ACEEE Testimony

American Council for an Energy-Efficient Economy

Submission of Steven Nadel,
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To the House Energy and Commerce Committee
Subcommittee on Commerce, Manufacturing, and Trade

Hearing on: Our Nation of Builders: Home Economics

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Summary

Energy is one of the largest costs of home ownership, only surpassed by mortgage payments and about the same as the cost of real estate taxes. Fortunately, there is much that can be done to reduce the energy use of both new homes and existing homes and it is typically less expensive to reduce energy consumption in a home through energy efficiency measures than the cost of the same amount of energy from new energy supplies. Unfortunately, a series of market barriers keeps investments in energy efficiency below optimal levels.

Smart policies can help address some of these market barriers, helping the private market to better capture these efficiency opportunities. State, local, and federal policies, such as building codes, tax incentives, and voluntary new home and home retrofit programs, have contributed to significant improvements in home energy efficiency. However, substantial cost-effective energy savings remain untapped—the National Academy of Sciences estimates available savings of 25-30% over the next 20-25 years relative to the Energy Information Administration's Reference Case forecast. As Congress considers ways to improve home economics and create jobs, we recommend that it consider policies to:

1. Support model and state building code activities
2. Improve home mortgage underwriting
3. Encourage home energy use benchmarking and disclosure
4. Provide temporary incentives for comprehensive home energy retrofits

Due to its ability to reduce home carrying costs and create jobs, energy efficiency should be one cornerstone of our efforts to improve home economics.

Introduction

My name is Steven Nadel and I am the Executive Director of the American Council for an Energy-Efficient Economy (ACEEE), a nonprofit organization that acts as a catalyst to advance energy efficiency policies, programs, technologies, investments, and behavior. We were formed in 1980 by energy researchers and celebrated our 30th anniversary in 2010. Personally I have been involved in energy efficiency issues since the late-1970s and have testified multiple times before this Committee and its Subcommittees as well as before the Senate Energy and Natural Resources Committee.

ACEEE is a nonpartisan organization. Today I appear as a Democratic witness but during the development of the *Energy Policy Act of 2005,* I appeared several times as a Republican witness. In our view, energy efficiency is a quintessentially nonpartisan issue. Today's hearing is on home building and home economics. A critical part of this is making homes energy efficient so they have low operating costs.

In my testimony I wish to make three primary points:

1. Energy efficiency is an important aspect of home economics.
2. Effective state, local, and federal policies have helped to improve the efficiency of American homes but more can be done.

3. There are a number of pending bills before Congress that have bipartisan support. These bills could provide a foundation for this Committee's work to improve home economics and promote cost-effective energy efficiency savings.

