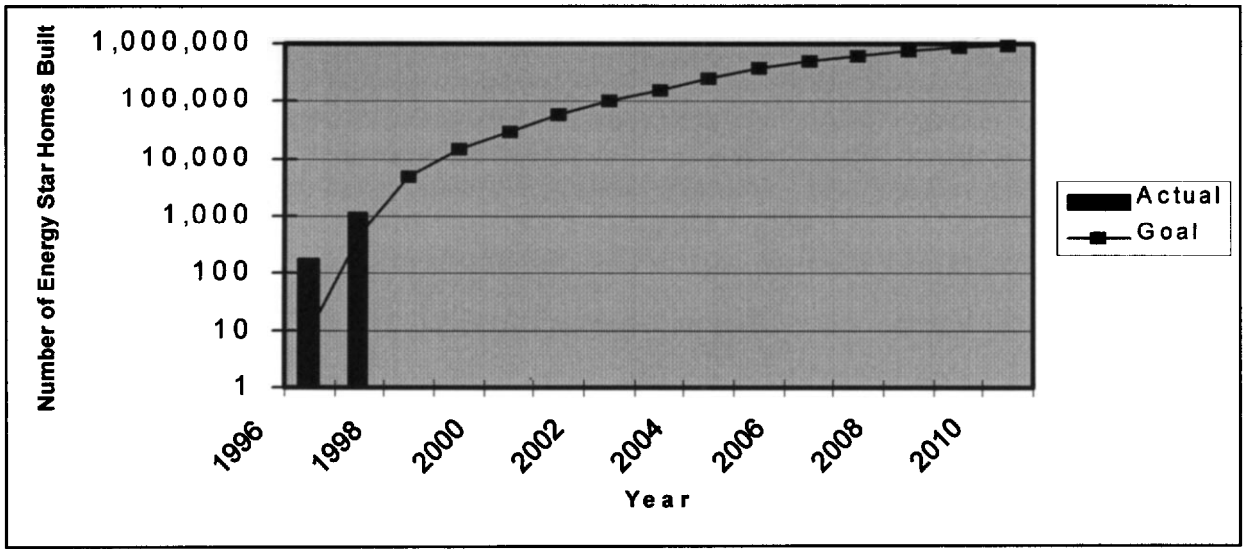
Is the Current Program Approach Working? Results for First Three Years

Since the ICR approval has not been received, EPA has not conducted any formal evaluation of the program to date. The information that is readily available is summarized below.

Number of ENERGY STAR Homes Completed. EPA has developed a set of annual goals for the number of ENERGY STAR Homes built per year that will ultimately lead to full market penetration (i.e. 1 million ENERGY STAR Homes per year). These goals are presented in **Exhibit 5**. The number of ENERGY STAR

Homes built in 1997 was 1,157, exceeding EPA's goal of 500 Homes by 657. This year's goal is 5,000 ENERGY STAR Homes built. The goal for the following year is significantly higher at 15,000 Homes.

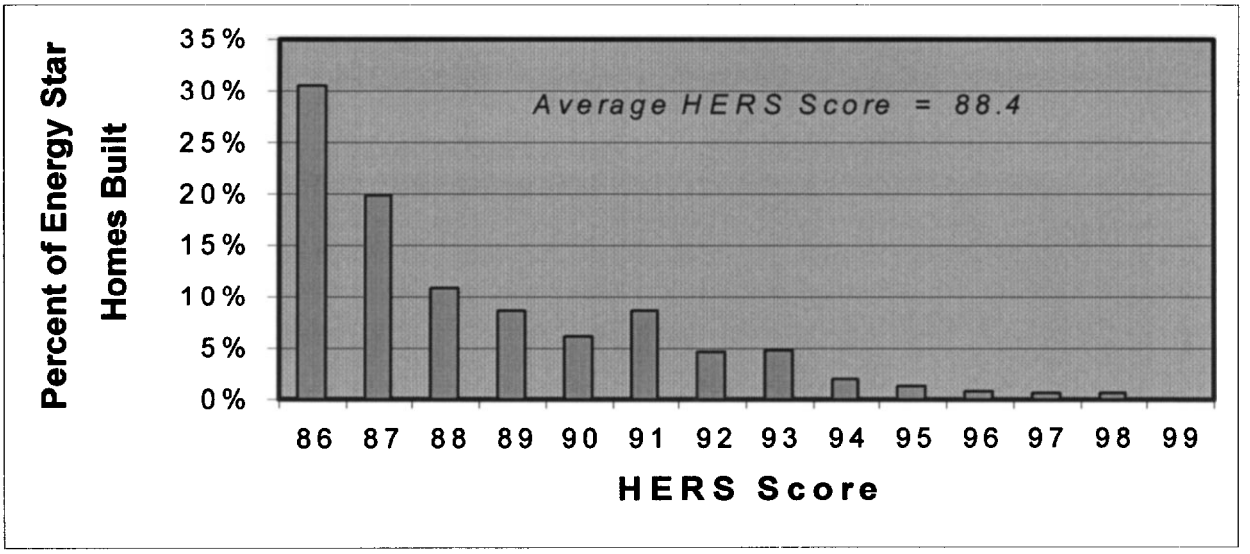
Exhibit 5
Summary of Program Goals and Progress to Date



Number of ENERGY STAR Homes Partners and Allies. There are currently over five hundred Builder Partners and over four hundred Ally Partners in the ENERGY STAR Homes program. Most of these Builder Partners have already built at least one ENERGY STAR Home. When the annual production of these builders is considered, this level of participation provides a strong base for future growth in the program.

