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THE SCIENCE BEHIND GREEN BUILDING RATING SYSTEMS

HEARING

BEFORE THE

SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

HOUSE OF REPRESENTATIVES

ONE HUNDRED TWELFTH CONGRESS

SECOND SESSION

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THE SCIENCE BEHIND GREEN BUILDING RATING SYSTEMS

TUESDAY, MAY 8, 2012

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
Washington, DC.

The Subcommittee met, pursuant to call, at 10:06 a.m., in Room 2318 of the Rayburn House Office Building, Hon. Paul Broun [Chairman of the Subcommittee] presiding.

Subcommittee on Investigations & Oversight Hearing

The Science Behind Green Building Rating Systems

Tuesday, May 8, 2012
10:00 a.m. to 12:30 p.m.
2318 Rayburn House Office Building

Witnesses

Panel I:
Dr. Kathleen Hogan, Deputy Assistant Secretary for Energy Efficiency, Office of Energy Efficiency and Renewable Energy, DOE

Mr. Kevin Kampschroer, Director of the Office of Federal High-Performance Green Buildings, GSA

Panel II:
Mr. Ward Hubbell, President, U.S. Green Building Initiative

Mr. Roger Platt, Senior Vice President, Global Policy and Law, U.S. Green Building Council

Professor John Scofield, Professor of Physics, Oberlin College

Mr. Victor Olgyay, Principal Architect, Built Environment Team, Rocky Mountain Institute

Mr. Tom Talbot, CEO, Glen Oak Lumber and Milling of Wisconsin

U.S. House of Representatives
Committee on Science, Space, and Technology
Subcommittee on Investigations & Oversight

HEARING CHARTER

"The Science Behind Green Building Rating Systems"

Tuesday, May 8, 2012
10:00 a.m. – 12:00 p.m.
2318 Rayburn House Office Building

Purpose

On Tuesday May 8, 2012, the Subcommittee on Investigations and Oversight will hold an oversight hearing to examine the scientific record that green building ratings systems are based upon. The federal government through the General Services Administration (GSA)and the Department of Energy (DOE) invests federal resources in green buildings through federal research and development funding and construction choices. Several laws and executive orders impose energy and environmental requirements upon these federal buildings. In addition, several private sector developed green building rating systems and codes seek to encourage or mandate similar goals upon the private and public sector including Green Globes, the Leadership in Energy and Environmental Design (LEED) system, and ASHRAE 189.1.

Under Section 433 of the Energy Independence and Security Act of 2007, the DOE and GSA are required to determine every five years which, if any, third-party green building rating system(s) should be adopted for federal buildings or whether a federally developed system should be used instead.[1]

DOE and GSA are currently working to determine the preferred third-party building rating system to be used by the federal government for the next five years with a decision expected later in 2012 or early in 2013. A recent study to compare third-party green building rating systems was conducted by Pacific Northwest National Lab (PNNL) and was just released last week[2]. In light of the ongoing DOE research and ongoing decision process, the Subcommittee on Investigations and Oversight is holding a hearing to review the work of the Department of Energy to examine the science behind green building rating systems.

Background

[1] The Energy Secretary makes the ultimate determination although the Secretary of Defense does have authority under Section 433 to set a separate standard for privatized military housing.
[2] *Green Building Certification System Review*, PNNL-20966.

Buildings currently account for almost 40% of total energy consumed in the U.S. For electricity specifically, buildings account for over 70% of nationwide electricity usage.[3] For both total energy and electricity specifically, usage is divided roughly equally between commercial and residential buildings. As a large owner, operator, and developer of commercial buildings, the federal government has invested resources in methods to reduce energy usage in its own buildings as a model for private sector building owners and operators to do the same. Reductions in federal energy usage allow federal resources to be directed elsewhere on programmatic needs and/or a reduced need for taxpayer dollars for operational expenses.

With limited federal funds, ensuring that spending is made in the most cost effective effort is critical. Long-term investments in reducing energy usage in public and private buildings typically requires a larger initial investment in design and/or materials such as greater amounts of insulation and more efficient heating and cooling systems. Investments with a shorter payback period are favored. For example, assume that an additional federal investment of $1 million dollars in a new courthouse for more energy efficient windows than are typically used reduces annual energy usage by $100,000. This investment of taxpayer dollars would have a 10-year payback period. In contrast, assume the same investment of $1 million had been spent on thicker insulation reducing energy usage by $250,000 per year. This would result in a shorter 4-year payback period. On a dollar for dollar basis, the investment in insulation in this hypothetical example would be a more effective use of taxpayer funds than the same investment in windows.[4]

Existing Federal Efforts and Programs

Federal attention to energy savings began to increase sharply after the oil crisis of the 1973 although it has not been a consistent effort. The Energy Conservation and Production Act of 1976 (ECPA) contained provisions mandating that the Department of Housing and Urban Development create a uniform energy standard for residential and commercial buildings.[5] The Department of Energy was created shortly afterwards in 1977 to focus on the nation's energy usage.[6] Authority for federal energy standards was transferred from HUD to DOE in the legislation creating DOE. To study building technologies and how they can reduce energy usage, DOE utilized several national labs including the National Renewable Energy Laboratory and the Pacific Northwest National Laboratory. DOE has an Assistant Secretary of Energy Efficiency and Renewable Energy (EERE) whose responsibilities encompass federal energy standards[7]. EERE also oversees the Federal Energy Management Program (FEMP) that works with existing federal building managers to improve their building's energy performance.[8]

Under ECPA, DOE was directed to develop building standards for public and private sector buildings. These standards were to be mandatory for all buildings nationwide. On November 28, 1979, DOE issued a notice of proposed rulemaking in the Federal Register containing these

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[3] 2011 Buildings Energy Data Book, DOE EERE.

[4] Note that since each federal building is unique, what is a better investment in energy efficiency in Alaska may not be the same for an investment in energy efficiency in Texas.

[5] Titles III and IV of P.L. 94-385.

[6] P.L. 95-91.

[7] See www.eere.energy.gov. Dr. Kathleen Hogan, the Assistant Secretary of Energy for EERE is one of the hearing witnesses.

[8] *See* www1.eere.energy.gov/femp.

proposed building energy performance standards.[9] 1800 comments were received and there was strong opposition to the proposed rules. [10] Over the next several years, Congress significantly scaled back the legislative mandate to develop mandatory standards for all buildings and replaced it with a mandate to create voluntary standards for federal buildings. [11]

In 1992, the Environmental Protection Agency (EPA) created the voluntary labeling system called Energy Star to identify items with increased energy efficiency.[12] Initially focused on identifying energy efficient personal computers and printers, the Energy Star system has expanded to identify energy efficient home products such as dishwashers, windows, light bulbs, etc… in addition to buildings that use less total energy. Management of the Energy Star program is now split between the EPA and DOE depending upon which product is being rated. Green building rating systems often encourage or even mandate the use of Energy Star rated products.

With continuing increases in energy costs, Congress enacted the Energy Policy Act (EPACT) in 2005 that reinstated mandatory residential and commercial building energy standards by requiring states to adopt them as part of their building codes.[13] However, no penalties were imposed upon states that chose to not meet these requirements. Additional legislation in 2007, the Energy Independence and Security Act (EISA), expanded the focus of the government to more than reductions in energy savings by adding other energy and environmental goals such as reduced water usage, increased use of recycled products, and a preference to build on already developed locations.[14]

EISA contained several provisions that specifically addressed federal green buildings. Section 433 mandated the Secretary of Energy in consultation with the Administrator of the GSA and the Secretary of Defense choose a certification system and level for federal buildings. The first decision was to be made within 90 days of enactment with reviews occurring at least every five years thereafter. The initial decision was to adopt the LEED rating system developed by the U.S. Green Building Council (USGBC).

Private Sector Domestic Green Building Certification Systems

ASHRAE 189.1

In 1975, the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) developed Standard 90 that identified minimum energy efficiency standards for commercial buildings. Continuously updated as new technology was developed, Standard 90 became known as ASHRAE 90.1 standard that is now updated every three years. The most recent version is ASHRAE 90.1 (2010). ASHRAE 90.1 is used as the basis for U.S. domestic building codes concerning energy efficiency.

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[9] 44 Federal Register 68120.

[10] D.L. Shankle, J.A. Merrick, and T.L. Gilbride, "A History of the Building Energy Standards Program," PNL-9386, Pacific Northwest Laboratory, February 1994, p. 1-3.

[11] Ibid.

[12] See www.energystar.gov/index.cfm?c=about.ab_history for additional information about the history of Energy Star.

[13] Section 101 of P.L. 102-486.

[14] P.L. 110-40.

In 2011, ASHRAE developed Standard 189.1, *Standard for the Design of High-Performance, Green Buildings Except Low-Rise Residential Buildings,* that expanded upon its earlier work in Standard 90.1. ASHRAE partnered with the American National Standards Institute (ANSI) and the U.S. Green Building Council to develop Standard 189.1. Instead of focusing solely on energy efficiency, Standard 189.1 focuses on energy efficiency, water usage efficiency, indoor environmental quality, site sustainability, and building impact.

To determine the increased savings of Standard 189.1, NREL compared it to the existing 2007 version of the 90.1 standard. NREL determined that energy savings were increased by an average of 29.7% by using Standard 189.1 instead of Standard 90.1[15]. The specific amount of energy savings varied depending upon the type of building. For example, NREL determined that warehouses would experience an energy savings of up to 42% under Standard 189.1 while outpatient healthcare facilities would only experience a 15% energy savings.[16]

Green Globes

Introduced in the U.S. in 2004, the Green Globes system grew out of Canadian building standards. Green Globes is a standard accredited by the American National Standards Institute (ANSI). This accreditation means that the development of the standard meets the requirements of the National Technology Transfer and Advancement Act. This Act provides for a formal government preference for private sector standards that have been developed by bodies such as ANSI. The National Institute of Standards and Technology (NIST) also recognizes ANSI as the U.S. representative on the International Organization for Standardization (ISO), the leading international body for standards of all types.

The Green Globes rating system uses a point based system for building design and construction choices that results in a building earning one to four leaves based upon the number of points earned to signify its meeting of key Green Globe standards. Choices viewed as "green" earn more points than those that are not viewed as such. Although it has not been used as widely as the LEED system, Green Globes has been used by several federal agencies. For example, in 2009, the Department of Veterans Affairs (VA) entered into a partnership with Green Globes to utilize its rating system on 21 VA hospitals to assess their energy and environmental status. Green Globes has highlighted its efforts at the Portland, Oregon hospital, an 11 story, 1.5 million square foot building. According to Green Globes, the VA's use of the Green Globes system resulted in a 99% rating under the Energy Performance category of Green Globes which led to significant energy savings.[17]

Green Globes certification costs depend upon the size of the building, but they are capped around $25,000 per building plus the cost of hiring an independent assessor to travel to the site to undertake his or her review for new construction projects. This amount does not include additional design or construction costs resulting from choices made to earn points. One of the biggest differences between Green Globes and LEED systems is the requirement by Green Globes that an independent assessor be used to assess whether a building is performing properly, not just designed properly. This extra step by Green Globes is highlighted by its supporters as a

[15] NREL Technical Report TP-550-47906 accessible at www.nrel.gov/docs/fy10osti/47906.pdf
[16] Ibid.
[17] Green Globes Case Study accessible at www.nrel.gov/docs/fy10osti/47906.pdf.

way to ensure that the extra costs of Green Globe certification are recaptured by lower building operating costs.

Leadership in Energy and Environmental Design (LEED)
The Leadership in Energy and Environmental Design (LEED) green building standard is overseen by the U.S. Green Building Council (USGBC). Founded in 1993, the USGBC released the first version of the LEED rating system in 2000 for new construction projects.[18] The USGBC has subsequently updated and expanded its rating systems to cover other types of building projects including:

- Major renovations
- New Construction
- Existing Buildings: Operations & Maintenance
- Commercial Interiors
- Core & Shell
- Schools
- Retail
- Healthcare
- Homes
- Neighborhood Development

Building owners seeking LEED certification for their projects submit construction plans and other required information to the USGBC in order to earn points in several categories ranging from natural lighting, encouragement for hybrids and alternative forms of commuting, reduced water usage, and energy efficient heating and cooling equipment. Depending upon the number of points earned, a building is considered LEED certified at the lowest level of Certified or higher levels of Silver, Gold, and Platinum when more points are earned. LEED certification costs are dependent upon building size and are capped at no more than $30,000 for new construction projects.

The leadership of the USGBC is composed of a 16 member Board of Directors with self-selected categories including a seat for local and state governments currently held by an employee of the Pennsylvania Governor's Green Council. Several federal employees serve in various capacities within the USGBC rating development system. At the highest level, Don Horn, the Deputy Director of GSA's Office of Federal High-Performance Green Buildings, serves as the Federal Liaison to the USGBC Board of Directors.

The USGBC rating systems are updated on a regular basis and are adopted after they are voted on by USGBC members. Voting for the 2012 updates of several of its rating systems will occur in June with eligible voters coming from its dues-paying corporate, individual, and public sector members.[19]

Living Building Challenge

[18] A LEED factsheet can be found at www.usgbc.org/ShowFile.aspx?DocumentID=3330.
[19] See www.usgbc.org/DisplayPage.aspx?CMSPageID=2602 for more details.

The Living Building Challenge system was founded in 2006. Since it is a newer green building rating system in comparison to Green Globes and LEED, the usage of the Living Building Challenge system has been much lower with less than 100 certified projects in the United States. It does not appear that any federal buildings have been rated under this rating system, but it was considered robust enough to be studied in detail by PNNL as a possible replacement for LEED over the next five years.

Currently at version 2.1 released in May 2012, the Living Building Challenge determines rankings based upon achievements in the seven categories of site, water, energy, health, materials, equity, and beauty. These categories are called "petals." Somewhat similar to Green Globes and LEED, within each "petal" are several subcategories in which various criteria must be met. Certification costs are also similar with a maximum cost of $25,000.

Issues

Reliance upon and preferences for specific third parties building standards
EISA allows the government to use a federally or private sector developed standard as the preferred option for federal buildings. DOE has studied energy savings technologies and has the expertise to develop its own standards if it chooses to create them. However, as noted before, federal law gives preference to private sector developed standards that are ANSI accredited. However, the private sector green building standard used for the past five years by the federal government was not accredited in this manner.

DOE has worked with a variety of outside entities to research and develop standards. For example, the USGBC has designated a Federal Liaison to its Board of Directors, Don Horn, who is the Deputy Director of GSA's Office of Federal High-Performance Green Buildings. At one point, he may have served as an actual USGBC Board Member. Given that GSA plays such a critical role in determining which green building rating system is used by the federal government (and therefore received federal funds for certification costs), there are concerns over whether all rating systems should have a similar liaison if they desire.

Local and state government often look to, and rely upon, federal government research and decisions as a model for their own regulations. Local communities do not have the resources to conduct in-depth reviews to the extent that federal laboratories do. Federal adoption or preferences for specific building rating systems indirectly sets a precedent for local and state action. Green Globes and LEED have both sought adoption of local and state green building codes. In some cases, state and local governments have adopted a LEED only requirement or preference in their building codes over the opposition of Green Globes that has sought more neutral public policies.[20] Although local and state sovereignty issues are not a topic for this hearing, Committee oversight of DOE and GSA actions will have an impact at the state and local level.

Federal reviews of private sector developed green building rating systems

[20] A list of green building regulatory requirements can be found at www.usgbc.org/DisplayPage.aspx?CMSPageID=1852.

On May 3, 2012 GSA released a review of green building certification systems conducted by DOE's Pacific Northwest National Laboratory. DOE reviewed 14 green building certification systems including 8 systems that were only available internationally in specific countries. Of the six remaining rating systems, only three were deemed worthy of detailed consideration – Green Globes, LEED, and the Living Building Challenge. These three systems were then compared with federal regulations, federal law, and executive orders related to green buildings.

PNNL's survey identified the various areas in which these three rating systems matched existing federal priorities. All three building rating systems reflect self-selected energy, environmental, and social goals in some manner. The Living Buildings Challenge that allows ratings to be earned based upon such categories as "democracy and social justice", "human scale and humane places", and "beauty and spirit" arguably has the most focus on social goals compared to purely energy savings goals.

Only the Green Globes system follows ANSI approved methods that meet the OMB definition of "consensus" to ensure that all concerns about its proposed standards are addressed.[21] Since GSA and DOE do not require any third party rating system it chooses to meet this definition, it is unclear whether those that do not such as LEED and the Living Building Challenge lack widespread support outside of their membership community.

Do green building rating systems save taxpayer dollars?
Although it has been widely assumed that the private sector green building rating systems reduce operating costs, there has been little peer reviewed research into confirming this to be the case. The USGBC released a non-peer reviewed study in 2007 conducted by the New Buildings Institute that concluded a 25 to 30% lower energy use for LEED certified buildings.[22] This study was criticized by some who felt that the buildings surveyed did not adequately represent existing LEED buildings.

Professor John Scofield who will be testifying at the hearing conducted a peer reviewed study that identified several concerns with the USGBC sponsored study.[23] Among the concerns were that the LEED system focused too much on building design, rather than building performance. A well designed building will not save as much energy as it could if it is not tested and run properly. Professor Scofield advocates more usage of an Energy Star like system to reduce federal energy usage.

Preferences for or against specific types of materials
Green building standards often give additional points to buildings that include or do not include certain types of materials. For example, current LEED standards grants an additional point for use of wood that is Forest Stewardship Council (FSC) certified. Other timber certification standards exist including American Tree Farm Standard (ATFS) certified and Sustainable

[21] OMB Circular A-119 sets the federal definition of "consensus."
[22] The New Buildings Institute study can be found at www.usgbc.org/ShowFile.aspx?DocumentID=3930.
[23] Professor Scofield's study can be found at www.oberlin.edu/physics/Scofield/pdf_files/Scofield%20IEPEC%20paper.pdf.

Forestry Initiative (SFI) certified.[24] By only allowing a point to be earned for wood that is FSC certified, ATFS and SFI wood is less desirable among builders seeking LEED certification.

This has led to complaints by companies that manufacture or distribute non-FSC certified wood that they are losing business to FSC certified timber companies. They state that there is no scientific basis to give preference to FSC certified wood over ATFS and SFI certified wood. Efforts to change or eliminate this preference in the LEED system by these timber certification entities have not been successful so far, further raising questions about how much consensus exists within the LEED system. A timber industry witness with concerns over this preference for FSC certified wood in LEED will testify at the hearing.[25] The Governor of Maine signed an Executive Order in December 2011 that essentially prohibited the use of LEED for state buildings due to its preference for FSC wood.[26]

Under a proposed version of several updated LEED standards for 2012 related to new construction, points could be earned by avoiding the use of certain chemicals regardless of whether they are present in a warehouse, data center, school, or healthcare setting which have very different human population levels and exposure profiles. It is unclear what science, if any, this proposal is based upon.[27] LEED 2012 is still in draft form so it is unknown whether this proposed addition to the LEED rating system will actually be made. Similar to complaints from the non-FSC timber certification entities, chemical industry interests have stated that t their concerns have also been ignored due to the lack of a consensus process and that there is a lack of a scientific basis for such a proposal.

Witnesses

Panel I:
Dr. Kathleen Hogan, Deputy Assistant Secretary for Energy Efficiency, Office of Energy Efficiency and Renewable Energy, DOE

Mr. Kevin Kampschroer, Director of the Office of Federal High-Performance Green Buildings, GSA

Panel II:
Mr. Ward Hubbell, President, U.S. Green Building Initiative

Mr. Roger Platt, Senior Vice President, Global Policy and Law, U.S. Green Building Council
Professor John Scofield, Oberlin College

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[24] Additional information about these standards can be found at www.sfc.org, www.treefarmsystem.org, and www.sfiprogram.org respectively.
[25] The USGBC has stated that it does not ban the use of non-FSC certified wood. Although this is technically true, under a point based rating system there is significant business pressure to earn as many points as possible thereby lowering interest in using materials that would not earn a point.
[26] The text of the Maine Executive Order can be found at www.maine.gov/tools/whatsnew/index.php?topic=Gov_Executive_Orders&id=323510&v=article2011.
[27] Version 3 of proposed 2012 LEED MR Credit: Avoidance of Chemicals of Concern.

Dr. John Scofield, Professor of Physics, Oberlin College

Mr. Victor Olgyay, Principal Architect, Built Environment Team, Rocky Mountain Institute

Mr. Tom Talbot, CEO, Glen Oak Lumber and Milling of Wisconsin

Appendix A
Definition of a High Performance Green Building from Section 401 of EISA

(13) HIGH-PERFORMANCE GREEN BUILDING.—The term ''high-performance green building'' means a high-performance building that, during its life-cycle, as compared with similar buildings (as measured by Commercial Buildings Energy Consumption Survey or Residential Energy Consumption Survey data from the Energy Information Agency)—

(A) reduces energy, water, and material resource use;

(B) improves indoor environmental quality, including reducing indoor pollution, improving thermal comfort, and
improving lighting and acoustic environments that affect occupant health and productivity;

(C) reduces negative impacts on the environment throughout the life-cycle of the building, including air and water pollution and waste generation;

(D) increases the use of environmentally preferable products, including biobased, recycled content, and nontoxic
products with lower life-cycle impacts;

(E) increases reuse and recycling opportunities;

(F) integrates systems in the building;

(G) reduces the environmental and energy impacts of transportation through building location and site design that support a full range of transportation choices for users of the building; and

(H) considers indoor and outdoor effects of the building on human health and the environment, including—

(i) improvements in worker productivity;

(ii) the life-cycle impacts of building materials and operations; and

(iii) other factors that the Federal Director or the Commercial Director consider to be appropriate.

Chairman BROUN. The Subcommittee on Investigations and Oversight will come to order.

Good morning. Welcome to today's hearing entitled "The Science Behind Green Building Ratings Systems." You will find in front of you packets containing our witness panel's written testimony, their biographies, and their Truth in Testimony disclosures. I now recognize myself for five minutes for an opening statement.

The Federal Government is a major developer and operator of commercial buildings nationwide. The energy consumption of these buildings is a significant expense to taxpayers. Since federal buildings tend to be left untouched for many years, upfront investments in truly energy-saving technologies can save taxpayer dollars in the long run. One only has to walk along Pennsylvania Avenue to see how long some federal buildings go without energy efficient upgrades.

Ongoing efforts by the Department of Energy have led to the development of new technologies and strategies to reduce federal building energy consumption and its related energy bill. Many of these efforts reflect common sense approaches to saving money, such as more efficient air conditioners and better insulation. There are other efforts that I have concerns with, such as the $10 million L Prize award from the Department of Energy to the manufacturer of a $50 LED light bulb. Even with taxpayer subsidies, a $50 light bulb has a very long payback period, if ever.

The *Energy Independence and Security Act of 2007* directed DOE to choose one or more third-party rating systems every five years for federal buildings. I have several questions about how this process has worked in the past and how it will work in the future. In 2007, GSA and DOE chose the LEED rating system and the Federal Government has used this system on a large number of projects. I am interested in learning how the Federal Government has benefited from using LEED over the past five years. Specifically, are we saving taxpayers money as a result of LEED standards? The current five-year cycle is coming to a close and the Pacific Northwest National Lab released its review of private-sector green building certification systems just last week.

Our second panel contains representatives from two of the three certification systems that were studied in detail in the report, LEED and Green Globes. As private entities, they are free to operate as they wish. However, both of these entities directly benefit financially from the Federal Government paying them to use their rating systems. I would like to hear about the differences between the two systems, why these differences exist, and why one is more deserving of taxpayer dollars. I would also like to learn why both of these rating systems are more effective than one that could be developed by DOE and GSA themselves.

I am also concerned that consensus appears to be missing in some cases. For example, the timber certification standards recognized by the two rating systems represented here today are quite different. What scientific basis, if any, exists to explain this difference? Why is some of Mr. Talbot's wood effectively devalued by a government adoption of a third-party standard? Does GSA and DOE agree with the preference for FSC wood in LEED and its impact on Mr. Talbot's business and his employees?

Recent proposed changes to LEED for 2012 also appear to penalize some common building materials with little or no basis in science, such as PVC piping. I am not sure why PVC piping in a warehouse is such a concern. Shouldn't we instead be focusing on saving taxpayer dollars rather than social engineering?

As the Science Committee, we should be guided by metrics that identify where government investments will have the most cost-effective impact. A full life cycle assessment can help determine which of potentially many choices has the lowest overall cost, and prior investments should be verified by peer-reviewed research to ensure that taxpayer dollars were spent properly.

As I have said before, our Nation is in an economic crisis with high debt and high unemployment. Adopting standards for federal buildings that truly save the taxpayers money and put Americans back to work is a good idea. In contrast, adopting standards that don't save taxpayer money or tell American workers that the products that they make are not welcome in federal buildings defies common sense.

[The prepared statement of Dr. Broun follows:]

PREPARED STATEMENT OF SUBCOMMITTEE CHAIRMAN PAUL C. BROUN

The Federal Government is a major developer and operator of commercial buildings nationwide. The energy consumption of these buildings is a significant expense to taxpayers. Since federal buildings tend to be left untouched for many years, upfront investments in truly energy-saving technologies can save taxpayer dollars in the long run. One only has to walk along Pennsylvania Avenue to see how long some federal buildings go without energy efficiency upgrades.

Ongoing efforts by the Department of Energy have led to the development of new technologies and strategies to reduce federal building consumption and the related energy bill. Many of these efforts reflect common sense approaches to saving money, such as more efficient air conditioners and better insulation. There are other efforts that I have concerns with, such as the $10 million "L Prize" award from the Department of Energy to the manufacturer of a $50 LED light bulb. Even with taxpayer subsidies, a $50 light bulb has a very long payback period.

The *Energy Independence and Security Act of 2007* directed DOE to choose one or more third-party rating systems every five years for federal buildings. I have several questions about how this process has worked in the past and how it will work in the future. In 2007, GSA and DOE chose the LEED rating system, and the Federal Government has used this system on a large number of projects. I am interested in learning how the Federal Government has benefited from using LEED over the past five years. Specifically, are taxpayers saving money as a result of LEED standards?

The current five-year cycle is coming to a close, and the Pacific Northwest National Lab released its review of private-sector green building certification systems last week. Our second panel contains representatives from two of the three certification systems that were studied in detail in the report, LEED and Green Globes. As private entities, they are free to operate as they wish. However, both of these entities directly benefit financially from the Federal Government paying them to use their rating systems. I'd like to hear about the differences between the two systems, why these differences exist, and why one is more deserving of receiving taxpayer dollars. I'd also like to learn why both of their rating systems are more efective than one that could be developed by DOE and GSA themselves.

I am also concerned that consensus appears to be missing in some cases. For example, the timber certification standards recognized by the two rating systems represented today are different. What scientific basis, if any, exists to explain this difference? Why is some of Mr. Talbot's wood effectively devalued by a government adoption of a third-party standard? Do GSA and DOE agree with the preference for FSC wood in LEED and its impact on Mr. Talbot's business and his employees?

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As I've said before, our Nation is in an economic crisis with high debt and unemployment. Adopting standards for federal buildings that truly save the taxpayer money and put Americans to work is a good idea. In contrast, adopting standards that don't save taxpayer money or tell American workers that the products they make are not welcome in federal buildings defies common sense.

Chairman BROUN. I now recognize the Ranking Member, Mr. Miller, for five minutes.

Mr. MILLER. Thank you, Chairman Broun. I am actually not the Ranking Member, but I am stepping in this morning for my friend, Mr. Tonko, who has pressing business in his district.

The American people are way ahead of Congress on the need for energy efficiency, and they are getting impatient. A survey released in March by the nonpartisan Civil Society Institute found that three out of four Americans, 76 percent, including 58 percent of Republicans, 83 percent of independents, 88 percent of Democrats, think the United States should move to a sustainable energy future through "a reduction in our reliance on nuclear power, natural gas and coal and instead launch a national initiative to boost renewable energy and energy efficiency." The same survey found that more than three out of four Americans, 77 percent, including 70 percent of Republicans, 76 percent of independents, 85 percent of Democrats, believe that, quoting again, "The energy industry's extensive and well-financed public relations campaign contributions and lobbying machine is a major barrier to moving beyond business as usual when it comes to America's energy policy."

No plan to increase energy efficiency can leave out buildings. America's buildings account for more than 40 percent of our primary energy consumption. By 2030, we will see almost two-thirds of our existing buildings replaced with new buildings or renovated. We have a terrific opportunity to drive efficiency into building energy consumption if we adopt smart standards.

Today the Committee will discuss this evolving building industry. We will examine standards surrounding green buildings and also high-performance green buildings. As has often been true in the past, the Federal Government has turned to the private sector for guidance on building efficiency standards. The first OSHA rules were cribbed entirely from private industry's voluntary workplace safety standards published by the American National Standards Institute, ANSI, and those are the right standards. There were bad actors in industry who were willing to put their workers' lives at risk to save a buck but most of industry really did want to do the right thing and struck the right balance at the time between the need for workplace safety and cost, and OSHA's first rules were almost word for word those ANSI standards.

Similarly, GSA, in applying the Energy Independence Security Act for energy efficiency in federal buildings, also largely relied on the rating system published by the Leadership in Energy and Environmental Design, LEED, a private-sector effort. Are those standards or the standards of the Green Globe rating system, another

private-sector system, the right standards for now? And how can we make sure that those standards remain properly demanding as our energy technologies improve?

Green building is simply construction aimed at reducing the overall environmental effects of a building in its construction and operation. High-performance green building takes the additional steps of weighing the uses of the building against the environmental costs of the building, looking for ways to increase environmental performance while taking into account the activities that will be housed in that space. For example, a high-performance green building integrates and optimizes on a life cycle basis—a lot of jargon today—all major high-performance attributes including energy conservation, environment, safety, security, durability, accessibility, cost, benefits, productivity, sustainability, functionality and operational considerations.

It is not easy right now to create a high-performance green building because you need to mix complex technologies to meet all of those performance attributes. Even after building completion, systems rarely work together to improve overall energy efficiency and environmental performance.

The inefficiencies resulting from this fragmentation of building components and systems and the lack of monitoring and verification of building performance point to a need for a more integrated approach to building design, construction, operation and technology development. While the current array of rating systems are useful, they can be improved to support building performance better.

With broad support by both Republicans and Democrats, Congress has recognized the need to build high-performance buildings by passing several energy bills with strong efficiency targets and provisions requiring adoption of standards and sustainability principles that will lead to high-performance federal buildings. By adopting these requirements, the Federal Government is leading the way to more efficient and better performing buildings. The Federal Government's portfolio of more than 500,000 buildings functions as a laboratory, provides us a laboratory for new technologies and whole buildings that are working to meet demanding standards, encouraging innovation in the private sector and driving down the costs for consumers.

We should ask how those investments are performing and whether our standards are driving significant reductions in energy consumption. We should be looking for the strongest models and constantly improving our analytical abilities for design and performance based on real-world lessons. However, there is no question that the Federal Government can help drive change in the market, not just our own buildings, which are significant enough, but change in the market, driving innovation and savings that will have wide-ranging benefits in reducing demand for energy, a cleaner environment and public health benefits.

I hope this hearing will illustrate to the American people that Congress can work together to ensure tax dollars are spent in a way that represents their strong views in support of sustainable energy.

Thank you, Mr. Chairman. I yield back. Actually, I had no time to yield.

[The prepared statement of Mr. Miller follows:]

PREPARED STATEMENT OF ACTING RANKING MEMBER BRAD MILLER

This statement is not available.

Chairman BROUN. Thank you, Mr. Miller, and I don't think you will find any disagreement with the statement that you just made that the Federal Government being engaged in making decisions and picking winners and losers certainly is going to drive the marketplace, and I think it should be the other way around. The marketplace drives policy, and I think the marketplace unencumbered by taxes and government regulations is the best way to control quality, quantity and cost of all goods and services, including my business of health care.

Now, if there are Members who wish to submit additional opening statements, your statements will be added to the record at this point.

At this time I would like to introduce our first panel of witnesses: Dr. Kathleen Hogan, the Deputy Assistant Secretary for Energy Efficiency at the Office of Energy Efficiency and Renewable Energy of the Department of Energy, and Mr. Kevin Kampschroer. Is that how you pronounce your name?

Mr. KAMPSCHROER. Kampschroer, please.

Chairman BROUN. Kampschroer. I will try to remember that. My name is Broun, but it is spelled B-r-o-u-n, so I try to be very—I will try to keep that right. But Mr. Kampschroer is the Director of the Office of Federal High-Performance Green Buildings at the General Services Administration.

As our witnesses should know, spoken testimony is limited to five minutes each, after which the members of the Committee will be given five minutes each to ask questions. Your written testimony will be included in the record of the hearing.

It is the practice of the Subcommittee on Investigations and Oversight to receive our testimony under oath. Do either of you have an objection to taking an oath?

Mr. KAMPSCHROER. No, sir.

Dr. HOGAN. No.

Chairman BROUN. Okay. Let the record reflect that both of them are certainly willing to take the oath. Now, either of you may be represented by counsel. Do either of you have counsel with you here today?

Dr. HOGAN. No.

Mr. KAMPSCHROER. No, sir.

Chairman BROUN. Okay. Very good. Let the record reflect that the witnesses do not have counsel. Now, if you all would stand and raise your right hand? Do you solemnly swear to tell the truth, the whole truth and nothing but the truth, so help you God? Okay. You may be seated. Let record reflect that the witnesses participating have taken the oath.

Now I recognize our first witness, Dr. Hogan. Ma'am, you are recognized for five minutes. If you could, try to keep it within that five-minute period. I would appreciate it. Thank you.

STATEMENT OF DR. KATHLEEN HOGAN, DEPUTY ASSISTANT SECRETARY FOR ENERGY EFFICIENCY, OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY, DEPARTMENT OF ENERGY

Dr. HOGAN. Thank you. Chairman Broun, Member Miller and other Members of the Subcommittee, thank you for the opportunity to discuss the Department of Energy's initiatives with energy-efficient and sustainable buildings.

Increasing the efficiency of our Nation's buildings is an important focus for the Department, for many of the reasons you have already mentioned, and then including the fact that the large energy bill can be reduced by 20 to 50 percent or more cost-effectively through a variety of approaches.

To achieve these savings, the Department supports research and development of new advanced technologies as well as supports programs to accelerate their adoption and use. In addition to saving energy, money, this of course also creates domestic jobs and helps protect our environment. Today I would like to make five points in this area.

