Statement of Matt Belcher,

On Behalf of the National Association of Home Builders

"*Climate Benefits of Improved Building Energy Efficiency*"

House Energy and Commerce Subcommittee on Energy and Air Quality

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Chairman Boucher, Ranking Member Upton, and distinguished members of the Subcommittee, my name is Matt Belcher and I am a home builder from St. Louis, Missouri. I am pleased to present testimony today on behalf of the 235,000 members of the National Association of Home Builders (NAHB), representing every aspect of the residential construction industry – single family and multi-family builders, light commercial builders, remodelers, material suppliers, appliance manufacturers, real estate professionals, and housing finance interests. Comprising 16% of the country's gross domestic product, the housing industry plays a major role in our national economy and has a significant impact on several businesses that depend directly upon housing, including many in the energy efficiency community.

NAHB members build about 80% of all the new homes in the United States and thus have tremendous influence on the manner in which energy efficiency and sustainable technologies are introduced into our nation's housing stock. As one of the leaders in promoting sustainability, both in my personal business and as part of NAHB's national efforts, I am excited to testify today about both the challenges and opportunities facing us as we work collectively to improve efficiency in the residential sector.

Because my business is one of the largest green home builders in St. Louis, I can personally attest to the investments and processes required to deliver not only energy efficiency, but also sustainability, into the homes that I build. As a former code official, I also have a unique

perspective on what can and cannot be achieved through new building code requirements. Lastly, I am also committed to finding a meaningful way to address the energy lost in the more than 128 million existing homes upon which building code upgrades for new construction have zero impact.

Indeed, the challenge of climate change affects everyone, including the residential construction industry. NAHB members are responding in numerous ways, yet there is a perception that builders are generally doing nothing for energy efficiency. This is blatantly false. Regardless of the often deliberately misleading information attributed to our industry, builders *are* working to address today's environmental challenges and we support effective measures to promote greater sustainability and efficiency in the broadest possible manner. This written statement explains the realities of the current situation, and suggests policy changes that will encourage real energy savings while simultaneously preserve housing affordability for millions of future residents of green and energy-efficient dwellings.

Residential Energy Consumption Realities

Although the residential sector is only one part of the nation's built environment, it has been targeted as a major untapped reservoir of potential energy and greenhouse gas emissions (GHGs) savings. In 2005, the Energy Information Administration (EIA) reported that the residential sector is responsible for consuming 21.9% of the energy in the U.S. and for producing 21% of the nation's (GHG) emissions. Despite the fact that EIA typically does not report a "buildings" category, the portion of the GHG emissions attributable solely to housing is almost always combined with the commercial, and some of the industrial, sectors to form a "building" qualifier, repeatedly discussed both in policy and media circles as a singular entity. In fact, some reports show dramatically higher percentages of GHG emissions attributed to "buildings" – even as high as 50% - which, unfortunately, misrepresents the data in a way to suggest that perhaps more can probably be accomplished than is possible in terms of material results.

Nowhere is this data distortion more pronounced than in what is attributed to newer homes - i.e., homes built after 1991 – that represent the smallest fraction, 2.5%, of all the energy consumed nationally.

Energy Consumption in 2001 in Trillions of Btu

Total	**96,498**	**100.00%**
Residential Sector	**20,228**	**20.96%**
Manufactured Housing	**1,301**	**1.35%**
Fossil Fuel Used to Generate Electricity	815	0.84%
Consumed by Residence	486	0.50%
Single Family and Multifamily Built before 1991	**16,498**	**17.10%**
Fossil Fuel Used to Generate Electricity	8,743	9.06%
Consumed by Residence	7,755	8.04%
Single Family and Multifamily Built 1991-2001	**2,429**	**2.52%**
Fossil Fuel Used to Generate Electricity	1,386	1.44%
Consumed by Residence	1,043	1.08%

Sources: Annual Energy Review by the Energy Information Administration; the 2001
Residential Energy Consumption Survey, Energy Information Administration.

This fact is noted not to minimize the existing impact of these residential dwellings on GHG emissions, but to ensure against miscommunication of where substantial emissions reductions and energy savings are actually possible. For example, simply mandating that all new homes must achieve significant above-code performance will not produce the greatest energy savings because new homes are only 2.5% of the problem. Solutions to address all 21% - or both new and existing homes – is something that demands greater focus.