Energy Savings Achieved. The first goal of the evaluation effort is to assess whether ENERGY STAR Homes are substantially more efficient than average new homes. In the formal evaluation effort, this assessment will be performed for different regions and builder markets. Currently available information is limited to the HERS documentation submitted for each ENERGY STAR Home. A frequency plot of the number of ENERGY STAR Homes submitted at HERS scores above 86 is provided in **Exhibit 6**. It is interesting to note that the average HERS score is 88.4 (or 42 percent better than MEC), substantially above the minimum of HERS score of 86.

Exhibit 6
Summary of HERS Scores Achieved in Completed ENERGY STAR Homes



The Future Of The ENERGY STAR Homes Program

The level of energy efficiency of new houses constructed in the U.S. range from below the requirements of the Model Energy Code (MEC) to greatly in excess of the MEC requirements. Many of the early participants in the ENERGY STAR Homes program have been builders that already value energy efficiency in their home designs. These builders are contributing to the early rapid growth in the program. Further, these builders are clearly demonstrating that energy efficiency does add significant value to their homes and is helping them to sell their homes more quickly and overall helping them to sell more homes. Through the participation of these builders, the program is successfully proving to other builders that the ENERGY STAR Homes program can help them to differentiate their homes from their competition, and to be more profitable.

The upcoming challenges for the ENERGY STAR Homes program are to address the needs of:

- Builders of "code" homes who are unfamiliar with high efficiency home construction techniques;
- Mass production builders who build homes that are nearly identical in large batches; and
- Other existing successful energy efficiency programs (i.e., utility-funded energy efficiency programs).

To meet these needs, EPA has developed some new strategies to provide alternative participation paths for builders. The intent of these paths is to accommodate the special needs of builders that would not otherwise participate in the program. These alternative participation paths are described below.

Regional Builder Option Packages (ReBOPs)

Many builders want to know the specific requirements of participation in the ENERGY STAR Homes program, prior to joining the program. Builders that are unfamiliar with energy efficient measures are likely to be reluctant to incorporate design changes in their current home designs. The pre-construction specification of energy efficiency features (i.e., the ReBOPs) enables a builder to reduce the risk of failure

to pass a HERS rating of a newly constructed home. The ReBOP participation path offers builders a fixed set of criteria and procedures (i.e., the ReBOP) that should be incorporated in their home designs to ensure the HERS scores/ratings of at least 86 are achieved. Thus, ReBOPs offer builders that are hesitant to incorporate energy efficient features in their home designs a simple, low-risk pathway to success in the ENERGY STAR Homes program.

Ally Builder Option Packages (ABOPs)

ENERGY STAR Homes Allies (utilities, manufacturers, HERS providers, etc.) sometimes have energy efficiency programs or products that are strongly established in the marketplace. The ABOPs provide an alternative participation path for builder's that chose to participate in these other energy efficiency programs or that chose to use high profile energy efficiency products promoted by other companies. Similar to ReBOPs, ABOPs enable ENERGY STAR Homes program participants to simple understand the pathway to successfully meeting the ENERGY STAR Homes level of performance in their home designs. Each of these other programs, or products must be reviewed and approved by EPA for equivalency to the ENERGY STAR Homes program.

Similar to ReBOPs, ABOPs are for builders that are hesitant to incorporate energy efficient features in their home designs. ABOPs also enable the ENERGY STAR Homes program to embrace other energy efficiency programs and products, rather than competing with them. This approach reduces confusion in the local marketplace - by focusing media attention (and thereby consumer awareness) on one well-recognized brand name.

Sampling Protocol

The sampling protocol enables large production builders to use a random sample approach to inspect homes with similar designs, features, and construction techniques. This approach acknowledges that homes built using a mass production or batch approach are virtually identical. Thus, only random testing/inspections are required to ensure that ENERGY STAR Homes performance levels are being achieved. A random sampling of 15 percent of the new homes built are to be tested. If the *sampled* homes fail to meet a HERS score of at least 86, *all of the homes in the batch* must be fixed and retested. In order to minimize the risk of failure, and the expense of retesting, builders are encouraged to obtain full HERS ratings of the first three homes built in a new subdivision. By ensuring that each of the first three homes built meet the ENERGY STAR performance level, the risk of future failures is significantly reduced. Further, the first three homes can serve as test cases for new designs, building products and materials, and construction practices.

Large production builders that actively embrace energy efficient features in their home designs, and build homes using a mass production or batch production process are encouraged to use the sampling protocol. The protocol helps HERS Providers to improve the value of services offered to large production builders - minimizes the effort required to inspect a large volume of near identical homes. The sampling approach significantly streamlines the rating process for builders by minimizing the logistics of planning and obtaining inspections. Each tested home receives a full HERS rating. Each untested home receives only an ENERGY STAR Homes Certificate.

Summary

The ENERGY STAR Homes program is a well-developed voluntary market -based program with a compelling message for program participants. Builders are encouraged to partner with the EPA and the

other program Allies to improve their profitability. New home buyers are encouraged to make better buying decisions and obtain "more home for less cost".

As the program continues to rapidly grow, new issues are continuously raised. Several important issues that are currently under review by EPA, include: (1) new third party verification strategies (ReBOPs, ABOPs, and sampling protocol), (2) rapid program growth (increased reliance on Allies), and (3) stepped-up recruiting of non-energy efficient builders.

The Homes program has demonstrated substantial success since its introduction only two years ago. Two thousand ENERGY STAR Homes have been built, and there are over nine hundred Program Partners (Builder, Ally, and Financing partners). For 1998, the program is on track to substantially exceed its goal of 5000 ENERGY STAR Homes in the ground.