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**To the House Energy and Commerce Committee
Subcommittee on Energy and Power**

**Hearing on:
American Energy Security and Innovation: An Assessment of Private-
Sector Successes and Opportunities in Energy-Efficient Technologies**

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SUMMARY

Energy efficiency is the least-cost energy resource available in the United States today. Energy efficiency is also important to the U.S. economy, contributing over half as much benefit as conventional energy resources contribute, and an important source of new jobs.

Energy efficiency policies represent bipartisan opportunities to improve our energy and economic security. A number of energy efficiency policy opportunities exist within this Committee's jurisdiction that can contribute to these goals. Among these policies are:

- Appliance and equipment standards
- Building codes
- Building labeling and disclosure
- Training and assistance centers for buildings and industry
- Industrial energy efficiency

These policies can help ameliorate some of the market barriers that keep 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.

INTRODUCTION

My name is Neal Elliott and I am the Associate Director for Research with the American Council for an Energy-Efficient Economy (ACEEE), a nonprofit organization dedicated to increasing energy efficiency to promote both economic prosperity and environmental protection. ACEEE was formed in 1980 by energy researchers and will be celebrating our 33rd anniversary in 2013. Personally I have been involved in energy efficiency issues since the late-

1970s, primarily focusing on industry and agriculture, and have testified multiple times before various House and Senate committees on energy efficiency topics.

ACEEE is a nonpartisan organization, having testified before this committee as both a Republican and Democratic witness in the past. In our view, energy efficiency is a quintessentially nonpartisan issue.

In my testimony I wish to make two primary points:

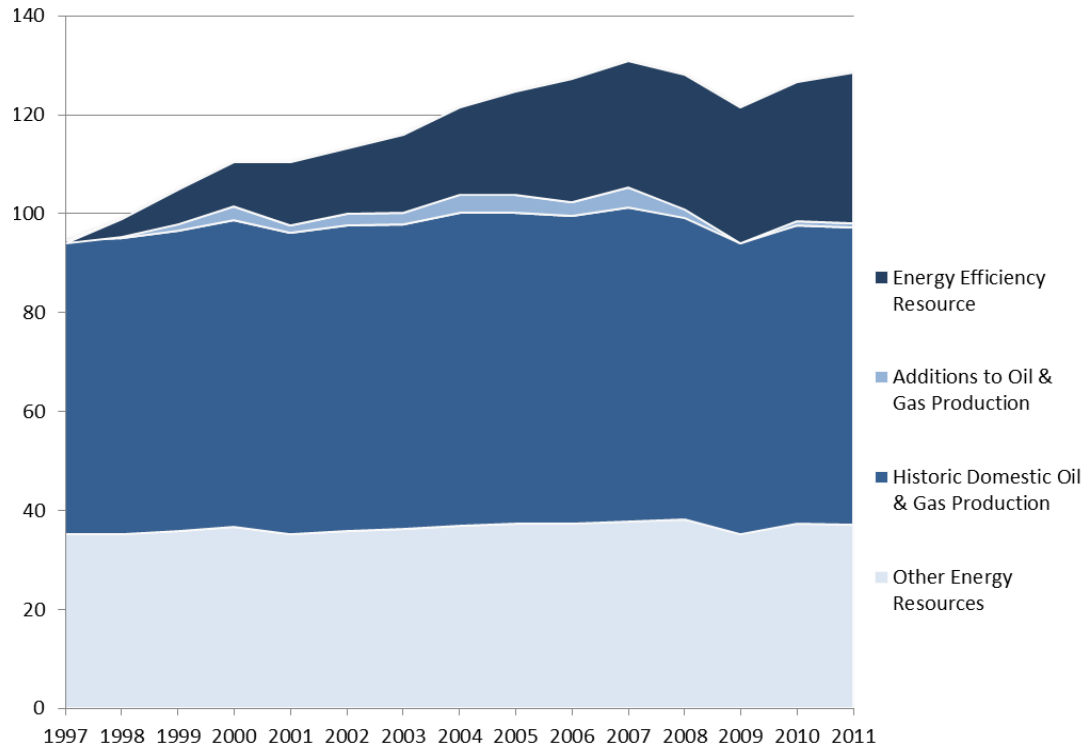
1. Energy efficiency is a key energy resource for the United States, with costs generally lower than other energy resources. Energy efficiency is important to the U.S. economy, contributing over half as much benefit as conventional energy resources contribute.
2. A number of energy efficiency policy opportunities exist today that can contribute to our energy and economic security. Among these policies that I will focus on in my testimony are:
 - Appliance and equipment standards
 - Building codes
 - Building labeling and disclosure
 - Training and assistance centers for buildings and industry
 - Industrial energy efficiency