Information from the EIA, as reported by the Department of Energy (DOE)'s *Building Energy Data Book 2007*, shows that most (48.5%) of the energy consumed in a home is the result of the lighting, refrigeration, laundry, cooking, and electronics use by the residents.[1] This presents a substantial challenge for builders, who may otherwise have constructed a home that would meet conservation targets. Essentially, it is possible to build an efficient home that performs poorly due to improper maintenance and operation by its residents. The disconnect

[1] *2007 Buildings Energy Data Book*. U.S. Department of Energy, September 2007. Page 32, Table 1.2.3. *This number includes primary energy consumed across all fuel types. The number also includes "other," as it could possibly pertain to building envelope efficiency.*

between envelope improvements – which are primarily the responsibility of the builder and resident behavior – over which a builder has no control – is one of the major barriers to achieving greater improvements in residential energy efficiency in new homes.

Nonetheless, builders are responsible for driving technology and innovation to consistently improve the energy performance of homes. In fact, extensive gains in building efficiency have been realized over the past decade that have resulted in dramatic energy savings in newer homes versus existing homes.[2] Part of the reason for this improvement is the result of a maturing code adoption process, but it is also the product of a growing market shift in demand for more efficient homes in both new construction and for existing homes. For example, a recent survey of remodelers conducted by NAHB found that one-third of respondents reported an increase in calls for work to improve energy efficiency in an existing home within the last three months. Also, 73% of the respondents reported installing windows with low emissivity (or "low-e") glass in the past three months, 65% reported upgrading insulation, and more than 50% installed high-efficiency HVAC systems. These numbers are not necessarily surprising given the current energy crisis facing the nation, but they are dramatic examples of how changing consumer demands are ushering in a new era of residential construction generally. Saving energy and resources with an energy-efficient home is no longer just a savvy marketing technique, but it represents a financial benefit to the homeowner as well as an environmental benefit to our planet.

Data on Efficiency Improvements in New Homes

Generally, the federal government's collection of detailed information from construction and housing surveys regarding energy efficiency and cost savings is inadequate given the realities of today's emerging energy crisis. With limited funding from the shrinking budget of the Department of Housing and Urban Development (HUD)'s Office of Policy Development and Research, the Census Bureau's Survey of Construction, which generates information on the

[2] *2005 Residential Energy Consumption Survey (RECS)*. Energy Information Administration. U.S. Department of Energy. *Homes constructed in the decade between 1991-2001 consumed 2.5% of total U.S. energy. Homes built before 1991 consumed 17.1% of the total U.S. energy.*

characteristics of new homes, is producing a relatively incomplete picture of changing construction dynamics that have occurred over more recent years. For example, this survey is two pages with only about three dozen questions; limiting its ability to provide meaningful information. This same scenario is true for the American Housing Survey, which is a longer and less-frequent survey that collects more detailed data on new and existing housing. The survey lacks the kind of detail about code requirements, zoning ordinances, or other regulations that exist locally and because it is conducted by the Census Bureau, it is funded out of the same shrinking HUD budget.

Although not as timely as preferred it is essentially the best available, in light of the federal government's data collection efforts in this area. Above all, in order to get more accurate information about efficiency in homes, upon which effective public policy can be created, the federal government really needs more adequate investment in this area.

That being said, the results from the 2005 RECS are summarized in Exhibit 1.

Exhibit 1. Share of Housing Units that Have Some Energy Efficiency Features

	Year of Construction								
	Total	**Before 1940**	**1940 to 1949**	**1950 to 1959**	**1960 to 1969**	**1970 to 1979**	**1980 to 1989**	**1990 to 1999**	**2000 to 2005**
Solar power usage at home									
Used as Main Heating Fuel	Used	Not used	Not used	Not used	Not used	Not used	Not used	Not used	Used
Space Heating Usage									
Well Insulated	38.5%	26.5%	29.7%	32.0%	35.2%	34.4%	39.8%	50.9%	62.0%
Type of Glass in Windows									
At Least Double Pane	54.4%	47.6%	50.0%	46.4%	40.0%	48.7%	55.4%	71.7%	75.0%
Double-pane With Low-e Coating	7.2%	6.1%	5.4%	6.4%	4.8%	7.4%	5.4%	8.1%	16.3%
Have a Programmable Thermostat	29.8%	23.1%	28.4%	26.4%	24.8%	27.0%	32.3%	32.9%	47.8%
Home Appliances Usage									
Energy Star (Most-Used) Refrigerator**	21.5%	20.4%	21.6%	22.4%	16.8%	19.6%	19.4%	18.5%	42.4%
Energy Star Dishwasher**	14.8%	9.5%	9.5%	10.4%	10.4%	14.3%	14.0%	13.3%	43.5%
Energy Star Clothes Washer**	19.5%	17.7%	17.6%	20.0%	18.4%	15.9%	19.9%	19.1%	31.5%

*: Information on solar power is limited in the 2005 RECS. If no cases exist in the sample, then solar power usage is reported as "Not used"; if data withheld because of large RSE or because of a small sample, then solar power usage is reported as "Used".