First, the Federal Government does pursue a range of energy and other goals, goals set by Congress as well as the executive branch, which form an overriding portfoliowide framework for the government's sustainability efforts, and the government is making great strides in many of these goal areas. The key goals that have been established through EPAct 2005, EISA 2007 and Executive Orders that particularly drive improvements in federal buildings include ones for energy intensity, water intensity, greenhouse gas reduction, renewable energy, sustainable procurement and data center efficiency among others, and recent achievements in these areas are quite substantial. It includes reductions in energy use per square foot by about 15 percent, reductions in water use intensity by more than 10 percent, use of renewable energy sources for more than five percent of electricity, and of course, the impact for savings are quite meaningful across the broad portfolio of federal buildings.

The second point I want to make is about the Department of Energy's Federal Energy Management Program, or FEMP, which provides assistance across the government to help achieve these goals cost effectively for the taxpayer. FEMP was established to provide services, tools, expertise to help the federal agencies address the many complex issues with these efforts and to achieve their energy and sustainability goals. As an example, since 2006, FEMP has assisted federal agencies in saving over $5 billion in energy costs over the average life of efficiency measures implemented through energy savings performance contracts, and FEMP is now working with federal agencies to, among other efforts, help them achieve substantial additional savings through the Better Buildings Challenge, an effort to engage in $2 billion in additional performance-based contracting by December 2014. FEMP is also implementing a tracking database pursuant to EISA 2007 that will provide building performance data for metered buildings as well as data on available and untapped cost-effective energy savings measures as well as water.

The third point I want to make is that DOE is making progress on its responsibilities under EISA to consult with GSA and the Defense Department to identify a green building certification system for the Federal Government. We drafted a proposed rule, presented it at a public hearing in 2010, and it is important, I think, to note that in this proposed rule, DOE did not propose to pick a particular third-party certification system but chose instead to allow federal agencies to use any third-party certification system that would meet the statutory criteria with the addition of one criterion that the certification system include verification post occupancy. We are currently responding to public comments and drafting the final rule for the certification criteria. In addition, we are working with GSA and the Defense Department in GSA's most recent study that you will all hear more about.

Fourth, DOE is advancing a broad building research and development portfolio to improve building efficiency as well as the other important things here, improving comfort and lowering energy bills. We have goals to reduce the energy required to operate new buildings by 50 percent and to reduce energy required to operate existing commercial and residential buildings by 50 and 40 percent, respectively. We are also working on the new Better Buildings Challenge to work with a variety of organizations to improve the efficiency in the marketplace by 20 percent or more across the whole portfolio of buildings that organizations have. We have great participation in this effort as of December 2011.

I think the last point I want to make is that we undertake all of these efforts in strong coordination with our federal peers. We routinely coordinate with agencies such as DOD, NIST, GSA, Department of Housing, and EPA on these initiatives. We have memorandums of understanding in place that outline coordination mechanisms, rules and responsibilities, and we have regular exchanges.

In summary, I think we are making great progress improving the efficiency of our Nation's buildings and saving money. There clearly remains a lot of additional opportunity in the federal sector and across the country and efforts that can build jobs, save energy and protect our environment.

We appreciate the opportunity to be here to comment on DOE's role, and I am happy to address your questions.

[The prepared statement of Dr. Hogan follows:]

STATEMENT OF

DR. KATHLEEN HOGAN

DEPUTY ASSISTANT SECRETARY FOR
ENERGY EFFICIENCY

OFFICE OF ENERGY EFFICIENCY & RENEWABLE ENERGY
U.S. DEPARTMENT OF ENERGY

BEFORE THE
SUBCOMMITTEE ON INVESTIGATIONS & OVERSIGHT
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
UNITED STATES HOUSE OF REPRESENTATIVES

MAY 8, 2012

Chairman Broun, Ranking Member Tonko, and Members of the Subcommittee, thank you for the opportunity to discuss the Department of Energy (DOE) initiatives to promote energy efficient and sustainable buildings.

As Deputy Assistant Secretary for Energy Efficiency in the Office of Energy Efficiency and Renewable Energy (EERE), I am responsible for overseeing DOE's portfolio of energy efficiency research, development, demonstration and deployment activities, including DOE's efforts to improve energy efficiency of buildings in the public and private sectors.

Improving energy efficiency in our buildings offers a tremendous opportunity to create well-paying jobs, save money for businesses and consumers, and make our air cleaner. In the U.S., buildings consume 40 percent of the Nation's total energy with an annual energy bill of more than $400 billion.[1] These energy bills can be cost-effectively reduced by twenty to fifty percent or more through various energy efficiency approaches.[2]

In pursuit of these energy savings, DOE supports the research and development of new and advanced technologies and pursues programs to accelerate market adoption of energy efficient products and services.

Today I will address the following areas:

1) The Federal government's progress in meeting its energy and sustainability goals for buildings;
2) DOE sustainability rulemakings in the Federal sector
3) DOE's advanced building technologies research and development activities; and,
4) Coordination of DOE's building-related research and development activities with those across the Federal government.

1. The Federal government's progress in meeting its energy and sustainability goals for buildings

The Federal government has the opportunity to significantly reduce its energy bills as well as to provide leadership in achieving these savings and meeting other sustainability goals. The Federal government owns or leases more than 3 billion square feet of building space, which represents 4 percent of the commercial square footage in the United States.[3] The annual energy bill to the Federal government is several billion dollars. For example, the Defense

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[1] *Buildings Energy Data Book,* U.S. Department of Energy. March 2012 http://buildingsdatabook.eren.doe.gov/TableView.aspx?table=1.2.3.

[2] See, for example, DOE / ASHRAE's *Advanced Energy Design Guides* for commercial buildings (available at: http://www1.eere.energy.gov/buildings/commercial_initiative/guides.html) and DOE's Building America program (available at: http://www1.eere.energy.gov/buildings/building_america/index.html)

[3] Calculated using data from *AEO 2012 Early Release Overview,* Energy Information Administration. January 2012.

Department expended nearly $4 billion for facility energy costs in FY 2010. [4] The size of the government's investment in buildings—and the corresponding use of energy and other resources—has prompted Congress and the Executive Branch to set a number of energy management and other goals through a number of statutes and Executive Orders, including the Energy Independence and Security Act of 2007 (EISA) and Executive Order 13514.

DOE's Federal Energy Management Program (FEMP) was established to provide services, tools, and expertise to Federal agencies to help them achieve the statutory and Executive Order goals. FEMP offers technical assistance and guidance to agencies on energy efficiency, renewable energy and other energy management projects. FEMP also helps agencies use both appropriated funds and money leveraged through performance contracts to secure the financing necessary to implement these projects. FEMP also collects information from the agencies on their progress toward the goals, facilitates the Office of Management and Budget's (OMB) development of annual agency scorecards, and reports annually on progress.

The preliminary data from fiscal year 2010 (FY2010) indicate that the Federal government as a whole is making progress in achieving its buildings-related energy, water and sustainability goals. For example:

- The government achieved a 14.6 percent reduction in energy use per square foot as compared to FY2003, just shy of the 15 percent interim target. The government is required to reduce energy intensity by 30 percent by FY2015, under Section 431 of EISA.
- Renewable energy sources provided 5.2 percent of the government's electricity use, ahead of the target of 5 percent. In FY2013 and beyond, the government must derive at least 7.5 percent of its electricity from renewable sources to the extent economically feasible and technically practicable under Section 203 of the Energy Policy Act of 2005 (EPACT 2005).
- The government reduced its potable water intensity use by 10.4 percent as compared to FY2007. The target reduction for FY2010 was a 6 percent reduction, with a long-term goal of 26 percent reduction by FY2020 under Executive Order 13514.
- And, the government's emission of scope 1 and 2 greenhouse gases (GHG)—that is, all direct GHG emissions and indirect GHG emissions from the consumption of purchased electricity, heat or steam, the majority of which arise from building energy use—were reduced by 6.4 percent in FY2010 relative to FY2008. The government's aggregated long-term target is a 28 percent reduction.

[4] Department of Defense Annual Energy Report FY 2010, p9, issued 2011. Available at http://www.acq.osd.mil/ie/energy/DoD_AEMR_FY2010__July_2011

Since 2006, FEMP has assisted Federal agencies in saving over $5 billion in energy costs over the average life of efficiency measures implemented through energy savings performance contracts. FEMP is now working with Federal agencies to help them achieve the President's directive for federal agencies under the Better Buildings Initiative of engaging in an additional $2 billion or more in performance-based contracting by December 2013 and achieve substantial additional energy savings.[5]

Agencies are also working to meet additional goals for high performance and sustainable buildings which are outlined in Executive Order 13514 (signed in October, 2009). Several of the new federal building-related goals from E.O. 13514 follow:

- "beginning in 2020 and thereafter, ensuring that all new Federal buildings that enter the planning process are designed to achieve zero-net-energy by 2030;
- "ensuring that all new construction, major renovation, or repair and alteration of Federal buildings complies with the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings, (Guiding Principles);
- "ensuring that at least 15 percent of the agency's existing buildings (above 5,000 gross square feet) and building leases (above 5,000 gross square feet) meet the Guiding Principles by fiscal year 2015 and that the agency makes annual progress toward 100-percent conformance with the Guiding Principles for its building inventory;
- "when adding assets to the agency's real property inventory, identifying opportunities to consolidate and dispose of existing assets, optimize the performance of the agency's real property portfolio, and reduce associated environmental impacts."

2. DOE sustainability rulemakings in the Federal sector

In addition to providing technical assistance to the Federal agencies, DOE is also responsible for issuing regulations and guidance to guide implementation of Congressional requirements. One rule specified in EISA Section 433 (Federal Building Energy Efficiency Performance Standards) pertains specifically to the sustainability of new construction or major renovations of covered Federal buildings.

In response to Section 433 of EISA, DOE has issued a proposed rule to (1) establish sustainable design standards for the siting, design, and construction of Federal buildings and (2) identify, in consultation with the General Services Administration (GSA) and DOD, a green building certification system and certification level to be used for Federal facilities.

[5] Presidential Memorandum -- Implementation of Energy Savings Projects and Performance-Based Contracting for energy savings. December 2, 2011. Available at: http://www.whitehouse.gov/the-press-office/2011/12/02/presidential-memorandum-implementation-energy-savings-projects-and-perfo

DOE was directed under EISA to consult with GSA and the Defense Department to "identify a certification system and level for green buildings" that is "most likely to encourage a comprehensive and environmentally sound approach to certification of green buildings." DOE's decision must be based in part on the results of a GSA-commissioned study of systems available in the market, required by EISA Section 436(h). The EISA criteria under which DOE must identify a building rating system are virtually identical to the criteria that GSA must apply in its study. These criteria are:

- the availability of independent auditors to verify metrics;
- the ability of the organization to collect and reflect public comment;
- the extent to which the system is consensus-based;
- criteria relating to the "robustness" of a high performance green building (i.e., how the system incorporates items such as the efficient use of energy and water resources, renewable energy sources, and indoor air quality); and
- whether the system has achieved a level of national recognition.[6]

DOE drafted a proposed rule and presented it before a public hearing in the summer of 2010. In the proposed rule, DOE did not propose to pick a particular third-party certification system, but preliminarily chose instead to allow Federal agencies to use any third-party certification system that met the statutory criteria (with the addition of a criterion that the certification system include a verification system for post-occupancy assessment). DOE is responding to public comments on the proposed rule and is developing a draft final rule for these certification criteria.

DOE, GSA, and the Defense Department are collaborating to review GSA's most recent study in support of EISA Section 436(h). This initial GSA report is at the beginning of the process of Federal agency and public review.

3. DOE's advanced buildings technologies research and development activities

Increasing the efficiency of our Nation's private sector building stock is also an important area of focus for DOE. The Department's Building Technologies Program (BTP), in partnership with industry, develops, promotes, and integrates energy technologies and practices to make buildings more efficient, affordable and comfortable. BTP research and development (R&D) activities focus on reducing building energy consumption through innovative building systems and components. DOE has goals to reduce the energy required to operate new commercial and residential buildings by 50 percent and to reduce the energy required to operate existing commercial and residential buildings by 40 percent and 50 percent, respectively. In addition,

[6] See 42 U.S.C. 6834(a)(3)(D)(iii).

DOE is working with organizations through the Better Buildings Challenge (BBC), a national leadership initiative calling on corporate chief executive officers, university presidents, and state and local leaders to make a significant commitment to building energy efficiency. The goal of the BBC is to work with organizations to improve the efficiency of their whole portfolio of buildings by 20 percent or more. As of December 2011, more than 60 private companies, hospitals, cities, states, colleges, and universities, among others, have committed $2 billion in financing and 1.6 billion square feet of property for energy efficiency improvements. Combined, these efforts could help save American consumers tens of billions of dollars per year.

BTP follows three interwoven pathways, each of which can result in lowering building energy use:

- Improve the performance and cost to manufacture and install building components (such as solid state lighting, windows, heating ventilation and cooling, building envelope, sensors and controls) through strategically identified, groundbreaking R&D; and develop whole building energy simulation programs that engineers, architects, and researchers can use to model energy use in buildings;
- Increase market pull for energy efficient products and solutions from private industry through cooperation with stakeholders, improvement of building design, development of operation and audit tools, and the creation of reliable efficiency benchmarks and databases to define efficiency's value-add to consumers; and,
- Raise the efficiency standards for new energy-consuming equipment and new buildings with cost-effective, continually-updated equipment and model building codes.

BTP will achieve its goals by working with its partners in industry, academia, the National Laboratories, DOE's Office of Science and Advanced Research Projects Agency-Energy (ARPA-E), and other stakeholders. BTP engages with the National Laboratories, industry and academia via lab-directed work and competitive solicitations, which are targeted at BTP's research, development, demonstration and deployment goals. Reviews of projects and awards are conducted annually or in phases of performance milestones, resulting in cancelling of projects, revisions and/or redirection as necessary to ensure an effective portfolio. Expert stakeholder and independent review panels assess the efficacy and quality of the processes used to solicit, review, recommend, monitor, and document proposal actions. Panels also assess the quality of the resulting portfolio, specifically the breadth and depth of portfolio elements, and the national and international standing of the elements.

4. Coordination of DOE's building-related R&D with those across the Federal government

DOE also coordinates with various Federal agencies such as DOD, the National Institute of Standards and Technology (NIST), the Department of Housing and Urban Development (HUD), and the Environmental Protection Agency (EPA), on R&D as well as technology deployment activities. The Agencies typically host meetings where information about project portfolios is shared and coordination plans are implemented. For instance, DOE staff has served on DOD solicitation review committees and helped evaluate the progress of specific projects. DOE and EPA also coordinate directly on the Energy Star Program. Coordination with NIST includes joint projects such as the development of low global warming potential working fluids for heating, ventilation and air conditioning equipment.

Finally, DOE—through FEMP—works in partnership with GSA's Office of Federal High Performance Green Buildings and with EPA to bring cutting edge technology, reporting tools, and best practices to the built Federal environment.

In summary, DOE is working to deliver on the promise of an energy-efficient, sustainable, built environment. Through FEMP, the Department is working to assist the entirety of the Federal family to meet our statutory and Executive Order-based energy and sustainability goals. By supporting energy efficient buildings activities, DOE helps create a market for new, energy efficient building technologies. We appreciate the opportunity to comment on DOE's progress towards addressing these high performance goals and achieving significant savings and other benefits. I will be happy to address your questions.

Chairman BROUN. Thank you, Dr. Hogan.

Mr. Kampschroer, you are recognized for five minutes, sir.

STATEMENT OF MR. KEVIN KAMPSCHROER, DIRECTOR OF THE OFFICE OF FEDERAL HIGH-PERFORMANCE GREEN BUILDINGS, GENERAL SERVICES ADMINISTRATION

Mr. KAMPSCHROER. Thank you. Good morning, Chairman Broun, Member Miller and Members of the Subcommittee. My name is Kevin Kampschroer, and I am the Director of the Office of Federal High-Performance Green Buildings within GSA's Office of Government-wide Policy. Thank you for inviting me today to discuss our work on the Green Building Certification System review as well as the Federal Government's role in using sound science and peer-reviewed studies to evaluate and implement advanced building technologies. I am submitting my testimony for the record.

Today I will highlight our use of tools that help us achieve building performance requirements, including the use of green building certification systems. Congress, in the past two Administrations at least, has set aggressive building performance goals through law and Executive Order that the Federal Government must meet. In establishing these building performance requirements, Congress, the Administration, the Chair and the Ranking Member have all mentioned that buildings use almost 40 percent of U.S. energy, 70 percent of electricity, 13 percent of our freshwater resources and form part of an indoor environment where Americans spend 90 percent of their time. With these enormous impacts also comes the opportunity for a variety of benefits. Compared to average buildings, high-performance buildings use less energy, water and material resources, have better indoor environmental quality, reduce air and water pollution and produce less waste.

To accomplish these goals set in statute and Executive Order, the Federal Government needs to use every tool available to evaluate, to measure and to improve building performance. We rely on the best data available to make decisions about which tools to use, whether it be peer-reviewed research or case studies.

One tool the Federal Government uses to evaluate and measure building performance is green building certification system. Just as with other tools, green building certification systems have evolved over time. In recognition of this, Congress included a requirement within the *Energy Independence and Security Act of 2007* for GSA to evaluate and compare available third-party green building certification systems. EISA also requires that the GSA Administrator recommend a comprehensive approach to the Secretary of Energy, who in consultation with the Secretary of Defense and other appropriate parties will encourage the governmentwide certification of green federal buildings.

My office is currently conducting our review focusing on new construction, major renovations and existing buildings. We are subjecting our review to a rigorous, thorough and transparent process which will include the opportunity for public comment before we make a recommendation to the Secretary of Energy. On May 3, my office released the facts and findings from a study conducted by the

Pacific Northwest National Laboratory. Three systems met the minimum expectations of a green building certification system with respect to EISA: Green Building Initiatives, Green Globes, U.S. Green Building Council's Leadership in Energy and Environmental Design, and the International Living Building Institute's Living Building Challenge. Though the study provides no recommendations, it does conclude that none of the systems we have reviewed meet 100 percent of the Federal Government's needs.

I have asked the Department of Energy and the Department of Defense, and they have agreed to co-chair an interagency taskforce to work through the issues around building performance requirements and including the applicability of ASHRAE standard 189.1 using our recently published study to guide the discussions. There are six planned meetings for the interagency taskforce with the first meeting scheduled on May 17. Given the high level of interest, we are planning listening sessions where the public can provide input both in person and remotely. Prior to submitting our recommendation to the Secretary of Energy, my office will publish the interagency taskforce conclusions in the *Federal Register* and will solicit comments from the public over a period of 60 days. Only after taking into consideration the deliberations of the interagency taskforce and the public comments from the listening sessions and the *Federal Register* notice will the GSA Administrator make his or her final recommendation to the Secretary of Energy, which we anticipate to be in the fall.

Another tool GSA and other federal agencies use to improve building performance is the energy savings performance contract, which is a contracting vehicle that allows agencies to accomplish energy projects for their facilities with private-sector engineering, design and funding for upfront capital costs. The investment is paid back through guaranteed cost savings from building improvements that save energy and water at the facility.

Last fall, my office, in collaboration with DOE's Federal Energy Management Program, launched a program to enhance and increase the use of these contracts across the government, and it coincides with providing advice to all the agencies participating in the $2 billion challenge that Dr. Hogan just mentioned. We will use GSA buildings nationwide to demonstrate how to use ESPCs to achieve maximum savings possible with no artificial limit on the use of technologies.

Thank you again for this opportunity to come before you. All of us in the Federal Government who are managing its real property inventory are excited by the contribution that Congress has allowed us to make. I am available to answer any questions you may have. Thank you.

[The prepared statement of Mr. Kampschroer follows:]

STATEMENT OF

KEVIN KAMPSCHROER
DIRECTOR

OFFICE OF FEDERAL HIGH-PERFORMANCE
GREEN BUILDINGS

OFFICE OF GOVERNMENTWIDE POLICY

U.S. GENERAL SERVICES ADMINISTRATION

BEFORE THE

SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

U.S. HOUSE OF REPRESENTATIVES

MAY 8, 2012

Good morning, Chairman Broun, Ranking Member Tonko and members of this Subcommittee. My name is Kevin Kampschroer and I am the Director of the Office of Federal High-Performance Green Buildings (OFHPGB) within the Office of Governmentwide Policy (OGP) at the United States General Services Administration (GSA). Thank you for inviting me today to discuss our work on the Green Building Certification System review as well as the Federal government's role in using sound science and peer-reviewed studies to evaluate and implement advanced building technologies.

Congress has set aggressive statutory goals for improvements in performance - from reducing energy and water intensity across the Federal government's real property inventory to pursuing net-zero energy buildings. In recognition of the cost savings and improved efficiency these achievements would provide, these targets have been reinforced by Executive Orders in two successive Administrations. To accomplish these goals, the Federal government will have to use every tool available to measure and improve building performance, and we must ensure these decisions are based on sound science. GSA is at the forefront of a variety of sustainability initiatives, including the Congressionally-mandated review of green building certification systems, which will help the Federal government select and use the best tools available to attain these goals and save taxpayer money.

GSA's success is measured in how well it aids other agencies in their effectiveness. GSA's broad reach over the acquisition, management, and disposal of Federal assets provides a unique opportunity to improve the performance of the entire Government. GSA owns or leases 9,624 assets and maintains an inventory of more than 370.2 million square feet of workspace for 1.1 million Federal employees. GSA recognizes that it has a responsibility to increase the efficiency and sustainability of the Federal government by reducing the cost and environmental impacts of its buildings as well as its products, services, processes, and activities.

Congress created the OFHPGB to enable and enhance Federal leadership in the field of large scale sustainable real property portfolio policy, management and operations. Chartered in December 2007 under Section 436 of the Energy Independence and Security Act (EISA), the office combines authoritative knowledge of Federal processes with multidisciplinary expertise in high-performance green buildings to provide leadership within GSA, the Federal government, and the broader commercial property market to ensure that our buildings minimize their burden on both the environment and the taxpayer. EISA also gave OFHPGB the mandate to conduct a study every 5 years to evaluate and compare available third-party green building certification systems, and requires the GSA Administrator to recommend a system(s) to the Secretary of Energy that encourages a comprehensive and environmentally-sound approach to the government-wide certification of green Federal buildings

Building Performance Goals

As noted, Congress has set aggressive goals for performance in Federal buildings that have been reinforced and expanded by Executive Order. In 2005, Congress passed the Energy Policy Act of 2005 (EPACT) that amended a number of energy management goals for Federal facilities including requirements that new Federal buildings be designed to meet the American Society of Heating, Refrigeration, and Air Condition Engineers (ASHRAE) 90.1-2004 energy efficiency standard and, if life-cycle cost-effective, to exceed these standard by 30%. In addition, EPACT required the Federal government's consumption of renewable electric energy meet or exceed 3 percent of electricity use from FY2007 – FY2009 with increases to 5 percent in FY2010 – FY2012 and 7.5 percent in FY2013, to the extent economically feasible and technically practicable.

In 2007, Congress expanded the Federal government's energy management goals and included water conservation requirements by passing the Energy Independence and Security Act of 2007 (EISA). EISA requires:

- Energy managers to complete annual comprehensive energy and water evaluations for approximately 25 percent of covered facilities, with each facility evaluated at least once every 4 years;[1]
- 30 percent of hot water demand in new Federal buildings and major renovations be met with solar hot water equipment provided it is life-cycle cost effective;
- Agencies use energy-efficient lighting fixtures and bulbs in Federal buildings;
- Sustainable design principles to be applied to new Federal buildings and major renovations of Federal buildings;
- Aggressive fossil fuel-generated energy reductions for new Federal buildings and major renovations of Federal buildings, phased-in through 2030, and
- Agencies reduce total energy consumption per gross square foot in their new and existing Federal buildings by 30 percent from a FY2003 baseline by FY2015.

In 2009, the President signed Executive Order 13514 – *Federal Leadership in Environmental, Energy, and Economic Performance*, which reinforced and expanded upon the energy reduction and environmental performance requirements set in EPACT and EISA as well as Executive Order 13423. Among the expanded requirements, EO 13514 requires agencies to:

- Reduce potable water intensity by 26 percent in FY2020 compared to FY2007;
- Reduce industrial, landscaping, and agricultural water use 2 percent annually, leading to a 20 percent reduction by FY2020 compared to FY2010;
- Ensure all new Federal buildings entering the design phase in 2020 or later be designed to achieve net zero energy by 2030, and

[1] Covered facilities are those individual agency's Federal facilities that contribute at least 75 percent of the agency's total energy use. EISA requires agencies to identify all of their "covered facilities."

- Have at least 15 percent of existing buildings and leases meet the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings by 2015 with continued progress towards 100 percent.

In setting these building performance requirements and goals, Congress and the Administration realized the impacts buildings have on the environment, the economy, natural resources, occupant health, and productivity. Buildings use almost 40 percent of all energy, emit nearly 40 percent of carbon dioxide emissions, use 13 percent of our freshwater resources, generate over two-thirds of all non-industrial secondary materials, and form an indoor environment where Americans spend 90 percent of their time. If too little outdoor air enters a building, pollutants can accumulate to levels that can pose health and comfort problems[2].

Benefits

With these enormous impacts also comes the opportunity for a variety of benefits. High-performance buildings provide value for the taxpayer and for the public through both life-cycle cost benefits and positive effects on human health and performance. Compared to average buildings, high-performance buildings use less energy, water, and material resources; have better indoor environmental quality; reduce air and water pollution, and produce less waste; use environmentally preferable products; have integrated systems; use sites well and use local transportation to reduce adverse impacts on the local community; and improve conditions for the health and productivity of the buildings' occupants.

The life-cycle costs of well-designed and maintained green buildings are usually lower than the life-cycle costs of conventional buildings. Even the initial capital costs are not necessarily higher. When they are, GSA's study[3] of the initial capital cost shows that the increase on average is about 3 percent, ranging from zero to ten percent), depending on the design. Similarly, a private sector study by Davis Langdon[4] in 2007 shows that green building features tend to have a lesser impact on costs than other building decisions, such as which kind of finishes and amenities the building might include.

EISA states that a high-performance green building must not just perform well mechanically, but perform to improve the health and enhance the performance of the occupants.[5] EPA has found that indoor air can contain volatile organic compounds, such as those found in paints and cleaning products, at concentrations indoors that are

[2] US Environmental Protection Agency, The Inside Story: A Guide to Indoor Air Quality http://www.epa.gov/iaq/pubs/insidestory.html

[3] GSA LEED Cost Study, 2004. http://www.wbdg.org/ccb/GSAMAN/gsaleed.pdf

[4] Lisa Fay Mathiesson, Peter Morris, "The Cost of Green Revisited" Davis Langdon, July 2007, http://www.davislangdon.com/upload/images/publications/USA/The percent20Cost percent20of percent20Green percent20Revisited.pdf

[5] EISA Sec. 401(13).

2-5 times, and sometimes as much as 100 times, higher than outdoor air. Poor indoor air quality associated with such pollutants as mold, tobacco smoke, and radon can also increase respiratory diseases and the risk of cancer.[6] Lighting quality, including levels of daylighting and views, have significant impacts on employee productivity and satisfaction, as the Pacific Northwest National Laboratory has found. Carnegie Mellon University has documented over 100 scientifically valid, peer-reviewed, studies that demonstrate the link between high-performance features and various aspects of productivity.

The Federal government as a whole has made tremendous strides in improving building performance. GSA has demonstrated significant progress by achieving a green score for all of the status goals included on the FY2010 and FY2011 OMB Sustainability and Energy Scorecard. GSA has reduced its energy intensity by over 19 percent as compared to its FY2003 baseline through sustainable design of new buildings, energy-efficient management of existing Federal buildings, and increased procurement of renewable energy. In FY2011, GSA purchased or generated 15.8 percent of its total electricity from renewable resources. GSA has also reduced its water intensity in covered buildings by over 13 percent as compared to its FY2007 baseline.

In 2011, GSA conducted a follow-up study to its 2007 report *Assessing Green Building Performance: A Post Occupancy Evaluation of 12 GSA Buildings.*[7] To answer the question "do green buildings deliver the performance they promise," GSA selected 22 of its earliest green buildings from its national portfolio and confirmed that, on average, GSA's sustainable designed buildings use 25 percent less energy, cost 19 percent less to maintain, and have occupants who are 27 percent more satisfied than those working in typical buildings.[8]

Achieving Performance Goals

To accomplish building performance goals, the Federal government must measure the performance of the inventory and make needed improvements. GSA's OFHPGB assists in these efforts.

Measurements

One tool used to benchmark the energy performance of buildings is Energy Star®, a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy. Energy Star® Portfolio Manager is an interactive energy management tool for tracking and assessing energy and water consumption across an entire portfolio of buildings. Portfolio Manager uses building performance information that is entered into the system and compares a particular building with similar facilities. Portfolio Manager provides a score from 0 to 100 and if a building achieves a score of 75 or greater, it may

[6] US Environmental Protection Agency, Indoor Environments Division, http://www.epa.gov/iaq/voc.html
[7] Study can be found at http://www.gsa.gov/graphics/pbs/GSA_Assessing_Green_Full_Report.pdf
[8] Follow-up study can be found at http://www.gsa.gov/graphics/pbs/Green_Building_Performance.pdf

qualify for the Energy Star® label. At the end of FY11, GSA had earned the Energy Star® label on 149 owned buildings with an additional 176 buildings that are eligible.

Green Building Certification systems are another tool agencies use to evaluate and measure achievements in the sustainable design of buildings. Section 436(h) in EISA requires that the Director of OFHPGB in GSA evaluate green building certification systems every five years to identify a system and certification level that will be most likely to encourage a comprehensive and environmentally sound approach to certification of green buildings. EISA requires the GSA Administrator to provide his/her findings to the Secretary of Energy, who consults with the Secretary of Defense and the GSA Administrator to identify the system that the Secretary of Energy determines to be the most likely to encourage a comprehensive and environmentally-sound approach to certification of green buildings. In 2006, GSA first evaluated certification systems focusing on new construction. Based on this 2006 review, GSA identified the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) certification system for use in the Federal sector. Much has changed in the past half-decade, however.

My office is currently conducting its second review of green building certification systems focusing on new construction, major renovations, and existing buildings. High performance building requirements for new construction and existing buildings from EISA and Executive Orders 13423 and 13514 form the foundation for the criteria that OFHPGB is applying in this review. These requirements include performance standards relating to energy use, greenhouse gas emissions, water use, waste reduction, materials use and employee commuting for all Federal facilities. With the help of the Pacific Northwest National Laboratory (PNNL), OFHPGB completed its most recent evaluation of green building certification systems in March 2012. PNNL conducted a fact finding of all the green building certification systems and standards currently in the market and initially identified over 160 different systems and tools. Undertaking a detailed review of this large field of potentially useful tools was not cost-effective, so OFHPGB developed a set of screening criteria to narrow this field. The following screening criteria were used to identify which systems met the minimum expectations of a green building certification system with respect to EISA:

- Systems must employ whole building evaluation, addressing key sustainable design and operations metrics;
- Systems must be available in the U.S. market, and
- Systems must have third party certification.

Three certification systems passed the screening criteria: Green Building Initiative's Green Globes® (2010), U.S. Green Building Council's Leadership in Energy and Environmental Design® (2009), and the International Living Building Institute's Living Building Challenge™ (2011). Following screening, these three systems were then evaluated against a list of detailed criteria summarized below:

- Independence – assessors have no stake in outcome

- Availability – assessors are available to review buildings
- Verification – documented verification method
- Transparency – documented approach for inclusion of public comments in standard development and updates
- Consensus based – per OMB circular A-119
- Robustness – efficient and sustainable use of water, energy, and other natural resources; Federal requirements are met for resource use as well as indoor environmental quality, building system controls, siting, integrated design, and renewable energy
- System Maturity – effective links are available to the latest tools and standards; system included components to track performance post occupancy; system is consistently updated
- Usability – affordable, technical knowledge to use the system is readily available, well defined and easily understood, professional rigor
- National Recognition – recognized academically, within the private market and Federal sector

GSA recently published PNNL's Green Building Certification System Review report. Prior to its release, the report was reviewed by Federal sector peers to ensure accuracy and to gauge the completeness of the evaluation. In addition, the draft report was provided to the three green building certification system organizations for their input with comments reconciled and included in the appendices. The report shows that none of the green building rating systems cover 100 percent of Federal green building requirements for new construction, major renovations, and existing buildings.

In recognition that there is a high level of interest in the green building certification system review, both within and outside the Federal sector, OFHPGB has asked the Department of Energy and the Department of Defense to co-chair an interagency task force to work through a set of related questions and issues around building performance requirements, proposed revisions to the High Performance and Sustainable Building Guiding Principles, applicability of ASHRAE Standard189.1, and certification systems using the recently published PNNL study on Green Building Certification System Review[9]. Agencies with large portfolio holdings such as the Department of State, National Park Service, Department of Veterans Affairs, and Forest Service, in addition to the Department of Energy and Department of Defense, have been invited to participate on the task force. There are six planned meetings for the interagency task force with the first meeting scheduled on May 17, 2012. In addition, we are planning public listening sessions where the public can provide input. Prior to submitting our recommendation to the Secretary of Energy, the OFHPGB will publish the interagency task force conclusions in the Federal Register and will solicit comments from the public over a period of 60 days. After taking into consideration the deliberations of the interagency task force and the public comments from the listening sessions and Federal Register notice, GSA will make its final recommendation to the Secretary of Energy, which we anticipate to be in the fall.

[9] Available at http://www.gsa.gov/gbcertificationreview

Improvements

GSA's OFHPGB is also involved in initiatives to improve building performance such as the increased use of energy savings performance contracts (ESPCs) and implementation of the Federal Buildings Personnel Training Act (FBPTA).

An ESPC is a contracting vehicle that allows Federal agencies to accomplish energy projects for their facilities with private sector funding for up-front capital costs. The private investment is paid back through guaranteed cost savings from building improvements that save energy at the facility. OFHPGB, in collaboration with DOE's Federal Energy Management Program launched an effort in 2011 to enhance and increase the use of ESPCs at GSA buildings. This effort, the Deep Retrofit Challenge, will use GSA buildings across the country as demonstration projects for deep savings from EPSCs. The goal of the project is to achieve the maximum savings possible with no artificial limit on the use of technologies. My office convened a meeting in October 2011 of Federal contract negotiation and contract management personnel with the Energy Services Company (ESCO) providers on the DOE ESPC Indefinite Delivery Indefinite Quantity (IDIQ) contract. The meeting provided an opportunity to discuss barriers and solutions to raise the bar on the level of savings an ESPC can provide to government agencies. GSA recently announced the list of GSA buildings participating in the Deep Retrofit Challenge and issued a Notice of Opportunity for ESCOs to express their interest, approach, and preferred buildings with a goal to present the best retrofit plans that move a building towards net zero energy consumption.