ENERGY EFFICIENCY IS A KEY RESOURCE

Energy efficiency investments have been an important contributor to our nation's economic growth and increased standard of living over the past 40 years. Energy efficiency improvements since 1970 accounted for approximately 100 quadrillion Btu in 2010, which is

about as much energy as we consume each year and more than the energy we get annually from domestic coal, natural gas, and oil sources combined.¹

Figure 1. U.S. Energy Resources 1997–2011



Source: Data from EIA except for energy efficiency, which was derived by ACEEE from EIA data on energy use per dollar of GDP.

A recent analysis by ACEEE suggests that the incremental cost of all energy efficiency investments (e.g., upgrading from an average refrigerator to an ENERGY STAR® model) was \$72–\$101 billion in 2010.² This includes energy efficiency program expenditures, sales of ENERGY STAR products, investments in building efficiency improvements, repairs and new construction, trends in manufacturing energy use and investments, and sales of efficient

¹ See Figure 1 in Laitner et al. 2012. *The Long-Term Energy Efficiency Potential*. American Council for an Energy-Efficient Economy. <http://www.aceee.org/research-report/e121>.

² This estimate is based on our analysis of available data for 2010—the last year for which reasonably complete data is available on these types of investments.

vehicles. This estimate is consistent with studies by others and is significantly greater than our earlier estimate for investments made in 2004.³

Even though the United States is much more energy efficient today than it was 40 years ago, there is still enormous potential for additional cost-effective energy savings. A January 2012 study by ACEEE found that by 2050, energy efficiency measures and practices could reduce U.S. energy use by 42-59% relative to current projections, and in the process save consumers and businesses billions of dollars, raise gross domestic product in 2050 by \$100-\$200 billion, and support 1.3-1.9 million jobs in 2050.⁴