**: The question of whether the appliance was Energy Star was asked only of those housing units having a appliance less than 4 years old.

Source: Energy Information Administration, 2005 Residential Energy Consumption Survey detailed tables.

Use of solar for heating is infrequent enough that EIA does not report actual percentages in most cells, due to large margin of errors. However, the only vintage category for which any homes reported using solar power as the main heating fuel were built in 2000 or later. It should also be noted that the insulation level reports in the RECS are entirely subjective, based upon asking respondents their opinion on how well their homes were insulated. Nonetheless, the differences in this measure are still dramatic enough to indicate that new homes are significantly better insulated. About 62% of respondents in homes built in 2000 or later reported that their homes were "well insulated" compared to an overall average of 38.5% across all decades.

By more objective measures, 75% of homes built in 2000 or later have at least double pane windows, compared to an overall percentage of 54.4% for all homes irrespective of vintage. Slightly more than 16% of homes built in 2000 or later have double-pane windows with low-e coating – more than twice the 8.1% reported for homes built between 1990 and 1999. This data shows a similar surge in the use of Energy Star® appliances in homes built after 1999. Overall, to the extent that the 2005 RECS provides information on energy-efficient construction techniques, it does demonstrate a regular pattern of greater efficiency for newer structures.

For most energy-saving features, a particularly strong increase in the use of these sustainable techniques is evident in either 1990 or 2000 – the finest detail currently available from the 2005 RECS tables. This similarly coincides with the beginning of the green building movement (discussed later in this statement) and corroborates anecdotal data that NAHB has collected from its members over time about the increasing market demand for more energy efficient features in homes.

Market Dynamics of Efficiency Features and Affordability

There are a number of factors affecting market penetration for certain home features, including energy efficiency features. Because housing markets, much like climate zones, are highly localized and impact individuals differently, it is not terribly surprising that the demand for

some efficiency features in new homes, particularly those which can be very costly, has not been higher. In this case, it is not the fault of the builder or the consumer, but is more a result of the market dynamics of affordability that can make important decisions on certain features potential constraints.

Home building is widely recognized as a competitive industry. According to a 2003 monograph by the American Real Estate and Urban Economics Association, "In the United States, as in most countries, the market for housing services per se can be approximated by a competitive market…few landlords or developers are large enough to exert significant market power."[3] In a competitive market like this, builders need to build homes with features their customers want, at a price that customers are willing and able to pay, or they will be driven out of business by other builders who can provide the types of homes demanded at the right prices. Essentially, customers ultimately determine the types of homes that get built.

Typically, if certain energy-saving features are not achieving a higher market penetration, it is most likely the result of unwillingness by the customer to pay for them. In the case of energy savings, customers are presented with the eventual savings of certain features versus the initial up-front costs. Consequently, if a particular feature costs nothing, or generates a large savings for the consumer to pay back quickly, then the market demand for such features would be incredibly high.

To be sure, it is possible that the market may occasionally fail if home buyers do not have all the information they need – for example, if they do not realize a certain energy-saving feature is possible, or if they do not fully understand how much energy it saves. In this case, greater public education would be appropriate. Yet, if the market is working and customers have enough information but simply choose not to pay for a feature at a current price, then Congress has the

[3] Richard Greene and Stephen Malpezzi. *A Primer on U.S. Housing Markets and Housing Policy. AREUEA Monograph Series No. 3*, The Urban Institute Press, Washington (2003). Richard Greene is currently Associate Dean for Graduate Programs and Olver T. Carr, Jr. Chair of Real Estate Finance at George Washington University. Stephen Malpezzi is Professor, and Lorin and Marjorie Tiefenthaler Distinguished Chair in Real Estate at the University of Wisconsin-Madison.

opportunity to alter the market outcome to achieve the broader purpose of saving energy. The best ways to approach this are through additional research into new technology, thereby lowering costs, as well as to providing incentives for efficient behavior (e.g., Section 25C, Section 45L, and Section 179D of the Internal Revenue Code). NAHB has been a strong supporter of both efforts, working alongside the federal government to maintain the Partnership for Advancing Technology in Housing (PATH), a program at HUD that drives technology innovation, as well as lobbying aggressively for tax incentives alongside many in the environmental community, including some here today.