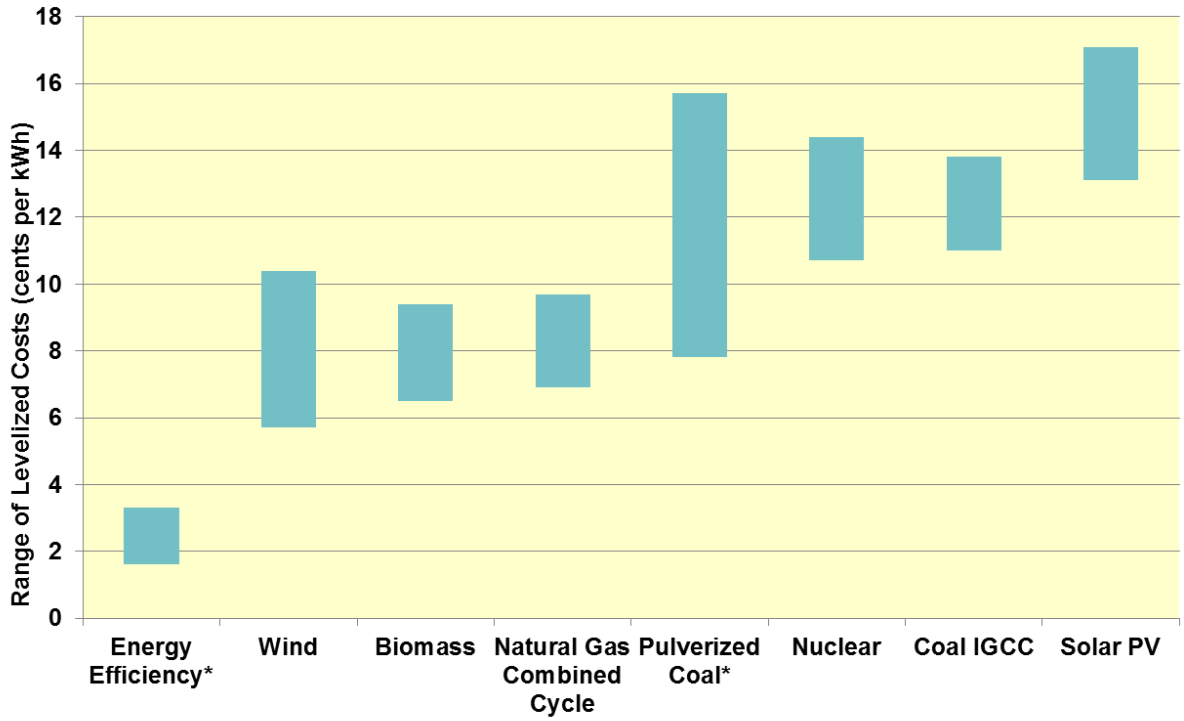
Energy Efficiency and Home Economics

The major costs of home ownership are mortgage payments, property taxes, home insurance, and energy. The mortgage industry commonly refers to "PITI" for principle, interest, taxes, and insurance. But energy costs should also be included as they are usually higher than insurance costs and sometimes higher than taxes. The table below provides average numbers:

Item	Annual Amount	Notes and Source
Mortgage payments	$12,732 ($1061 per month)	Based on a national average home loan for $222,261 with a 30-year mortgage at 4%, according to LendingTree: http://realtormag.realtor.org/daily-news/2012/01/03/what-does-average-home-owner-pay-mortgage
Real Estate Taxes	$2,331	Median Real Estate taxes in 2011 for homes with a mortgage from the American Community Survey: http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_11_1YR_S2506&prodType=table
Energy	$2,051	2012 figure estimated by ACEEE using 2009 consumption from *Residential Energy Consumption Survey* and average 2012 residential energy prices for electricity, natural gas, fuel oil, and propane from several Energy Information Administration reports and databases.
Homeowners Insurance	$806	Average of 2006, 2007, and 2008 from: http://www.census.gov/compendia/statab/cats/banking_finance_insurance/insurance.html, Table 1224.

As can be seen, energy costs average about $2,050 per home each year. But some homes use more than twice this amount and others less than half this amount. In most homes, energy use and energy bills can be reduced by 20-40% through cost-effective energy efficiency investments. The cost-effectiveness of energy efficiency investments is illustrated in Figure 1, which compares the cost of power from new power plants of various types with the cost per kWh saved of utility-administered energy efficiency programs. Our research indicates that residential and commercial programs, on average, have the same costs per kWh saved as each other, and thus average cost for all sectors is a reasonable approximation for residential sector costs. Energy efficiency programs average approximately 3 cents per kWh saved while power from new power plants starts at 6-7 cents per kWh.

Figure 1. Levelized Cost per kWh for Different Electricity Resources



*Notes: Energy efficiency average program portfolio data from Friedrich et al. 2009 (ACEEE); All other data from Lazard 2012. High-end range of advanced pulverized coal includes 90% carbon capture.