GSA is also working with other Federal agencies to carry out requirements from the Federal Buildings Personnel Training Act of 2010 (FBPTA). FBPTA requires GSA, in collaboration with DOD and DOE, to identify the necessary core competencies for Federal building operations and management personnel, the methods required for demonstrating these core competencies, and a recommended course curriculum. Congress passed FBPTA to ensure the Federal building operations workforce is adequately trained and maintains certain core competencies to ensure Federal buildings are maximally productive and properly maintained in order to achieve the highest possible return on investment over the infrastructure's projected operating life.

Sound Science

As the Federal government makes decisions on which technologies to utilize, we must ensure we use peer-reviewed studies and a sound scientific foundation. The Federal government relies on the extensive work funded by DOE and their Commercial Buildings Program and Federal Energy Management Program. Many prospective green building technologies are developed, evaluated and tested by DOE's National Laboratories, which incorporate peer-review into their scientifically based studies. The Federal government relies on these studies, and others identified, to make decisions on advanced building technologies. However, there is a well-documented divide between

technologies that achieve research and development success and those technologies that do not or have not yet achieved adequate commercialization.

One role the Federal government can play is to communicate research results to practitioners so that the research findings are used in building operations.. The OFHPGB identified a method to repackage and distribute solid scientific research that has yet to be broadly practiced in the field. Effectively delivering this research to its intended audience, such as facility managers and financial decision-makers, will expedite adoption of best practices, embed sustainability in building design and operations and lead to integrated solutions that achieve continuous high performance in buildings.

Conclusion

Putting all of these tools together, and ensuring we use the best evidence available to make decisions, will allow the Federal government to make strides in achieving the aggressive performance goals set by Congress and pursued by the Administration. GSA is proud to be part of that effort.

Thank you again for this opportunity to come before you. All of us in the Federal government who are managing its vast real property inventory are excited by the contribution Congress has allowed us to make. I am available to address any questions you may have.

Chairman BROUN. Thank you, Mr. Kampschroer. I thank you both for your testimony, reminding Members that Committee rules limit questioning to five minutes. The Chair at this point will open the first round of questions. The Chair recognizes himself for five minutes.

Mr. Kampschroer, I understand that your deputy is a federal liaison to the board of directors of U.S. Green Building Council and his trips to their board meetings are paid for by U.S. taxpayers. Can you please provide for the record a list of all of the board meetings that he has attended and in what capacity? And finally, can you explain to the Committee why it is that a senior GSA employee has such a role in an entity that is competing for and receiving taxpayer dollars, even with a recusal system in place? Doesn't it send the wrong message to GSA employees and the USGBC competitors?

Mr. KAMPSCHROER. Mr. Horn has been a federal advisor to the U.S. Green Building Council. We have also had federal advisors to the board of the Green Building Initiative. It is part of our participation in the development of standards. The matter of payment for trips to the board is a standard which we have reviewed by our general counsel and meets the guidelines that GSA has set out for non-federal source travel, so most of the travel is actually not paid for by the American taxpayer.

Chairman BROUN. Well, if you would provide a list of those meetings as I requested as well as——

Mr. KAMPSCHROER. I would be happy to.

Chairman BROUN. As you and I know, GSA is under a microscope for the travel and things that have occurred in the news recently.

Mr. Kampschroer, what is the total amount of taxpayer dollars' that GSA has spent on LEED certification costs?

Mr. KAMPSCHROER. I can get that information for you. I do not know off the top of my head.

Chairman BROUN. Okay. If you would, please provide that for the Committee.

Dr. Hogan, how does energy efficiency rank compared to other criteria in determining what is a green building?

Dr. HOGAN. Yes, so as we talked about green means many things and there are multiple pathways to get to green, and as the Department of Energy and really all of the federal agencies pursue the large number of goals that we have for energy efficiency, water efficiency, there is a lot of emphasis put on those pathways that get you to green that also really help you meet the goals that have been set by Congress as well as the Executive Orders. So that would mean that energy efficiency ranks quite high in what we look for when we go down the path to seeking a high-performance or certified building as part of the federal fleet.

Chairman BROUN. I didn't hear a clear definition there, but that is fine. I don't think any member of this Committee would disagree with us seeking energy efficiency. I think where the disagreement would arise is between something that Mr. Miller said in his opening statement about going to totally renewable resources and that process of trying to get away from fossil fuels, which my Democratic colleagues seem to hate, and that we need to utilize those

God-given energy resources in a economically and environmentally sustainable way. I don't think any of us want to see clean air—or dirty air or dirty water.

Mr. Kampschroer, the National Technology Transfer and Advancement Act requires federal agencies to recognize and incorporate existing consensus standards and policy initiatives. How do you respond to the lack of OMB and ANSI-defined consensus in the U.S. green buildings rating development process?

Mr. KAMPSCHROER. In our most recent review, both LEED and Green Globes seemed to meet the criteria for a consensus-based standard. We are also engaging with the National Institutes of Science and Technology, or NIST, to review that finding as they are the people who aid all of the government in the interpretation of this law and the implementing OMB Circular 119.

Chairman BROUN. Very quickly, how can you be certain of the true environmental benefits of your green building policies?

Mr. KAMPSCHROER. Through, as Dr. Hogan mentioned, rigorous measurements post renovation and post operation over time.

Chairman BROUN. Okay. Thank you, sir.

My time is expired. I now recognize Mr. Miller for five minutes.

Mr. MILLER. Thank you, Mr. Chairman. I will start providing you a copy of my statement in writing so that you do not rely upon your apparently imperfect ability to comprehend it as you hear it read aloud. I certainly did not say what you said I said in my statement.

Chairman BROUN. If I misinterpreted, I apologize.

Mr. MILLER. Well, I said that we should reduce—I said the American people think we should reduce—overwhelmingly, the American people think we should reduce our reliance on fossil fuels—I certainly did not say in my statement we should end the use of fossil fuels—and that we should support energy-efficient technologies.

Now, I am puzzled by where we are in the standards here. Was I incorrect, either of you, when I said in my statement that we really began with industry standards, that no government agency is promulgating energy-efficient standards for buildings, you are sort of starting with those that are developed by private sector, the rating systems that we talked about private-sector efforts, industry efforts. Is that right? I mean, we heard before, and we hear frequently about government picking winners and losers. We heard it in the commentary immediately after my statement, that government is picking winners and losers, although I made it very clear in my statement, I think, that government is actually trying to use what industry is developing. We are working with industry. Is that right, Ms. Hogan, or is that Dr. Hogan?

Dr. HOGAN. Either will work.

Mr. MILLER. Okay.

Dr. HOGAN. So you are right. So we are not—what the Department of Energy put out in a proposed rule in the area of green building certifications in 2010, which is still in process but what we put out in a proposed rule in 2010 established a set of criteria, largely picking from the criteria or using the criteria enumerated in EISA 2007 and adding one additional that said the federal agencies could go and choose a third-party certification system, any one that would meet these criteria. So we are not setting or developing

our own certification, we are enumerating based on largely what Congress gave us a set of criteria that we think are the ones that will deliver the benefits we all are looking for and then the agencies can choose based on if they want to what is out there in the marketplace that has been developed by industry as long as they would meet those criteria.

Mr. MILLER. Okay. And I don't think anyone would suggest you should just blindly follow something developed by some third-party group. You should do some analysis to figure out whether those are the right standards.

Mr. Kampschroer, first of all answer the same question that Dr. Hogan just answered, but also, what studies do you plan to do in the future to determine the benefits of high-performance building and whether the measures being adopted are the right ones, the most cost-efficient ones, the ones that will lead to the most energy efficiency for the cost?

Mr. KAMPSCHROER. Thank you. Briefly, I think it is worthwhile distinguishing between green building certification systems, which are used to measure the delivery of projects to the government, and standards which might be used as a form of specification. Generally speaking, the government does not use the green building certification systems as a way to specify what is desired but rather as a way to measure what is delivered. Standards such as ASHRAE 90.1 or the energy code are used to specify minimum performance levels, and in fact, EPAct requires us to be 30 percent better than ASHRAE Standard 90.1.

As to the question of benefits and measures, I think this is a key point. We have seen that in not all cases do buildings actually perform at the level they are designed to perform regardless of certification level or whether or not the building has been certified. So a significant reason for doing the demonstration project research that we are doing in conjunction with the Department of Energy and others is to measure the benefits in detail, publish them in a way and then take that research and apply it to other buildings. So I think the key thing here is really accurate measurement over an extended period to see how buildings are performing.

Mr. MILLER. Is the way that you are using these third-party rating systems and the way that you have described it substantially different from the way that they are being used in industry?

Mr. KAMPSCHROER. I think it is, in some cases, different than industry. I think, in some cases, building owners are using green building certification systems in lieu of providing detailed performance requirements for their buildings. The government does not do that.

Mr. MILLER. My time is expired, as you were about to say, Mr. Chairman.

Chairman BROUN. I was indeed. Thank you so much, Mr. Miller.

Now, Dr. Bucshon, you are recognized for five minutes.

Mr. BUCSHON. Thank you, Mr. Chairman.

For Dr. Hogan, drafts of the LEED 2012 proposed a credit for the avoidance of certain products commonly used today. Has the DOE or its lab studied how this would impact federal energy savings goals or increase the cost of federal buildings?

Dr. HOGAN. We have not at this time studied that.

Mr. BUCSHON. Do the federal buildings being built today, are the windows, are they made of vinyl? Are we using foam insulation? I mean, how are they being built today?

Dr. HOGAN. The codes that are in place today still allow a variety of technologies to meet a performance specification, so our codes are largely performance based. Typically, there also are tables that demonstrate how you can put together packages of certain technologies to meet those performance levels, but typically it is technology neutral based on performance.

Mr. BUCSHON. And under potential new standards, would all that be the same?

Dr. HOGAN. Yes. Certainly as we participate with code bodies and the Department of Energy brings information to the table, we are very focused on the performance that can be achieved, the energy savings that can be achieved and not trying to be prescriptive about what technology gets there.

Mr. BUCSHON. Okay. And Mr. Kampschroer, so the GSA would support a credit, and hasn't it routinely used products in the past that the credit would potentially penalize?

Mr. KAMPSCHROER. Potentially, as with the Department of Energy, we have not studied this proposed credit yet. It was not included in our recent evaluation because it is merely proposed and has not actually been incorporated.

Mr. BUCSHON. Okay. I yield back, Mr. Chairman.

Chairman BROUN. Thank you, Dr. Bucshon.

Now, Mr. McNerney, is he—he is not coming back? Okay. Stand by one minute here. We appreciate you all's testimony. Members may very well want to give you additional written questions. If you would be very expeditious in answering those as quickly and as thoroughly as you possibly can, and you are now excused, and thank you for your testimony.

As they are taking their seats, I would like to introduce our second panel of witnesses: Mr. Ward Hubbell, the President of U.S. Green Building Initiative: Mr. Roger Platt, the Senior Vice President for Global Policy and Law of the U.S. Green Building Council; Dr. John Scofield, a Professor of Physics at Oberlin College; Mr. Victor Olgyay, Principal Architect of the Built Environment Team of the Rocky Mountain Institute; and Mr. Tom Talbot, the CEO of Glen Oak Lumber and Milling.

As our witnesses should know, spoken testimony is limited to five minutes each, after which Members of the Committee will ask all you all questions. Your written testimony will be included in the record of the hearing.

It is the practice of the Subcommittee on Investigations and Oversight to receive testimony under oath. Do any of you have an objection to taking an oath? Let the record reflect that all witnesses indicated that they are willing to take an oath. You also may be represented by counsel. Do any of you have counsel with you here today? Let the record reflect that all of them indicated that they do not have counsel. If you all would please raise your right hand? Do you solemnly swear and affirm to tell the whole truth and nothing but the truth, so help you God? Thank you. You may be seated. Let record reflect that all the witnesses participating have taken the oath.

And as he takes his seat, I will recognize Mr. Hubbell for five minutes, our first witness. Mr. Hubbell.

STATEMENT OF MR. WARD HUBBELL, PRESIDENT, U.S. GREEN BUILDING INITIATIVE

Mr. HUBBELL. Thank you, Chairman Broun, Mr. Miller and other Members of the Committee.

My organization is the Green Building Initiative. We are the exclusive U.S. licensee to Green Globes, an online green building assessment and rating system for new and existing commercial buildings. The GBI is recognized as a standards developer by the American National Standards Institute and became the first green building organization to publish an ANSI standard for commercial green building. Our organization also developed the first third-party certification protocol specifically designed to measure compliance with the federal guiding principles for sustainable buildings.

Today, I will describe our rating tools and comment on current federal policy regarding green building assessment and rating.

Green Globes is a proven method for evaluating and improving the environmental performance of new, renovated and existing commercial buildings. It delivers a comprehensive sustainability assessment through an interactive, web-enabled platform, which results in greater ease of use, lower cost and the convenient evaluation of building performance over time. We also offer what we believe is the most credible, comprehensive and cost-effective third-party certification process that exists today.

Green Globes has been used to certify buildings owned by governments, major corporations, small businesses, school districts and higher education institutions across the country, and has been formally recognized as an equivalent standard to LEED in more than 20 U.S. States.

Green Globes is highly compatible with the federal guiding principles for sustainable buildings due to its focus in areas such as energy and water conservation, carbon emission reduction and continuous improvement. In a study released last week, GSA reported that Green Globes for New Construction, and I am quoting from the report "aligns at some level with more of the federal sustainability requirements for buildings than any other new construction system reviewed by the GSA."

One of the reasons Green Globes has been so well received in the federal sector is due to some of its unique technical features. For example, to measure energy efficiency, Green Globes uses the EPA's Energy Star program, which evaluates the whole cycle of energy performance. Through Energy Star, our users can benchmark their energy performance against actual data from similar building types rather than relying on hypothetical energy data as other rating systems do. More than a third of Green Globes points are weighted to energy and only those buildings projected to perform in the top 25 percent of buildings nationwide are eligible for energy performance points.

To evaluate the impacts of construction materials, Green Globes employs life cycle assessment, a science-based approach that measures the environmental footprint of materials based on five major

criteria: embodied energy, global warming potential, and impacts on land, air and water. We provide this information through a peer-reviewed, online calculator which we developed and incorporated into Green Globes. This tool enables building owners to select and be rewarded for using the lowest impact materials that can meet the practical demands of their building's intended use.

Other technical features of Green Globes include a focus on management criteria over the life cycle of a building and incentives to reuse existing buildings and increase building durability.

Now, in addition to Green Globes, we have also developed a third-party certification protocol specifically designed to measure compliance with the federal guiding principles. Executive Order 13514 requires that 15 percent of an agency's buildings larger than 5,000 square feet meet the guiding principles requirements by fiscal year 2015. Through this program, we provide a survey, a third-party on-site assessment, a compliance score and rating, and detailed recommendations for improvement. To date, nearly 200 federal buildings have gone through this program and more are in the pipeline.

Despite our successful interactions with federal agencies, we do not believe there is a level playing field with regard to green building certification across the federal sector. The Department of Energy and GSA, both of which own or manage many buildings in the U.S, continue to have LEED-only policies. We believe those policies should be reconsidered in light of GSA's own findings regarding Green Globes and due to the availability of a guiding principles compliance tool which was designed to provide 100 percent alignment with the federal principles.

In conclusion, we believe that if general performance goals are set as they have been, agencies should have the flexibility to use a variety of credible tools to help them achieve their sustainability goals. Locking federal agencies into a one-size-fits-all approach, as a LEED-only policy does, constrains the federal sector to the limitations of one tool and discourages organizations like mine from being innovative, keeping prices low and focusing intensely on good customer service. In their sustainability plan, GSA lists as one of their accomplishments that they are a proving ground for new green building technologies. We believe their policy toward green building rating systems should reflect that.

Thank you.

[The prepared statement of Mr. Hubbell follows:]

Green Building Initiative testimony to the US House of Representatives Science, Space and Technology Committee Subcommittee on Investigations and Oversight

By Ward Hubbell, President, Green Building Initiative

May 8, 2012

Chairman Broun, Ranking Member Tonko and Members of the Subcommittee, thank you for the opportunity to share my views with you today.

My organization, the Green Building Initiative, is the exclusive U.S. licensee of Green Globes, an online green building assessment and rating system for new and existing commercial buildings. The GBI is recognized as a standards developer by the American National Standards Institute and became the first green building organization to publish an ANSI standard for commercial green building. Our organization also developed the first third party certification protocol specifically designed to measure compliance with the Federal Guiding Principles for Sustainable Buildings.

In my testimony today I will describe our rating and assessment tools and some of their unique technical features, and will also comment on current federal policy regarding green building assessment and rating.

About Green Globes®

Green Globes is a proven method for evaluating and improving the environmental performance of new, renovated and existing commercial buildings. It delivers a comprehensive sustainability assessment through an interactive, web enabled platform, which results in greater ease of use, lower cost and convenient evaluation of building performance over time. We also offer what we believe is the most credible, comprehensive and cost effective third party certification process that exists today.

Green Globes has been used to certify buildings owned by governments, major corporations, small businesses, school districts, and higher education institutions across the country, and has been formally recognized as an equivalent standard to LEED in more than 20 US States.

Green Globes is highly compatible with the Federal Guiding Principles for Sustainable Buildings due to its focus in areas such as energy and water conservation, carbon emission reduction and continuous improvement. In a study released last week, the US General Services Administration reported that Green

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Globes for New Construction "... aligns at some level with more of the Federal Sustainability Requirements for buildings than any other **new construction** system reviewed by GSA."

Unique technical features of Green Globes

One of the reasons Green Globes has been so well received in the federal sector is due to some of its unique technical features.

Energy Efficiency and Performance

For example, to measure energy efficiency, Green Globes uses the US EPA's Energy Star program which evaluates the whole cycle of energy performance including source efficiency, regional factors, and site consumption. Through Energy Star our users can access the US Department of Energy's CBECS database enabling them to benchmark their energy performance against actual data from similar building types rather than relying on hypothetical energy data as other rating systems do. More than a third of Green Globes points are weighted to energy and only those buildings projected to perform in the top 25% of buildings nationwide are eligible for energy performance points.

Life Cycle Assessment

To evaluate the impacts of construction materials, Green Globes employs Life Cycle Assessment (LCA) a science-based approach that measures the environmental footprint of materials based on five major criteria: Embodied Energy, Global Warming Potential, and Impacts on Land, Air and Water. We provide this information through a peer-reviewed, online calculator which we developed and incorporated into Green Globes. This tool enables building owners to select and be rewarded for using the lowest impact materials that can meet the practical demands of their building's intended use.

Other Technical Features

Green Globes incorporates management criteria over the life cycle of a building and also supports the whole building life cycle concept by rewarding the reuse of existing buildings and steps taken to extend the useful life of buildings.

Guiding Principles Compliance program

In addition to Green Globes, we have also developed a third party certification protocol specifically designed to measure compliance with the Federal Guiding Principles for Sustainable Buildings, which address such issues as energy, water, indoor air quality, material impacts and building management. Executive Order 13514 requires that 15 percent of an agency's buildings larger than 5,000 square feet meet the Guiding Principles requirements by fiscal year 2015.

Through this program, we provide a survey, a third-party on-site assessment, a compliance score and rating, and detailed recommendations for improvement. To date, nearly 200 Federal buildings have gone through this certification program and more are in the pipeline.

Despite our successful interactions with federal agencies, we do not believe there is a level playing field with regard to green building certification across the federal sector. The US Department of Energy and the General Services Administration, both of which own or manage many buildings in the US, continue to have LEED-only policies. We believe those policies should be reconsidered in light of GSA's own findings regarding Green Globes' compatibility with the Federal Guiding Principles and due to the availability of our Federal Guiding Principles Compliance tool which was designed to provide 100% alignment with the Federal Principles.

In conclusion, we believe that if general performance goals are set as they have been, agencies, regions, and departments should have the flexibility to use a variety of credible tools to help them achieve their sustainability goals. Locking federal agencies into a one-size-fits-all approach, as a LEED-only policy does, constrains the federal sector to the limitations of one tool and discourages organizations like mine from being innovative, keeping prices low and focusing intensely on good customer service. In their 2010-2015 Sustainability Plan, GSA lists as one of their accomplishments that they are "a proving ground for new green building technologies." We believe their policy toward green building rating systems should reflect that.

Thank you.

Green Building Initiative Background and Relevant Information

The Green Building Initiative (GBI) is a 501(c)(3) non-profit organization based in Portland, Oregon, established to accelerate the adoption of sustainable design and construction practices by promoting credible and practical approaches to green building for commercial construction.

GBI Mission

The GBI is committed to accelerating the adoption of green building practices by offering credible and practical tools that make green design, management and assessment more accessible to a wider population of builders and designers.

GBI owns the rights to promote and distribute Green Globes®-a highly innovative green management tool that features an assessment protocol, rating system and guide for integrating environmentally friendly design into commercial buildings. It features modules for New Construction (Green Globes-NC); the Continual Improvement of Existing Buildings (Green Globes-CIEB), and Green Globes for Continual Improvement of Existing Buildings-Healthcare, each of which facilitates recognition of completed projects through third-party assessment.

Green Globes is successful because it is rigorous, yet easy to use and affordable. Due to its unique, web-based platform, the detailed information and references users need to design energy-efficient, healthier and environmentally sensitive buildings are embedded in the tool, enabling it to provide relevant information as required.

GBI has also developed the Guiding Principles Compliance Assessment Program, a third-party assessment and rating program designed for assessing and rating compliance to the Guiding Principles for federal agencies that own, lease and operate buildings.

The Guiding Principles Compliance (GPC) Program utilizes a simple-to-use survey and third-party assessment process that minimizes the amount of time and effort required from agency personnel in progressing towards compliance with the Guiding Principles.

Innovation and Competition

When GBI was established in late 2004, there were no green building rating systems with the specific objective of supporting mainstream design and building professionals. This is at the core of the Green Globes system and is fundamental to encouraging energy efficiency and other green building practices on the broad scale that is clearly necessary.

Of primary importance, having more than one rating system supports the diversity of buildings, design and building professionals, and budgets. It also creates an atmosphere of healthy competition, which does for green building what it has done in countless other areas – drives improvements, lowers costs and benefits the ultimate consumer, which in this case is our shared environment.

In the last seven years, for example, GBI:

- Became the first green building organization to be accredited as a Standards Developing Organization (SDO) by the American National Standards Institute (ANSI),
- Completed ANSI/GBI 01-2010: Green Building Assessment Protocol for Commercial Buildings which was derived from the Green Globes environmental design and assessment rating system for New Construction and was formally approved on March 24, 2010, becoming the first ANSI green building rating standard for commercial green building,
- Introduced Green Globes-CIEB (for existing commercial buildings) to strengthen the link between sustainable design objectives and actual building performance,
- Developed the first peer reviewed tool for integrating life cycle assessment (LCA) – widely considered to be the most effective way to compare the environmental impacts of building materials and assemblies – into a green rating system,
- Chose to advance the green movement as a whole by supporting the development of a generic version of its LCA tool-the ATHENA® EcoCalculator for Assemblies-which is available free of charge through the ATHENA Institute),
- Developed a healthcare version of Green Globes for initial use with almost 200 healthcare facilities operated by the US Department of Veterans Affairs,
- Developed the Guiding Principles Compliance assessment program, the first third-party assessment and rating program designed specifically for federal agencies to assess compliance with the Guiding Principles.

As evidenced by these highlights, GBI's offerings have evolved as new opportunities have arisen to help mainstream practitioners accelerate their adoption of green building practices. Our goal is for green building to become the norm and, while GBI has arguably become a leading voice in the movement, we are committed to remaining nimble and continuing our role as an agent of positive change.

Having long recognized the power of collaboration, GBI has sought to foster relationships with a variety of organizations related to the built environment with the goal of helping to accelerate the acceptance of sustainable design and construction in the marketplace. To this end, GBI has a formal partnership with the US Environmental Protection Agency's ENERGY STAR® program, as well as Memorandums of Understanding with the following organizations:

- American Institute of Architects (AIA)
- American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
- Associated General Contractors of America (AGC)

- Association for Facilities Engineering (AFE)
- Building Owners and Managers Association (BOMA)
- National Association of Home Builders (NAHB)

GBI has also established collaborative relationships with, among others:

- Alliance to Save Energy (ASE)
- Architecture 2030
- Sustainable Buildings Industry Council (SBIC)

Green Globes – History and Credentials

Originally developed in Canada, the Green Globes environmental assessment and rating system represents more than a dozen years of research and refinement by a wide range of prominent international organizations and experts.

The genesis of the system was the Building Research Establishment Environmental Assessment Method (BREEAM), which has been used to certify close to 100,000 buildings in the UK demonstrating the important role of rating systems in the building sector.

Green Globes and the Green Building Initiative

In 2005, GBI acquired the rights to distribute Green Globes for New Construction in the United States. In adapting the system, the only changes made were those necessary to make the system appropriate for the US market (e.g., converting units of measurement and integration with the ENERGY STAR program).

Since then, GBI has committed itself to ensuring that Green Globes continues to reflect best practices and ongoing advances in research and technology. To that end, the GBI sought and received accreditation as an ANSI standards developer and began the consensus-based process of establishing Green Globes as the first ANSI standard for commercial green building. As part of the process, GBI established a technical committee and subcommittees featuring more than 75 building science experts, including representatives from four federal agencies, states, municipalities, universities and leading construction firms, as well as building owners.

As part of the ANSI process, GBI relinquished control of the Green Globes tool to the technical committee, or consensus body, which determined the final standard. This is the first time an organization has committed its commercial building rating system to further development through ANSI's third-party codified, consensus-based committee process, which represents the ideals of balance, transparency and public input.

For example:

- In the energy section, the standard uses carbon dioxide (CO2) as the basis for calculating the performance path instead of the previous kBTUs per square foot per year of energy consumed, which requires the calculation of CO2 equivalency. This is particularly important in the context of climate change and the need to consider buildings in terms of their total carbon footprint.

- The standard is the first green building rating system to fully integrate life cycle assessment (LCA).

- The green building movement is experiencing a fundamental shift in the way it approaches sustainable design, away from a prescriptive methodology-whereby materials are assumed to have environmental benefits based on rapid renewability, recycled content or other attributes – toward one that emphasizes measurable performance. LCA is a means to this end because it allows the impartial comparison of materials, assemblies and even whole buildings, from cradle-to-grave, in terms of quantifiable impact indicators such as embodied energy and global warming potential.

- LCA is widely accepted in the environmental research community as one of the best ways to assess building sustainability, but its use has been limited by the perception that it is too complex or time consuming for mainstream practitioners. To remedy this, GBI commissioned a tool that provides instant LCA results for hundreds of building assemblies, making it more accessible than ever before.

- Although developed for integration into Green Globes, GBI recognized the tool's importance to the broader sustainable design community and supported the development of a generic version, the ATHENA® EcoCalculator for Assemblies, which is available free of charge from the Athena Web site (www.athenasmi.ca). GBI encourages the use of this tool among other green building organizations and universities, and at all levels of government.

- The standard incorporates a calculator that allows users to project water consumption of new buildings based on their designs. As with other elements of building sustainability, water use has a significant impact on energy consumption.

Green Globes and Energy Efficiency

The Green Globes system is unique in a number of ways that directly impact energy efficiency.

- Green Globes relies on information from the US EPA's ENERGY STAR program and, as such, uses data generated through the Department of Energy's Commercial Buildings Energy Consumption Survey (or CBECS). CBECS provides data on actual building performance by building type, which is the first step in determining how to achieve a building that performs significantly better than average.

- More than a third of Green Globes' point system is weighted to energy efficiency. To receive points under energy performance, a building must be compared to an average building using the ENERGY STAR system. Only those buildings projected to perform in the top 25% of buildings nationwide are eligible for points in this category.

- The three modules of Green Globes seamlessly connect new building design to existing building performance. Certification with Green Globes-NC is just the first step to achieving a truly green structure. Green Globes-CIEB has an important role to play in incentivizing the ongoing measurement and monitoring of building performance – as re-certification every three years is necessary to ensure that a building is in fact being managed in a manner that maintains the integrity of its initial assessment.

- Because of its low cost, Green Globes is appealing to budget-sensitive projects such as those that utilize public funds or those that may not otherwise be considered in a green building context.

Using Green Globes for New Construction

Although many green building tools claim to be web-enabled, this is typically limited to providing online information and templates. Green Globes' use of web tools is far more complex and offers a fully interactive experience.

Once an online questionnaire is completed, the system generates a point score and project design highlights. The report generated includes an educational component, which emphasizes sustainability attributes of the building and provides detailed suggestions for improvements that should reduce the building's overall environmental impact. This is supported by links to further information regarding best design practices and standards or specific information on building systems and materials. Links are selected to provide educational information, government references, NGOs, and industry research relevant to each stage of project delivery and to help users achieve a higher performance design and thus higher Green Globes score.

In Green Globes-NC, projects are awarded up to 1,000 points based on their performance in seven areas of assessment:

1. Project Management

   The Green Globes system places an emphasis on integrated design, an approach that encourages multi-disciplinary collaboration from the earliest stages of a project while also considering the interaction between elements related to sustainability. Most decisions that influence a building's performance (such as siting, orientation, form, construction and building services) are made at the start of the project and yet it's common, even for experienced designers, to focus on environmental performance late in the process, adding expensive technologies after key decisions have been made. This is costly as well as ineffective.

To ensure that all of the relevant players are involved, the system tailors questionnaires so that input from team members is captured in an interactive manner, even on those issues which may at first appear to fall outside their mandate. For example, while site design and landscaping may come under the purview of the landscape designers, the questionnaire prompts the electrical engineer to get involved with design issues such as outdoor lighting or security. Thus the Green Globes format promotes design teamwork and prevents a situation where, despite strong individual resources, the combined effort falls short.

Also included under project management are environmental purchasing, commissioning, and emergency response.

2. Site

Building sites are evaluated based on the development area (including site selection, development density and site remediation), ecological impacts (ecological integrity, biodiversity, air and water quality, microclimate, habitat, and fauna and flora), watershed features (such as site grading, storm water management, pervious cover and rainwater capture), and site ecology enhancement.

3. Energy

To simplify the process of energy performance targeting, Green Globes-NC directs users to the Web interface used for the ENERGY STAR Target Finder software, which helps to generate a realistic energy consumption target. As a result, an aggressive energy performance goal can be set-with points awarded for design and operations strategies that result in a significant reduction in energy consumption-as compared to actual performance data from real buildings.

As previously stated, Green Globes is the only green rating system to use energy data generated through the US Department of Energy's Commercial Buildings Energy Consumption Survey (CBECS), which is widely considered to be the most accurate and reliable source of energy benchmarking information.

In addition to overall consumption, projects are evaluated based on the objectives of reduced energy demand (through space optimization, microclimatic response to site, daylighting, envelope design and metering), integration of "right sized" energy-efficient systems, on-site renewable energy sources, and access to energy-efficient transportation.

4. Water

Projects receive points for overall water efficiency as well as specific water conservation features (such as sub-metering, efficiency of cooling towers and irrigation strategies), and on- site treatment (of grey water and waste water).

5. Resources

   The resources section covers building materials and solid waste. It includes points for materials with low environmental impact (based on life cycle assessment), minimal consumption and depletion of resources (with an emphasis on materials that are re-used, recycled, bio-based and, in the case of wood products, certified as having come from sustainable sources), the re-use of existing structures, building durability, adaptability and disassembly, and the reduction, re-use and recycling of waste.

6. Emissions, Effluents and Other Impacts

   Points in this section are awarded in six categories, including air emissions, ozone depletion and global warming, protection of waterways and impact on municipal waste water treatment facilities, minimization of land and water pollution (and the associated risk to occupants' health and the local environment), integrated pest management, and the storage of hazardous materials.

7. Indoor Environment

   According to the US EPA, indoor air can be up to 10 times more polluted than outdoor air, even in cities where the quality of outdoor air is poor. This has obvious health implications, but the consequences are also economic. A study by Lawrence Berkeley National Laboratory found that improving indoor air at work could save US businesses up to $58 billion in lost sick time each year, with another $200 billion earned in increased worker performance.

   This section evaluates the quality of the indoor environment based on the effectiveness of the ventilation system, the source control of indoor pollutants, lighting design and the integration of lighting systems, thermal comfort and acoustic comfort.

Projects that achieve a score of 35% or more become eligible for a Green Globes rating of one, two, three or four globes, as follows:

One Globe:	35-54%
Two Globes:	55-69%
Three Globes:	70-84%
Four Globes:	85-100%

However, buildings cannot be promoted as having achieved a Green Globes rating until the information submitted has been assessed by a qualified third party.

The Green Globes third-party assessment process features a rigorous two-stage approach. Stage I can be initiated by the design team as soon as the Construction Documents questionnaire is finalized. The completed questionnaire is assessed against the documentation generated throughout the design process and, once complete, the design team receives a Certificate of Achievement. However, a final rating cannot

be achieved until after Stage II, which occurs post-construction and includes an on-site inspection by a qualified assessor. This stage can be initiated as soon as construction is complete. The GBI currently oversees a network of Green Globes-trained assessors comprised primarily of licensed architects and engineers with significant experience in building sciences and sustainability issues.

Green Globes for Continual Improvement of Existing Buildings

Considering that the United States is home to more than 100 million buildings, the need to improve the performance of existing structures is a necessary prerequisite for widespread energy efficiency. The missing element-until several years ago when GBI introduced Green Globes-CIEB-was a practical and affordable way to measure and monitor performance on an ongoing basis.

Green Globes-CIEB allows users to create a baseline of their building's performance, evaluate interventions, plan for improvements, and monitor success-all within a holistic framework that also addresses physical and human elements such as material use and indoor environment.

As in Green Globes-NC, energy is the most significant area of assessment within Green Globes-CIEB. A combined focus on energy use, building features and management helps to pinpoint where performance is lacking and what corrective action is required. The system uses the ENERGY STAR Portfolio Manager to determine a consumption target for each building type and, where appropriate, buildings must meet a minimum performance target of 75% based on the comparable ENERGY STAR building.

US Market Acceptance

To date, almost 450 buildings have successfully achieved Green Globes third-party certifications across the United States. Many more buildings are registered with our tools and we expect that many, if not all of these, will ultimately complete certification.

Green Globes has also been formally recognized by the public and private sectors including the following:

- 23 states have incorporated Green Globes in law including: Arkansas, Connecticut, Delaware, Florida, Hawaii, Illinois, Kentucky, Massachusetts, Minnesota, Missouri, Nevada, New Jersey, New Mexico, New York, North Carolina, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Utah, Virginia and Wisconsin.

- Green Globes is included in insurance packages offered for green buildings by Aon Corporation, Fireman's Fund Insurance Company; and Liberty Mutual.