If, however, the government instead adopts the approach of mandatory energy efficiency measures, the potential risk is the harm done to marginal first-time home buyers. These home buyers are typically characterized by lower incomes, limited up-front cash for down payments, with intent to purchase relatively modest-priced homes. These lower-income marginal buyers simply cannot afford to wait for twenty or thirty years for future paybacks from efficiency features. Academic studies may disagree in some respects, but are consistent in finding that shorter payback periods are most needed for households with lower incomes, or those buying lower priced homes.[4]

Mandated criteria that increase up-front costs for new homes in exchange for a future payback may work well at the top of the market, or even in the average case, yet have the effect of pricing out marginal first-time buyers at the lower end of the market. NAHB does not support the assertion that a broad public policy objective should be achieved on the backs of a relatively narrow segment of the market with limited resources. Nonetheless, recognizing the importance of energy efficiency, NAHB recently adopted new policy on accepting efficiency mandates that embrace a payback of ten years or less. This policy is based on the longest payback period for

[4] *The Value of Energy Efficiency in Housing: Review and Analysis of the Literature*, by David J. Dacquisto, Paul Emrath, Joseph Laquatra, and John A. "Skip" Laitner, working paper commissioned by the U.S. Environmental Protection Agency.

first-time buyers found in NAHB consumer surveys, specifically since on average, home owners only remain in a home for seven years.

Cost-Effectiveness and Technical Feasibility

In light of the need for reasonable payback periods, particularly at the lower end of the market, there are many ways to determine whether or not energy efficiency code changes are actually cost-effective in the long term. Some efficiency features are very expensive at the front end, leading some to claim that they are never cost effective. For example, in a June 2008 article for the *Journal of Light Construction* called "A Close Look at Common Energy Claims," Martin Holladay suggests that "replacing old single-pane windows with new double-pane low-e units certainly saves energy, but the cost is so high – and the amount of energy saved is so low – that window replacement is almost never cost effective." Meanwhile, installing fluorescent lighting and replacing incandescent bulbs is a modest investment with almost immediately cost-effective returns.

Some argue that building envelope improvements – often accomplished through code change requirements – are the best way to address building efficiency because it is assumed that builders will simply absorb the additional costs. The truth is that builders cannot simply push thousands of dollars of efficiency upgrades onto consumers, particularly in instances where consumers are not even demanding such features, and expect to remain competitive in the market. Builders, and homeowners, have to strike the right balance between the most appropriate efficiency features that meet the right pricing targets.

Building codes are designed to change and to improve as changes in technology and building practice grow and mature in the market. There is currently a proposed change to the International Energy Conservation Code (IECC) for the 2009 edition that seeks a 30% improvement in overall energy efficiency. However, some of the changes within this proposal have no reasonable level of cost-effectiveness. For example, one change proposes an increase in the wall insulation level (or R-value) from 13 to 16 in Climate Zone 2, which encompasses most

of Florida. The energy savings for this change is calculated at $22/year for a 2,000 square foot house with a cost of (at least) $1,600 in high wind zones; making the payback for such a feature more than 70 years. Another change proposed in Southern Florida will require a change from a single pane window to a double pane window. Computer energy simulation models show that there is actually an energy penalty of $3 for adding the second window pane at a cost of over $700 for the same 2,000 square foot house.

Implementation and Liability Problems

As with many new trends, liability for unexpected problems with a new technology or practice is a legitimate concern. There is the potential for significant problems with large energy efficiency improvements in houses and apartments that should be noted. Building scientists often discuss buildings operating as a system, meaning when one thing changes, it affects how the entire house operates. An example of this is seen in a hot humid climate where improving the efficiency of a building can challenge the performance of an air conditioner beyond its capability. Conventional air conditioners are designed to remove a certain amount of moisture, but "high performance" homes have the problem of requiring less air cooling and a similar amount of moisture removal. Current air conditioner designs will reduce the temperature and leave too much moisture resulting in a cold and clammy condition that is very suitable for mold growth.