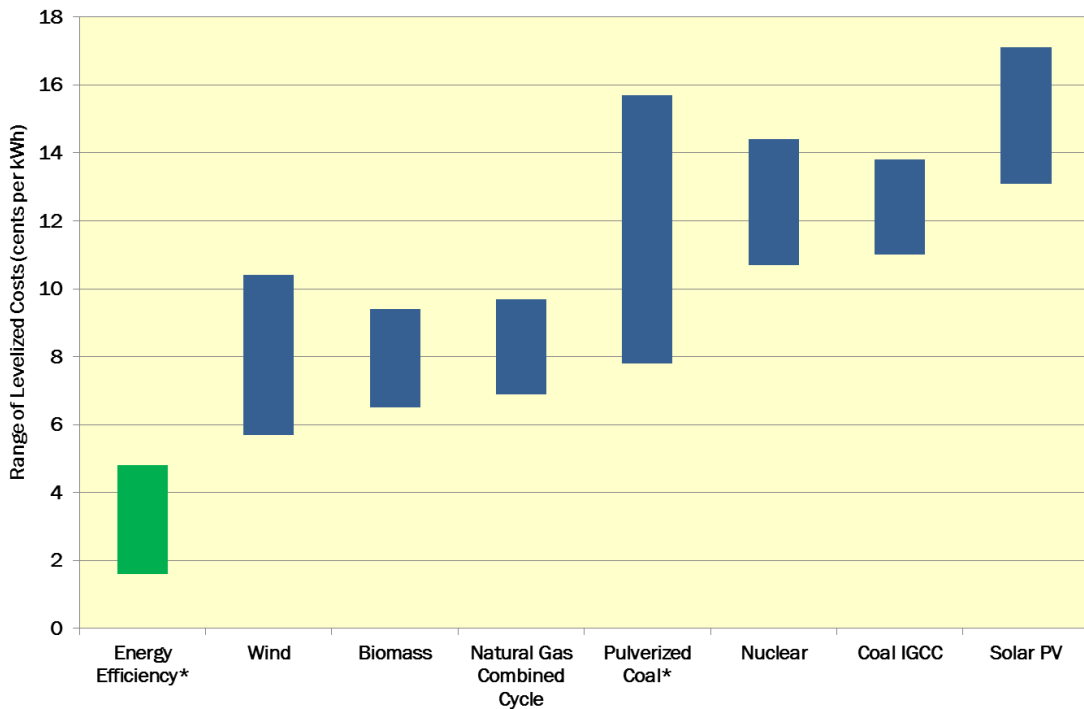
By contrast, \$170 billion was spent on conventional energy supply in 2010, which is about twice the investment in energy efficiency. The productivity of our economy may be currently more directly tied to greater levels of energy efficiency than to energy supply.

Energy efficiency investments have a variety of important economic benefits. For example, energy efficiency tends to be less expensive than most energy supply resources. Figure 2 compares the cost to the utility of energy efficiency investments and new power supply investments.

³ ACEEE. 2013. Fact Sheet, "The Importance of Energy Efficiency to the U.S. Economy," Washington D.C., <http://aceee.org/fact-sheet/energy-efficiency-investment>

⁴ Laitner et al. 2012. *The Long-Term Energy Efficiency Potential*. Washington, D.C. American Council for an Energy-Efficient Economy. <http://www.aceee.org/research-report/e121>.

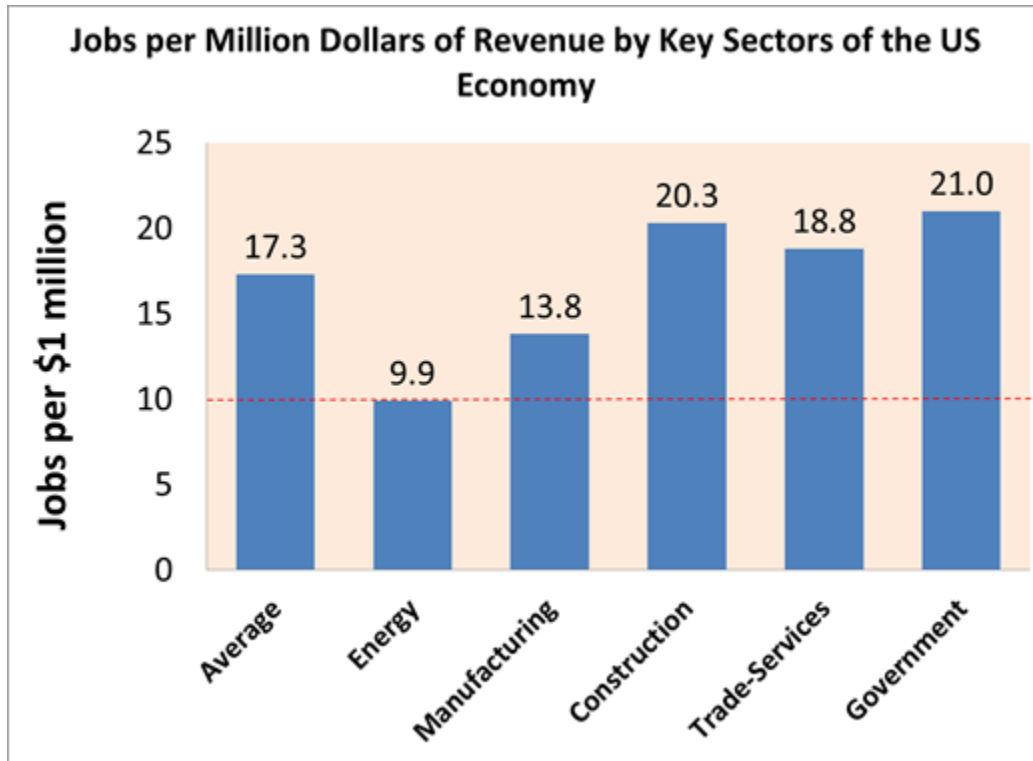
Figure 2. Levelized Cost per kWh for Different Electricity Resources