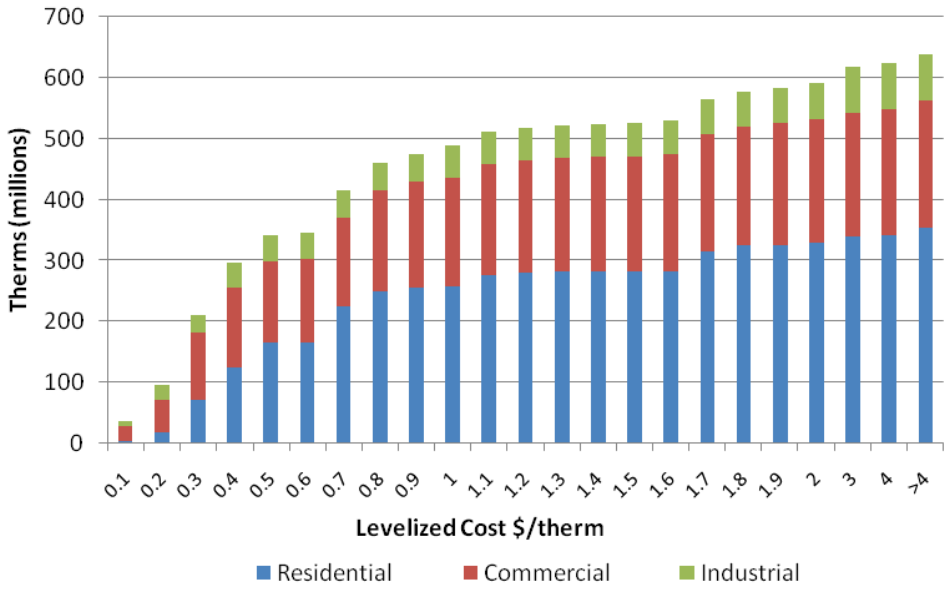
Friedrich, Katherine and Maggie Eldridge, Dan York, Patti Witte, Marty Kushler. 2009. *Saving Energy Cost-Effectively: A National Review of the Cost of Energy Saved Through Utility-Sector Energy Efficiency Programs.* Report Number U092. Washington, D.C.: American Council for an Energy-Efficient Economy; Lazard Ltd. 2012. *Levelized Cost of Energy Analysis: Version 6.0.* Lazard Ltd.

Likewise, substantial cost-effective natural gas savings are available, even at today's low natural gas prices. Figure 2 shows the results of a study by Northwest Energy (a natural gas utility) on the opportunities for cost-effective natural gas savings as a function of natural gas prices. As can be seen, even at 2012's average residential natural gas price of $1.06 per therm,[1] large savings are available.

Another virtue of energy efficiency investments are that they tend to be very labor-intensive, helping to create jobs. First, jobs are created designing, manufacturing, and installing efficiency measures. Second, as consumers and businesses save on their energy bills, they re-spend the savings, which generates additional jobs. Figure 3 shows how more jobs are generated per dollar invested in construction and services (where most of the energy efficiency jobs are) than in the energy sector (which is capital but not labor intensive).

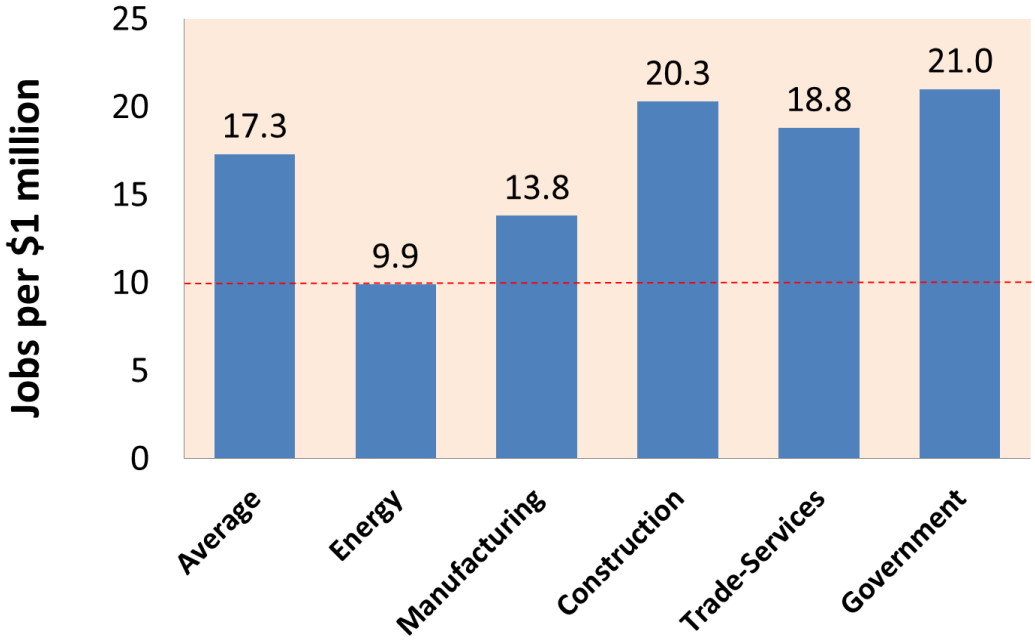
[1] EIA. 2013. *Natural Gas Monthly.* Washington, DC: Energy Information Administration, U.S. DOE. http://www.eia.gov/naturalgas/monthly/.