- Several federal agencies-including the Department of Health and Human Services; Department of the Interior; and the Department of Veterans Affairs recognize GBI's tools in their formal sustainability policies. The Department of Navy recently changed their Sustainability Policy to move away from their LEED only approach and to allow equivalent systems to be used. The Army

Corps of Engineers has also begun to recognize Green Globes as a tool that can be used to certify buildings especially when LEED is not a good fit.

- To date, Green Globes certified buildings comprise about 7% of the cumulative total of certified federal buildings. This includes buildings from the US General Services Administration (GSA), the Department of Veterans Affairs (VA), the Department of State (State) and Department of Health and Human Services (HHS).

- Since the launch of Green Globes, some of the nation's premier corporations, educational institutions and foundations have chosen Green Globes to evaluate and certify their new and existing buildings. These include: Capital One, Bristol Myer Squibb, Pfizer, Whole Foods, Entergy, Drexel University, Purdue University, University of Arkansas, Arizona State University, The Clinton Presidential Library, along with many small business, local school districts and state and local government agencies. For a complete list, go to www.thegbi.org.

The Potential of Green Building Rating Systems to Accelerate Building Efficiency

In addition to the specifics associated with Green Globes, green building rating systems in general help to accelerate progress toward energy efficiency in three important ways:

1. Rating systems define achievable goals beyond mandatory codes.

   a. A building must be approximately 25% more efficient than an average building built to the ASHRAE 90.1-2004 standard (or code) in order to achieve any points in the Green Globes section on energy performance.

2. Rating systems provide the means to measure progress against these goals.

   b. For example, the Green Globes system rates on a 1000-point scale, with points awarded based on the building's performance against a broad range of environmental and energy metrics. Using the system helps building owners set priorities during the design process, measure outcomes once the building is operational, and plan for improvements.

3. Rating systems create a market dynamic that rewards those who go beyond mandatory codes. In the private sector, this includes incentives such as green insurance products and mortgages and there is a growing body of information supporting the marketing benefits of green building certification. However, this is equally important in the public sector where buildings that perform well serve as examples for others-both at a technical level, for those who manage the performance of buildings, and as a more general encouragement to the community to follow suit.

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Chairman BROUN. Thank you, Mr. Hubbell.

Now, Mr. Platt, you are recognized for five minutes.

STATEMENT OF MR. ROGER PLATT,
SENIOR VICE PRESIDENT,
GLOBAL POLICY AND LAW,
U.S. GREEN BUILDING COUNCIL

Mr. PLATT. Thank you, Chairman Broun, Member Miller, Members of the Committee. I am here today on behalf of the U.S. Green Building Council, a nonprofit with more than 13,000 organizational members, the vast majority of which are small businesses. We have 75 local chapters covering all 50 states, which represent 30,000 individual members. I am Roger Platt, the Senior Vice President at USGBC.

I am here today to tell you what our organization does to encourage and recognize best practices in the design, construction and, most importantly, perhaps, in the operation of high-performance buildings. We are best known for our LEED rating system, L–E–E–D, stands for Leadership in Energy and Environmental Design, and the system provides a verifiable framework for driving energy efficiency, water conservation, waste reduction and best practices in building design and performance.

Today, LEED-certified and registered projects represent more than 8 billion square feet of commercial real estate. As a point of reference, the island of Manhattan has roughly 400 million square feet of commercial office space. LEED projects cover that many times.

We have also trained a workforce of nearly 200,000 LEED-accredited professionals in the United States and globally. That is a whole new category of jobs.

Let me turn first to why and how LEED was developed. Buildings in this country account for 40 percent of our Nation's energy consumption and more than 70 percent of our electricity use. Collectively, we spend nearly $400 billion a year to power all of these buildings. According to a recent McKinsey and Co study, more than 30 percent of that money, or $130 billion, is wasted. Building industry professionals from private and public sector helped establish LEED back in 2000, 12 years ago, as a way to reduce this waste and expense. Over the past 12 years, LEED has quickly become the most successful voluntary, private, market-driven building rating system in the country.

Part of the reason for our success is that LEED is developed through an extremely open, transparent, consensus-driven process, a process insisted upon by our diverse constituency of business leaders and professional practitioners. Membership in USGBC is completely voluntary, and LEED was developed to be used in a voluntary and flexible manner.

Today there are more than 12,000 LEED-certified buildings in the U.S., and every day one and a half million additional square feet of commercial real estate are certified as complete projects. That is the equivalent of certifying about three Empire State Buildings every week.

This tremendous demand for LEED is driven by the business case. The scale of this is not explicable in any other way than as being a market-based phenomenon. High-performing LEED-certified buildings save money and deliver higher profit margins. Iconic companies such as Coca-Cola, Home Depot, Procter and Gamble, just to name a few, rely on LEED certification to manage costs, increase their product performance and their bottom line. For the same reason, nearly half of the Fortune 100 uses LEED certification.

Governments, like businesses, are eager to find ways to implement the LEED standard and the best practices it reflects but they do it because they want to save taxpayer money. The Federal Government is the largest single user of energy in the U.S., and several federal agencies have embraced LEED to minimize waste. For example, in 2011, the Pacific Northwest Lab found GSA LEED-certified buildings reduced energy use compared to the national average by 25 percent. These high-performance buildings reduced operational costs by 19 percent when compared to the national average. Recently, the Treasury Building just down the street underwent an historic preservation retrofit, in the process achieving a LEED Gold Standard. The energy and water conservation elements of that LEED project save taxpayer dollars in the amount of $3.5 million every single year.

In conclusion, LEED saves energy, water, natural resources and jobs, and as a U.S. citizen, to me, that means LEED is saving taxpayer dollars.

I look forward to answering your question.

[The prepared statement of Mr. Platt follows:]

STATEMENT OF ROGER PLATT, SENIOR VICE PRESIDENT OF GLOBAL POLICY AND LAW, USGBC

BEFORE
THE HOUSE SCIENCE, SPACE AND TECHNOLOGY COMMITTEE's SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT:

THE SCIENCE BEHIND GREEN BUILDING RATING SYSTEMS

Tuesday, May 8, 2012

On behalf of the U.S. Green Building Council, our nearly 13,000 organizational members and more than 75 local chapters, I would like to thank Chairman Broun and Ranking Member Tonko for the opportunity to testify today. My name is Roger Platt and I am the Senior Vice President of Global Policy and Law at USGBC.

We commend the Committee for its leadership in convening this important hearing to learn more about the science underlying green building rating systems.

USGBC is a nonprofit membership organization whose vision is a sustainable built environment. One of the ways we support this mission is through our LEED Green Building Rating System, a voluntary certification program that can be used with any building type and at any phase in the building lifecycle.

LEED-certified buildings have become an essential component of any sound business strategy for property owners. High-performing LEED-certified buildings save money and deliver higher profit margins by reducing energy and operating costs. Some of America's most admired and iconic companies – Pepsi-Cola, General Electric, Google, Target, Marriott, McDonalds, Apple and Procter and Gamble – rely on LEED certification to increase their bottom line and their brand value.

My testimony will focus on three areas: 1) How the private sector developed LEED; 2) The market-driven business case for LEED; and 3) How government adoption of LEED is saving millions of dollars every year.

Private Sector Development of LEED

Private sector leaders and building professionals established LEED in 2000 and it has quickly become the most successful voluntary, private, market-driven real estate program in the country. The formula underlying LEED's 100-point rating system is developed in an open, consensus-based process among stakeholders and technical experts. Final approval of changes to the developed system is made by USGBC membership.

LEED provides a measurable, private sector consensus definition of **L**eadership in **E**nergy and **E**nvironmental **D**esign to the building community. It is the chief tool USGBC employs in its mission of market transformation. LEED challenges market leaders to meet high standards, builds momentum for best practices and moves the whole of the market forward as those best practices are mainstreamed by market forces.

Since its initial public launch in 2001, LEED has continuously raised the bar. USGBC released rating systems for the operations and maintenance and commercial interiors markets in 2006, for the schools sector in 2007 and for the residential market in 2008. These programs have had great success in the private marketplace. To date more than 12,300 commercial projects and over 19,000 residential units have achieved LEED certification.[1] Of the certified commercial buildings, 6% are federal government projects.[2] The newest version of the rating system, LEED 2012, is currently in development and is scheduled for release at the end of the year.

The hallmarks of the LEED development process are openness, transparency and consensus. LEED is developed by balanced and diverse technical committees composed of USGBC members. Any changes to the LEED standard must be approved through a democratic balloting process open to all USGBC members. While many of our systems rely on government tools such as ENERGY STAR, private sector leaders, relying on expert technical advice, ultimately set the criteria for LEED.

USGBC relies on expert committees to provide a consistent source of sound advice and subject matter expertise. The committees ensure the integrity of LEED is grounded on technical considerations of the highest quality. To date, technical experts from across the building industry have donated more than 25,000 hours on the development of the newly proposed LEED rating system and each public comment (now over 20,000 in number) is responded to

[1] LEED project data
[2] Ibid.

individually and is available online.[3] We expect further refinement with an additional public comment period opening in May.

Details about the LEED development process are publicly available on the USGBC Web site, www.usgbc.org, in the "LEED Foundations Documents," which describe the consensus process with great specificity.

The Business Case for LEED

LEED saves money and increases the bottom line for business. The economic benefits of LEED certification – reduced energy and operating costs – are well known. A recent independent study of PNC's bank branches by the University of Notre Dame found that the annual utilities cost per employee in their LEED facilities was $675.26 lower than in non-green facilities.[4] In addition, and more generally, LEED-certified buildings have been proven to generate higher rents, have a greater resale value, offer faster lease-up and retain higher occupancy rates. It is results like these that make it easy to see why nearly half of the Fortune 100 companies use LEED certification to increase their brand value and their bottom line, all the while preserving natural resources.

Contrary to the opinion of some, LEED-certified buildings do not have to cost more than a conventional building. The high-performance building market has reached a state of maturity. At LEED's inception in 2000, a high-performance building premium did exist, but as LEED has achieved widespread adoption, the premium has all but disappeared.

LEED Saves Taxpayers Money

LEED saves U.S. taxpayers money just as it does private developers. The federal government is the largest user of energy in the United States. And just like other large building owners, the federal government seeks ways to reduce and eliminate energy waste. As responsible stewards of taxpayer money, the Congress and the Administration have sought opportunities to reduce energy use, and taxpayer waste, in the federal building portfolio.

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[3] DIVE INTO 2012 available at: http://www.usgbc.org/DisplayPage.aspx?CMSPageID=2360

[4] Conlon, E. and Glavas, A. (2012). The Relationship Between Corporate Sustainability and Firm Financial Performance. Accessed March 27, 2012 via business.nd.edu/uploadedFiles/Conlon%20and%20Glavas%202012.pdf

The federal government has completed 797 certified LEED projects representing over 80 million square feet of real estate.

Some notable LEED success stories from the public sector include:

> ***Department of Treasury Headquarters, Washington, D.C.***: The 19th-century U.S. Treasury Building – a National Historic Landmark neighboring the White House – was awarded LEED Gold certification in September 2011. The certification is expected to yield energy savings to taxpayers of more than $3.5 million every year while reducing potable water use by 43 percent, and adding 164 additional workstations in the building (offsetting leased space costs).[5]
>
> ***FBI Regional Building, Chicago, IL:*** Developed by USAA Real Estate Company and occupied by the FBI, the buildings increased its ENERGY STAR rating from a highly efficient score of 78 to an exceptional score of 95 (out of 100), meaning the building is operating in the top five percent of the market in terms of energy efficiency.[6]
>
> ***Potomac Yards, Arlington, VA:*** The Potomac Yards federal complex has twice earned LEED Gold certification – once under LEED for New Construction, and in 2008 under LEED for Existing Buildings. The building, which earned an ENERGY STAR label in 2007, also achieved a verified 41 percent reduction in water use.[7]

GSA has recently launched a new building portfolio management system, designed to benchmark performance in sustainable building operations across its portfolio. The system is the backbone of GSA's application to the LEED Volume Program for Operations & Maintenance, a

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[5] "At Treasury, Green is Our Favorite Color – But We'll Take (LEED) Gold!" by Dan Tangherlini. Available at: http://www.treasury.gov/connect/blog/Pages/At-Treasury-Green-is-Our-Favorite-Color-But-Well-Take-LEED-Gold.aspx

[6] "FBI Chicago Regional Office Transforms into Intelligent Building for Environmental Efficiency and Sustainability." Available at: http://www.cisco.com/web/strategy/docs/gov/fbiChicago_cStudy.pdf

[7] "Arlington, Virginia - Potomac Yard." Available at: http://www.epa.gov/oaintrnt/facilities/hq_nova.htm

program through which GSA intends to certify 50 buildings by the end of 2012.[8] According to the General Services Administration, this process allows them to save time and taxpayer resources on verifying energy and water performance.[9]

Private sector leadership is changing the way government thinks about high-performance buildings. Everyday 1.5 million square feet of real estate is certified under the suite of LEED rating systems[10], more than 75% is in the private sector.[11]

Governments that have embraced LEED have seen significant savings for taxpayers. Studies have demonstrated that LEED saves money.[12] Just as research in the private sector has demonstrated that using LEED is a wise investment for businesses large and small, the work of the national labs conclusively demonstrated that using the LEED rating system saved taxpayers money. In 2011 a Pacific Northwest National Lab (PNNL) study found GSA LEED buildings to have 25 percent lower energy use compared to the national average. These high-performing buildings reduced operational costs by 19 percent compared to the national average. LEED Gold buildings were singled out as being particularly high performers.[13]

That research built on the study that PNNL performed in 2006, evaluating the applicability, stability, objectivity and availability of five different sustainable building rating systems.[14] The study concluded that LEED "continues to be the most appropriate and credible sustainable building rating system available for evaluation of GSA projects."[15] In particular, GSA noted that

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[8] "Like TurboTax for LEED" - GSA Launches Building Portfolio Management System. Available at: http://www.constructiondive.com/story/like-turbotax-for-leed-gsa-launches-building-portfolio-management-syste/
[9] Ibid.
[10] LEED project data
[11] Ibid.
[12] McGraw Hill Construction (2010). Green Outlook 2011: Green Trends Driving Growth.; Conlon, E. and Glavas, A. (2012). The Relationship Between Corporate Sustainability and Firm Financial Performance. Accessed March 27, 2012 via business.nd.edu/uploadedFiles/Conlon%20and%20Glavas%202012.pdf.
[13] Green Building Performance a Post Occupancy Evaluation of 22 Buildings available at: http://www.gsa.gov/graphics/pbs/Green_Building_Performance.pdf
[14] Pacific Northwest National Laboratory (operated for the U.S. Department of Energy by Battelle), *Sustainable Building Rating Systems Summary (*July 2006), completed for General Services Administration under Contract DE-AC05-76RL061830, *available at https://www.usgbc.org/ShowFile.aspx?DocumentID=1915.*
[15] Letter dated Sept. 15, 2006 from GSA Administrator Lurita Doan to Sen. Christopher Bond, Chairman, Subcommittee on Transportation, Treasury, the Judiciary, HUD, and Related Agencies, Committee on Appropriations (accompanying report), *available at https://www.usgbc.org/ShowFile.aspx?DocumentID=1916; see also* Pacific Northwest National Laboratory (operated for the U.S. Department of Energy by Battelle), *Sustainable*

LEED "[is] applicable to all GSA project types; [it] ranks the quantifiable aspects of sustainable design and building performance; [is] verified by trained professionals; [has] a well-defined system for incorporating updates; and [is] the most widely used rating system in the U.S. market."[16]

We are also pleased that the PNNL review of Green Building Certification System[17] released on Friday showed that LEED matched more than any rating system (96 percent), of the performance requirements set out by the federal government[18]. We look forward to providing further input to this Committee, GSA, the national labs and other stakeholders, as they review rating systems per the requirements of the Energy Independence and Security Act of 2007.

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*Building Rating Systems Summary (*July 2006), completed for General Services Administration under Contract DE-AC05-76RL061830, *available at https://www.usgbc.org/ShowFile.aspx?DocumentID=1915.*

[16] Letter dated Sept. 15, 2006 from GSA Administrator Lurita Doan to Sen. Christopher Bond, Chairman, Subcommittee on Transportation, Treasury, the Judiciary, HUD, and Related Agencies, Committee on Appropriations (accompanying report), *available at https://www.usgbc.org/ShowFile.aspx?DocumentID=1916.*

[17] Green Building Certification System Review available at: http://www.gsa.gov/graphics/ogp/Cert_Sys_Review.pdf

[18] Johnson, Lacey (2012) "GSA releases an evaluation of green certification systems" accessed May 3rd via http://www.eenews.net/

Chairman BROUN. Thank you, Mr. Platt. I appreciate you keeping it within five minutes, too.

Dr. Scofield, you are recognized for five minutes.

STATEMENT OF DR. JOHN SCOFIELD, PROFESSOR OF PHYSICS, OBERLIN COLLEGE

Dr. SCOFIELD. Good morning. My name is John Scofield. I am a Professor of Physics at Oberlin College and a member of the American Physical Society. For the last two decades, I have written about various aspects of renewable energy and green buildings including two peer-reviewed articles which address energy consumption by LEED-certified new commercial buildings. It is on this topic that I am here to speak to you today. The comments I offer are mine alone and do not necessarily reflect the views of Oberlin College or the American Physical Society.

There are many features that characterize a green building, but none are more important than energy: energy consumed during construction, energy embodied in the building and energy used to operate the building. Studies have shown that over the lifetime of a building, the energy used for operation dominates these other forms. This is particularly true for federal buildings because they last so long. So the paramount goal of any green building standard, in my opinion, must be to significantly reduce the total primary energy consumption.

So do green-certified buildings save energy? There are many examples of those that do but others do not. The question really is this: are there convincing, credible scientific data showing that certified green buildings collectively use less primary energy than other buildings. It is really similar to asking the same question about certifying a drug for use. And the answer to this question is no, there are not such credible data. Without this scientific justification, green building certification remains nothing more and nothing less than an herbal remedy. Individuals surely have the right to doubt such remedies, but the Federal Government should not mandate them or pay for them with my tax dollars.

The problem with the science behind green building certification is twofold. First, there is a woeful lack of credible metered energy data for green or so-called high-performance buildings. Energy data are the private property of the building owner. Having already benefited from the positive publicity of the green label, they have little to gain and much to lose in making energy consumption data public. In many cases, energy flows are not even measured. And when energy data are volunteered by owners, there is no doubt there is a tendency to provide selective data that put the best light on the building's performance. So-called case studies published for high-performance buildings are frequently little more than well-packaged marketing literature often presenting energy simulations rather than metered energy data. And studies have shown there to be little correlation between such simulations and measured building energy consumption.

The second problem is simply the quality of scientific studies. Most consider only a small set of buildings that are hand-picked so

are not representative of the larger population. Moreover, such studies are frequently performed as contract work without real peer review. The results of such studies are greatly shaped by the choice of the contractor. I am aware of only one comprehensive study of energy consumption for a large group of green-certified buildings. This was a study performed by the New Buildings Institute in 2007 under contract with the U.S. Green Building Council. NBI, the New Buildings Institute, looked at energy consumed by commercial buildings certified under LEED new construction version II, and one of the main conclusions drawn by NBI was that, and I quote, "average LEED energy use was 25 to 30 percent better than the national average." This report immediately drew criticism for its conclusion and methodology. Concerning this, an energy study committee constituted by the American Physical Society wrote: "Whatever their efficiency, these LEED buildings consume more total energy per square foot either site or primary than the average for the entire commercial building stock."

Cathy Turner, the lead author of the NBI study, made a summary version of their data available for independent analysis. I have analyzed these data and identified key flaws in NBI's methodology, and after correcting for these flaws, I found that LEED buildings consume about the same amount of primary energy as do comparable non-LEED buildings. LEED buildings in this study were statistically no better or no worse with regard to primary energy. And the same can be said about greenhouse gas emissions as primary energy correlates strongly with carbon emission. My study was published as a peer-reviewed paper in the 2009 International Energy Program Evaluation Conference. Cathy Turner, co-author of the NBI study, was one of the reviewers of my paper.

In conclusion, while green building certification has become popular and has succeeded in creating the image of energy efficiency in building, I am aware of no credible scientific study that demonstrates the efficacy of green building certification in reducing measured primary energy for the entire collection of buildings, or I should say, on average.

Thank you for your attention. I look forward to answering any questions you may have to the best of my ability.

[The prepared statement of Dr. Scofield follows:]

Written testimony to the U.S. House of Representatives
House Committee on Science, Space and Technology
Subcommittee on Investigations and Oversight

The Science Behind Green Building Rating Systems

10:00 AM, Tuesday May 8, 2012
Rayburn House Office Building, Room 2318

by

Dr. John H. Scofield
Professor of Physics
Oberlin College

Good morning. My name is John Scofield. I am a professor of Physics at *Oberlin College* and a member of the *American Physical Society* (APS). For the last 20 years I have conducted research and published peer-reviewed articles on solar cells, photovoltaic arrays, wind energy, energy efficiency, and green buildings. In 2007-8 I served as one of two staff for the APS *Energy Efficiency Study Committee* and was a contributing author to its final report, *Energy Future, Think Efficiency*. I have written two peer-reviewed articles which address energy consumption by LEED-certified commercial buildings, and it is on this topic that I am here to speak to you today. The comments I offer the Committee are mine alone and do not necessarily reflect the views of *Oberlin College* or the *American Physical Society*.

In 2000 the *US Green Building Council* (USGBC) introduced the *Leadership in Energy and Environmental Design* building rating system known as LEED. While this is just one of several systems for rating "green buildings" it has rapidly emerged as the most popular. It is commonly assumed that a LEED building is an energy-efficient building – though until 2007 there were relatively little data to back this up. In 2007 the USGBC commissioned the *New Buildings Institute* (NBI) to gather energy consumption data from LEED-certified commercial buildings and determine if, indeed, LEED buildings were using less energy than other buildings. In March 2008 NBI released its final report in which it concluded:

> "*...on average, LEED buildings are delivering anticipated savings. Each of three views of building performance show average LEED energy use 25-30% better than the national average, a level similar to that anticipated by LEED modeling.*" [Turner & Frankel]

The NBI study and its conclusions have been widely disseminated by the USGBC and serve as the scientific basis for its claims that LEED-certification results in lower energy consumption and lower green house gas emission [USGBC, Watson].

With its publication the NBI study immediately drew criticism. New York contractor Henry Gifford criticized the study on two counts. The first was that the LEED data were self-selected, volunteered by building owners willing to share their data, and therefore not representative of all LEED certified buildings. He likened this to a voluntary (alcohol) breathalyzer test set up alongside the highway. Second, Gifford criticized NBI for comparing the **median** energy intensity of LEED buildings with the **mean** for all commercial buildings. Gifford further asserted that the mean energy intensity for the LEED buildings in the NBI study was actually 29% higher than the corresponding mean for all U.S. commercial buildings. [Gifford]. The USGBC and others discounted Gifford's criticisms because it was not vetted through the peer-review process.

In 2008 the APS *Energy Efficiency Study Committee* confirmed one of Gifford's assertions by writing, "Whatever their efficiency, these 121 LEED buildings consume more total energy per square foot (either site or primary) than the average for the entire commercial building stock." [Richter et al.].

Cathy Turner, the lead author of the NBI study, made a summary version of the NBI LEED data available for independent analysis.

I have analyzed these data and identified key flaws in NBI's methodology. After correcting for these flaws I found that LEED buildings consume about the same amount of primary energy as to comparable, non-LEED buildings. LEED buildings are statistically no better and no worse. The same can be said about green house gas emission, since primary energy correlates strongly with carbon emission. My study was published in a peer-reviewed paper at the 2009 *International Energy Program Evaluation Conference* (IEPEC). Cathy Turner, co-author of the NBI study, was one of the reviewers of my paper [Scofield-1]. The paper may be obtained on the web at
http://www.oberlin.edu/physics/Scofield/pdf_files/Scofield%20IEPEC%20paper.pdf.

About the same time a Canadian group published their analysis of the NBI LEED data in the journal *Energy and Buildings*, supporting, but clarifying, the conclusion reached earlier by NBI [Newsham]. Upon reading that paper I immediately recognized the Canadian group had made mistakes similar to those made by NBI. I quickly wrote a follow up paper correcting their analysis, and again reached the conclusion that LEED-certification was not yielding any significant reduction in primary energy consumption. My rebuttal paper was submitted to *Energy and Buildings* and published in record time [Scofield-2].

To summarize this portion of my testimony, my analysis of the LEED building energy consumption data gathered by NBI shows that LEED-certified commercial buildings use about the same amount of primary energy as their conventional counterparts. And keep in mind Gifford's criticism, that the buildings included in the NBI study are probably more efficient than the 80% of the LEED-certified buildings for which NBI was not able to collect energy data. I am not aware of any other comprehensive study of energy consumption by LEED-certified commercial buildings, or buildings certified by any other green building rating system, for that matter.

Inasmuch as buildings are responsible for roughly 40% of US primary energy consumption and associated GHG emission this has important policy implications. All strategies for reducing our nation's GHG emission start with improving building efficiency. LEED certification has not been useful at reducing building primary energy consumption and, by inference, GHG emission associated with building operation. There may be many green benefits from LEED certification – but reduction of primary energy consumption for building operation is not one of them. Studies have shown that, over the lifetime of a building, energy used for operating the building dominates – far exceeding the embodied energy of construction [Dimoudi & Tompa]. **There then appears to be no scientific basis for institutions such as colleges, universities, or the Federal Government to require LEED certification as a GHG or energy reduction strategy for its buildings.**

This largely concludes the central message of my testimony. I would like to take this opportunity to further address two related questions: (1) why is it that LEED certification has not achieved significant reductions in primary energy consumption for buildings, and (2) what advice so I have for selecting a green building rating system for Federal buildings to move our nation towards its goal of 30% reduction in building energy consumption?

First, let me address the shortcomings of LEED. To borrow a metaphor, building energy efficiency is a stool supported by three legs: (1) design, (2) construction, and (3) operation and maintenance. The "D" in LEED is for design – the acronym includes no letters for the other two legs, and they are not sufficiently addressed by LEED. Moreover, LEED certification is contingent upon accumulating a certain number of points awarded for a checklist of "green" measures that are included in the building design ranging from trivialities such as bike racks, employee showers, and parking spaces designated for efficient cars, to potentially more substantive points for demonstrating an energy-efficient design. Energy efficiency points, however, are based on how much lower projected energy consumption is as compared with projections for a baseline case – the baseline case being a conventional design selected by the architect that meets building codes (that is a building that if it were any worse, would be illegal). One might expect that baseline energy consumption for similar buildings is a well-defined number. That is not what NBI found in its study. NBI found that baseline energy consumption put forward by LEED designers of similar buildings varied by as much as 400%! In short, designers can "game" the system simply by constructing a very inefficient baseline case (one no one would actually build) to which their design is to be compared. The LEED rating is achieved before the building is ever occupied and is not contingent upon achieving any measured energy performance target.

In addition, studies have shown there to be little or no correlation between energy projections made by the design team and actual energy consumption once the building is constructed and occupied [Johnson]. For instance, in their study, NBI found no correlation between the number of energy efficiency points awarded by LEED and measured energy consumption. If your goal is to lower measured energy consumption then you should focus on that, not a hypothetical projection of energy consumption calculated before the building is even constructed based upon untested assumptions regarding building occupancy and usage.

It is my experience that what LEED designers deliver is what most LEED building owners want – namely, green publicity, not energy savings. Long before the building is occupied LEED building owners reap enormous green publicity from so-called news articles that are nothing more than press releases that list the many benefits of the intended building along with the architect's optimistic energy projections. After the building is occupied the owner has little to gain – and much to lose – by measuring and publicly reporting the energy consumption. It is no accident that nearly 80% of the owners of LEED-certified commercial buildings eligible for the NBI study were unable or unwilling to provide metered energy data for their buildings. No doubt Henry Gifford is right when he supposes the LEED buildings studied by NBI are not representative of the larger LEED building population.

This lack of credible metered building energy data is bigger than just LEED – it applies generally to *High Performance Buildings*. The U.S. Department of Energy (DOE) website hosts a High Performance Buildings database that includes data for a mere 129 buildings. Compare this to the thousands of commercial buildings now certified by LEED. Data for these 129 buildings are submitted by building owners or their representatives without independent validation, and the vast majority of these do not include metered data, but rather, design projections. Similarly the DOE hosts a Zero Energy Buildings (ZEB) database which lists only nine commercial buildings – reporting metered data for only four of them. One of the four is my own institution's *Adam Joseph Lewis Center*. Since its inception this building has been described by its architect as a ZEB, it has been listed as such on the DOE's web site, and it is included in the recent ZEB study released by NBI [New Buildings Institute]. Yet utility meters show this building has been a net-energy importer for each of its 11 years of occupancy. There is a huge gap between green building mythology and scientifically demonstrated performance.

It seems that the high performance building community prefers to play "fantasy football" to the real game on the field. But physics trumps politics – our nation's energy expenditures, green house gas emissions and primary energy consumption continue to rise.

Finally, what advice do I give the Subcommittee as it considers adopting some green rating standard for Federal Buildings?

Buildings last a long time – often more than 100 years, particularly in the case of Federal buildings. Studies have found that the energy used to operate a building over its lifetime is much greater than the energy used in its construction. There is no single characteristic more important for a green building than the lowering its annual energy consumption. Numerous studies, including the 2008 APS Energy Efficiency Study, have concluded that cost effective deployment of energy efficient technologies can significantly lower energy consumption both for new and existing buildings. Clearly all building owners, and in particular, the Federal Government, should seek maximal, cost-effective deployment of building energy efficient technologies. These will lower operating costs, save natural resources, and lower green house gas emissions.

But green building rating systems, in my opinion, are not moving this nation towards these important goals. They are, instead, a distraction, tapping our time and financial resources while yielding little documented reduction in the only metrics that matter. I am not aware of any comprehensive study that uses credible metered energy data for a large number of buildings to demonstrate the effectiveness of any green building rating system at reducing primary energy consumption. As I have already pointed out you can't even get the metered data to compare the results of various green building designs. What frequently passes for building science are so-called "case studies" that are nothing more than marketing brochures written to put the best spin possible on a particular building design and its design team. Many lack metered data making it impossible to compare the results of different designs.

The Federal government would not require or fund wide-spread use of a drug without scientific research that demonstrates its efficacy. Data from a few, hand-selected cases would not suffice. The standards are clear. Similarly the Federal government should not require or spend my tax dollars on green building certification absent scientific proof that these measures have achieved significant reduction in primary energy consumption. Individuals who suffer from arthritis may choose to wear copper bracelets – but the government should not mandate or fund such unsupported remedies.

The closest thing to a scientifically-based green building rating system of which I am aware is the *Energy Star* building score. It isn't very sexy, but it is based upon 1) metered energy data, 2) primary (or source) energy consumption, and 3) requires data validation by a third party. What I would like to see is a green building rating system that combines the sex appeal of LEED with the substance of Energy Star and, of course, has scientifically demonstrated success before any consideration of a mandate.

At night I occasionally scan through my cable-TV channels and run across an "infomercial" for the latest and greatest "weight-loss" program. Americans spend tremendous amounts of money on such programs chasing the promise of lean sexy bodies with little effort or time. And yet we remain a nation of obesity. The science of weight loss is pretty simple – a lower, long-term caloric intake combined with regular exercise. The recipe doesn't yield rapid results – but it yields real, sustainable results. Similarly we know how to make our buildings more energy efficient. We need to stop chasing the energy infomercials.

Thank you for your attention. I look forward to answering any questions you may have to the best of my ability.

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Chairman BROUN. Thank you, Professor. I appreciate your testimony.

Now, is it Olgyay? Is that how it is pronounced?

Mr. OLGYAY. Olgyay, please.

Chairman BROUN. Olgyay. Okay. Very good. Mr. Olgyay, you are recognized for five minutes.

STATEMENT OF MR. VICTOR OLGYAY,
PRINCIPAL ARCHITECT,
BUILT ENVIRONMENT TEAM,
ROCKY MOUNTAIN INSTITUTE

Mr. OLGYAY. Thank you, Chairman Broun and Members of the Subcommittee on Investigation and Oversight. I appreciate the opportunity to provide this testimony on the importance of fossil fuel reduction targets and green building rating systems.

I lead the retrofit initiative at Rocky Mountain Institute, RMI, an entrepreneurial nonprofit that has 30 years of experience in addressing energy issues with the major focus on buildings. We provide research and consult with private and public entities and particularly service providers to provide dramatically more efficient buildings than the typical. We seek to find profitable business-led solutions that will help transition the United States to a more verdant, prosperous and secure future.

Highly efficient buildings are a crucial element of that future, and we have directly observed the impact that aggressive federal goals like EISA have made in inspiring people across the country to increase the efficiency of our built environment. We found them effective, practical and a good investment.

RMI's analysis presented in our recent book "Reinventing Fire" conservatively identified $1.8 trillion in current value achievable through cumulative building energy savings for the United States as a whole captured with only a total outlay of about $400 billion over the next 40 years.

Investing in energy efficiency is a win-win situation. A federal agency gets infrastructure improvements, improved reliability, diversity, energy security and, of course, energy cost savings. The Treasury achieves deeper savings, controls energy costs. The environment benefits and Americans are put to work. It really is good for business.

We also find that EISA's 433 section targets are being met. These targets score frequent and ambitious energy-saving projects that are practical and accelerate investments in new technology. RMI has guided many projects using EISA criteria when designing highly efficient new buildings, net-zero buildings as well as retrofits of existing buildings. A recent example is the Byron Rogers Federal Building in Denver, a deep energy fit of a 1965 building which will show about a 70 percent improvement in its energy use. It offers a net present value of about $556,000 to the GSA as compared to a traditional building design. It is a clear path to net zero by 2030, and when it is complete, it will be one of the most efficient buildings in the country. Again, this is just good business. It would be a problem if we didn't do these kinds of things.

Completed in 2010, the National Renewable Energy Laboratory's Research Support Facility is a net-zero energy building built to comply with EISA. Its construction cost, design and so forth are in line with other buildings in Colorado. A PV system, photovoltaic solar energy system is paid for through a power purchase agreement at no extra cost to NREL, and this building is extensively documented and monitored so there is lots of information there.

In the private sector, we also see EISA as being really important. We recently worked with the International Monetary Fund headquarters here in DC. They used EISA goals as their framework for guiding their design and found opportunities for about a 60 percent energy reduction and cost optimized 50 percent energy reduction. We will see where that comes out.