DOE's Building America program recognizes this problem and a possible need for supplemental dehumidification equipment. However, in the Building America Best Practices Series there is very little guidance beyond, *"One Building America team recommends that all homes in the hot and humid climate call for supplemental dehumidification. Other teams call for these systems in homes where moisture proves to be a problem."* Even some of the best building scientists in the country are unable to provide a standard solution. This new technology approache may be good for cutting edge programs where the builders get free engineering support through a government-sponsored program, however, this is not appropriate if every house is required to meet stricter standards with merely a warning to builders of potential

problems. The liability and health issues associated with sweeping changes to the energy code without verifiable and rigorous research could be disastrous to the building industry.

As the demand for energy efficiency increases, the call for tighter and tighter homes continues to grow. In areas of the country where moisture and humidity are particularly problematic, tighter homes – e.g., that may be required for certain code increases – can result in a ripe environment for mold growth and other indoor health issues. In this case, the builder, not the building code, is the responsible party and could be subject to extensive litigation, despite the fact that he or she simply complied with the efficiency requirements of the code. This scenario becomes more realistic in terms of the push for national benchmarks for code changes that demand significant above-code compliance. Basically, because some construction techniques may be appropriate in some areas of the country does not mean that the same code requirements are suitable in other areas – and in some cases to the detriment of the well-intentioned builder that would have to choose between legal liability or code compliance.

The Role of Building Energy Codes

As a former code enforcement official, I can confirm that a great majority of the rhetoric that exists today relative to building codes, aimed at the public and policymaker alike, is unfortunately, terribly distorted. In some respects, certain groups appear to suggest that all concerns about the built environment and the GHG emissions attributable to it could easily be ameliorated with a few aggressive building code regulations. Regrettably, this completely misrepresents the realities of what is actually possible with changes to energy codes not only because of their irrelevance for the current inefficient housing stock, but, ultimately because the codes are only meaningful if they are actively enforced.

It is true that codes are consistently improved through a normal cyclical process whereby stakeholders from every interested party – enforcement officials, environmentalists, builders, etc. – convene to discuss the merits of certain changes, eventually producing a revised code for adoption by state or local governments. It is false to assume that just requiring states or local

governments to adopt an arbitrary above-code compliance target for all new construction is going to translate into improved enforcement of such code requirements or achieve the energy savings goals envisioned. It may be worthwhile for a state or local government to decide to adopt an aggressive energy code, but if the resources, or infrastructure, to enforce the code are not available, then the savings assumed will never materialize.

The manner in which building and energy code adoption occurs is one reason why the federal government is unique in terms of what it can "require" of state and local governments. Under the police powers of the U.S. Constitution, states are given the authority to determine appropriate building codes within their jurisdiction. Some states then defer this authority to local municipalities and consequently set up a framework whereby climate and geography concerns can be specifically addressed in an individual state or area. For example, Florida needs the flexibility to require hurricane impact resistant building standards, and similarly may require higher-efficient air conditioning equipment because these are specific geographic demands that make sense for the state. Whereas requiring the same codes in Michigan – i.e., hurricane impact resistant building standards and high-efficiency air conditioners – might be completely illogical.

Because geography, climate, and local impacts are crucial to the combined safety, soundness, and energy performance of residential structures in various parts of the U.S., it is impossible to develop a national energy code to accommodate every individual state's demands simultaneously. While it is entirely possible for the federal government to encourage above-code compliance by offering incentives to builders achieving significant savings (e.g., Section 45L New Energy Efficient Home Credit), the federal government should be careful in how much it pushes (or mandates) an individual state or local area to adopt an energy code because it could run contrary to local geography needs or supersede existing public-private programs that have produced incredibly successful conservation results, (e.g., Energy Star®). Proposals that require states to adopt above-code targets could leave those states out of compliance with federal law

should they choose not to adopt the federal benchmark. This lack of compliance potentially opens the state to a myriad of litigation, or other federal enforcement regimes.

Congress is slowly shifting focus to find ways to address these federalism barriers and improve state energy codes. H.R. 6 – *The Energy Independence and Security Act* (PL 110-140) included a provision to authorize the creation of an Energy Efficiency Block Grant program that would deliver funds to state and local governments to implement measures (and potentially offset some costs) of local efficiency needs. Also, the U.S. House recently passed H.R. 4461 – *The Building Code Administration Grant Act* to provide more resources for state and local building code departments to enforce existing codes. Lastly, Congress should require DOE to fulfill its commitment to training individuals on the energy code, as promised in various meetings with NAHB staff and members.