*Notes: Energy efficiency average program portfolio data from Molina 2013 (ACEEE)- forthcoming; All other data from Lazard 2012. High-end range of advanced pulverized coal includes 90% carbon capture and compression.

Likewise, energy efficiency tends 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 respnd the savings, generating 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).

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>.

Unfortunately, a variety of market barriers keep these savings from being realized. These barriers are many fold 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); lack of consumer information; lack of skilled work force; and bundling of energy-saving features with high-cost extra “bells and whistles.”

Potential Energy Efficiency Strategies

As the Committee considers energy legislation for the 113th Congress, I urge you to consider energy efficiency provisions that represent bipartisan opportunities to improve our energy and economic security. The following represent ideas that fall within the Committee’s

jurisdiction, and for which partners in the business and advocacy communities stand ready to support.

Appliance and Equipment Standards

Appliance and equipment standards have been one of the greatest energy efficiency policy success stories of the last quarter century, resulting in cumulative energy savings since 1987 of 3.4 quads in 2010, with the net present value of consumer savings from standards already in place about \$1.1 trillion through 2035⁵. In addition, these standards have also contributed to increased consumer choices in products such as light bulbs, refrigerators, and washing machines by spurring innovation among manufacturers.

Updates to existing standards and standards on new products have the potential to bring about large savings in energy consumption. ACEEE's analysis last year found that the potential energy savings from 34 new standards would result in annual electricity savings in 2035 of about 310 TWh, or about 7% of projected electricity consumption in that year, and natural gas savings of about 240 TBtu enough to energy heat 8% of all the natural-gas-heated U.S. homes.⁶

Increasingly these updates and new standards are resulting from collaboration between energy efficiency advocates and manufacturers. Several consensus agreements are emerging in standards proceedings that are currently underway at the Department of Energy (DOE), and a provision from the *Energy Policy Act of 2007* allows DOE to adopt these consensus agreements directly. In addition, other consensus agreements have been put into place in legislation of the

⁵ Amanda Lowenberger, Joanna Mauer, Andrew deLaski, Marianne DiMascio, Jennifer Amann, Steven Nadel, 2012, *The Efficiency Boom: Cashing In on the Savings from Appliance Standards*, <http://aceee.org/research-report/a123>.

⁶ Ibid.

past decade. We encourage the Committee to consider including future agreements as they develop in energy legislation by the Committee. The energy efficiency community and our business partners stand ready to work with the Committee on implementing these agreements through legislation.

On a less encouraging note, unfortunately, the Administration has recently missed deadlines for completing eight new appliance, lighting and equipment energy efficiency standards, largely because of delays by the Office of Management and Budget in approving notice of proposed rules or final rules. These delays have cost consumers over \$3.7 billion in savings as of this month. The Committee should encourage the Administration to expedite these reviews.⁷

Building Codes

Buildings consume roughly 40% of all energy in the United States.⁸ Building energy codes are universally recognized as the easiest and most cost-effective way to help consumers save energy and money, making housing more affordable and reducing air pollution. 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 which are considering adopting these codes. We recommend that DOE set energy saving goals for model codes and expand its work to encourage and assist states to adopt and successfully implement these codes.