And of course, you may have heard of the Empire State Building, which we worked on, and that has been completed. It is currently providing about a 38 percent energy savings in energy improvements and also should have a payback of about three years, a little over three years. It also, even more importantly than that, than the energy savings, it has increased the value of that building so it is now something that more people desire, both the tenants and the owner, and this is really one of the hidden things in all of these things that what we haven't been talking about. The payback is oftentimes much more than just energy.

So the technical goals outlined in EISA 433 are in line with many long-term targets that have been adopted by the building industry such as the Architecture 2030 Challenge adopted by the AIA and ASHRAE, amongst others, and there are more stringent standards as well—the Living Building Challenge, which was also evaluated by the GSA, and California's CPUC, which requires residential construction to be net zero by 2020. And all of the codes that are linked to these ASHRAE standards, which are also going to net zero by 2030, private-sector standards have codes linked to them as well. So it is really—it is becoming the norm. It is really not extraordinary at all.

And I would also commend EISA in providing for building owners the idea of using time to coordinate investment and increase the cost-effectiveness of implementation. Existing technology, services and resources such as natural gas, power purchase agreements, energy service performance contracts, gradient cooling technology, they work now and they are part of the roadmap. They shouldn't be excluded. But the key here is strategic planning. What we want to do is capitalize on changes in occupancy to effectively trigger energy savings.

I would just like to end by saying that we strongly support the continuation of the existing *Energy Independence and Security Act* sections 433 and 436. The science and practice supporting EISA is effective and good business. Thank you for letting me testify.

[The prepared statement of Mr. Olgyay follows:]

May 8th, 2012

Testimony of Victor Olgyay

Principal, Built Environment

Rocky Mountain Institute

House Subcommittee on Energy and Environment

Hearing on

"The Science Behind Green Building Rating Systems"

Introduction

Chairman Brown and Members of the Subcommittee on Investigation and Oversight and, thank you very much for the opportunity to offer testimony on the impact and importance of fossil-fuel reduction targets and green building rating systems. My name is Victor Olgyay, and I lead the RetroFit Initiative at Rocky Mountain Institute (RMI), an entrepreneurial think-and-do tank that has 30 years of experience in problem-solving in energy, with a major and long-running focus on the new and existing commercial building sectors. We provide research to, and consult with, both private and public (federal, state and municipal) entities and particularly ESCO's and service providers to produce radically more efficient buildings.

RMI supports the continuation of existing Energy Independence and Security Act of 2007 (EISA) Sections 433 and 436. In this testimony, I would like to describe our position, and share our views on federal building efficiency targets and green building rating systems. First, let me outline why this is so important; then I will detail 5 key points based on our hands-on experience in this business.

Why addressing building energy use (and having government be a leader) is urgent:

Buildings in the U.S. use 40 percent of the nation's primary energy, more than any other sector in the country, and more than any other entire nation on earth with the exception of China and the U.S.. If America's buildings were a country, they'd rank third, after China and the U.S. The nation's total building square footage is also projected to grow by 28 percent between now and 2030, and in that time frame roughly sixty percent of all buildings will either be newly constructed or undergo renovation. The way those projects are done – and how well they perform – will thus shape America's energy footprint. Therefore, in our view, those buildings are not a liability; they are an opportunity. RMI's analysis, presented in our recent book *Reinventing Fire conservatively* identified $1.8 trillion in current value via achievable cumulative building energy savings for the US as a whole, captured with a total outlay of $400 billion over the next forty years. The employment impacts of this investment are also remarkable, because the work is inherently local and cannot be exported.

Others' work supports this conclusion. A recent [1] research study by the Rockefeller Foundation and DB Climate Change Advisors examines the potential size and investment opportunity of energy-efficient retrofits in U.S. real estate. The report states, "In the United States alone, more than $279 billion could be invested across the residential, commercial, and institutional market segments. This investment could yield more than $1 trillion of energy savings over 10 years, equivalent to savings of approximately 30 percent of the annual electricity spent in the United States. If all of these retrofits were undertaken, more than 3.3 million cumulative job years of employment could be created." These findings show that investing in energy-efficiency is a win-win situation for all parties involved. The

[1] http://www.rockefellerfoundation.org/news/publications/united-states-building-energy-efficiency

federal agency gets infrastructure improvements, improved reliability, diversity, security and energy cost savings. The energy service company sells more products. The Treasury achieves deeper savings and controls energy costs. The environment benefits from reduced carbon emissions. Americans are put to work. We will demonstrate how EISA 2008 Sec. 433 rules accelerate the realization of this opportunity, and emphasize durable and thorough projects that include long-term energy plans.

Benefits of retaining and enforcing EISA 2007 standards:

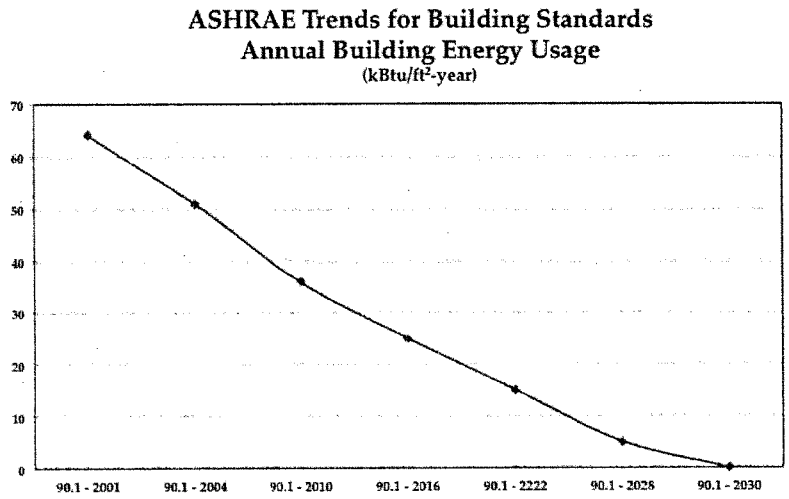
1. The standards are challenging but can be met. Other "cream-skimming" shallow efforts create less value

Over the years, RMI has guided projects designing highly efficient new buildings, including net zero buildings, as well as deep energy retrofits for a variety of existing building types. These buildings work very well, and those done for the Federal government can meet EISA criteria. A recent example is the Byron Rogers Federal Building in Denver. Funded by ARRA, this historic, poorly oriented center city high rise will, when renovated, be one of the most efficient office buildings in the country! Byron Rogers, by the way, was redesigned with a clear path to net zero by 2030 in keeping with EISA. Success does require care in project selection and execution process, of course. But such care simply makes economic sense – and avoids the sort of shallow retrofit that must be redone, again and again over the years, costing money and destroying value.

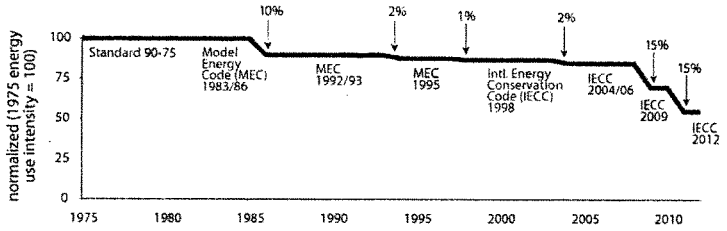
2. The EISA standards help support increasingly stringent private industry standards

The technical goals outlined in EISA 433 are in line with long-term targets that have now been generally adopted by the building industry. For example, the EISA 433 targets match the energy performance targets outlined by the Architecture 2030

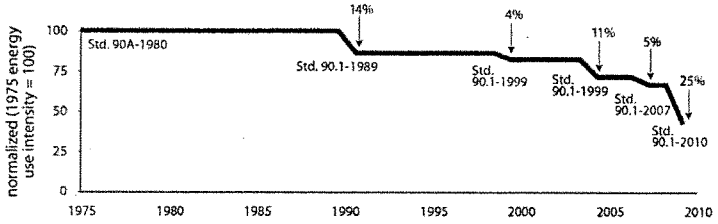
Challenge, a widely used standard in the private sector, which result in 100 percent fossil fuel reductions for all new buildings and major renovations by 2030. Numerous major professional organizations have adopted the 2030 Challenge, including the American Institute of Architects (AIA), the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), the American Society of Interior Designers (ASID), the U.S. Green Building Council (USGBC). Major architecture and engineering firms have also signed on to the 2030 Challenge, as well as many local and state governments, and organizations including the U.S. Conference of Mayors and the National Governors Association. Other building industry trends are following a similar trajectory. The energy standards developed by ASHRAE have becoming more and more stringent, with predictions for annual building energy use reaching zero by 2030, as shown in Figure 1. Building codes linked to them have done likewise (Figure 2).



Changes in residential building codes, 1975–2011



Changes in commercial building codes, 1975–2009



This "ratcheting up" is now the norm in the private sector. Each new version of the LEED green building rating system has required more energy reductions, making energy efficiency the priority among all sustainability categories. Yet, EISA goes above and beyond LEED in regards to energy for two reasons: 1. EISA requires aggressive energy reductions from each building's starting point, instead of just a minimum level of performance, and 2. EISA defines a strict and absolute baseline (2003 regional average commercial building usage). EISA requires specific energy savings, while LEED awards points based on comparing the building to a standard code building and the performance beyond the minimum requirement is optional.

3. Beyond rating systems, the clear **EISA goals inform and push public and private projects and industry participants to adopt higher performance levels**

On a variety of projects, RMI has experienced firsthand the impact of the EISA Sec. 433's fossil-fuel reduction targets and can definitively state that the targets spur more frequent and more ambitious energy saving projects. They are well suited to aggressive, entrepreneurial players to invest to learn and improve. Well known examples include newly built National African American Museum of History and Culture and the National Renewable Energy Laboratory's Research Support Facility, the retrofits of the previously mentioned Byron Rogers Federal Building, the IMF headquarters in Washington, , and buildings throughout all branches of the military, EISA 2007 Sec. 433 goals inspired the GSA's process for finding deep retrofits. The nation gets better and far more valuable buildings, which improve the health and productivity[2] of occupants while maximizing financial benefits for the building owner.

For the Byron Rogers building, an all-out deep energy retrofit project (70% improvement!) meant as a pilot of new approaches still offered a net present value of $556,000 to GSA, when compared to a baseline of traditional building design.. GSA also received a step by step plan to move Byron Rogers to net zero by 2030, which can now inform similar analyses on other GSA office buildings. As has been shown by the new NREL Research Support Facility, after attaining significant energy savings, it becomes far easier and more cost effective to install or contract for renewable energy to reach net zero status.

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[2] Gurtekin PhD, B., Hartkopf PhD, V., & Loftness FAIA, V. BUILDING INVESTMENT DECISION SUPPORT (BIDS). Carnegie Mellon University Center for Building Performance and Diagnostics.

Kats, G. 2010. Greening Our Built World: Costs, Benefits, and Strategies. Island Press, Inc.: Washington DC.

The New Buildings Institute recently published [3]a report on the status of net-zero energy office buildings in the U.S, finding defensible data for 60 projects that were net-zero or net-zero capable. The data showed that net-zero buildings are already feasible and achievable with current technologies for some building types. All net-zero projects aggressively reduced energy use before sizing and adding renewable systems. It is this cost effective approach to encouraging efficiency that makes EISA so remarkably useful. Setting a high bar is part of helping reshape the industry to do great things. And that is the role EISA has played.

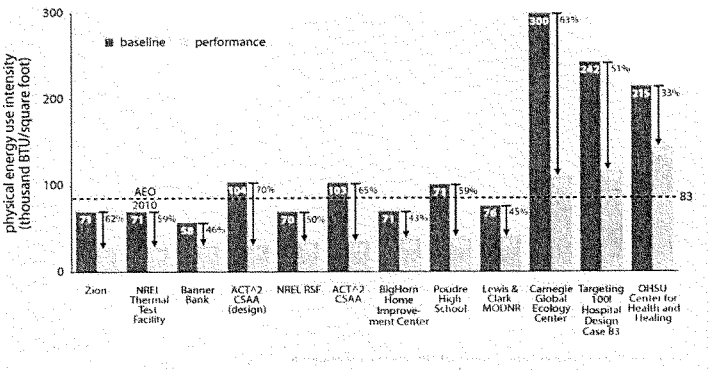
4. Aggressive but stable standards accelerate investment in technology and execution process development

The technology and design and construction practices enabling highly efficient buildings improve each year, and further solidify building efficiency as the leading path in the US economy to profitable energy-saving opportunities. According to AIA, EISA Sec. 433 goals are helping spur the development of new materials, construction techniques, and technologies to make buildings more energy efficient. And it is showing that significant energy reductions are both practical and cost-effective. Completed in 2010, one building that purposely sought to test new technologies and design-build approaches is the National Renewable Energy Laboratory's Research Support Facility in Golden, Colorado. It is a net-zero energy building, built to comply with EISA Section 433 goals. Its construction costs, including costs for the highly efficient design, are in line with other recently built large office buildings in Colorado. A rooftop and parking-garage solar photovoltaic system, sized to meet the building's tiny annual energy use, is paid for through a power purchase agreement at no extra cost to NREL. If all new federal buildings were built like NREL's research facility, the federal government would

[3] http://newbuildings.org/zero-energy

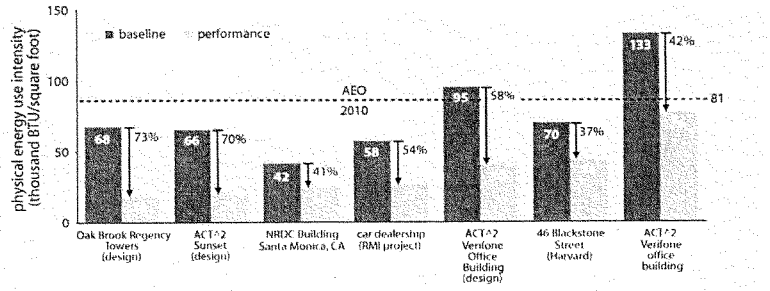
attain a significant portion of the total EISA 2007 goals.

Energy savings for integrative design cases (new commercial)



In existing buildings, where structural and logistical constraints exist, EISA regulations push project teams to not give up too easily, to strive find solutions to reach major energy reductions. In our experience such solutions usually exist. For example the plan to retrofit the International Monetary Fund headquarters – a very difficult space to work with - used EISA goals as a framework, and found opportunities for 60 percent energy reduction and a cost-optimized 50 percent energy reduction solution.

Energy savings for integrative design cases (existing commercial)



5. Stable, committed future standards help shape comprehensive and long-term energy planning, which optimizes real estate economics

Aggressive energy performance targets like the EISA Sec. 433 goal or the American Institute of Architect's 2030 Challenge are not easy to accomplish or even immediately cost-effective for all existing buildings—for instance, some large buildings in urban settings have difficulties. Efficiency efforts can be constrained by the building's orientation, geometry, and existing system configurations.. That said, 92% of the total U.S. building stock (square footage) are low-rise buildings, mostly one and two-stories in height. These buildings have large roof areas, can easily accommodate renewable energy systems, and are much easier to renovate.

RMI and others' proven success with large urban projects demonstrate that deep retrofits can work in this setting, especially with wise choice of which buildings to work on first. The clear targets that EISA creates are the linchpins in creating long-term capital plans, along with equipment replacement cycles, building envelop repairs, and interior work due to tenant changes etc. And when retrofit projects are developed as part of an overall plan of capital improvements, we find many energy savings opportunities are in fact incremental and easily paid back. Famously, this was the case with our recent project at the Empire State Building – a very difficult building. But coupling energy work with a building overhaul provided 38% savings (it actually will likely be over 40%) and payback of investment costs of just over 3 years. It also significantly impacted the value of the building in tenant's eyes. . EISA 2007 has inspired a wave of comprehensive analyses of buildings' life cycles, often revealing

profitable opportunities for prudently investing to reach high efficiency. Many of these potential projects have yet to reach their optimal timing, and many more are waiting to be the early adopters.

6. Comparison of High Performance Building Rating Systems

While there are now hosts of building certification systems, they have begun to evolve into a complementary set of standards. These systems are slowly transforming our building stock to be more energy efficient and are crucial drivers for meeting our nation's energy goals. Of these systems, LEED, Energy Star, and Green Globes have become predominant. Each offers a unique and valuable approach to evolving our building stock toward higher energy efficiency.

LEED provides a framework outlining processes and come to environmentally responsible solutions. Energy is an important piece of this framework. The LEED suite reaches out to design professionals, building owners, and operators to establish accepted processes and to determine energy efficient and other sustainably minded strategies for improving building stock through new construction and building retrofits.

The LEED system has become the most prominent of the certification systems, now segmented into many building typologies and constraints. Applicable to various parts of the retrofit process are LEED New Construction (applicable when 50 percent or more of the building is renovated), LEED Existing Buildings (applicable to buildings with relatively minor retrofits and ongoing operations and maintenance), and LEED for Commercial Interiors (applicable to major and minor tenant improvements).

LEED promotes a wide variety of strategies conducive to energy efficient design. The Energy and Atmosphere category includes commissioning; energy use monitoring; efficient design and construction; efficient appliances, systems and lighting; and the use

of renewable and clean sources of energy, generated on-site or off-site.4 Each of these approaches offers strategy as well as background info allowing building professionals to educate themselves while pursuing these measures.

While LEED focuses on the process of sustainable design and construction, Energy Star concentrates on end-use energy consumption. Energy Star is an outcome-focused certification system measuring actual energy use in existing buildings and new construction. Over 14,520 buildings have earned the Energy Star label, representing more than 2 billion square feet—1.2 billion square feet were labeled in 2010 alone.5 The label of Energy Star for buildings generally signifies that they are in the top 25 percent of the U.S. building stock. These buildings typically use about 35 percent less energy than average buildings.

Energy Star Portfolio Manager is an interactive energy management tool that allows tracking and assessing energy consumption across entire portfolios of buildings in a secure online environment. It is a key component to the Energy Star system, which allows individual buildings and portfolios to set investment priorities, identify underperforming buildings, verify efficiency improvements, and receive EPA recognition for superior energy performance. This free benchmarking software provides a relatively easy way to compare the performance of one building to its peers with similar occupant activity and climate.

Green Globes offers a more streamlined approach to certification than LEED, aiming to reduce the time and cost of producing a certification submission. It is particularly well suited for smaller, lower budget buildings, which do not have as much time or resources to apply for a certification. So far Green Globes has not gained the same market share as LEED, but for some types of projects it may be an attractive option.

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[4] http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1989
[5] http://www.energystar.gov/index.cfm?c=business.bus_energy_star_snapshot

Together these standards are creating an environment for far and wide adoption of energy efficient design in retrofits and new construction. When considering that the Energy Star label indicates a building performing in the top quarter of the US building stock, buildings currently labeled by Energy Star only represent about 10% of the total market eligible for labeling. LEED's popularity is no different—within its suite of rating systems, over 2.2 billion commercial square feet (out of roughly 80 billion total) have been certified. These systems together have shown themselves to be valuable components in the evolution toward meeting the nation's energy efficiency goals.

6. Building efficiency presents a significant financial opportunity

With EISA Sec. 433 driving public and private organizations to deeper savings, it's important to note the opportunity that energy-efficiency offers. A recent research study by the Rockefeller Foundation and DB Climate Change Advisors examines the potential size and investment opportunity of energy-efficient retrofits in U.S. real estate. The report states, "In the United States alone, more than $279 billion could be invested across the residential, commercial, and institutional market segments. This investment could yield more than $1 trillion of energy savings over 10 years, equivalent to savings of approximately 30 percent of the annual electricity spent in the United States. If all of these retrofits were undertaken, more than 3.3 million cumulative job years of employment could be created." These findings show that investing in energy-efficiency is a win-win situation for all parties involved. The federal agency gets infrastructure improvements, improved reliability, diversity, security and energy cost savings. The energy service company sells more products. The Treasury achieves deeper savings and controls energy costs. The environment benefits from reduced carbon emissions. Americans are put to work. EISA 2008 Sec. 433 rules accelerate the realization of this opportunity, and emphasize durable and thorough projects that include long-term energy plans.

7. Goals push the building industry to undertake more than incremental savings

Without aggressive goals, public and private clients will default to implementing incremental efficiency without a long-term plan for deep savings. Convincing risk-averse building owners to undertake capital intensive and delayed payback renovations of their buildings requires a convincing leader to show the way. EISA 2007 has inspired a wave of comprehensive analyses of buildings' life cycles, often revealing profitable opportunities for prudently investing to reach high efficiency.

Conclusion

Thank you for inviting us to discuss our perspective on this very important issue. We hope that our insights and experience will prove useful as you consider options for EISA Sec. 433 and 436.

In our role as an independent, non-partisan think-tank, we seek to find profitable, business-led solutions that will help transition the United States to a more verdant, prosperous, and secure future. We consider highly efficient buildings a crucial element of that better future, and have directly observed the impact that aggressive federal goals, like EISA 2007 Sec. 433 have made; inspiring people across the country to reach for groundbreaking ways to make our built environment not a liability – but an opportunity.

Thank you again for the opportunity to testify

Victor Wayne Olgyay
Principal, Buildings Practice
Rocky Mountain Institute

Chairman BROUN. Thank you, Mr. Olgyay.

Now Mr. Talbot, you are recognized for five minutes.

STATEMENT OF MR. TOM TALBOT, CEO, GLEN OAK LUMBER AND MILLING OF WISCONSIN

Mr. TALBOT. Good morning, Mr. Chairman, Ranking Member Miller and Members of the Subcommittee. My name is Tom Talbot, and I am the founder and Chief Executive Officer of Glen Oak Lumber and Milling, which operates facilities in Wisconsin, Kentucky, Pennsylvania and Georgia, and employs 190 individuals across all branches of our core business.

In addition, I serve on the Hardwood Federation's board of directors. The Hardwood Federation coordinates industry policy positions to ensure a unified voice on legislation impacting hardwood businesses. We are the largest D.C.-based hardwood industry trade association representing thousands of hardwood businesses in every state in the U.S. Companies in the hardwood industry are predominantly small family-owned businesses dependent upon a sustainable supply of healthy timber resources. Overall, the U.S. forest products industry produces about $175 billion in products annually and employs nearly 900,000 men and women in good-paying jobs. The industry meets a payroll of approximately $50 billion annually and is among the top 10 manufacturing sector employers in 47 States.

The industry plays a significant role in the U.S. economy and has experienced a significant decline in operations due to the economic downturn and housing market crash. Specifically, U.S. hardwood lumber production is down 53 percent from 2007 to 2011 with a total loss of 583,000 jobs in wood manufacturing employment.

One of the most important opportunities for the future viability of the forest products industry is recognition of wood as a true green material in green building design because of its environmental benefits. The green building market is one of the fastest-growing markets for wood products. Some even estimate the market could grow from its $7.1 billion value in 2010 to as much as $173 billion in value by 2015. Wood has played a significant role as a structural material in the United States for hundreds of years. Indeed, the USDA, the U.S. Forest Service and the environmental community all have recognized its impact. To quote U.S. Department of Agriculture Secretary Tom Vilsack from a March 2011 announcement on USDA commitment to promoting wood in any green building designs: "Wood has a vital role to play in meeting the growing demand for green building materials. Forest Service studies show that wood compares favorably to competing materials."

To truly address the environmental concerns that green building is attempting to resolve—reducing energy consumption, carbon emissions, air and water pollution—green building must use science-based systems, life cycle assessment, to evaluate building materials. LCA is a system involving a rigorous process that measures the environmental impact of a product. Scott Bowe, Professor of Wood Science and Forest Products for the University of Wisconsin, reports: "LCA has become the world standard for measuring

the environmental impact of a product's manufacture and use. It is important that the green building programs used in the United States adopt LCA as their standard measure for environmental performance."

LCA has been incorporated into the design system by some standards like Green Globes. Currently, the U.S. Green Building Council's LEED standard does not use LCA to evaluate building materials. The lack of a rigorous process to measure environmental impacts means that products that do have a lower environmental footprint, like wood products, are not promoted and encouraged. For example, a recent review of several LCA assessments by a Canadian think tank shows that substituting one cubic meter of wood for one cubic meter of other building materials such as steel, concrete or plastics, reduces CO_2 emissions by an average of 1.1 tons.

Irrespective of species, one kilogram of U.S. hardwood lumber stores the equivalent of 1.6 kilogram of carbon dioxide for as long as it is in use. Wood is the only mainstream construction material that, through sustainable management and harvest for use in long-life products, has the potential to act as a significant carbon pool, as opposed to a drain, within the structure of the building.

To ensure a level playing field for all building products—wood, steel, plastic, concrete, et cetera—the same rigorous standards for measurement of environmental performance must be adopted. This will require a shift towards the use of LCA and recognition of the importance for the development and use of environmental product declarations. LCA-based EPDs can deliver transparent, standardized information on the full environmental impact of a material or product across its entire life cycle. International standards have been developed to ensure that the information provided in EPDs is comparable and that environmental assessments are performed in the same way and yield the same results, no matter who does the analysis.

Moving forward, it is imperative that federal agencies when developing building material preferences ensure that the environmental and economic benefits are determined by embracing LCA and the future use of EPDs. We applaud the leadership of the Committee in holding this hearing and in helping to return science to green building decisions.

[The prepared statement of Mr. Talbot follows:]

Statement for the Record
Mr. Tom Talbot
Founder and Chief Executive Officer
Glen Oak Lumber & Milling
On behalf of the
Hardwood Federation

House Science, Space, & Technology Subcommittee on Investigations and Oversight
May 8th, 2012

Good Morning, Mr. Chairman, Ranking Member Miller, and members of the Subcommittee. My name is Tom Talbot and I am the founder and Chief Executive Officer of Glen Oak Lumber & Milling, which operates facilities in Wisconsin, Kentucky, Pennsylvania, and Georgia. Founded in 1979, Glen Oak prides itself on being never satisfied with the "status quo" and we regularly invest in research and development activities that can improve product quality and add more value to our industry leading brands, while maintaining a strong environmental focus. Glen Oak Lumber and Milling employs approximately 190 individuals across all branches of our core business.

In addition, I serve on the Hardwood Federation's Board of Directors. The Hardwood Federation coordinates industry policy positions to ensure a unified voice on legislation impacting hardwood businesses. We are the largest DC based hardwood industry trade association, representing thousands of hardwood businesses in every state in the U.S. Hardwood Federation and its members believe it is critical to keep American companies operating and our citizens employed by maintaining an impressive record of hardwood forest stewardship and a growing consumer demand for hardwood products. Companies in the hardwood industry are predominantly small family-owned businesses dependent upon a sustainable supply of healthy timber resources.

Overall, the U.S. Forest products industry produces about $175 billion in products annually and employs nearly 900,000 men and women in good paying jobs. The industry meets a payroll of approximately $50 billion annually and is among the top 10 manufacturing sector employers in 47 states.

The industry plays a significant role in the U.S. economy and has experienced a significant decline in operations due to the economic downturn and housing market crash. Specifically, U.S. hardwood lumber production is down 53% from 2007 to 2011 with a total loss of 583,000 jobs in wood manufacturing employment (*Hardwood Publishing Company, 2011: NAICS 321- Wood Products and NAICS 327 – Furniture & Related Products*). During this period the hardwood industry has relied mainly on the export market to keep us afloat.

One of the most important opportunities for the future viability of the forest products industry is recognition of wood as a true "green" material in green building design, because of its environmental benefits. The green building market is one of the fastest growing markets for wood products. Even in this current economy with the housing market in dire condition, the green building market is expected to continue growing. Some even estimate the market could grow from its $7.1 billion value in 2010, to as much as $173 billion in value by 2015.

Wood has played a significant role as a structural material in the United States for hundreds of years. USDA Secretary Tom Vilsack in March 2011 announced its commitment to promoting wood in any green building designs: "Wood has a vital role to play in meeting the growing demand for green building materials. Forest Service studies show that wood compares favorably to competing materials" (*USDA News Release No. 0143.11*).

There is also strong support from the conservation community applauding the Secretary's announcement. Both the environmental community and industry expressed in a joint letter their commitment to work closely with the Administration to "conserve working forests and mitigate climate change through wood products utilization in green building."

U.S. Forest Service Chief Tom Tidwell states: "Our country has the resources, the work force, and the innovative spirit to reintroduce wood products into all aspects of the next generation of buildings." In addition, Chief Tidwell remarks that "as we move forward with restoring America's forests, we are getting smarter and more efficient in how we use wood products as both an energy and green building source. Our progress in this area will also help maintain rural jobs" (*USDA, Science Supporting the Economic and Environmental Benefits of Using Wood and Wood Products in Green Building Construction, 2011*).

To truly address the environmental concerns that green building is attempting to resolve—concerns like reducing energy consumption, carbon emissions, and air and water pollution— green building must use a science based system, Life Cycle Assessment (LCA), to evaluate building materials. Systems that don't incorporate and rely on LCA for building materials are not founded in science and will not likely be accomplishing the environmental goals that the systems were intended to achieve.

LCA is a methodology involving a rigorous process that measures the environmental impact of a product. Scott Bowe, Professor of Wood Science and Forest Products for the University of Wisconsin reports: "LCA has become the methodical standard for measuring the environmental impact of a product's manufacture and use. It is important that the green building programs used in the United States adopt LCA as their standard measure for environmental performance." (Please see written comments from University of Wisconsin to Committee on Science, Space & Technology.)

LCA has been incorporated into the design system by some standards, like Green Globes. Currently, the US Green Building Council's LEED standard does not use LCA to evaluate building materials. The lack of a rigorous process to measure environmental impacts means that products that do have a lower environmental footprint, like wood products, are not promoted and encouraged. A recent proposal from USGBC would also better incorporate LCA into the LEED standard, which is an improvement. This proposal has not been finalized and is therefore still subject to change.

For example, a recent review of several LCA assessments by a Canadian think tank shows that substituting one cubic meter of wood for one cubic meter of other building materials such as steel, concrete, or plastics, reduces CO2 emissions by an average of 1.1 tons. Irrespective of species, 1 kg of US hardwood lumber stores the equivalent of 1.5948 kg of carbon dioxide for as long as it is in use. Irrespective of species, carbon storage in American hardwood lumber is more than sufficient to offset the Global Warming Potential (GWP or 'carbon footprint) of all emissions (from burning of fossil fuels) during forestry, sawmilling, kiln drying and all stages of transport even when delivered to ports in Europe and Asia. Wood is the only mainstream construction material that, through sustainable management and harvest for use in long life products, has the potential to act as a significant carbon pool (as opposed to a drain) within the structure of a building. Without LCA, these impacts are not considered when designing green buildings.

While we commend the steps being taken in the LEED system to incorporate "responsible extraction" in its new standard for all products, not just wood, we are concerned with its approach. LEED continues to recognize only one forest certification standard, the Forest Stewardship Council, for its "responsible extraction" credit. HF supports the inclusion of all credible forest certification standards and believes that the varied patterns of forest ownership require varied structures for certification systems.

In addition, there is simply no comparability between the standards for responsible extraction required of wood and non-wood materials in order to achieve the credit. As things stand, the draft actually rewards (by making compliance easier) those industries that have done little or nothing to develop responsible extraction standards. While we can understand that LEED is trying to encourage transformation to responsible extraction by these sectors, the draft standard ignores the obvious underlying fact that the wood sector has played the leadership role on this issue now for decades. Whereas responsible extraction is an inherent part of normal business practice in the U.S. wood products sector, it is hardly even on the radar of most other sectors.

Wood's environmental benefit is maximized when it is supplied from a sustainable source. For example, American Hardwood Export Council reports that a detailed analysis of U.S. government forest inventory data gathered at regular intervals over the last 60 years demonstrates that the volume of hardwood standing in U.S. forests more than **doubled** from 5.2 billion m^3 to 11.4 billion m^3 between 1952 and

2007. Due to very low levels of hardwood forest utilization, projections of U.S. hardwood supply indicate that harvests could rise from current levels of less than 100 million m^3 to in excess of 250 million m^3 within the next 40 years without threatening long term sustainability. Analysis of hardwood growth and removals indicates strong potential to significantly increase supply. Indeed, as part of its Annual Report of Forest Products Markets in 2011, the United Nations Timber Committee cited the *underutilization* of the American hardwood forest due to the recent economic downturn as the most pressing concern for the North American resource.

To ensure a level playing field for all building products (wood, steel, plastic, concrete, etc) the same rigorous standards for measurement of environmental performance must be adopted. This will require a shift towards the use of LCA and recognition of the importance for the development and use of Environmental Product Declarations (EPDs). There is confusion that arises from the wide variety of environmental claims made by material suppliers, some of which may be genuine, but others are false claims. A huge array of labeling systems has evolved, many certifying only a small part of the material supply chain which in reality may have only a marginal impact on the overall environmental footprint of a product. The development of EPDs would also respond to the criticism of those building rating systems which allocate environmental credits to construction materials in an uncoordinated way on the basis of single attributes.

LCA-based EPDs can deliver transparent, standardized information on the full environmental impact of a material or product across its entire life cycle. They help to ensure that efforts to reduce one impact do not result in environmental degradation elsewhere. International standards have been developed to ensure that the information provided in EPDs is comparable and that environmental assessments are performed in the same way and yield the same results no matter who does the analysis. Requirements for LCA are set out in the ISO 14040 series of standards including, for example, rules for stakeholder consultation and peer review to ensure credibility. The obvious benefits of an LCA based approach to material specification is already driving rapid uptake of EPDs in many material sectors, especially in green building systems in the UK (BREEAM), France (HQE/FDES), Germany (IBU), as well as the possibility of new opportunities for LCA based credits in the LEED system.

In closing, the use of wood in building designs has an important role in America's history and in its future. It is important to jobs, specifically in rural communities, and essential to keep forests as working forests and protect America's landscapes. Moving forward, it is imperative that federal agencies when developing building material preferences ensure that the environmental and economic benefits are determined by embracing LCA and the future use of EPDs. We applaud the leadership of the committee in holding this hearing and in helping to return science to green building decisions.

Chairman BROUN. Thank you, Mr. Talbot. I want to thank all of you all for your testimony here today, reminding Members that Committee rules limit questioning to five minutes each. The Chair at this point will open the first round of questions. The Chair recognizes himself for five minutes.

Mr. Platt, you just heard Mr. Talbot's testimony. Why does the LEED system not recognized life cycle analysis?

Mr. PLATT. The LEED system is in the midst of being re-renewed and evolved, and in the course of that, we made it very clear that life cycle analysis is going to be a part of our philosophy, and I commend Mr. Talbot for his commitment to that. We discussed earlier evolution of that issue in Germany. He was very impressed with that. We are trying to make sure the global standard that we are also taking into account the life cycle analysis study. That is controversial in some circles. Some types of industries don't like looking at their products except when they are in the building. They don't like looking at the product when they are being manufactured or when they are being disposed of. We are going to look at, I believe the way this will evolve is, we will begin to look fully at the life cycle and in that respect are impressed with what Mr. Talbot said and what the Green Globes people have done.