State and local governments need to be actively engaged in developing code requirements that are appropriate for the structures built within their jurisdictions. The federal government needs to support them with resources to enforce the codes, and must encourage them to adopt the most appropriate energy codes available while not endangering public health. Just as the federal government must encourage greater efficiency in our nation's housing stock, so too should they continue to support housing affordability in a manner that allows everyone, at all price points, to be able to enjoy a green or energy-efficient home.

Meaningful Incentives for Energy Efficiency

Congress plays an important role in developing effective ways to incent builders and homeowners to improve the efficiency of residential dwellings. One of the primary ways is to offer tax incentives to homeowners and builders that upgrade and construct highly-efficient homes. The Internal Revenue Code Section 25C – Nonbusiness Energy Credit goes directly to the homeowner for making improvements in windows, water heating, adding insulation, etc. Albeit modest (e.g., no more than $200 for windows), the credits are an important federal commitment

to promoting efficiency in existing homes. Unfortunately, these credits expired at the end of 2007 and have not yet been extended.

Similarly, the Internal Revenue Code Section 45L – New Energy Efficient Home Credit provides a $2,000 tax credit (subject to basis adjustment) for a builder who constructs a home that is 50% more energy efficient than the 2004 supplement to the 2003 International Energy Conservation Code (IECC). This credit was originally passed in the Energy Policy Act of 2005 and extended for one year, expiring December 2008. Last year, a dramatic increase in the number of homes achieving certification for this credit was reported. Over 23,000 homes were certified in 2007 versus approximately only 9,000 in 2006[5]. This nearly three-fold increase is significant, not only because it occurred amidst the most serious downturn in housing since World War II, but also because it proves that building for efficiency is growing dramatically.

Unfortunately, neither of these tax incentives has been renewed by Congress. NAHB has been lobbying aggressively alongside many environmentalists, corporations, and other trade groups to urge a quick extension of these important incentives. The House recently passed H.R. 6049 – *The Renewable Energy and Job Creation Act* that has a number of renewable energy production incentives, as well as some efficiency credits. However, the Section 45L credits were not included. Despite the fact that no one, in either Chamber or in either party, has expressed objection to Section 45L, there was a complete omission of including this incentive for residential energy efficiency. The shocking reality is that many of the incentives that Congress did include in H.R. 6049 were incredibly expensive, meanwhile a one-year extension of Section 45L is only $50 million, which, as demonstrated above, reaps tremendous efficiency benefits in the number of super-efficient homes that have been constructed under it. It is time for Congress to restore its commitment to promoting residential energy efficiency in new construction and preserve, by

[5] This figure was reported by the Residential Energy Services Network (RESNET) on June 2, 2008 – www.natresnet.org. The 2007 data comprises almost 3% of all the new homes constructed in 2007.

extending for as long as possible, the *only* federal incentive for efficiency in new residential construction – Section 45L.

In addition to incentives for new homes and existing home upgrades, Congress should also extend Internal Revenue Code Section 179D – Deduction for Energy Efficient Commercial Buildings. This provides a $1.80/sq. foot deduction for commercial buildings (or those four stories above grade – including multifamily) for achieving 50% energy savings above ASHRAE 90.1. The incentive also provides a $0.60/sq. foot deduction for buildings that achieve 2/3% of energy reductions above the same code. Because of the relatively short duration of this credit, which also expires at the end of 2008, many commercial builders have not had the opportunity to fully utilize the incentive, incorporating into long term development plans. Without a Congressional commitment to a longer incentive, it loses some of its interest because of the unpredictability of its existence. To make it meaningful, Congress must extend the tax incentive for many years – or make it permanent.

Lastly, in relationship to state and local governments, encouraging local officials to adopt expedited permitting and faster building reviews for builders that construct highly-efficient homes, or green homes, would also encourage a change in behavior locally. Inherent within many of the energy efficient homes is a requirement to conduct a plan review, contract an energy rating, wait for a code inspection, and then receive a Certificate of Occupancy. Once the new construction market recovers and the demand for homes returns, builders will be searching for ways to speed the permitting and inspection processes to get the property built and quickly ready for sale. If building green or highly-efficient homes provides access to expedited review and permitting, it will become increasingly more attractive to undertake.

The Green Building Movement

NAHB's experience and support for voluntary energy efficiency and green predates many of the available green ratings systems today. Long before green was a part of every day lexicon, NAHB members were actively engaged in building energy efficient homes and buildings, as part

of an organic process that has significantly reshaped residential construction. Aside from our members' work in efficiency programs, like Energy Star® and the Department of Energy's (DOE) Building America program, they have been long-standing pioneers in what is now known as the green building movement.