Figure 2. Natural Gas Efficiency Northwest Regional Supply Curve, 2020



Source: NW Energy 2009[2]

Figure 3. Jobs per Million Dollars of Revenue by Key Sectors of the U.S. Economy



Source: ACEEE. *How Does Energy Efficiency Create Jobs*. http://www.aceee.org/fact-sheet/ee-job-creation.

[2] Northwest Energy Coalition. 2009. *The Power of Efficiency: Pacific Northwest Energy Conservation Potential Through 2020.* http://nwenergy.adhostclient.com/wp-content/uploads/Power-of-Efficiency-050109.pdf. Seattle, WA: Northwest Energy Coalition and Ecotope, Inc.

Unfortunately, a variety of market barriers keep builders, homeowners, landlords, and renters from realizing these savings The barriers are manifold and include such factors as "split incentives" (landlords and builders often do not make efficiency investments because the benefits of lower energy bills are received by tenants and homebuyers); panic purchases (when a product such as a refrigerator needs replacement, there often is not time to research energy-saving options); and bundling of energy-saving features with high-cost extra "bells and whistles." These barriers are discussed more fully in a recent ACEEE study.[3]

Current Policies to Promote Energy Efficiency in Housing

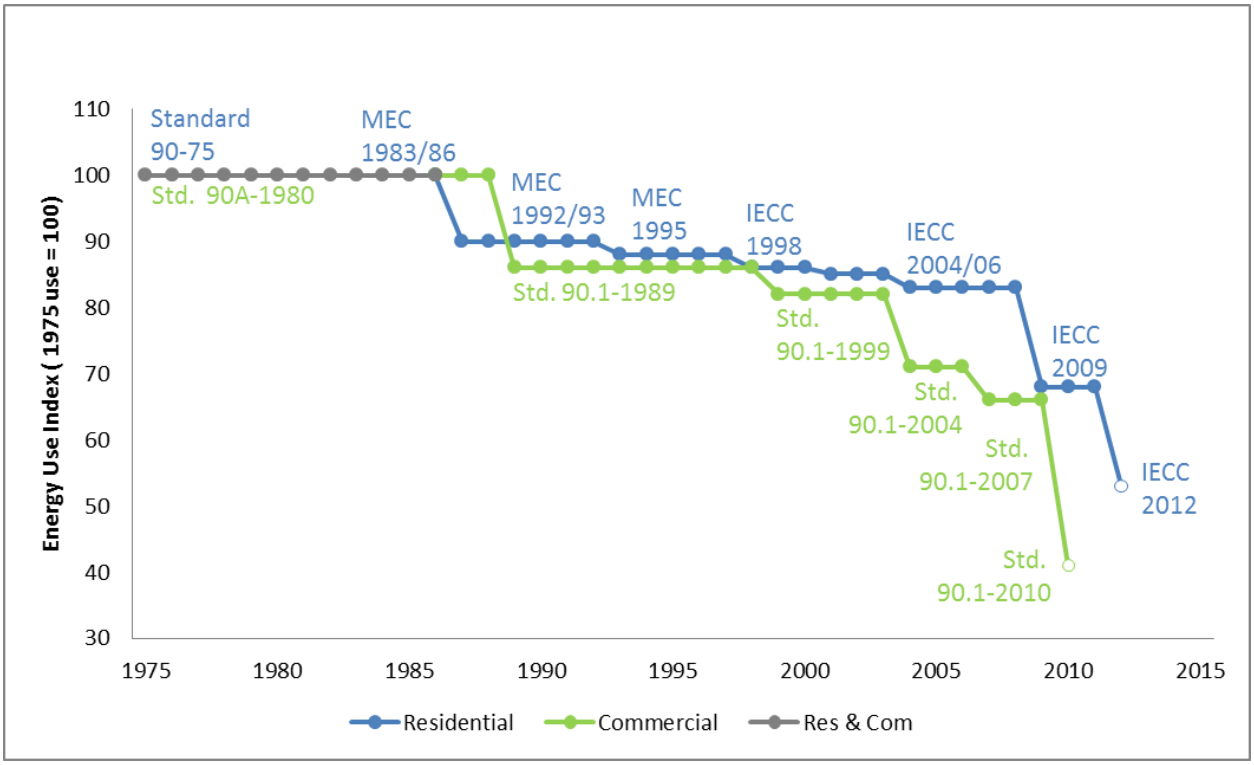
In the United States, policies to improve the efficiency of homes, both new and existing, are primarily at the state and local level. However, federal policy has had an impact, and at a minimum, the federal government can provide information and assistance in order to make it easier for states and local jurisdictions to undertake appropriate local actions. Among the policies that have been driving improvements in home energy efficiency are:

- Building codes
- ENERGY STAR, federal tax incentives, and other voluntary new home programs
- Home Performance with ENERGY STAR and other voluntary home retrofit programs

Building Codes. States and local jurisdictions have been including energy efficiency requirements in their building codes since the 1970s energy crises. There are several national model codes developed by independent membership organizations with active public participation. These include the International Code Council [ICC] and the American Society of Heating, Refrigerating and Air-conditioning Engineers [ASHRAE]. Typically states then adopt these model codes, sometimes with state-specific modifications. As a result, as shown in Figure 4, the efficiency of new homes built to model codes has steadily increased, with substantial improvements in recent years. For example, a home built to the 2009 International Energy Conservation Code (IECC), the code most commonly adopted by states, will use about 30% less energy than a home built to the 1975 version of ASHRAE Standard 90.

[3] Vaidyanathan et al. 2013. *Overcoming Market Barriers and Using Market Forces to Advance Energy Efficiency.* Report E136. Washington, DC: American Council for an Energy-Efficient Economy. https://www.aceee.org/research-report/e136.

Figure 4. Energy Use Index for Homes and Commercial Buildings Built to Different Model Energy Codes



Source: Compiled by ACEEE based on data from DOE

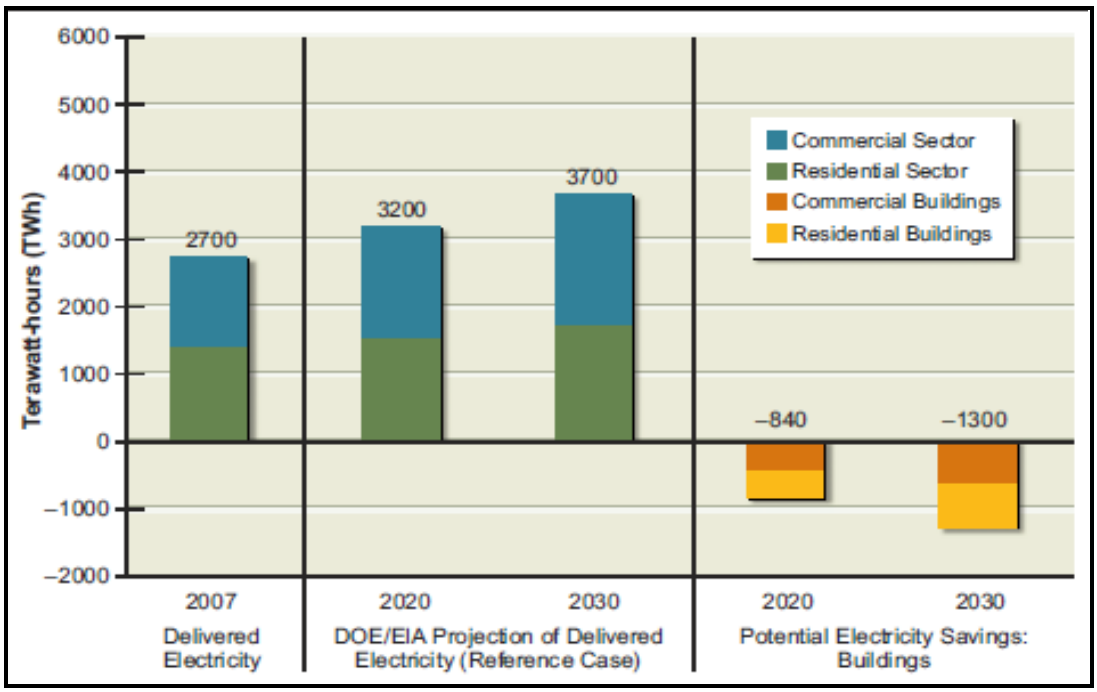
ENERGY STAR New Homes and New Energy Efficient Home Tax Credit. The Environmental Protection Agency (EPA) and the Department of Energy (DOE) have run a program for many years to encourage builders to build and homebuyers to purchase homes that are substantially more efficient than required by building codes (e.g., typically 15% more efficient). Thousands of builders participate and as of 2012, more than 1.4 million ENERGY STAR Homes have been built.[4] In addition, in the *Energy Policy Act of 2005* Congress adopted the Section 45L New Energy Efficient Home Tax Credit, which provides $2,000 to builders for each home that reduces energy use by 50% below the 2003 IECC. When this credit was enacted, less than 1% of new homes met this standard. In 2011(the last year with data available), about 11% of new homes built qualified for this tax incentive.[5]