Chairman BROUN. Well, thank you. I believe that all cost energy use in producing the products needs to be part of the process of evaluation. We need the metrics and the data to further that.

Mr. Hubbell, would you be willing to have a federal advisor on your board of directors of the same seniority as Mr. Kampschroer's deputy?

Mr. HUBBELL. Yes, we would.

Chairman BROUN. Have you asked GSA? And if so, what has their response been?

Mr. HUBBELL. We requested—I believe I am correct here—we requested some time ago to have a GSA representative serve on our board in a similar capacity as Don Horn was serving on the board of the U.S. Green Building Council, and that request was not accommodated.

Chairman BROUN. Why?

Mr. HUBBELL. I don't know.

Chairman BROUN. Okay. Let me see if I can get an answer for you in written questions.

Mr. Talbot, GSA currently has a policy that calls for new construction to be LEED certified whereas other federal agencies like the USDA have adopted multiple green building rating systems. Why is it important to your business that federal agencies open their policies to multiple green building rating systems?

Mr. TALBOT. The problem the hardwood industry has is that—or should I say challenge—is only 80, or 20 percent of the timberlands are FSC certified, and with the environmental and economic conditions we are all going through as an industry and the housing crash, it just isn't compatible for most of the industry to supply these buildings because our case in point, we are not FSC certified and we don't see the value in investing those dollars in these economic times.

Chairman BROUN. Do you think that FSC certification should be abandoned as a parameter, as a metric in the green ratings?

Mr. TALBOT. The way I look at it, is that the certification piece is yesterday's news. I think the future should be based on life cycle assessments and EPDs because it is how efficiently one does it, and I think there shouldn't be one system that is the system. It should be an open framework or model and I think the market will take care of itself because, you know, it is proven that American forests are the best managed in the world and the hardwoods are doing and have done for many, many generations what they have always done, and I don't think we should have a stamp that it has to be one certified body that controls that.

Chairman BROUN. Very good. Mr. Platt was nodding his head yes, and he said we are going to go to life cycle analysis, so hopefully that will be in the near future that it is so.

Mr. Platt, USGBC went through the process of becoming an accredited ANSI standards developing organization. Is USGBC now committing to develop all of its standards according to those ANSI rules?

Mr. PLATT. USGBC has a process, Mr. Chairman, that works extremely well, and we are nonetheless very eager to find out any specific concerns that either this Committee has or others have here about that process. Our process is one that is extremely responsive to this huge demand to address continuous requests for new systems, new standards. We are very, very, very confident in our process. We have not had an overwhelming demand from our membership, from the people that are using our materials to have our—change our process. But again, having said that, if there is something about ANSI review of our process that would improve it, we would be very open to talking to you and other members of the committee about that.

Chairman BROUN. Well, that sounds like a no. My time is expired.

Mr. Miller, you are recognized for five minutes.

Mr. MILLER. Thank you, Mr. Chairman.

I may overstate the case with respect to Dr. Scofield's testimony, but he criticized sternly the research that lies behind the representations that buildings are green or high-performance green buildings, that that claim is simply kind of marketing, it is vacuous puffery, saying a green building—a building is a green building is like an advertisement saying that Miller Beer has great taste, and is less filling. There really is nothing to it.

Mr. Olgyay, is the——

Mr. OLGYAY. Olgyay.

Mr. MILLER. Olgyay. Excuse me. And I just heard it pronounced repeatedly for Dr. Broun's benefit. Is that a fair characterization of Rocky Mountain Institute's analysis of the savings of green building design for the Empire State Building or any other building?

Mr. OLGYAY. I agree with Dr. Scofield in that, you know, the rating system itself does not produce a high-performance building. What the rating system does is, it encourages people, and within any set of buildings, you will find high performers and low performers. We like to focus on the high performers, and we do feel that rating systems do end up raising the bar for the lower performers. They can't basically get rated if they don't do at least as well as the codes and the recognition within the different rating

systems require. So our experience is that rating systems including, you know, the recommendations in EISA are fantastic in pushing the process farther and deeper, and again, the proof is in the pudding. You have to actually look at how much the energy is saving and measure that, and we find that when we do that and we actually go for deep energy savings, it is very cost-effective and the rating systems do encourage that.

Mr. MILLER. Mr. Platt and Mr. Hubbell, there appears to be criticisms of your rating systems. Do you embrace Dr. Scofield's testimony or do you disagree with it? Mr. Hubbell, Mr. Olgyay's testimony appeared to be that there is some value but it certainly needs a lot of work. Mr. Platt.

Mr. PLATT. Well, we are very——

Mr. MILLER. Olgyay.

Mr. PLATT. We are very, very confident in the state of the record with respect to the value of LEED-certified buildings. People don't have to do this. They do it voluntarily, and we reference various standards including the Energy Star standard and the Energy Star benchmarking process. More than half of the 1.7 million square feet a day that we certify is certified as existing buildings that perform better than they did when they began the process of becoming LEED certified, and those buildings perform on average an Energy Star score of 86. That means by definition, they are in the top 15 percentile of performing buildings, and that includes the Empire State Building, which is LEED Gold. It includes the Treasury Building that I referred to that is LEED Gold. The performance level of LEED buildings, and again, the majority of the square footage are these existing buildings, is staggeringly impressive and nobody—because of that alignment with Energy Star, nobody has been claiming that that level of performance is not accurate.

Dr. Scofield, I am not a professor, so I won't take him on. I will just say that his study does not—and I think, you know, he fairly made that point—his study is only about new buildings and a data set that is very stale. It is almost eight years old, the actual buildings in the data set. So that is a different story altogether.

Mr. MILLER. Mr. Hubbell.

Mr. HUBBELL. Yes. I would agree with Dr. Scofield that none of us are perfect in documenting the performance of buildings that we certify and so certainly we need to make improvements there. I would take some issue, as Mr. Platt has, that we are not doing it at all. We rely on Energy Star and we, for example, in our energy performance section, you have to be 25 percent, the top 25 percent to even get points. That is based on a Department of Energy database of real buildings. And so our users can go—and it is called the CBECS database. Our users can go in and they can plug in their building type, they can look at what actual buildings are doing and they benchmark against that. So we are doing some things right. We have got things to learn. We have got improvements to make. And I would say that is probably the case with both Mr. Platt and my organization.

Mr. PLATT. I associate myself fully with his "we could improve and do a lot better" point.

Mr. MILLER. Yes, I know. All right.

Chairman BROUN. The gentleman's time has expired. If it okay with you, I will ask one more question and let you ask one more question and we will be done. How about that?

Mr. MILLER. That is a deal, Mr. Chairman.

Chairman BROUN. Okay. Good.

Professor Scofield, has USGBC responded to your study of their rating systems, and what about GSA or DOE and its national labs?

Dr. SCOFIELD. Well, let me first, if I can, respond to his comment. It is absolutely correct that my work is totally restricted to the LEED new construction buildings. It doesn't address at all existing buildings, and I am encouraged by the fact that they use Energy Star building scores as a way to test performance.

In answer to your question, I have never had a response from the U.S. Green Building Council, and I have had no communication with the GSA.

Chairman BROUN. Maybe after today you will. How about DOE? You didn't respond to that.

Dr. SCOFIELD. I have not.

Chairman BROUN. And its national labs, too.

Dr. SCOFIELD. Yeah, I have not had any communication subsequent to the papers I have written with anybody from the DOE.

Chairman BROUN. Okay. Very good. Mr. Miller.

Mr. MILLER. Thank you, Mr. Chairman. I will keep our agreement to ask one question, but it will be to several witnesses and in several parts.

Some of the agencies do use the LEED system for new construction but not all of them. The USDA has adopted multiple green building rating systems that includes LEED and Green Globes, and that seemed to be what Dr. Hogan was saying earlier, the Department of Energy wasn't just adopting any set of third-party ratings from the private sector, they were kind of picking and choosing cafeteria style. Do you think it is important that there be one rating system? Well, first of all, do you think the government should promulgate their own standards or do something more like what OSHA initially did with ANSI standards, workplace safety standards? Should government adopt their own standards or is it important that there be one set of ratings or can they be picked from cafeteria style? And that is to the entire panel, anyone who wishes to address it.

Dr. SCOFIELD. Well, let me jump in to say that I think the rating systems do a lot of good things to encourage good building practices, and they have some success. I would like to see the government augment any rating system with a fundamental standard on performance. It is a question of closing the loop. We can think we are making energy-efficient buildings based on simulations and folklore but the bottom line is, what is the measured primary energy performance? And if we don't close the loop properly, you end up with this Lake Woebegone effect where we think we are above average, but somehow we are using more energy. And so I think that would be the thing for the government to do would be to add a really critical performance standard that I don't see in any of the rating systems.

Mr. MILLER. Okay. Mr. Platt.

Mr. PLATT. LEED is a completely voluntary system and it was developed to be used in a flexible way. One of the challenges of the user of the—as a government is that it will have all kinds of other pressures and concerns, sometimes very appropriately, placed on it, but as far as the government deciding, I believe they should decide, you know, building by building, situation by situation, what is the appropriate—or portfolio by portfolio in some cases. But really, the USGBC is not here to say that everybody should use LEED every moment in every context.

Mr. MILLER. Tom Talbot.

Mr. TALBOT. To take this a little different way, if you look at environment product declaration, or an EPD, and it is all done by math, and you talk about the energy consumption from the woods to the transportation to the dry kiln to the transportation to the sawmill, all of that is mathematical, and if an EPD no matter whether it is wood, concrete, steel or aluminum, is the basis, you will get the numbers you really need because it all becomes math, and it takes the emotion out of it. So all I can say is, as long as there is an EPD model in this, you will win, and the taxpayer will win.

Mr. MILLER. Mr. Hubbell.

Mr. HUBBELL. Sure. Thanks. Generally speaking, I think competition is a good thing. I think it drives down cost and improves quality, and that is not just in this instance, it is in all instances, and that has been proven since the beginning of time. So I think that is a good thing. Multiple systems are good. I think the Federal Government is doing a good thing by drafting their own benchmarks, the federal guiding principles. What you are doing there is, you are establishing a hurdle and you are telling the rest of us to go jump over it, and that is, I think, a good thing.

Frankly, my own personal opinion is, I think that this industry that we are in is in the process and should be in the process of being commoditized. Green building certification shouldn't be expensive. Every dollar you pay me to tell you about your building is a dollar you can't spend improving your building. There is nothing magic about hanging a plaque on a wall. We want to drive the cost as low as possible and still provide a credible assessment so that people can upgrade their HVAC systems, they can add more insulation, they can improve their doors and windows, and so that is how—I think that is the path we are on and I think it is a good path.

Chairman BROUN. The gentleman's time is expired.

I want to thank you all for you all's valuable testimony here today and the Members for their questions. The Members of the Subcommittee may have additional questions for the witnesses, and we ask for you to respond to these in writing. Please do so as expeditiously as possible and as verbosely as possible. The record will remain open for two weeks for additional comments by Members. The witnesses are excused and the hearing is now adjourned.

[Whereupon, at 11:32 a.m., the Subcommittee was adjourned.]

Answers to Post-Hearing Questions

Answers to Post-Hearing Questions

Department of Energy
Washington, DC 20585

September 13, 2012

The Honorable Paul Broun, M.D.
Chairman
Subcommittee on Investigations and Oversight
Committee on Science, Space, and Technology
U. S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

On May 8, 2012, Dr. Kathleen Hogan, Deputy Assistant Secretary for Energy Efficiency, Office of Energy Efficiency and Renewable Energy, testified regarding "The Science Behind Green Building Rating Systems."

Enclosed are the answers to three questions that you submitted to complete the hearing record.

If we can be of further assistance, please have your staff contact our Congressional Hearing Coordinator, Lillian Owen, at (202) 586-2031.

Sincerely,

Christopher E. Davis
Deputy Assistant Secretary
for Congressional Affairs
Congressional and Intergovernmental Affairs

Enclosures

cc: The Honorable Paul Tonko, Ranking Member

Printed with soy ink on recycled paper

QUESTION FROM CHAIRMAN BROUN

Q1. DOE issued a proposed rule on design standards for new federal buildings in May 2010. No final rule was ever issued. What is the status of this work and when do you expect the final rule to be issued?

A1. DOE issued the Notice of Proposed Rulemaking on May 28, 2010 in the Federal Register with a 60-day comment period. 75 FR 29933. DOE received substantial comments from 62 entities, including Federal agencies and private organizations. The draft final rule is currently under Executive Order 12866 review. Additional information can be found at www.reginfo.gov.

QUESTION FROM CHAIRMAN BROUN

Q2. Does the Department have the ability to develop its own standard for federal green buildings and would it support or oppose the developments of such standards?

A2. DOE is required under the Energy Conservation and Production Act, as amended, to establish sustainable design standards for new Federal buildings and certain major renovations of Federal buildings. (42 USC 6834(a)(3)(D)(i)(II) and (III).

Also, pursuant to the Energy Conservation and Production Act, as amended, DOE also is required, following consultation with the General Services Administration and the Department of Defense, to identify a certification system and level for green buildings that DOE determines to be the most likely to encourage a comprehensive and environmentally-sound approach to certification of green buildings. DOE issued a Notice of Proposed Rulemaking on May 28, 2010 in the Federal Register with a 60-day comment period. 75 FR 29933. DOE received substantial comments from 62 entities, including Federal agencies and private organizations. The draft final rule is currently under Executive Order 12866 review. Additional information can be found at www.reginfo.gov.

QUESTION FROM CHAIRMAN BROUN

Q3. What comments does the Department have regarding Professor Oberlin's study on the cost effectiveness of LEED?

A3. We believe Chairman Broun is referring to Professor John Scofield of Oberlin College's recent testimony regarding his analysis of a study on the effectiveness of LEED by the New Buildings Institute (NBI). The Department of Energy (DOE) does not have specific comments on Dr. Scofield's analysis of NBI study, nor on the NBI study itself. DOE is aware of the NBI study, associated criticism, and of Dr. Scofield's analysis.

DOE notes that the study concerned a fraction of buildings and the application of a past version of LEED-NC. DOE considers these analyses highly relevant to our deliberations on the identification of a green building rating system as directed by Congress in §433 of the Energy Independence and Security Act (EISA) of 2007, and as advised by the General Services Administration under §436(h) of EISA.

DOE also notes that the National Research Council (NRC) on behalf of the Department of Defense is in the process of conducting an analysis on the cost effectiveness of LEED as applied to military installations, which Congress mandated in the National Defense Authorization Act for Fiscal Year 2012. Pub. L. No. 112-81., §2830 (a)(2). Upon its release, DOE will review and consider the NRC analysis, along with other available analyses and studies.

QUESTIONS FOR THE RECORD
U.S. House Committee on Science, Space, and Technology
Subcommittees on Investigations & Oversight and Energy & Environment Joint Hearing

"The Science Behind Green Building Rating Systems"

Thursday, May 8, 2012

Mr. Kevin Kampschroer
Director of the Office of Federal High-Performance Green Buildings, GSA

Questions submitted by Dr. Paul Broun, Chairman, Subcommittee on Investigations & Oversight

1. **The National Technology Transfer and Advancement Act requires federal agencies to recognize and incorporate existing consensus standards in policy initiatives. How do you respond to complaints that the USGBC rating development process lacks OMB and ANSI defined consensus?**

   OMB Circular A-119 (1998) establishes policies on Federal use of voluntary consensus standards, based on the National Technology Transfer and Advancement Act. These policies define voluntary consensus standards bodies" as "domestic or international organizations which plan, develop, establish, or coordinate voluntary consensus standards using agreed-upon procedures..." They also are defined by the attributes of openness, balance of interest, due process, an appeals process and consensus. The NTTAA directs that federal agencies use voluntary consensus standards to carry out their missions; however, the use of other technical standards to meet government needs is not prohibited.

   The Green Building Certification System Review completed for GSA in March 2012 concluded that the U.S. Green Building Council's Leadership in Energy and Environmental Design (USGBC LEED) system was developed as a voluntary consensus standard, based on criteria developed to address the attributes outlined above.

   ANSI publishes the *Essential Requirements: Due process requirements for American National Standards.* This document sets forth the requirements for developing standards which carry the designation of American National Standards. The process for standards developing organizations to demonstrate conformity of individual standards with ANSI's requirements has two parts. The first is demonstrating that the processes used by standards developers meet ANSI's requirements. The second is demonstrating that individual standards have been developed in accordance with these processes. Only standards that have gone through the second step can be designated as American National Standards.

   Although, USGBC has demonstrated that its processes meet ANSI's requirements, at the present time, individual USGBC standards have not been designated as American National Standards.

2. **Life cycle assessment is a scientific evaluation of the environmental impacts of a product or material. Now that at least some rating systems include life cycle assessments, how will GSA rank rating systems that make such assessments a priority?**

   Life cycle assessment (LCA) is a complex process that is not yet widely used in the U.S. or the rest of North America. Several organizations (both Federal and private) are working to create processes and tools to simplify LCA in order to increase its use. While the International Standards Organization (ISO) has developed internationally recognized standards governing the methodology for life cycle assessment, there is not yet wide-spread consensus on whether or not an effective LCA must address all impact categories. In addition, peer-reviewed data about life cycle impacts is not yet broadly available. Given the challenges and uncertainties surrounding use of life cycle assessment at this time, GSA considered inclusion of LCA as a plus, but did not include it as a requirement.

3. **What reviews of GSA green buildings have occurred after opening to ensure that the promised benefits from its rating system have been obtained? Who audits or peer reviews these findings? If audits are conducted, are they undertaken by independent third party reviewers and how has their performance compared to other federal buildings?**

   GSA Public Buildings Service commissioned the Pacific Northwest National Laboratory (PNNL[1]) to conduct two assessments of green buildings from its national portfolio. The first, evaluating 12 buildings, was completed in 2008; a second, evaluating 22 buildings, was completed in 2011. These evaluations were comprehensive, measuring five categories of environmental performance, financial metrics relating to operations and maintenance, and occupant satisfaction. Results were compared to both industry and GSA baselines. All buildings in the study incorporated sustainable design practices; sixteen were LEED-NC (LEED-New Construction) certified or registered and the remaining six buildings implemented a suite of sustainability strategies to enhance building performance. The results of these studies confirmed that, on average, GSA's sustainably designed buildings use 25% less energy, use 11% less water, emit 19% less CO2, cost 19% less to maintain, and have occupants who are more satisfied than those working in typical buildings. Both reports can be found online at: http://www.gsa.gov/gbcertificationreview.

   GSA evaluates the energy performance of all of its facilities. Benchmarking is accomplished in two ways: using EPA's Energy Star Portfolio Manager, and using an internal information technology application and database (Energy Usage Analysis System (EUAS)) that generates a variety of comparison reports. Portfolio Manager allows GSA to compare energy consumption for all buildings in the owned inventory to similar buildings nationwide. In FY11, 146 GSA buildings had earned an Energy Star label. An additional 184 GSA buildings were eligible for the Energy Star label. EUAS benchmarks buildings against themselves, against other buildings in GSA's inventory, and against commercial inventories maintained by other federal agencies.

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[1] *PNNL is one among ten U.S. Department of Energy (DOE) national laboratories managed by DOE's Office of Science.*

The energy consumption of all eligible GSA buildings are tracked on a rolling 12 month basis each fiscal year as part of GSA's "Linking Budget to Performance" (LB2P) measures program, a performance management process that is independently audited by the CFO. The GSA Energy Center establishes reduction targets, then tracks monthly consumption performance in British thermal units per gross square feet at building, service center, regional and national levels compared to established baselines (2003 for the Energy Policy Act and EISA 07 and the most recent completed year for LB2P).

Energy audits are conducted every 4 years as a part of the commissioning requirements of Energy Independence and Security Act (EISA) Section 432, and in compliance with Department of Energy guidelines for "Covered Facilities" (those buildings accounting for at least 75% of total GSA facility energy use). This work is conducted by independent third party firms or qualified agency staff with 25% of this universe of buildings being audited annually. In fiscal year (FY) 2012, GSA completed energy audits for the final 25% of these covered facilities, the first Federal agency to complete this process. GSA retained the services of a contractor that uses an innovative data virtualization product to conduct high quality rapid assessments comparable to physical audits at a reduced cost in much shorter timeframes. GSA in-house staff collaborates with this contractor to review their analysis for accuracy and agree on recommendations for both operational and retrofit opportunities. This approach also supports verifying implementation of improvements and their continuous commissioning through a time stamped logging system and re-evaluation of performance.

GSA calculated this virtual analysis process avoided approximately $1.5 million in physical engineering audits and reduced disruptions to local building staff. The audits further yielded a detailed examination of building operations through analysis of interval data and energy end user profiles. Working closely with GSA regional and building managers, the pilot has already resulted in numerous actions and building level energy savings.

Finally, with the completion of the installation of advanced meter in FY 2012, the energy use of approximately 450 facilities are being monitored in real time using a National Advanced Metering System which has historical trending and alarming capabilities.

In addition to the energy tracking mechanisms outlined above, GSA recently developed a Sustainable Operations and Maintenance Program designed to meet EO13514, and GSA Strategic Sustainability Performance Plan targets for a number of buildings complying with the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings. The program features standardized procedures for documenting building performance as well as a training program for building management teams on how to implement green operations and maintenance practices on-site at the building level. The program maps each of the Guiding Principles for Sustainable Existing Buildings to one or more credits under the LEED for Existing Buildings: Operations and Maintenance (LEED-EB) 2009 rating system. GSA is currently pursuing LEED-EB volume certification for approximately 50 buildings nationally. As part of this program, participating buildings not covered by EISA Section 432 conducted a basic energy audit and implemented no and low cost energy conservation measures.

4. **Does GSA have the ability to accept a revision or portion of a building rating system if the rest of it doesn't meet federal government objectives?**

GSA's use of a certification system always focuses first on meeting federal objectives and mandates. After that, project teams have flexibility to pursue additional credits or points as applicable to meet the requirements for certification. If GSA were to select only certain credits or points from a particular certification system, it could mean that a building might not qualify for certification through lack of points to meet certification thresholds.

Federal statutes and Executive Orders direct consideration of a variety of building performance categories, including energy efficiency and use of renewable energy, water-use efficiency, indoor environmental quality, waste reduction, incorporation of environmentally preferable materials, and access to alternative transportation, all of which generally align with all of the green building certification systems .

One of the ways in which Federal agencies are using green building certification systems is to provide a framework for independent verification that both performance metrics and Federal building requirements have been met. Green building certification systems create a definitional framework for what "high-performance" means in the design, construction and operation of buildings. Credits or points are developed around a set of standards, metrics and tools that are typically developed by third-party sources and widely recognized in the market. These credits and/or points provide performance definitions, methods for measuring performance, and methods for demonstrating conformance, which are used by auditors and assessors to provide independent verification that the building has met the specific levels of "high performance" as defined by that particular green building certification system.

Relying on these non-governmental certification systems offers several advantages to the Federal government. One of the biggest added values that green building certification systems offer is that they are kept current with market developments - an important benefit because the market is evolving so rapidly. Each of the green building certification systems reviewed regularly updates its performance metrics to maintain currency with changes in underlying standards, product certifications, applicable regulations, etc. Each of the green building certification systems maintain professional training and accreditation systems for designers, engineers, auditors and assessors, including continuing education requirements to assure that professionals maintain knowledge currency in the evolving market. These aspects of green building certification systems have substantial cost avoidance for federal agencies: large, ongoing investments of resources would be required to maintain a separate federal infrastructure. Costs avoided include:

- Costs to the Government of developing its own standards
- Initial costs to develop Federal or agency-specific standards
- Ongoing costs to keep Federal performance standards and metrics current with market developments
- Initial and ongoing costs to develop and maintain conformance metrics, methods and systems
- Initial and ongoing costs to maintain cadre of trained assessors/auditors using internal resources

5. **Does your initial written response to my question about GSA expenditures on LEED certification costs include expenditures by other federal agencies or building owners and developers themselves? Are LEED certification costs typically paid for by GSA or by other federal agencies and building owners or developers themselves? If LEED certification costs have been paid for by other entities than GSA, please provide those amounts. If the exact amount is not available, please indicate this and provide an estimate.**

   The costs provided previously were for GSA projects only. These costs included only government owned buildings. We do not have information on certification costs related to leased facilities. Certification costs are paid by the owner of the project, whether that is a government agency or a private sector owner.

6. **Initial drafts of LEED 2012 proposed a credit for the avoidance of certain products. Has GSA routinely used products in the past that the credit would penalize? Would GSA support such types of credits that penalize uses of certain products? If GSA was to discontinue the use of those materials, how much more would alternatives cost?**

   GSA evaluates green building rating systems once they are finalized and available in the market for public use. LEED 2012, now named LEED v4 is not available for public use, and GSA has not evaluated this system. As such, we do not have data on alternative costs of certain products that may be penalized for use in the final version of LEED v4. In general, GSA selects materials based on budget, functionality, durability and the needs of our clients (including sustainability requirements). GSA supports transparency in the development of standards, disclosure of ingredients and the avoidance of toxic or hazardous materials.

7. **During the hearing, Green Globes stated that they have asked to have such a liaison, but their request was rejected. Assuming that Green Globes or any other entity requests that GSA provide an official liaison to their Board, similar to the GSA liaison to USGBC, would GSA oppose that request? If not, how would such an entity go about requesting such a liaison?**

   GSA welcomes opportunities to work with standards developing organizations in an advisory capacity; GSA is not allowed to participate as a voting member on a green building certification system board of directors. Participation may be limited by time and available funding. A request to serve as an official liaison may be sent to the agency.

Questions submitted by Rep. Paul Tonko, Ranking Member,
Subcommittee on Investigations & Oversight

1. **In October 2010, the General Services Administration issued a press release indicating that new federal building construction would need to meet Leadership in Energy and Environmental Design (LEED) Gold certification as a minimum standard. This would be the LEED 2009 standards. Your testimony, however, stated that the recent report by the Pacific Northwest National Laboratory (PNNL) that evaluated the three green building certification systems found that none of the green building rating systems cover 100 percent of Federal green building requirements for new construction, major renovations, and existing buildings.**

   Please clarify whether the LEED 2009 Gold certification currently is a required minimum standard for new federal building construction, and if so why was this standard chosen as the minimum standard over the other green building certification systems?

   New construction and major renovation projects in GSA federally owned buildings are currently required to achieve LEED Gold[2] certification at a minimum. The decision to require LEED certification was made in 2006 based on GSA's first green building certification system review completed at that time. The 2006 report identified LEED for New Construction to be the most appropriate and credible sustainable building rating system available for evaluation of GSA projects. The decision to select a "Gold" certification level was based on the GSA Public Buildings Service's experience with achieving LEED ratings.

2. **The U.S. Green Building Council (USGBC) currently is in the process of developing a new proposal for the LEED rating system. You indicated in your response to Rep. Bucshon at the hearing that GSA has not evaluated the proposed changes to the LEED standards. If these standards are adopted by USGBC will GSA evaluate the impact of the new standards? Will the LEED 2009 standards continue to define the minimum standard for new federal buildings or will GSA, DOE and other federal agencies re-evaluate this once the LEED 2012 standards are adopted?**

   GSA intends to evaluate the suitability of the next version of LEED to meet its goals and objectives after the version has been finalized by USGBC. Until that evaluation has been completed, GSA will continue to use LEED 2009 for GSA buildings. Both U.S. Green Building Council (USGBC) and the Green Building Institute (GBI) set the requirements for use of their certification systems, including use of previous versions. USGBC usually includes a "sunset period" for previous versions once newer versions have been released.

   In its recommendation to the Secretary of Energy, per section 436(h) of the Energy Independence and Security Act (EISA) of 2007, GSA will be proposing a process where the Federal government will evaluate finalized updates to green building certification systems more frequently than every 5 years (the EISA-required timeframe). Green

[2] LEED 2009

building certification systems tend to evolve more rapidly than every 5 years in order to keep pace with changes in market conditions, underlying standards, product certifications, and applicable regulations.

3. **In situations where there may be a conflict between two performance goals or sustainability goals how are these resolved? For example, if a building technology would meet a vital safety or security need for a particular building, but it was not fabricated from a renewable feedstock or was the highest rated material from an energy efficiency perspective, would the goal of achieving LEED GOLD override the choice of the best material for safety or security (e.g. the use of high impact resistant or bullet-resistant windows; fire-resistant insulation)?**

   GSA takes safety and security for our clients very seriously, and these considerations take precedence over other requirements. The use of sustainable building features always includes evaluation of alternatives to make the best decision based on the budget, functionality, durability and the needs of our client (including security and sustainability). This decision process is unique to the circumstances of each individual project. All of the green building certification systems are designed to be flexible and enable the design team to make effective choices. In GSA's experience, LEED Gold certification can and should be attained while protecting safety and security considerations.

4. **Many people have advocated for the use of life cycle assessment (LCA) as an objective means to evaluate the overall performance of a building over its projected lifespan and as a means to compare the environmental performance of alternative building materials. At the current time, LEED has a pilot credit for life cycle assessment, but has not yet incorporated LCA into its standards. Alternatively, Green Globes standard has incorporated LCA into its evaluation of building materials. In addition to the energy goals in EPACT 2005 and EISA 2007, you referred to Executive Order 13514 in your testimony. One of the goals included in this E.O. is to encourage the use of environmentally preferable products.**

   Since wood can be produced sustainably and, when incorporated into long-lived structures like buildings essentially sequesters carbon it would likely achieve a high rating in a LCA. Does GSA or other federal agencies use LCA to determine building materials that are environmentally preferable? Does the federal government use an LCA approach similar to the one adopted by Green Globes? Since LEED does not yet incorporate LCA does GSA's primary reliance on LEED provide a less comprehensive evaluation of a buildings' overall environmental performance than envisioned by the goals in E.O. 13514?

   As noted above, life cycle assessment (LCA) is a complex process that is not yet widely used in the U.S. or the rest of North America. A number of organizations (both Federal and private) are developing tools intended to apply this methodology to products in order to promote more widespread use of this evaluation methodology. However, the lack of consensus about which impact categories must be included in an LCA analysis, and the relative lack of peer-reviewed data about products make it difficult to require LCA analyses at this time.

GSA agrees that wood is a resource that can be sustainably produced and can serve an important role in sequestering carbon. Material choices in our construction projects are primarily driven by building code, occupancy type, building height and the resulting fire resistive ratings required for the construction type. Due to the scale of GSA buildings and these life-safety drivers, the use of wood in GSA building projects is typically limited to finishes – trim, millwork and doors. GSA's use of LEED has not influenced on how much or how little wood is included in our building projects.

GSA is working with the U.S. Forest Service (USFS) on projects aimed at highlighting wood as a sustainable building material. The Office of Federal High Performance Green Buildings and GSA's Mid-Atlantic Region are supporting USFS and the City of Baltimore in developing a Carbon Design Challenge focused on designs that minimize carbon while providing jobs and revitalizing neighborhoods. The Carbon Design Challenge will require designers to use the entire life cycle of wood (from deconstruction materials to new products) and employ a life cycle eco-calculator to estimate impacts. GSA is also engaged in conversations with the USFS about locations for demonstration projects using cross-laminated timber as a structural replacement for concrete in mid-rise residential and commercial buildings. Cross-laminated timber is of particular interest because it can be made from beetle-killed and small diameter timber obtained through forest thinning operations, creating the potential for jobs in smaller, rural communities. The USFS' Forest Product Laboratory is currently conducting the seismic testing required to qualify this product for structural use in development codes in the U.S.

5. **Since the major operational costs for buildings are in heating and cooling and in lighting, it appears the energy efficiency factor for buildings is dominant in the consideration of whether a building achieves a high environmental performance rating. The goals for reducing energy use in buildings set in federal energy policy laws and in the E.O. also appear to be more stringent for energy than for other environmental performance factors. Is it possible for a building to achieve LEED Gold rating or above primarily through the points received for energy efficiency designs and materials? How large a role do the other factors play (e.g. water-use efficiency, proximity to transit, incorporation of renewable building materials, etc.) in the rating process?**

While federal laws and Executive Orders emphasize reducing energy use, these requirements also direct consideration of other environmental factors such as water-use efficiency, indoor environmental quality, waste reduction, incorporation of environmentally preferable materials and proximity to transit. These considerations are also reflected in the five Federal Guiding Principles for Sustainable Buildings applicable to both new construction and existing buildings: employ integrated design, assessment, operations and management principles; enhance indoor environmental quality; optimize energy performance; protect and conserve water; and reduce the impact of environmental materials. Many of these activities are inter-related with energy use at both the building and community scales. An integrated approach to building design and operations provides project teams the flexibility to balance client needs, site considerations, availability of resources, and operational and locational opportunities and constraints. All of the green building certification systems currently in widespread use in the United States reflect this philosophy.

It is not possible to certify a building at any level using only energy efficiency considerations. (This is true for both LEED and Green Globes). For LEED 2009 (New Construction), certification at the LEED Gold level requires accumulation of 60-79 points. Nineteen points are available in credits directly related to energy efficiency; an additional 5 points are available for activities related to commissioning of equipment and measurement/verification of energy use. Another 9 points are available for provision of on-site and off-site renewable energy, bringing the total available points for all energy-related activities to 33. While the points available for activities related to energy efficiency and renewable energy are the largest number of points available in any one category in LEED, this number falls below the minimum of 40 points required for the most basic level of LEED certification. The LEED system also includes prerequisites that must be met in each of the five building categories (Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, and Indoor Environmental Quality) in order to obtain certification.

The points available for the 5 categories in LEED break out as follows:

- Sustainable Sites: 26 points (includes alternative transportation, stormwater management, reduced heat island effect, avoiding light pollution, brownfields remediation)
- Water Efficiency: 10 points (includes landscaping water efficiency, water use reduction and innovative wastewater treatment)
- Energy and Atmosphere: 33 points directly related to energy efficiency and/or renewable energy, plus another 2 points available for enhanced management of refrigerants
- Materials and Resources: 11 points (includes materials re-use, waste management, recycled and bio-based content materials)
- Indoor Environmental Quality: 15 points (includes ventilation, thermal comfort, daylighting and acoustical performance)

A certification of One Green Globe requires buildings to achieve 35% or more of the 1000 possible points in the Green Globes rating system. At 380 points, the energy category has the most possible points within the Green Globes rating system; however, only 66 points within this category pertain to energy efficiency. Achieving all of these energy efficiency points would not allow a building to meet the minimum points required for One Green Globe.