In the early 1990's, local builders began driving sustainable residential construction that incorporates a flexible framework to accommodate geography, resources, and energy efficiency. As the movement grew, NAHB members became more engaged and, in 1998, NAHB established a special subcommittee at the national level to work specifically on green building issues. By 2004, the industry, including over sixty stakeholders, was developing a set of national guidelines to direct builders how to incorporate ever-increasing sustainability benchmarks for compliance with green criteria. This became known as the National Green Home Building Guidelines. However, as the need to develop a more reliable verification methodology became apparent, the members of NAHB agreed to work collaboratively with the International Code Council (ICC) to undergo a rigorous standards-developing process that would ultimately produce the first standard submitted to the American National Standards Institute (ANSI) for green residential construction and remodeling in the United States – the *National Green Building Standard™*.

The development of the *National Green Building Standard™* is the most recent, and most robust, effort undertaken by the industry to set compliance markers for green building in the various aspects that comprise residential construction – single family, multifamily, remodeling, and land development. The process began in early 2007 when a group of 42 stakeholders convened in Washington D.C. representing federal (U.S. EPA, DOE), state, and local governments, building code officials, design professionals, building supplier manufacturers, sustainable building interest groups (including the U.S. Green Building Council), utilities, builders, and energy efficiency consultants. These experts worked together for over a year to develop rigorous, environmentally-sound, and defensible criteria for green residential construction incorporating the seven primary principles of sustainability: energy efficiency, water efficiency,

resource efficiency, lot and site development, indoor environmental quality, global impact, and home owner education. Once the group finalized the criteria, balloted appropriately, addressed all appeals and responded to over 3,000 public comments, the resulting product was presented for approval to ANSI in April of this year. When approved, the *National Green Building Standard™* will be the only standard approved by a third-party Standards Developing Organization (SDO), (i.e., ANSI), for residential construction.

The process for developing the *National Green Building Standard™* is incredibly important in order to fit within the framework of established federal law relating to voluntary consensus standards utilized by federal agencies. The National Technology Transfer Act of 1996 (PL-104-113) states in Section 12 (d)(1) that:

> *In general.--Except as provided in paragraph (3) of this subsection, all Federal agencies and departments shall use technical standards that are developed or adopted by voluntary consensus standards bodies, using such technical standards as a means to carry out policy objectives or activities determined by the agencies and departments.*

NAHB understood the importance of providing a viable, rigorous, and consensus-based alternative to the plethora of privately developed green rating systems flooding the market as the dynamism of the green movement continues to grow. NAHB believes the federal government similarly understands the importance of this concept. By passing this law, it has appropriately identified the need to recognize those standards that have undergone the lengthy and rigorous approval procedures inherently equipped with adequate safeguards against undue private influence, confirmed by approval from unaffiliated SDOs.

One very important aspect of green building is, of course, energy efficiency. To be sure, green building embodies more than just energy efficiency, however this is a major component of building performance; primarily because of the costs associated with it, i.e., utility bills. Due to concerns about the variable of consumer behavior and how consumption habits could potentially offset some efficiency gains in the envelope, NAHB made sure to underscore the importance of

educating homeowners about maintenance and home operation with a requirement in the national program. This adds value the impact of consumer choices and informing the consumer about how personal conservation habits in the home are as important as changing the construction techniques in the structure itself.

Existing Homes & Remodeling

In addition to green building, the shift in demand for remodeling for greater energy efficiency is one of the brighter spots in the current housing downturn. In general, there are numerous ways to increase energy efficiency in existing homes and buildings. One of the most effective ways is to switch out incandescent bulbs with compact fluorescent lighting (CFLs) in areas that are lighted for extended periods of time, typically two hours or longer. CFLs are four times more energy efficient (using 50 to 80% less energy) and last up to ten times longer than incandescent bulbs. Since 11% of all energy used in a home is for lighting (*2007 EIA Building Energy Data Book*), this could reap tremendous energy savings and cost consumers very little upfront. Another measure is to install programmable thermostats to heating and cooling equipment that automatically turn on and off instead of running continuously. Also, sealing cracks with caulking and weather stripping can greatly improve energy efficiency, as could properly placing trees and shrubs to maximize the benefits of shading and protect against radiant heating from direct sunlight. Adding insulation to basements and attics, particularly when these areas are used as bedrooms or family room is also another way to improve efficiency.