Home Performance with ENERGY STAR and other retrofit programs. Another EPA/DOE program is Home Performance with ENERGY STAR. The program is designed to encourage extensive home renovations to make both the building shell and mechanical systems energy efficient. The program works with contractors to train them on whole home retrofit analysis, construction, and marketing techniques. The program often partners with states and utilities, which often offer incentives for these whole home retrofits. As of 2012, more than 250,000 homes had been retrofitted, with energy savings averaging 20% per home.[6]

[4] http://www.energystar.gov/index.cfm?fuseaction=new_homes_partners.locator.
[5] Baden, Steve (Residential Energy Services Network). 2012. Personal Communication. July 6.
[6] Number of homes built from Home Performance with ENERGY STAR Project Dashboard: http://www.energystar.gov/index.cfm?c=home_improvement.hpwes_project_dashboards. Average savings per home from U.S. EPA. 2011.

However, more can be done. As discussed above, about 11% of new homes qualify for the section 45L tax incentive, but many more do not. Home Performance with ENERGY STAR has retrofitted less than 1% of the single-family housing stock. If we double this to account for other comprehensive home retrofit programs, this still leaves more than 95% of homes that could be retrofitted. Overall, the National Academy of Sciences in 2010 found that energy efficiency could reduce U.S. energy use by 25-30% below forecasted levels over the next 20-25 years. Their results for buildings are illustrated in Figure 5.

Figure 5. Results of NAS 2010 Study on Energy Efficiency Opportunities in Buildings



Source: National Academy of Sciences. 2010. *Overview and Summary of America's Energy Future: Technology and Transformation.* Washington, DC: National Academies Press.

Additional Useful Policies

Recently, Representatives David McKinley (R-WV) and Peter Welch (D-VT), co-chairs of the High Performance Building Caucus, introduced the *Energy Savings and Industrial Competitiveness Act* (H.R. 1616), a bipartisan bill that includes several provisions to encourage energy efficiency that have widespread support. This is a companion bill to similar legislation introduced by Senators Jeanne Shaheen (D-N.H.) and Rob Portman (R-Ohio). The Senate bill was reported out of Committee on a bipartisan 19-3 vote and is expected to reach the Senate floor in July. Several provisions in the McKinley-Welch bill will promote cost-effective energy efficiency investments in homes as will several amendments that are likely to receive broad support when the Senate bill reaches the Senate floor. In addition, Representatives McKinley and Welch recently introduced the *Home Owner Managing Energy Savings Act of 2013* or the HOMES Act, which would provide rebates to homeowners who invest in energy efficiency improvements. (H.R. 2128). I will briefly discuss some of these opportunities.

Home Performance with ENERGY STAR—A Cost-Effective Strategy for Improving Efficiency in Existing Homes. May 23. Washington, D.C. http://www.energystar.gov/ia/home_improvement/HPwES_Utility_Intro_FactSheet.pdf .

1. **Support for Model and State Building Codes.** National model building codes are developed by the International Code Council (ICC) and the American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE). DOE provides technical assistance to these bodies and also assists states that are considering adopting these codes. Section 101 of H.R. 1616 makes the code-revision process more transparent and encourages and assists states to consider the most recent model codes and to improve compliance with codes. Decision-making remains at the state level.