⁷ Appliance Standards Awareness Project and ACEEE fact sheet "Cost of Overdue Energy Efficiency Standards," http://www.appliance-standards.org/sites/default/files/The_Cost_of_Overdue_Energy_Efficiency_Standard_Jan_2013_0.pdf.

⁸ Office of Energy Efficiency and Renewable Energy. 2011. *Buildings Energy Data Book*. Washington, D.C.: U.S. Department of Energy. <http://buildingsdatabook.eren.doe.gov/default.aspx>.

Information on Energy Use in Buildings

An informed consumer can make sound choices, so providing information about energy use in buildings, whether it is a home or commercial space, would allow consumers to make economically sound choices about the cost of owning a building, and would encourage investments that improve the energy efficiency of existing and new buildings.

While the benefits exist in all buildings markets, ACEEE feels that an appropriate initial focus would be on large buildings, including multifamily housing. This market is in general more sophisticated and is more capable of acting on energy use information, and the cost of generating benchmark information for these buildings is small relative to the value of these buildings.

In particular, we suggest that:

- The Energy Information Administration expand data collected by the Commercial Buildings Energy Conservation Survey (CBECS), which has seen its survey curtailed due to budget constraints.
- DOE establish a competitive solicitation to states and localities, implementing innovative building labeling and disclosure policies to advance EE in large, existing buildings.
- DOE create and maintain an online database of building energy performance data and make the database available for voluntary uploads from states, localities, and the private sector. Building on EISA Section 433 and Executive Orders, federal agencies should benchmark all federal buildings and disclose through the database scores and Energy Usage Indexes (EUIs) for all buildings not subject to national security exemptions. This effort could build upon DOE's Building Performance Database.

- Recipients of section 179D tax deductions and states, localities, contractors, and other private sector entities that receive federal funding for energy efficiency in buildings should benchmark the energy use in the buildings annually for 3-10 years and disclose this information through the database (again with exemptions for national security and other appropriate considerations).

Building and Industrial Training and Assessment Centers

Presently DOE has a very successful program to help train new energy efficiency engineers by working with university professors and their students to conduct energy audits of small to medium-sized manufacturing facilities. The students gain practical work experience and the manufacturers get a low-cost energy audit. Given this training, the majority of participating students receive multiple job offers upon graduation. This program has been successfully operated since 1976. ACEEE has proposed expanding the IAC program in both size and scope to better meet the workforce and energy assessment needs of U.S. manufacturers. The expansion would be accomplished by establishing Centers of Excellence at current IAC locations, and then partnering with other universities, community colleges, and trade schools to create satellite centers to educate students in energy efficiency at all technical levels.⁹

We recommend that this program be expanded to include training of building engineers and not just industrial engineers. ACEEE has developed a proposal, which we detailed in a conference paper in 2010.¹⁰ This provision was included in *Energy Savings and Industrial*

⁹ Daniel Trombley and R. Neal Elliott. 2009. "Expanding the Industrial Assessment Center Program: Building an Industrial Efficiency Workforce," in the proceedings of the 2009 ACEEE Summer Study on Energy Efficiency in Industry, <http://aceee.org/proceedings-paper/ss09/panel05/paper08>.

¹⁰ Daniel Trombley, et al. 2010. "How Building Assessment Centers Can Leverage the Success of the Industrial Assessment Centers to Train the Next Generation of Efficiency Experts," in the proceedings of the 2010 ACEEE Summer Study on Energy Efficiency in Buildings, <http://aceee.org/proceedings-paper/ss10/panel10/paper25>.

Competitiveness Act of 2011 (S. 1000) introduced in the 112th Congress, which also included the provision for an updated and expanded industrial center program.