Finally, replacing less efficient appliances with Energy Star® rated models can save an average of 30 percent over standard appliances. All of these measures can produce meaningful energy savings, as well as decrease utility bills for consumers. Some of the measures are more costly than others, (e.g., adding insulation versus replacing incandescent bulbs), but each has the potential to save energy for the consumer operating an existing home.

One of the major obstacles for upgrading efficiency in existing homes is the potentially-high upfront costs and sometimes lengthy payback periods. While some actions can reap short

term paybacks with very modest upfront investment, (e.g., CFLs), others can be much more expensive initially and take longer to recoup via utility savings, (e.g., installing low-e windows or major equipment replacement). Another obstacle is the lack of consumer information about the costs and paybacks associated with some of the upgrade activities, so that informed decisions can be made about what is appropriate for an individual household. Some utilities have been working on consumer education campaigns about saving energy for a long time with great success. However, a general lack of knowledge still exists for residents about the impact of certain consumption habits (laundering, cooking, electronics, etc.) in the home. This lack of knowledge on the part of the resident has the potential to offset energy savings from building envelope improvements. A conscientious effort to inform the public about conservation practices in a home is critically important to ensure that efficiency upgrades, once they are undertaken, actually perform as intended. Ultimately, operating an efficient home inefficiently serves no one.

The most effective way to encourage owners of existing buildings to upgrade their energy efficiency is through programs at local utilities and those directly linked to utility savings. This has historically been the most effective tool because it is the most immediate, and locally available, resource to drive behavior change. Providing rate breaks for owners that are operating appliances, etc. in off-peak periods may be one way to change behavior or, alternatively, charging higher rates to owners that are not operating the home in an efficient manner. Another method of shifting owners towards more efficiency or weatherization may be to provide two different billing schedules, one with an “efficiency path” and another with “standard rates” so that consumers can see potential savings from choices that can be made with respect to appliances, weatherization, and lighting, for example.

Finally, providing consumers and owners with information about peak-load demand and detailing information about when energy is the least expensive to use (i.e., during the day), may shift consumption patterns, spreading out the demand-side needs and moderating the overall use. Essentially, anything a utility offers a consumer that affects the monthly bill is going to have

the most immediate, and most profound, impact on that consumer's choices. Utilities are the ones that carry the ongoing and primary relationship with the homeowner, therefore, they have the most opportunity to change the dynamics, and the demand for energy services.

Conclusions and Recommendations

Improvements in residential energy efficiency and the growing green building movement are absolutely changing the dynamics of the housing market today, despite assertions to the contrary. In some instances, the changes and improvements may not be occurring at the pace desired by policymakers at all levels – federal, state, and local. But, to claim that nothing is happening at all to encourage improved efficiency and sustainability is entirely false. Due to the deficiency in data that the government has collected generally about various energy-saving technologies and their prevalence in the home, it is challenging to determine exactly what costs associated with improved efficiency features might be in every housing market in the U.S. To be sure, there are some standard data, mostly reported by Energy Star® that can serve as a reference point for cost-effectiveness. However, the reality is that a mix of incentives, consumer education, changes in construction technologies, and adoption of locally-enforceable and meaningful efficiency measures, is needed to drive greater efficiency in new home construction.

There are many opportunities for the government to work with home builders to achieve the goal of increased energy efficiency in the nation's residential buildings. NAHB would recommend the following to address energy efficiency in both new and existing homes:

- The government must make an active commitment to greater consumer education about energy conserving choices in home operation and maintenance. This can be accomplished through the utilities, but must be aimed directly at consumers that are using over 48% of their energy through use of appliances, cooking, laundry, and electronics.

- Congress must restore its commitment to energy incentives that help offset upfront costs of efficiency upgrades. To do this, Congress should extend, or make permanent, Section 45L, Section 25C, and Section 179D of the tax code.
- Congress should also commit appropriations for the Energy Efficiency Block Grant (EEBG) program authorized in *Energy Independence and Security Act of 2007* (PL 110-140). This gives resources directly to state and local governments that can be used to support efficiency upgrades in existing homes.
- Congress should provide direction to state and local governments to allow expedited permitting and review for builders constructing highly-efficient or green homes.
- Lastly, Congress must embrace the broadest possible green building policy and support programs and standards that have undergone the rigors of scrutiny by third-party Standards Developing Organizations (SDOs). The first-and-only *National Green Building Standard*™ (ICC700 – National Green Building Standard) for residential construction, remodeling, and land development is very near completion and was submitted to ANSI for approval in April of 2008.