The points available for the 7 categories in Green Globes (new construction) break out as follows:

- Energy: 380 points (includes energy performance, reduced demand, energy efficiency features, renewable energy, and transportation)
- Water: 85 points (includes water performance, water conserving features, and on-site treatment)
- Resources: 100 points (includes low-impact systems and materials, minimal use of non-renewables, reuse of existing buildings, durability and adaptability, and disassembly, demolition waste, recycling and composting facilities)
- Emissions: 70 points (includes air emissions, ozone depletion, sewer and waterway protection, and pollution control)
- Indoor Environment: 200 points (includes ventilation system, indoor pollution control, lighting, thermal comfort, and acoustic comfort)
- Project Management: 50 points (includes integrated design process, environmental purchasing, commissioning, and emergency response plan)

- Site: 115 points (includes development area, ecological impacts, watershed features, and site ecology enhancement)

As noted in question 1 above, GSA has developed a Sustainable Operations and Maintenance Program for existing buildings. This program is designed to meet EO13514 and GSA Strategic Sustainability Performance Plan targets for the number of buildings complying with the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings. The program leverages the LEED for Existing Buildings 2009 framework to document and verify performance in accordance with LEED-EB methodology for certain credits in the sustainable sites, water efficiency, energy and atmosphere, materials and resources, and innovation in operations categories.

6. **As you are aware, there are requirements in many federal procurement laws to purchase American made products when possible. To what extent is consideration given to domestically-produced building materials as compared to imported products in the design of federal buildings?**

The Buy American Act (BAA) applies to contracts for the construction, alteration, or repair of any public building or public work in the United States. If the contract or financial assistance agreement is funded by the American Recovery and Reinvestment Act (ARRA), then the provisions contained in section 1605 of ARRA would apply. The ARRA provision prohibits funds from being used for the construction, alteration, maintenance, or repair of a public building or public work unless all of the iron, steel, and manufactured goods used in the project are produced in the U.S. There are exceptions to both the BAA and ARRA Section 1605 requirements. In addition, both provisions must be applied in a manner that is consistent with the international trade agreements.

Question submitted by Rep. Larry Bucshon

1. **The California Proposition 65 program relies on "hazard" determinations, that is, whether a chemical is associated with a health effect at some level of exposure. If USGBC is intent on wading into the complex business of chemical evaluation and management, would it make more sense to rely on risk assessment? That is, to evaluate whether people or the environment are likely to be exposed to problematic levels of a chemical from particular building products?**

GSA has not been involved in USGBC's development of its approach to hazard determinations and has no information about that organization's decisions on this topic.

QUESTIONS FOR THE RECORD
U.S. House Committee on Science, Space, and Technology
Subcommittees on Investigations & Oversight and Energy & Environment Joint Hearing

"The Science Behind Green Building Rating Systems"

Thursday, May 8, 2012

Mr. Ward Hubbell
President, U.S. Green Building Initiative

Questions submitted by Dr. Paul Broun, Chairman, Subcommittee on Investigations & Oversight

1. I understand that Green Globes became the first and only commercial building rating system to become an American National Standard. Can you explain why taking this step was important to the Green Building Initiative and what distinguishes it from other systems?

We believed then and continue to believe that it is critically important for all green building certification standards to undergo an independent, balanced and transparent review, particularly given the inclination of local, state and federal agencies to develop public policy around them. We chose to develop our standard under the rules of the American National Standards Institute because we believed it was the most universally accepted and credible approach.

2. Would you be willing to have a federal advisor to your Board of Directors of the same seniority as Mr. Kampshroer's deputy? Have you asked GSA? What was their response?

Yes, we would like to have a comparable level of support from the federal government as that which is being provided to our competitors and this would include having a federal advisor serve on our board. Several years ago, when we learned that Mr. Don Horn of GSA was an active member of the board of directors of the US Green Building Council and that Mr. Horn played a significant role in the selection of green building rating systems used by the federal government, we requested that a comparably ranked GSA representative join our board of directors. That request was declined and I do not recall whether a specific reason was given.

3. Do you feel that the placement of a senior GSA official as a federal advisor to only one of the green building rating systems sends the wrong signal to local and state governments who might be willing to consider other rating systems?

Yes. We believe this effectively serves as an endorsement of one system over another.

Questions submitted by Rep. Paul Tonko, Ranking Member.

Subcommittee on Investigations & Oversight

1. Since wood can be produced sustainably and, when incorporated into long-lived structures like buildings essentially sequesters carbon it would likely achieve a high rating in a life cycle assessment (LCA). Some wood products are certified by private certification organizations based on the production methods. For other building materials, there is an all-or-none evaluation of the product because there are no comparable certification systems to evaluate alternative production methods for cement, steel, glass or other materials.

   It is my understanding that the LEED rating system encourages the use of wood certified by the Forest Stewardship Council (FSA), but not wood certified through the Sustainable Forest Initiative (SFI), American Tree Farm System, or wood products in general, while Green Globes rates all certified wood products (e.g. FSA, SFI) similarly. Does the Green Globes system discriminate between certified and uncertified wood in its rating system? Why has Green Globes opted for a single rating that includes all forest certification systems rather than selecting among the different certification systems available?

   Green Globes encourages the use of sustainably harvested wood building materials by awarding points for products that have been certified under any of the major North American sustainable forest management systems including Sustainable Forestry Initiative (SFI), Forest Stewardship Council (FSC), American Tree Farm (ATF) and the Canadian Standards Association (CSA). The decision to recognize these forest management certifications was made by our technical committee which operated under the rules of the American National Standards Institute (ANSI) and was thus independent and under no influence from our organization.

QUESTIONS FOR THE RECORD
U.S. House Committee on Science, Space, and Technology
Subcommittees on Investigations & Oversight and Energy & Environment Joint Hearing

"The Science Behind Green Building Rating Systems"

Thursday, May 8, 2012

Mr. Roger Platt
Senior Vice President, Global Policy and Law, U.S. Green Building Council

Questions submitted by Dr. Paul Broun, Chairman, Subcommittee on Investigations & Oversight

1. Why does the LEED™ standard allow users to concentrate points in a smaller subset of categories, rather than requiring a balance among its different categories?

   Every LEED building advances energy efficiency, water efficiency, sustainable sighting, indoor environmental quality and use of responsible materials and resources as a result of the pre-requisite requirements in each category.

   LEED buildings then go beyond these substantial prerequisites using the flexible credit framework which has made it the most widely used voluntary building rating system by the private sector.

   LEED projects also span an extraordinary range – from single-family homes and schools to NFL stadiums and skyscrapers. The projects' climactic conditions and local contexts range widely. There are LEED projects in all 50 states.

2. The USDA issued a report on the science behind using wood in green buildings, stating that "Sustainability of forest products can be verified using any credible third-party rating system, such as Sustainable Forestry Initiative, Forest Stewardship Council or American Tree Farm System" (USDA FPL-GTR-206). Given the weight of federal and non-federal scientific research that suggests there are no on-the-ground differences between the results of the certification standards, please explain why the USGBC does not recognize the Sustainable Forestry Initiative and American Tree Farm System standards?

   Since 2000 when LEED was first created, our membership (with the extensive input of hundreds of subject matter experts) has supported the FSC system as the only forest certification program to be recognized in LEED. The reason for that support is that there are substantial differences between the systems. In 2010, USGBC sent to ballot a change that would identify criteria against which all forest certification programs could achieve credit in this area; however, it was voted down by our membership (including opposition

from SFI and its supporters). USGBC continues to work with technical experts and all stakeholders to ensure that LEED reflects leadership in forest stewardship.

3. USGBC went through the process of becoming an accredited ANSI Standards Developing Organization. During the hearing you would not commit USGBC to develop all of its standards according to ANSI rules? What reasons exist for not committing to this?

   As per my testimony, the record has identified no specific problems with our process for developing leadership standards (beyond the fact that it inevitably results in standards that have both supporters and critics). But, let me provide some additional background.

   In order for federal agencies to utilize a green building standard, existing government requirements state that the body developing the standards must have certain attributes, including openness, balance of interests, due process, an appeals process and a consensus process resulting in general agreement but not necessarily unanimity. ANSI provides one way of signifying compliance with such principles, but is not the only way.

   USGBC became an accredited ANSI Standards Developing Organization so that it could both affirm its compliance with the principles of standard development embraced by ANSI and the federal requirements and understand the detailed rules of the development of an ANSI standard. At this time, USGBC has not identified a standard that was appropriate for application of these rules.

   The USGBC continues to work with ANSI and other organizations focusing on standard setting processes in order to achieve the very best process that serves our mission to change the way buildings and communities are designed, built and operated, and thereby achieve places that give private and public stakeholders improved health, environmental and economic value.

4. Which entities suggested or contributed to the development of the initially proposed chemical avoidance credit in LEED 2012? Was any input solicited from manufacturers of products that include the materials that could be included in such a credit?

   Manufacturers are the third largest segment of USGBC membership and are deeply engaged in all of our standard setting efforts. Nearly 1,300 product manufacturers – including two dozen chemical companies and some of their trade associations, including the American Chemistry Council– are members of USGBC.

   As I stated in my testimony, USGBC relies on expert committees to provide a consistent source of sound advice and subject matter expertise. The committees ensure that LEED is grounded on technical and scientific considerations of the highest quality. To date, technical experts from across the building industry, including manufacturers, have contributed more than 25,000 pro bono hours to the development of the newly proposed LEED rating system. The membership of the LEED committees is available online at

http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1750. The openness, transparency and consensus development of LEED allows public input into the process to allow for diverse interests to be heard. Each public comment (now over 22,000 in number) is responded to individually and is available on our website.

USGBC is working with all stakeholders, including companies across all sectors of the building industry, to ensure that LEED remains the most widely used and accepted high performance building rating system in the country.

5. Over the past five years, what amount of USGBC revenues have come from federal agencies, directly or indirectly? Please include costs for buildings constructed for federal purposes in which any certification costs were not directly paid for by GSA or other federal agencies.

   USGBC does not discuss or disclose private or public partners' financial data or other confidential information. GSA is in the best position to speak about its expenditures to USGBC in relation to pursuing LEED certification.

   While we are incredibly proud of the work we have done with federal partners, private sector partners continue to be the dominant users of LEED. GSA buildings make up less than three percent of the total LEED certified building stock.

6. How many federal employees are LEED accredited? For the purposes of the last question, please use any available information to determine who is a federal employee including email addresses that end in ".gov" or list a federal agency as their place of employment.

   0.5 percent of the more than 180,000 individuals who hold a LEED professional credential list their organization as "Government-Federal/National."

Questions submitted by Rep. Paul Tonko, Ranking Member,
Subcommittee on Investigations & Oversight

1. Since the major operational costs for buildings are in heating and cooling and in lighting, it appears the energy efficiency factor for buildings is dominant in the consideration of whether a building achieves a high green rating. Is it possible for a building to achieve LEED Gold rating or above primarily through the points received for energy efficiency designs and materials? How large a role do the other factors play (e.g. water-use efficiency; proximity to transit; incorporation of renewable building materials; etc.) in the current rating process? How do you anticipate they may change under evaluation through the new version of the LEED standards?

Under the 2009 version of LEED, it is not mathematically possible to achieve LEED Gold using only Energy and Materials related credits. As with the current LEED rating system, v4 will continue to focus on energy and water efficiency as key drivers in achieving LEED certification.

As proposed, LEED v4 has underlying system goals that are consistent with earlier versions of LEED, including the reduction of energy, the enhancement of individual human health, protection of water and habitat, and the promotion of sustainable materials. Economy and community enhancement are deliberately cross cutting and integrated into these goals.

2. Many people have advocated for the use of life cycle assessment (LCA) as an objective means to evaluate the overall performance of a building over its projected lifespan and as a means to compare the environmental performance of alternative building materials. At the current time, LEED has a pilot credit for life cycle assessment, but has not yet incorporated LCA into its standards. Do you anticipate that LCA will be incorporated into the new LEED standards? Will USGBC be using LCA as currently used in the Green Globes evaluation system?

   The current LEED v4 proposal, which is available on our website http://www.usgbc.org/DisplayPage.aspx?CMSPageID=2360, includes a significantly more integrated life cycle assessment in the materials and resource section of the rating system than previous versions of LEED. This section, like other elements of LEED v4, is not final and is still being refined with input from the general public and our membership. The changes to LEED are scheduled to be voted on in June of 2013 and must be approved through a balanced democratic ballot open to all USGBC members.

3. Since wood can be produced sustainably and, when incorporated into long-lived structures like buildings essentially sequesters carbon it would likely achieve a high rating in a LCA. Some wood products are certified by private certification organizations based on the production methods. For other building materials, there is an all-or-none evaluation of the product because there are no comparable certification systems to evaluate alternative production methods for cement, steel, glass or other materials.

   It is my understanding that the LEED rating system encourages the use of wood certified by the Forest Stewardship Council, but not wood certified through the Sustainable Forest Initiative or wood products in general, while Green Globes rates all certified wood products (e.g. FSA, SFI) similarly. How does USGBC handle this now and how might this change with the adoption of the new standard?

   As previously stated, since 2000 when LEED was first created, our membership (with the extensive input of hundreds of subject matter experts) has supported the FSC system as the only forest certification program to be recognized in LEED. The reason for that support is that there are substantial differences between the systems. In 2010, USGBC

sent to ballot a change that would identify criteria against which all forest certification programs could achieve credit in this area; however, it was voted down by our membership (including opposition from SFI and its supporters). USGBC continues to work with technical experts and all stakeholders to ensure that LEED reflects leadership in forest stewardship.

Additionally, the increased focus on LCA proposed in LEED v4, as well as the credits for responsible extraction, will enhance the profile of most renewable products, including wood. The LCA profile of most wood is correctly identified as advantageous. The proposed credit for responsible extraction of raw materials will catalyze the creation of certification programs for other building materials analogous to the programs that already exist for forest products. This should continue to highlight the significant investment in responsible extraction procedures that the forest products industry has made over the past decade.

4. I understand the new LEED standards under consideration will include an evaluation of materials based on the list of hazardous substances compiled under California's toxics law. A number of the substances listed are used widely in the construction industry due to their beneficial material properties and cost competitiveness with alternative materials, including in insulation and other products that improve buildings' energy efficiency performance. How will the new rating balance these alternative objectives of achieving better performance with respect to energy use and avoiding the use of particular materials?

   Based on feedback we received from our open, transparent process, the references to California's Proposition 65 have been removed from the proposed credits. There is no so-called "red list." Instead, the credits provide incentives for the use of chemicals for which greater information on content and the potential impacts on human health is available. As you indicate in your previous question, LCA is a trend in building assessment, but depends on information availability. It is also important to recognize that the proposed credits dealing with chemical content are completely voluntary elements within the rating system. Any project can get to the highest levels of certification without pursing these credits.

5. It is my understanding that all of the forest certification systems have evolved since they were first introduced. Are the differences between these systems very different at this point – at least as related to management of forest lands in the U.S.? Much of New York State's private forest land is certified under one or more of the certification systems – primarily the SFI system. I believe these forests are well-managed, and they support sustainable jobs and communities as well as sustainable forest practices. Are the alternative forest certification systems receiving consideration in the development of the new LEED standard? To what extent is consideration given to domestically produced forest products as opposed to imported products in the weighting system?

Any wood product sourced from a forest within 500 miles of a project site currently receives points toward LEED certification, regardless of sourcing methods or forestry certification. Almost 90 percent of certified commercial LEED projects (public and private) attain the local materials credit.

Questions submitted by Rep. Larry Buschon

1. Is there a *de minimis* threshold for a chemical beneath which a building product could still obtain the proposed credits? For example, one part per billion?

   See answer below.

2. What if the level of a chemical is beneath our ability to detect it using state-of-the-art equipment and techniques? How would you know whether or not a material qualified for the avoidance credit?

   See answer below.

3. The California Proposition 65 program relies on "hazard" determinations, that is, whether a chemical is associated with a health effect at some level of exposure. If USGBC is intent on wading into the complex business of chemical evaluation and management, would it make more sense to rely on risk assessment? That is, to evaluate whether people or the environment are likely to be exposed to problematic levels of a chemical from particular building products?

   In response to questions 1-3, The LEED credits dealing with transparency and product optimization (available at http://www.usgbc.org/DisplayPage.aspx?CMSPageID=2360) are still under development, but a threshold of the kind suggested in these questions is not currently in any of the proposed credits. The current draft of LEED v4 is seeking increased transparency and disclosure about what chemical makeup of a product. Based on feedback we received from our open, transparent process, the references to California's Proposition 65 have been removed from the proposed credits. There is no so-called "red list." Instead, the credits provide incentive for the use of chemicals that provide greater information on content and the potential impacts on human health. More specifically, project teams that disclose 20 percent of their total project cost through this process would receive credit in the proposed LEED v4 rating system. Because LEED is a flexible tool, the proposed credits dealing with material content are completely voluntary as part of the rating system. Any project can achieve the highest levels of certification without pursuing these credits.

QUESTIONS FOR THE RECORD
U.S. House Committee on Science, Space, and Technology
Subcommittees on Investigations & Oversight and Energy & Environment Joint Hearing

"The Science Behind Green Building Rating Systems"

Thursday, May 8, 2012

Dr. John Scofield
Professor of Physics, Oberlin College

Questions submitted by Dr. Paul Broun, Chairman, Subcommittee on Investigations & Oversight

1. Your testimony recommends adoption of an Energy Star like model. Would that be more likely to increase energy efficiency and save taxpayer dollars?

There is not a simple answer. If one established a high Energy Star score target (say 90 – meaning the measured energy performance of the building is in the top 10% of comparable buildings) then any building that met that target would surely have exemplary energy efficient (relative to comparable buildings). One could obviously establish a lower Energy Star score target (say 75) which then would not yield as high energy efficiency. It would be my recommendation that a score of 90 is a reasonable target.

But there is nothing in Energy Star that even considers cost – it is simply a measure of energy performance. To achieve cost-effectiveness one would have to add other stipulations – say that only measures with simple payback times of 5 years or less could be utilized (or another standard that is widely recognized as a standard for investment). Any energy improvements in Federal Buildings should also be cost-effective. And clearly there would be some Federal buildings that could not cost-effectively achieve Energy Star scores of 90 – and, as a tax payer, I would not want to see the Federal Government achieve such high scores at any cost. Perhaps the goal for a set of buildings would be to cost-effectively achieve an average Energy Star score of 85, recognizing that some buildings will do better and some worse. After a few years the goals could be revisited to see if the target was appropriate.

The major point I was trying to make in my testimony is that energy efficiency is demonstrated by actual performance. The Energy Star score is tied to measured performance and is based upon primary (or source energy) use as compared with that for similar buildings. It is the right measure for actual energy performance.

2. Since the hearing, has USGBC responded to your study of their rating systems? What about GSA, DOE, or the national labs?

I have not had any communication with any of these organizations since the hearing. Certainly none of them have responded to me with regard to my testimony.

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"The Science Behind Green Building Rating Systems"

Thursday, May 8, 2012

Mr. Victor Olgyay
Principle Architect, Built Environment Team, Rock Mountain Institute

Questions submitted by Dr. Paul Broun, Chairman. Subcommittee on Investigations & Oversight

1. Should energy efficiency be the primary goal for federal green building standards? Do you feel that the present LEED rating system ensures that energy efficiency is the primary goal?

Energy is a critically important, but certainly not the only aspect of a green building. Green building standards historically were developed to provide a balanced definition of what constitutes a green or sustainable building. Energy efficiency alone was not considered sufficient. For example, in areas where water is scarce, this resource clearly needs to part of the evaluation. for this reason, most current green building rating systems include site, water, energy, materials, and interior environmental quality as the basic categories. These should be the primary goals for a federal green building standard.

The current LEED rating system allocates up to 35 out of a possible 110 points to the energy category. This is a proper emphasis on energy efficiency in the definition of a green building, and is based on a comprehensive analysis of the relative environmental impacts of each of the different areas considered in LEED. The science behind this is rigorous and defensible.

QUESTIONS FOR THE RECORD
U.S. House Committee on Science, Space, and Technology
Subcommittees on Investigations & Oversight and Energy & Environment Joint Hearing

"The Science Behind Green Building Rating Systems"

Thursday, May 8, 2012

Mr. Tom Talbot
CEO, Glen Oak Lumber and Milling of Wisconsin

Questions submitted by Dr. Paul Broun, Chairman, Subcommittee on Investigations & Oversight

1. Why is it important that green building rating systems use life cycle assessments for evaluating building materials?

   The playing field for green building materials must be a level one and science is the only way to ensure all building products (wood, steel, plastic, concrete, etc) are held to the same rigorous standards for environmental performance. Life Cycle Assessment is the scientific method by which ALL the environmental impacts of extracting, processing, delivering materials, and manufacturing, using and disposing of products are identified, measured and assessed in an objective and balanced way. It is only through such a comprehensive procedure that genuine environmental risks can be identified and appropriate mitigation measures introduced. Efforts to award credits to different materials on the basis of preconceived notions of good environmental practice and lists of arbitrary criteria (such as 'recycled', 'rapidly-renewable', 'certified wood') - as currently practiced by LEED - may only reduce impacts at one stage of a products life cycle at the expense of increased impacts at another. These efforts also take no account of context. So for example, increased demand for "recycled" material may be appropriate if there is a reliable and good supply of recycled material close to hand, but not if huge amounts of energy are required to separate out and transport this material to the manufacturer. Use of 'fast-rotation' materials like bamboo, straw and hemp may be appropriate if there's enough spare farmland to allow some to be diverted away from food production towards supply of materials for building or furniture. If there isn't, use of these of products may simply lead to intensification of agriculture resulting in increased soil erosion, fertilizer and pesticide use, or conversion of natural areas like forests.

2. LEED's certified wood credit, with its sole recognition of the Forest Stewardship Council's forest certification system, has been a topic of some debate. Can you comment on the impact of this credit to your business?

   LEED's sole recognition of the Forest Stewardship Council, while giving some companies an advantage, has the effect of limiting the use of U.S. grown and manufactured wood products, since 90% of FSC certified lands are outside the U.S..

The Hardwood Federation believes that all forest certification systems are important and should be recognized, since all promote good forestry practices. In addition though, the Hardwood Federation believes that ***low risk*** *and* ***legal sources*** *of wood, like the supplies for many of our Hardwood facilities, should be recognized and used in all Green buildings.*

Glen Oak Lumber & Milling, Inc. and its subsidiaries procure or obtain the following types of wood supplies for manufacturing its products: hardwood logs, hardwood lumber, residuals from wood processing manufacturing, and fiberboard. The company's manufacturing facilities currently utilize wood materials primarily of temperate hardwood species produced in the United States. These "districts of origin" include the states of: Wisconsin, Michigan, Kentucky, Pennsylvania, Ohio, West Virginia, Virginia, Tennessee, North Carolina, Alabama and Arkansas.

U.S. hardwoods used by Glen Oak Lumber & Milling are predominantly supplied from small private family owned forest lands where forest certification is not practical. Early on, we decided that our company was not going to subscribe to, or align its fate with, a single forest certification organization, but that we were going to address the heart of the issue head-on. We have done so by implementing a comprehensive system to monitor and progressively increase the proportion of our wood resources that can be tracked back to the State and/or Ecoregion of origin.

*Under the expert guidance of Al Goetzl, the founder of Seneca Creek Associates, LLC (a consulting firm specializing in natural resource economics and policy), author of major studies of the illegal logging issue and its impacts of on U.S. industry competitiveness, and currently an International Trade Analyst with the US International Trade Commission, in 2009, we began the process of systematically monitoring our wood resources. We conducted our own comprehensive Wood Supply Risk Assessment to assess the risk of sourcing wood and fiber from any of the unacceptable or controversial sources as defined by the Forest Stewardship Council (FSC) Chain of Custody and Product Label Standards and by the Sustainable Forestry Initiative/Programme for Endorsement of Forest Certification (SFI/PEFC) Chain of Custody standards. Our Wood Supply Risk Assessment (which is updated annually) also evaluates Glen Oak Lumber & Milling's wood supplies in the context of Lacey Act provisions addressing illegally harvested wood. The assessment includes a detailed review of the data supporting a conclusion and self-declaration that Glen Oak Lumber & Milling, Inc. can be considered "****Low Risk****" with respect to illegal or controversial sources of wood supplies.*

*Glen Oak Lumber & Milling has assessed its U.S. wood supply regions against published and known areas of concern that might be deemed other than "****low risk****" for what are considered by recognized forestry certification systems as unacceptable or "uncontrolled" sources. The company has evaluated each of the five risk categories of wood that must be avoided.* ***These material categories include: (1) illegally harvested wood; (2) wood harvested in violation of traditional or civil rights; (3) wood harvested in forests where high conservation values are threatened by management activities; (4) wood harvested in forests being converted to plantations or non-forest use;***

and (5) wood harvested from forests where genetically modified trees are planted. *Based on a detailed review of available data for evaluating controlled wood indicators, Glen Oak Lumber & Milling's temperate hardwood wood supplies can be considered "**Low Risk**" in all five risk categories.*

*To insure a balanced approach, Glen Oak Lumber & Milling, Inc. also reviewed its wood supplies in the context of Sustainable Forestry Initiative (SFI) and the Program for the Endorsement of Forest Certification (PEFC) requirements for the avoidance of procurement of raw material from controversial sources. The SFI is a PEFC-endorsed North American certification standard. The SFI/PEFC standard defines controversial sources generally as those where harvesting is unauthorized, legally prohibited or planned to become strictly prohibited by law. Based on SFI/PEFC risk assessment procedures and indicators, Glen Oak Lumber & Milling, Inc.'s temperate hardwood wood supplies can be considered "**Low Risk**" for controversial sources.*

In conjunction with this assessment, as outlined above, we completed our own corporate policy on hardwoods sustainability and procurement. In doing so, we believe this put us ahead of the curve in our industry. We communicate our wood procurement policy to our lumber suppliers and gather documentation from each annually regarding their wood sources (per prescribed U.S. eco-regions) and their commitment to conform with our sustainable forestry program.

*It is the policy of our company to ascertain that all forest-based material used in its manufacturing is from **legal sources** and conforms to internationally recognized standards that ensure that there is a **low risk** of sourcing controversial and uncontrolled wood and fiber. Specifically, we require all of our suppliers to provide information about the species and source of wood materials that we purchase, and to provide written assurances that the wood material is harvested in full compliance of all applicable laws and regulations and does not originate from ecologically or environmentally controversial areas. Our company extends this requirement to ensure that any wood imports meet the provisions of the Lacey Act as amended in 2008 which prohibits the importation of wood products that are harvested illegally.*

We believe that our Sustainable Forestry and Wood Procurement Policy, Wood Supply Risk Assessment, and other documented programs and procedures aptly demonstrate Glen Oak Lumber & Milling's commitment to the goals of sustainable forestry and promoting responsible wood procurement. Furthermore, we are committed to a Zero Waste policy of wood material which means we utilize 100% of all wood materials supplied to our facilities to produce saleable products. Overall, Glen Oak Lumber & Milling believes in a resource use and conservation stewardship ethic that enables meeting the needs of the present without compromising the ability of future generations to meet their needs.

Despite all this effort and documentation—which gives us and our customers the confidence that Glen Oak Lumber & Milling's wood fiber supplies are legally produced and are not derived from sources to be avoided according to recognized

standards and guidelines—without the Forest Stewardship Council (FSC) label, Glen Oak Lumber & Milling products do not qualify users for the LEED certified wood credit.

We do not know exactly how much business opportunity we have lost as a result of not subscribing to FSC certification. I can tell you that some downstream companies (i.e. prospective customers of various products who may or may not be seeking LEED credits) that claim they use only FSC-certified wood in their products ***do not****. There are others who stick to their FSC-certified-only products policy that have told us they want to buy from us but cannot do so due to this FSC-only policy. There are also some companies who started out with the intention of purchasing and selling only FSC-certified hardwood products that have changed their strategies. They choose to buy from us because of our product offering and quality, and their comfort-level that the origin of our products is as good as any that carry the FSC stamp of approval. I look forward to a day when LEED gets away from its sole recognition of the FSC and recognizes a science-based system where Life Cycle Assessment and Environmental Product Declarations are used as the measuring stick for LEED and true Green building decisions. When LCAs and EPDs are utilized, it will promote a more even playing field for my business and for the American hardwoods industry as a whole.*

Questions submitted by Rep Paul Tonko, Ranking Member,
Subcommittee on Investigations & Oversight

1. There has been considerable controversy over the different forest certification systems over time. My understanding is that here in the U.S., most of our commercial forest lands are certified under the Sustainable Forest Initiative (SFI) system rather than the Forest Stewardship Council (FSA) system. What is the difference in cost to forest land owners of maintaining a FSC certification as compared to a SFI certification? Are there other barriers to achieving FSC certification for U.S. forest land owners?

   There seems to be a misunderstanding here about the relative importance of "commercial" forest land in supply of wood products. It is true that large industrial forest lands are almost exclusively certified to SFI. However, while these lands are important for supply of softwood, they are much less important for supply of hardwood. Around 80% of hardwood supply is from by non-corporate, family forest owners. In this sector, there is a very limited supply of wood certified under any system. This is not because of any failure in forest management, or lack of sustainability, but due to technical constraints to forest certification. Some 4 million individuals and other private entities own the 110 million hectares of hardwood and mixed oak-pine forest types. This resource supports an estimated 14,000 hardwood businesses across the U.S., mainly small and family owned.

   There is only one forest certification system that is designed solely for the non-corporate, family forest owners that supply most of our hardwood mills with their raw material—the American Tree Farm System (ATFS). ATFS certifies small family forest owners—no

larger than 10,000 acres, to eight standards of sustainability. To be ATFS certified, there is no cost, outside of the cost of getting a forest management plan for the property. Wood from ATFS certified forests is recognized by the Sustainable Forestry Initiative. While this is an important system, only 27 million of the 251 million acres of non industrial and family-owned forests are certified to this standard.

Certification systems, with their emphasis on compliance to lengthy, often complex, standards and regular audits are well adapted to large centrally planned forest enterprises supplying regular commercial volumes of timber. They are not well adapted to small family owned forest operations which might harvest only once in a generation, for which timber extraction may be only a secondary activity, and where unit costs of audits tend to be much higher. This is equally true of both FSC and SFI.

A paper commissioned by FSC-US in 2006 (Family Forest Program and Small Low Intensity Forests as a Cross Cutting Issue in the Standard Review Process, February 2006, Phil Guillery) noted that "the current regional standards are generally not approachable from the perspective of the family forest owner or manager. The standards are also difficult to audit or implement on small properties." This led FSC to embark on a process to review the standards in an effort to make them more relevant to small forest owners.

According to a recent report by Dovetail Partners, a non-profit providing independent information on U.S. forest certification, the results of this process have been mixed: "In general, the impact and benefits from the new FSC Family Forest Indicators are moderated by the fact that the changes do not represent a radical departure and auditors have the discretion to include indicators that are deemed relevant even if they have been identified as 'Low Risk' or 'Inapplicable'". Dovetail highlight the continuing high level of bureaucracy associated even with the new simplified procedures: "Current FSC reporting requirements are extensive and modifications could be enhanced to reflect family forest considerations and streamlining of the documentation."

Even if further more far-reaching amendments were made to the FSC so that it was more relevant to small owners, there would still be an essential need to undertake far-reaching communication to reach millions of private owners, and to provide meaningful incentives to encourage certification amongst non-industrial owners. Experience with FSC group forest certification systems now operational in Wisconsin, Minnesota, and Michigan suggest this can only be delivered following significant intervention by state authorities.

It's also highly questionable whether certification is necessary to demonstrate sustainability in the US hardwood sector. There is clear objective evidence that sustainability is anyway inherent to the ownership structure and cultural inheritance of this sector. Secure ownership rights, often held over many generations, have led to forest operations driven more by long term concern for forest quality than short-term timber values. According to the latest (2006) USDA National Woodland Owners survey, only 9% view timber production as an important reason for owning forest land. Much more important factors are enjoyment of the scenery, nature protection and biodiversity

conservation, together with a desire to pass on these benefits to the next generation. Low intensity selection harvesting has become the norm across the US hardwood forest.

Evidence from the U.S. Forest Service's Forest Inventory and Analysis (FIA) program, based on regular analysis of a dense network of sample plots located in forest-stands nation-wide, shows that the US hardwood forest is expanding dramatically in size -in terms of both standing volume and forest area - and also increasing in biodiversity (as stands are generally ageing). Latest data from this source indicates that the standing volume of hardwoods in all diameter classes and in the vast majority of species groups is rising, continuing a sixty-year-plus trend of increasing timber inventory. Between 1953 and 2007, the volume of U.S. hardwood growing stock more than doubled from 5,210 million m3 to 11,326 million m3. Furthermore, independent reports (such as Seneca Creek 2008) confirm that hardwood harvesting – which is typically low intensity selection harvesting - is both environmentally and socially desirable.

The independent LCA report on US hardwood lumber prepared by PE International for AHEC and subject to Critical Review by some the world's foremost LCA experts, includes an assessment of environmental impacts associated with hardwood forestry. On land-use change, it observes "in the system under investigation the main material – wood – comes from naturally re-grown forests. The harvested areas had undergone several iterations of harvesting and re-growth. After harvesting, the land is returned to forest so there is no direct land use change to account for in the timeline of few hundred years". On biodiversity impacts, the study concludes that: "Conversion of any other commercial land into the hardwood forest would most probably be a positive impact on the land quality including biodiversity and associated ecosystem services". On toxicity it notes that: "In the production of hardwood lumber there are no fertilisers or wood treatment chemicals or any other known substances of particular toxicity concern". On water resources it comments: "hardwood lumber is expected to have very low impacts".

2. It is my understanding that all of the forest certification systems have evolved since they were first introduced. Are the differences between these systems very different at this point – at least as related to management of forest lands in the U.S.? Does the market discriminate among wood products rated through these different systems? For example, is there a difference in prices for the same wood certified under FSA, SFI, or the American Tree Farm System? What proportion of the building materials market is served currently by wood products that are certified as compared to uncertified wood products? Of the certified wood products, what proportion of the market is served by wood certified under these different programs?

   A. On the question of differences and similarities between forest certification systems, this issue has been covered in depth recently by Dovetail Partners. See:
   http://dovetailinc.org/files/DovetailCertReport0310b.pdf
   http://dovetailinc.org/files/DovetailFSCSFIComparison32811.pdf

Essentially the reports conclude that there are distinctions in the detailed content of standards, but all systems now offer comparable (and strict) levels of transparency, oversight, and stakeholder participation, and all are valuable tools to promote better forestry practices in certain contexts.

The National Association of State Foresters (NASF) approved a forest certification policy statement in 2008 setting out the fundamental elements of forest certification: independent governance, multi-stakeholder standard, independent certification, complaints/appeals process, open participation and transparency. This policy statement found that all of the major certification programs used in the United States – SFI, ATFS, and FSC – include these elements and make positive contributions to forest sustainability.