Industrial Energy Efficiency Programs

Manufacturing continues to represent an important component of the U.S. economy, accounting for about 14% of gross domestic product. The manufacturing sector is responsible for almost a third of national energy consumption. Recently we have seen a dramatic return of manufacturing to the U.S., referred to as *reshoring* as affordable energy and high productivity have made the U.S. an attractive place for global manufacturing.

Until recently, energy use in the industrial sector has received little policy attention. This situation has changed with the signing of President Obama's executive order on industrial energy efficiency and combined heat and power last August, and the inclusion of manufacturing provisions in *American Energy Manufacturing Technical Corrections Act of 2012* (H.R. 6582) that was enacted last December. We recommend that the Committee explore three areas for action in the 113th Congress.

Future of Industry

The industrial program at DOE has been the leading federal program focused on manufacturing, and as has been among the most successful federal research and deployment programs.¹¹ This program, now renamed the Advanced Manufacturing Office (AMO) has unfortunately experienced a lack of leadership for over a decade.

¹¹ R. Neal Elliott. 2009. Testimony before the Senate Energy and Natural Resources Committee on *Restoring America's Manufacturing Leadership through Energy Efficiency Act of 2009*, March 24, 2009 <http://aceee.org/testimony/testimony-r-neal-elliott-associate-director-research-us-sena>.

To help get this important program back on track, we suggest that the Committee consider the following provisions:

1. Establish an Industrial Technologies Steering Committee that will create a strong working relationship between AMO and stakeholders, and facilitate the office's collaboration with industry and advocates;
2. Focus AMO efforts on an even mix of research and development and deployment programs that reflect the importance of both approaches for maximizing industrial efficiency;
3. Ensure that the program's research and development portfolio is responsive to the needs of the manufacturing sector; and
4. Ensure that AMO's deployment activities serve the needs of a wide array of market segments, including workforce training and combined heat and power technical assistance.

Smart Manufacturing

Opportunities in industrial energy efficiency will come increasingly from the application of "intelligence" in manufacturing systems, as we discussed in our 2012 report on long-term energy efficiency trends.¹² These developments are referred to as *Smart Manufacturing*.¹³

We suggest that a smart manufacturing program be established at DOE, and that the program focus on developing the infrastructure needed to enable smart manufacturing across the country. As part of this activity, DOE should undertake at-scale demonstrations of smart

¹² John "Skip" Laitner et al. 2012. Op sit.

¹³ Time. "What is Smart Manufacturing," <https://smart-process-manufacturing.ucla.edu/about/news/time-magazine-what-is-smart-manufacturing.pdf>.

manufacturing in small, medium, and large enterprises in various industry segments, and work with states to make critical resources, such as access to simulation expertise and supercomputing capacity available to all firms.

Energy Efficiency in Supply Chains

Related to smart manufacturing, we encourage the Committee to establish a program that focuses on energy efficiency in manufacturing supply chains. There is a growing consensus in the manufacturing community that it is important to deal with supply chain issues. We propose the establishment of a Supply Star program at DOE, based upon the successful Energy Star program, to help companies make their supply chains more efficient. DOE can provide companies with financing, technical support, and training to help improve their supply chain efficiency. Companies that are successful in making their supply chain more efficient will be rewarded with the Supply Star label, thus helping consumers make more informed purchasing decisions.

We also suggest that the program work with integrating companies and their suppliers to develop standards for the exchange of information about energy to be targeted across supply chains to reduce energy use. These data exchange principles will contribute to realizing the substantial energy savings that can be realized by deploying smart manufacturing across supply chains.

Conclusion

Energy efficiency is a key part of an “all of the above” energy strategy. Energy efficiency has reduced U.S. energy use by about half since 1970 and much more is possible. Energy efficiency is typically less expensive per unit of energy than most energy resources, and energy

efficiency is more labor intensive, helping to create more jobs. Unfortunately, a series of market barriers keep 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. ACEEE stands ready to assist the Committee in fleshing out these proposals.

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