2. **Improving Home Mortgage Underwriting.** Most mortgage underwriting decisions are made based on mortgage payments, taxes, and insurance but not energy costs. Investments in energy efficiency can reduce the carrying cost of a home, improving loan repayment rates and potentially qualifying more purchasers for mortgages. A recent study by researchers at the University of North Carolina found that efficient homes (those certified to ENERGY STAR criteria) had a 32% lower default rate than otherwise similar homes.[7] In the 112th Congress, Senators Bennet (D-CO) and Isakson (R-GA) introduced the *Sensible Accounting to Value Energy Act (SAVE)*. The bill is now going through revisions to address concerns from realtors and others and a revised bill may be incorporated into the S. 761 bill when it reaches the Senate floor. Our understanding is that the revised bill is likely to: (1) direct HUD to develop guidelines for considering expected energy cost savings of a property when determining home loan eligibility and home value determinations, and (2) encourage efforts to inform loan applicants of the costs and benefits of improving the energy efficiency of their new homes. These changes will make efficient homes more valuable and affordable, while reducing homeowner energy bills.

3. **Home Energy Use Benchmarking and Disclosure.** Many homeowners, building owners, and tenants do not know how efficient/inefficient their homes are. Benchmarking allows the owner or tenant to compare his or her home to similar homes and can motivate owners of inefficient homes to make energy efficiency investments. Likewise, prospective home purchasers and renters can use information on home energy use and relative performance to help make important decisions about which home to purchase or rent. Making this information readily available helps the new home and rental markets to function well—an informed consumer is more likely to be a smart consumer. State, local, and federal efforts to promote benchmarking are emphasizing commercial and multifamily buildings to start, but as lessons are learned, experiments at the residential level may be worthwhile.[8]

4. **Temporary incentives for comprehensive home energy retrofits.** About half the states have programs to encourage and assist homeowners to consider a package of energy efficiency measures to optimize the energy efficiency of their homes. Many of these work with the federal Home Performance with ENERGY STAR voluntary program. To encourage more contractors to learn how to offer such services and to increase adoption of such comprehensive retrofits, temporary financial incentives can be useful, with the incentives phased out after several years when the market for such services can better function on its own. Representatives McKinley and Welch have introduced the HOMES bill, which would provide such incentives and we support this bill. The key need is to develop an offset for the proposed program funding. Another option would be to consider tax incentives for such retrofits, such as a variation on the *Cut Energy Bills at Home Act* (S. 1914) introduced by Senators Snowe (R-ME), Bingaman (D-NM), and Feinstein (D-CA) in the 112th Congress.

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[7] UNC Center for Market Capital and Institute for Market Transformation. 2013. *Home Energy Efficiency and Mortgage Risks.* http://www.imt.org/uploads/resources/files/IMT_UNC_HomeEEMortgageRisksfinal.pdf.

[8] For a discussion of residential efforts to date, please see Cluett and Amann. 2013. *Residential Energy Use Disclosure: A Review of Current Policies.* Washington, DC: American Council for an Energy-Efficient Economy. https://www.aceee.org/research-report/a131.

In May 2012, ACEEE published an analysis of the costs and benefits of the 2012 version of the Shaheen-Portman legislation plus a related bill. We found that this energy efficiency legislation would reduce U.S. energy consumption in 2030 by 2.3 quadrillion Btu, about 2% of projected energy use that year, which in turn would drive annual consumer energy savings of about $23 billion in 2030. Furthermore, such a bill would create about 102,000 jobs by 2020 and about 185,000 jobs by 2030.[9] We are now beginning an analysis of the 2013 Shaheen-Portman bill, including likely amendments, and will be happy to share our results with you when they are available, likely in early September.

Conclusion

Energy is one of the largest costs of home ownership, only surpassed by mortgage payments and about the same as the cost of real estate taxes. The efficiency of American homes has improved substantially since the 1970s but much larger savings are possible, helping to reduce home carrying costs. These savings can help qualify more households for home ownership and decrease loan default rates while helping to generate jobs in our local communities. It is typically less expensive to reduce energy consumption in a home through energy efficiency measures than the cost of the same amount of energy from new energy supplies. Unfortunately, a series of market barriers keeps investments in energy efficiency below optimal levels.

Smart policies can help address some of these market barriers, helping the private market to better capture these efficiency opportunities. As Congress considers ways to improve home economics and create jobs, we recommend that it consider policies to:

1. Support model and state building code activities
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Due to its ability to reduce home carrying costs and create jobs, energy efficiency should be one cornerstone of our efforts to improve home economics.

This concludes my testimony. Thank you for the opportunity to present these views.

[9] Farley et al. 2012. *Impacts of Energy Efficiency Provisions in Pending Senate Energy Efficiency Bills.* American Council for an Energy-Efficient Economy. http://www.aceee.org/white-paper/shaheen-portman.