The question of price differentials is difficult to answer because each of the certification frameworks tends to service different forest ownerships and market sectors and typically there's not much direct competition between, say, "FSC-certified" and "SFI-certified" products. SFI is applied primarily by large industrial operations and state agencies producing mainly softwood-based products and all costs tend to be internalized, with SFI-certified products costing no more than equivalent uncertified products. The same applies to FSC certified wood from public or large industrial-ownerships that benefit from large economies of scale and, in the case of public forests, state subsidies. However certified hardwood from non-industrial forest lands may command a premium compared to equivalent uncertified product because smaller owners do not benefit from economies of scale in forest certification, and also because of relative scarcity of certified hardwood.

I'm not aware of any studies assessing the proportion of building materials served by certified as opposed uncertified products. However a rough estimate can be provided by considering the current coverage of certified forest land in the United States. It's also important to emphasize that there is a major imbalance between supplies of certified softwood and panels on the one hand, and certified hardwood on the other.

Overall it's estimated that perhaps 20-30% of softwood supply and less than 5% of hardwood supply is certified to any of the programs. Supply specifically from FSC certified forests is still negligible.

Although around 44 million hectares (22%) of the 204 million hectares of total U.S. timberland is now certified, only a very small proportion supplies hardwoods suitable for sawn lumber and veneer production. The certified area is made up as follows:

- *Around 6 million hectares (3% of forest area) is dual FSC-SFI certified, all under state-mandated programs in Wisconsin, Minnesota, and Michigan and several other states which supply a mix of softwood and northern hardwood species.*
- *20 million hectares (10%) are certified only under the SFI Program designed specifically for large forest tracts. The certified area is made up almost exclusively of large areas of industrial forest land supplying raw material to the pulp, paper, panel products and softwood lumber industries.*

- *The ATFS (5%) has certified around 10 million hectares distributed amongst 90,000 participants. While ATFS has been developed for small owners, awareness of the program remains very low in hardwood producing regions of the U.S.*
- *Around 8 million hectares (4%) is certified only to the FSC system - much of the land being in state or large industrial forest holdings. Some of these areas are able to supply FSC certified hardwoods (e.g. State of Pennsylvania forest lands, Forestland Group), but only constitute a tiny proportion of overall hardwood supply.*

3. Since wood can be produced sustainably and, when incorporated into long-lived structures like buildings essentially sequesters carbon it would likely achieve a high rating in a life cycle assessment (LCA). Some wood products are certified by private certification organizations based on the production methods. For other building materials, there is an all-or-none evaluation of the product under LCA because there are no comparable certification systems to evaluate alternative production methods for cement, steel, glass or other materials as exists for wood with FSA, SFI or American Tree Farm System. Does this place wood at a disadvantage as compared to other building materials in the rating systems that have developed for green buildings?

   A. The short answer is yes. The importance of this issue was highlighted recently by the recent effort to redraft the LEED 2012 standard - one aspect of which has been to try to extend the responsible sourcing credit to materials other than wood. LEED were unable to identify equivalent compliance paths for any non-biogenic materials - and instead propose that non-renewable materials like plastics, steel and concrete should receive equivalent credits for compliance to various self-regulatory industry programs - non of which involve third party assessment or development of consensus-based standards governing performance at point of extraction. LEED seems to operate on the principle that the less progress has been made, the lower the standard that should be set. As a result wood is penalized for its leadership role.

   This lack of a level playing field in requirements for responsible extraction and sourcing for wood and non-wood (and non-renewable!) products is a critical one for the forest products sector. Instead of constantly going over old ground about the relative merits of FSC vs PEFC vs SFI, a more critical issue is to address the lack of any form of scrutiny of extractive practices in most other material supplying sectors. Given the recent massive oil spill in the Gulf of Mexico, apparently the result of poor over-sight of drilling operations, it's surprising this issue isn't given greater prominence.

Appendix 2

Additional Material for the Record

GREEN BUILDING CERTIFICATION SYSTEMS HEARING FOLLOW-UP ITEMS

Green Building Certification Systems Hearing
House Committee on Science, Space, and Technology
Subcommittee on Oversight and Investigations
May 8, 2012

Follow-up Items

1. **Please provide a list of all USGBC board meetings that Mr. Horn has attended and in what capacity.**

   Mr. Horn has served two terms as the Federal Advisor; first as the Federal Advisor on the USGBC Board of Directors (a non-voting position on the USGBC Board of Directors) and the latest term as a Federal Advisor to the USGBC Board of Directors (a non-voting position advising the USGBC Board of Directors but not a position on the board itself). While Mr. Horn could provide input to the USGBC Board of Directors, he was unable to vote on matters before the board. Mr. Horn attended the following USGBC Board of Director meetings:

   Position: Federal Advisor on the USGBC Board of Directors (non-voting)

February 8-10, 2007	Washington, DC
June 8-9, 2007	Washington, DC
November 4-5, 2007	Chicago, IL
February 26-March 1, 2008	Syracuse, NY
July 17-18, 2008	Washington, DC
November 16-17, 2008	Boston, MA

   Position: Federal Advisor to the USGBC Board of Directors (non-voting)

February 25-26, 2010	Washington, DC
June 15-18, 2010	Salt Lake City, UT
November 14-15, 2010	Chicago, IL
July 10-13, 2011	Atlanta, GA
November 17-18, 2011	Washington, DC
February 29-March 1, 2012	Washington, DC

   Section 12 of the National Technology Transfer and Advancement Act (NTTAA) requires Federal agencies to use consensus-based private sector technical standards, when available, and participate in the development of technical standards. As an agency that maintains an inventory of more than 370.2 million square feet of workspace for 1.1 million Federal employees, GSA believes participating in the development of sustainable design technical standards is in the best interest of the taxpayer and will help increase the efficiency and sustainability of the Federal government by reducing the cost and environmental impacts of its buildings. By participating in the development of green building certification systems and standards, GSA is able to share its vast experience and knowledge in sustainable design, federal construction practices, and federal building performance requirements.

   GSA believes sharing its expertise with private sector green building certification systems and standards helps both the private and public sector advance towards minimizing environmental impacts from the built environment. Over the years, GSA has

participated in several green building rating system and standard development processes. Most recently, GSA supported and participated in the 3-year development process for the American Society for Heating, Refrigeration, and Air-Conditioning Engineers Standard for the Design of High-Performance Green Buildings (ASHRAE Standard 189.1), which provides a code-enforceable "total building sustainability package" for new construction, and serves as a compliance option to the International Green Construction Code (IgCC), which GSA also participated in its development. In addition, a former Assistant Commissioner in GSA's Public Buildings Service served as an advisor to the Green Building Initiative's Board of Directors with additional staff serving on technical committees in the development of the Green Globes rating system. Other staff have, and continue to participate in code development and updates in the fire protection and life safety, energy and commissioning areas, to name a few.

2. **What is the total amount of taxpayer dollars that GSA has spent on LEED Certification costs?**

GSA has only paid for LEED certification for 35 government-owned facilities. GSA has spent approximately $253,000 on LEED certifications from FY2002 to FY2011. The table below shows the amount spent per year, the number of LEED certifications per year, and the total approximate project cost for those certified buildings.

Fiscal Year	Amount Paid	Number of Building Certifications	Total Project Cost for Certified Buildings (in thousands)**
2002	$3,100*	2	$43,600
2003	$1,500*	1	$5,100
2004	$0.00	0	$0
2005	$6,350*	1	$11,500
2006	$9,818	2	$45,200
2007	$3,152	1	$61,800
2008	$37,557	4	$73,400
2009	$70,730	6	$806,300
2010	$61,259	9	$765,700
2011	$60,475	9	$233,000

* Denotes estimated fees paid for building certification.
** Approximate values

WRITTEN TESTIMONY OF RONALD E. JARNAGIN, FORMER ASHRAE PRESIDENT

ASHRAE Shaping Tomorrow's Built Environment Today

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Ronald E. Jarnagin
President

May 7, 2012

U.S. Representative Paul D. Tonko
Ranking Member
Subcommittee on Investigations and Oversight
Committee on Science, Space, and Technology

Dear Congressman Tonko:

On behalf of ASHRAE, I respectfully request that my attached testimony regarding the hearing entitled "The Science Behind Green Building Rating Systems", being held on Tuesday, May 8, 2012 by the House Committee on Science, Space, and Technology, Subcommittee on Investigations and Oversight be added to the *Congressional Record*.

Founded in 1894, ASHRAE is an international organization of over 53,000 members in more than 130 countries. Our members represent the breadth of professionals involved in the built environment – including consulting engineers and architects to manufacturers and their representatives, and academics. The Society and its members focus on building systems, energy efficiency, indoor air quality and sustainability within the industry. Through research, standards writing, publishing and continuing education, ASHRAE shapes tomorrow's built environment today.

Sincerely,

Ronald E. Jarnagin

Ronald E. Jarnagin
ASHRAE President 2011-2012

REJ/cn

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Ronald E. Jarnagin
President

Testimony of
Ron Jarnagin
ASHRAE

To the
U.S. House of Representatives
Subcommittee on Investigations and Oversight
Committee on Science, Space, and Technology
May 8, 2012
Washington, DC

Hearing on: "The Science Behind Green Building Rating Systems"

Chairman Broun, Ranking Member Tonko, and members of the Subcommittee, thank you for the opportunity to submit testimony on building metrics, the ways in which this data is translated into green building rating systems, and how these systems can be comprehensively supported. My name is Ron Jarnagin, and this year I am President of ASHRAE.

Founded in 1894, ASHRAE is an international organization of over 53,000 members in more than 130 countries. Our members represent the breadth of professionals involved in the built environment – including consulting engineers and architects to manufacturers and their representatives, and academics. The Society and its members focus on building systems, energy efficiency, indoor air quality and sustainability within the industry. Through research, standards writing, publishing and continuing education, ASHRAE shapes tomorrow's built environment today.

In pursuit of ASHRAE's mission to advance the arts and sciences of heating, ventilating, air conditioning and refrigerating (HVAC&R) to serve humanity and promote a sustainable world, building energy data is of paramount importance. As a national and global leader in the building and energy system community, ASHRAE has considerable experience with gathering and reviewing building energy data, and has developed an advanced building energy labeling program called the Building Energy Quotient (bEQ).

The Need for Change

As you well know, the energy and environmental impact of our nation's buildings is very large. In 2007, the estimated value of construction was $1.82 trillion (12.4 percent of gross domestic product). This figure includes renovation, heavy construction, public works, residential, commercial, and industrial new construction, as well as non-contract work. Within this amount,

new building construction, and residential and commercial renovation accounted for approximately 69 percent ($1.26 trillion)[1].

In addition to construction and renovation, our nation's buildings account for 41 percent of our primary energy use – more than either transportation or industry. Buildings are responsible for 74 percent of electricity consumption and 40 percent of the total U.S. carbon dioxide emissions[2]. Inefficient buildings create an astounding drag on the economy, wasting nearly $130 billion each year[3].

If the U.S. is going to achieve its energy, economic, and environmental goals, improving building energy efficiency must be a major part of the solution, and this in turn requires an increased understanding of buildings' intended and actual energy use – a role filled in part by surveys conducted by the U.S. Energy Information Administration (EIA).

Among the most important surveys conducted by EIA is the Commercial Buildings Energy Consumption Survey (CBECS). CBECS is a national sample survey that collects information on the stock of U.S. commercial buildings, their energy-related building characteristics, and their energy consumption and expenditures. CBECS data are critical to the building community because they help form the basis for understanding patterns of energy use, informing the decisions of the industry and key policymakers and government programs, and assessing progress towards energy conservation goals. For instance, CBECS data are used by ASHRAE in the development of our building energy efficiency standards, which are used by the federal government and most states. CBECS data are also the baseline used by many federal and private sector programs in their efforts to promote building efficiency, including: The U.S. Environmental Protection Agency's (EPA) and U.S. Department of Energy's (DOE) ENERGY STAR Buildings program, the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) for Existing Buildings, the Green Building Initiative's Green Globes® program, ASHRAE's (bEQ) building energy labeling program, and many others, which are all founded on performance comparisons with CBECS information. CBECS data are also used by federal agencies and national laboratories to help identify and prioritize opportunities to increase building efficiency.

ASHRAE encourages Congress to adequately fund EIA to allow work to continue on CBECS, and EIA's related Residential Energy Consumption Survey (RECS), and Manufacturing Energy Consumption Survey (MECS).

In addition to the energy consumption surveys, building rating systems, such as those listed above, help building owners, operators, tenants, the finance and real estate communities, policymakers, and the general public better understand building energy use through a variety of

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[1] U.S. Department of Energy. 2011. "Value of Construction and Research"."
http://buildingsdatabook.eren.doe.gov/TableView.aspx?table=1.3.1
[2] U.S. Department of Energy. 2011. "2011 Buildings Energy Data Book".
http://buildingsdatabook.eren.doe.gov/default.aspx
[3] Granade, Hannah Choi, et al. July 2009. "Unlocking Energy Efficiency in the U.S. Economy", McKinsey & Company.

interactive applications, reports, and plaques – all of which are designed to drive behavior change and reveal opportunities for increasing energy efficiency. In an effort to help achieve this goal, ASHRAE developed, and recently launched the bEQ program.

The Next Step in the Evolution of Building Energy Labeling: ASHRAE's bEQ

In the past, building rating systems have focused on either buildings' intended, as-designed energy use, or their actual, in-operation performance. ASHRAE's bEQ program takes the next step in the natural evolution of building energy rating programs by using both As Designed (asset) and In Operation (operational) ratings for all building types, except residential. One of the key benefits of the bEQ program is that it helps identify potential cost-effective energy efficiency improvements.

The bEQ program differs from programs like ENERGY STAR and LEED by focusing solely on a buildings' energy use, and provides a greater differentiation for high performance buildings along with an emphasis on net zero energy. The In Operation rating focuses on existing commercial buildings and has the ability to label additional building types, beyond what is available in ENERGY STAR. There is also a greater concentration on understanding the buildings' energy use and identifying opportunities for improvement of energy performance within that building. The rating requires a site visit by a certified energy assessor and includes a Level 1 Walk-through Energy Audit (as defined by ASHRAE in the *Procedures for Commercial Building Energy Audits*). Additional information provided includes measured indoor environmental quality information and subsystem energy use breakdown where available.

The bEQ In Operation label (Fig. 1) consistently analyzes buildings' energy use and compares that to similar building types. The information provided as part of the bEQ assessment process will help a building owner make better decisions in managing energy use and illustrate the benefits of potential building equipment and system investments. This in turn demonstrates corporate responsibility to employees, tenants, investors, and the public.

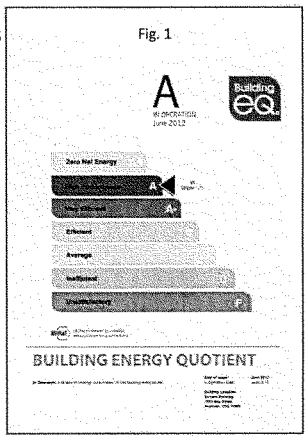

Fig. 1

bEQ helps a building owner respond to rising energy costs, improve the marketability of their property, and develop a business relationship with a professional whose concern is the buildings' energy performance.

The heart of the bEQ assessment is the Level 1 Walk-through Energy Audit, which includes a preliminary energy-use analysis, walk-through survey of the building, meeting with the owner, operator and occupants, space function analysis, and identification of energy conservation measures, including estimated costs and payback periods. The assessment also covers peak demand reduction and demand management opportunities,

energy use from on-site renewables, and spot measurements related to indoor environmental quality.

The bEQ In Operation Workbook documents all the measurements taken during the assessment and all the calculations to determine the buildings' rating score. The bEQ Certificate summarizes critical information from the Workbook and can be used by owners to comply with disclosure laws. The building owner also receives a bEQ Dashboard that provides a quick, visual depiction of their buildings rating score while highlighting other critical information. A bEQ plaque can be displayed on the building to inform the public of the buildings' rating.

The bEQ In Operation Assessment must be performed by a certified Building Energy Assessment Professional (BEAP)[4]. This certification, developed by ASHRAE and other leading building community groups, assures that assessors possess the ability to audit, analyze, and interpret information including project scope, data collection, building performance, systems alternatives, and energy conservation measures.

No energy assessor certification program is as rigorous as ASHRAE's BEAP certification. Employing a BEAP ensures that the bEQ assessment is being performed by a professional that has the knowledge and experience to know what to measure, how to measure, and how to analyze, and helps the building owner understand risks to make the best energy decisions for their building.

Additional information on ASHRAE's bEQ program can be found at www.BuildingEnergyQuotient.org. The Website includes information on obtaining certification as well as finding certified professionals. The In Operation Workbook forms and instructions can also be viewed and downloaded. A FAQ section answers frequently asked questions. Contact information is also provided for additional questions not covered on the Website.

Congress can help close the gap between the designed and operational energy use of buildings by requiring all new and existing buildings to put in place, within three years, an energy performance information program that measures both as-designed and in-operation performance. The information yielded from this program would be used to reconcile differences between intended and actual building energy use, and to help optimize building performance.

Supporting Building Energy Rating Systems

Building energy rating systems are just one tool needed to help the nations' building stock realize its energy efficiency potential. Other key elements include building modeling tools and

[4] Additional information on ASHRAE's Building Energy Assessment Professional certification program can be found at http://www.ashrae.org/education--certification/certification/building-energy-assessment-professional-certification.

education, integrated building design, high-performance standards, and certification for building operations and maintenance personnel.

Building Modeling

Building modeling represents one of the most powerful tools for optimizing building performance, and is an area worthy of increased support from Congress, as additional refinement of these high-potential tools is needed.

Software is currently being developed and improved which can create virtual models of buildings that simulate size, shape, appearance, and are capable of representing complex energy performance simulations, daylighting options, and predicting thermal comfort.

The improvement of building modeling software is receiving increased attention from the building community. One of the main centers for this activity is DOE's Energy Efficient Buildings Hub (formerly known as the Greater Philadelphia Innovation Cluster (GPIC) for Energy-Efficient Buildings)[5].

Integrated Building Design

To exploit the full capability of modeling tools, we must transform our design approach from a sequential process — where one discipline completes its work and hands off the design to the next — to a collaborative integrated building design process — where all of the disciplines involved in the buildings' design and construction work as team from the beginning to evaluate options and optimize the design.

Our biggest challenge is incorporating integrated design into daily practice. The traditional sequential approach misses the rich opportunities for optimizing building performance through a collaborative approach throughout the design process. It is going to require a cultural shift in our industry to transform the design process – and it's a shift that has to occur if we are going to reach our goal of net zero energy buildings.

Learning and sharing energy efficiency lessons from integrated building design, and transforming local building retrofit industries are among the main goals of DOE's Energy Efficient Buildings Hub. In an effort to advance our common coals of improving energy efficiency and reducing the environmental impact of buildings, ASHRAE signed a memorandum of understanding with the Hub in 2011[6].

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[5] Additional information on the U.S. Department of Energy's Energy Efficient Buildings Hub is available at http://gpichub.org/.

[6] ASHRAE's memorandum of understanding with the U.S. Department of Energy's Energy Efficient Buildings Hub can be found at http://www.ashrae.org/File%20Library/docLib/About%20Us/MOUs/GPIC-MOU_2011.pdf.

To help expand awareness throughout the government of the potential benefits of increased energy savings that can be achieved through integrated, whole building design, we recommend creating a new demonstration program with selected, geographically diverse buildings. A report on the success and challenges of such a demonstration program would yield useful lessons learned that could be applied and expanded to other buildings, as well as buildings in the private sector.

Standard 189.1: A New Foundation for Green Building Standards

In our continuing efforts to push the envelope on building efficiency, and in collaboration with the Illuminating Engineering Society of North America (IES) and USGBC, ASHRAE published Standard 189.1, *Standard for the Design of High-Performance, Green Buildings Except Low-Rise Residential Buildings* – the first code-intended commercial green building standard in the United States. ANSI/ASHRAE/USGBC/IES Standard 189.1, also serves as a compliance path of the International Green Construction Code (IGCC), published by the International Code Council.

Standard 189.1 represents a revolutionary new step for building standards, as it provides a long-needed green building foundation for those who strive to design, build and operate green buildings. From site location to energy use to recycling, this standard will set the foundation for green buildings through its adoption into local codes. It covers key topic areas similar to green building rating systems, including site sustainability, water use efficiency, energy efficiency, indoor environmental quality and the building's impact on the atmosphere, materials, and resources. One of the goals of Standard 189.1 is to provide significant energy reduction over that required in ANSI/ASHRAE/IES Standard 90.1-2007, *Energy Standard for Buildings Except Low-Rise Residential Buildings*. For these reasons, ASHRAE encourages Congress to support the adoption of Standard 189.1 and the IGCC.

Certification

In partnership with the higher education facilities association – APPA and the U.S. General Services Administration (GSA), ASHRAE has developed the Operations & Performance Management Professional (OPMP) certification program to recognize practitioners who have demonstrated a well-rounded understanding of the knowledge of the management of facility operations and maintenance and their impact on HVAC&R systems' performance.

Similarly, commissioning, re-commissioning, and retro-commissioning are important tools to ensure that buildings and equipment are operating as they were designed. Definitions of these processes, which have been adopted from ASHRAE Guideline 0-2005, *The Commissioning Process*[7, 8] are as follows:

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[7] National Institute of Building Sciences. 2010. "Commissioning Definitions". http://www.wbdg.org/pdfs/comm_def.pdf.

[8] See also ASHRAE Guideline 0-2005 *The Commissioning Process*. http://www.ashrae.org/standards-research--technology/standards--guidelines/titles-purposes-and-scopes#Gdl0.

- Commissioning Process: A quality focused process for enhancing the delivery of a project. The process focuses upon verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the Owner's Project Requirements.

- Re-Commissioning: An application of the Commissioning Process requirements to a project that has been delivered using the Commissioning Process. This may be a scheduled re-commissioning developed as part of an Ongoing Commissioning Process, or it may be triggered by use change, operations problems, or other needs.

- Retro-Commissioning: The Commissioning Process applied to an existing facility that was not previously commissioned. This guideline does not specifically address retro-commissioning. However, the same basic process needs to be followed from Pre-Design through Occupancy and Operations to optimize the benefits of implementing the Commissioning Process philosophy and practice.

To help ensure that commissioning processes are performed by qualified professionals, ASHRAE worked in close collaboration with several leading building community organizations to develop the Commissioning Process Management Professional Certification (CPMP). The purpose of this certification is to help building owners, developers, standards writing agencies, and others assess the capability of individuals to manage the whole building commissioning process[9].

In addition to commissioning and building operations and performance management, ASHRAE's credential programs include certifications for High-Performance Building Design[10], Building Energy Modeling[11], Building Energy Assessment[12], and Healthcare Facility Design[13] professionals.

To help improve the energy efficiency of buildings, ASHRAE encourages Congress to support the use of private sector-developed certifications.

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[9] Additional information on ASHRAE's Commissioning Process Management Professional Certification can be found at http://www.ashrae.org/education--certification/certification/commissioning-process-management-professional-certification.

[10] Information on ASHRAE's High-Performance Building Design Professional Certification can be found at http://www.ashrae.org/education--certification/certification/high-performance-building-design-professional-certification.

[11] Information on ASHRAE's Building Energy Modeling Professional Certification can be found at http://www.ashrae.org/education--certification/certification/building-energy-modeling-professional-certification.

[12] Information on ASHRAE's Building Energy Assessment Professional Certification can be found at http://www.ashrae.org/education--certification/certification/building-energy-assessment-professional-certification.

[13] Information on ASHRAE's Healthcare Facility Design Professional Certification can be found at http://www.ashrae.org/education--certification/certification/healthcare-facility-design-professional-certification.

Summary and Recommendations for Improving Building Energy Efficiency

In closing, I offer the following comments and recommendations for Congress to consider in its efforts to optimize the performance of the building stock.

- Adequately fund EIA to support CBECS, RECS, and MECS.

- Adequately fund the federal agencies that support the development and enforcement of energy standards and guidelines, including DOE, National Institute of Standards and Technology, EPA, and GSA, which serve as leaders in the implementation of leading edge building technologies and practices.

    - Specifically, help improve federal, commercial, and home building efficiency by continuing support for funding for the Building Technologies and the Federal Energy Management programs within the Department of Energy.

- Support research and development necessary to develop and deploy cost-effective technologies needed to achieve our nation's energy goals. This includes the technologies envisioned under the Zero-Net Energy Commercial Buildings Initiative established in the Energy Independence and Security Act (P.L. 110-140).

- Continue to support the use of voluntary consensus standards in regulation and codes as recognized by the National Technology Transfer and Advancement Act of 1995 (P.L. 104-113) and OMB Circular A-119.

- To help improve the energy efficiency of buildings, encourage greater use of professional certifications, such as those developed by private sector organizations, to raise the bar for people hired to design, construct, and commission buildings.

- Require all new buildings and all existing buildings to put in place, within three years, an energy performance disclosure program that assesses both an asset (as-designed) and achieved (in-operation) performance. The information yielded from this program would be used to provide key information to prospective owners and tenants, reconcile differences between as-designed and in-operation building energy use, and help optimize building performance.

- Examine the potential benefits and increased energy savings from integrated whole building design through a new demonstration program with selected, geographically diverse buildings. This demonstration program could be performed with private sector organizations in partnership with DOE's Energy Efficient Buildings Hub. A report on the success and challenges of such a demonstration program would yield useful lessons learned that could be applied and expanded to other buildings, as well as buildings in the private sector.

Thank you again for the opportunity to submit testimony to the Subcommittee. Please feel free to contact Doug Read or Mark Ames in ASHRAE's Government Affairs Office by email at WashDC@ashrae.org, and phone at 202-833-1830.

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STATEMENT FOR THE RECORD ON BEHALF OF THE NATIONAL ASSOCIATION OF HOME BUILDERS

Statement for the Record

On behalf of the
National Association of Home Builders

Before the
House Committee on Science, Space, and Technology
Subcommittee on Investigations and Oversight

Hearing: "The Science Behind Green Building Rating Systems"

May 8, 2012

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Introduction
Chairman Broun, Ranking Member Tonko, and distinguished Members of the Committee, on behalf of the National Association of Home Builders (NAHB), we respectfully submit this statement discussing the federal government's use of green rating systems, more specifically the GSA's and DOE's preferential treatment of certain private rating systems.

NAHB represents more than 140,000 members involved in the home building, remodeling, multifamily construction, property management, subcontracting and light commercial construction industries. We are affiliated with more than 800 state and local home builder associations throughout the country, and since the association's inception in 1942, NAHB's primary goal has been to ensure that housing is a national priority and that all Americans have access to safe, decent and affordable housing, whether they choose to buy or rent a home.

Background
NAHB members are leaders in the green building industry, having been at the forefront in educating the industry about green practices and building science through its Certified Green Professional (CGP) curriculum and its annual National Green Building Conference & Expo, which recently celebrated its 14th anniversary. These tools provide the industry with access to the nation's premier building science and technology knowledge on the principles and trends of green building. Additionally, several state and local associations within the NAHB federation, along with green advocacy groups, utilities and others pioneered the use of the green residential rating with regional systems – some of which are still in use today. NAHB and its members are strongly invested in ensuring that any public policy related to green building is successful and encourages voluntary and market-driven programs that:

- Promote building practices that represent resource-efficient construction
- Encourage the research and use of new technologies and practices
- Stimulate market demand for cost-effective, environmentally-friendly construction; and
- Provide education and meaningful information to builders, remodelers, homebuyers, home owners and regulators on the benefits of builder- and market-driven green building practices.

Additionally, in 2006, NAHB and the International Code Council (ICC), developers of the International Residential Code (IRC), the International Building Code (IBC) and the International Energy Conservation Code (IECC), partnered to develop a true, above-code residential green building standard. The resulting National Green Building Standard ICC-700 (NGBS), is the first and only residential green building standard to carry approval by the American National Standards Institute (ANSI). It thus complies with the federal government's National Technology Transfer and Advancement Act of 1995, which requires federal agencies to recognize and incorporate existing consensus standards in policy initiatives.

EISA 2007
The Energy Independence and Security Act of 2007 (EISA) authorized the DOE and GSA to review green building rating systems every five years and determine if any should be adopted at the federal level. The Act also required GSA to "identify and develop Federal high-performance green building standards for all types of Federal facilities."

To comply with these requirements, an initial determination was made to use the USGBC's LEED rating system. GSA recently published an updated analysis, but only examined three existing rating systems. NAHB strongly believes that no one private system should be favored in any public green building initiative. There are many widely used ratings in the market today, each meeting the needs of different

building types and users. The Federal government should not choose winners and losers, but instead support all consensus standards that promote buildings with reduced environmental impact and significant energy efficiency. Furthermore, the Act requires all building types to be addressed. Although GSA's building portfolio consists mainly of commercial properties, other agencies, such as the Departments of Housing and Urban Development, Defense, and Agriculture include other building types. Any public report should include an analysis of rating systems that measure these other needs (e.g. residential, storage/warehouses, etc.).

Because of the impact to the market and across the public sector, NAHB believes that GSA/DOE should conduct a revised, comprehensive study that examines all other legitimate rating systems, including the National Green Building Standard.

Green Rating Systems

Green building rating systems are a great tool to advance energy efficiency and resource conservation. They help builders build high performing buildings, they help consumers understand the impact their home can have and how to reduce its impact to the environment, and they help transform the market in a positive, cost effective manner.

In fact, as U.S. homes on average have become larger and energy needs have grown because of new home electronics, these homes have also become more energy-efficient. A 2009 report from the DOE's Energy Information Administration, the Residential Energy Consumption Survey (RECS), found that energy use dropped 31 percent in U.S. homes from 1978 to 2005. There are many reasons for this. New technologies and processes developed in the industry have certainly played an important role, but there is also a larger awareness of and desire for resource conservation. Voluntary rating systems have helped in this capacity.

These systems, as effective as they can be, do have limitations. In any discussion of rating systems, it is important to note that *green rating systems cannot substitute for building codes and should remain voluntary.* These systems were not designed to serve as mandates. Existing building and energy codes are already adopted at the state and local levels to ensure the health, safety and welfare of the public. These systems were created to serve as voluntary tools to encourage builders, remodelers and consumers to go "above and beyond" typical practices.

GSA Review of Green Rating Systems Is Critically Flawed

As authorized in EISA 2007, the General Services Administration (GSA) recently submitted a report, the Green Building Certification System Review, evaluating various green rating systems. The stated goal of this evaluation is to validate a certain certification system and level to be used by other federal agencies. GSA is considered the landlord of the federal government, and as such is viewed as "the" federal expert on real estate. Other agencies depend on GSA's analysis and recommendations and in many cases, are not equipped or otherwise able to conduct their own research. As such, this report carries tremendous weight across the public sector and has consequences far beyond the federal building stock managed by GSA. Furthermore, the implication to the private sector is significant.

NAHB believes that this review has two critical errors. It was not inclusive of all legitimate rating systems used in the market today and does not account for the necessary building types used by federal agencies.

It is true that the vast majority of GSA owned/leased buildings are commercial properties, but other agencies procure different building types. NAHB, being the voice of the housing industry, is of course most concerned with residential properties, and agencies such as HUD, the Army, USDA, among others, promote, build, and contract with developers to build housing. One glaring omission in the standard review is the ICC 700 National Green Building Standard (NGBS), the first and only ANSI approved residential green rating system. These other agencies look to GSA and DOE to determine their own policies on buildings.

Example: Department of Defense Sole Reliance on LEED
Over the past few years, there has been a great deal of discussion over the Department of Defense's exclusive use of the LEED rating system and certification. No one disputes the economic, social, and environmental benefits of green, high-performance military installations. Instead, the debate has been over the cost of attaining LEED certification. NAHB would like to see the Department of Defense explicitly authorize the use of the National Green Building Standard for the residential buildings it constructs, as well as the residential projects that it contracts with private builders to construct. We have heard from numerous private developers that would prefer using the National Green Building Standard for residential projects, and that they believe the Standard would likely even result in higher-performing residential buildings. However, these developers would like the Department of Defense to affirmatively state their acceptance of the Standard, as opposed to the developers advocating for the use of the Standard for individual projects. As the only ANSI-approved green building rating system for residential projects, there is simply no reason that the Department of Defense should not consider the NGBS for residential projects.

The impact of this report and any federal guidance on green standards is even broader. State and local governments also look to the federal government when making these types of policy decisions. In some cases, local governments have even adopted green ratings within building codes, which apply to more than just the public building stock, but to all buildings. It is essential that any type of federal review, analysis and recommendation be inclusive of all legitimate rating systems.

The ICC 700 National Green Building Standard (NGBS) Should be Included in Any Evaluation of Green Rating Systems

The NGBS is a standard originally developed in 2009. There are six primary categories: Lot and site development, resource efficiency, energy efficiency, water efficiency, indoor environmental quality, and homeowner education. It provides four certification levels: Bronze, Silver, Gold, or Emerald. In each of these levels, no category is weighted more or less than any other, and all projects must achieve a minimum point threshold in every category.

NAHB strongly believes that the NGBS should be included in any evaluation of green rating systems for the following reasons:

NGBS is Rigorous and Affordable
The NGBS is a very rigorous standard, but it also maintains affordability as a chief component, something that is often used to criticize "green standards." In fact, an independent study[1] conducted by

[1] AIA Cincinnati. "Comparison of United States Green Building Council's LEED for Homes ® First Edition 2008 And National Association of Home Builders' National Green Building Standard ™ ICC 700-2008." January 2010. http://www.aiacincinnati.org/community/LEED_NAHB_Sum.cfm

the Cincinnati Chapter of the American Institute of Architects, comparing NGBS and LEED for Homes, found that both ratings are essentially equivalent in rigor, but that the NGBS is more affordable and easier to use. Several other studies have examined specific buildings and climate zones and reached the same conclusion.

During this economic climate, it is more important than ever to conserve government resources. If certain standards/rating systems can be used to save taxpayer dollars, while also achieving a high level of efficiency, these options should be included.

It is also important to note that the NGBS is currently being used in communities across the country. The AIA Cincinnati report referenced above also found that the NGBS had parity with the LEED program in numerous state, local and national policy initiatives. Furthermore, it is already well understood by the industry, as it provides the framework for NAHB's green related education, and is the basis for NAHB Research Center's National Green Building Certification Program. Of chief importance, the NGBS is structured to be applicable across a wide range of geographical, climateological and economic conditions and places a greater emphasis on escalating energy performance than other popular residential green rating systems, including LEED.

NGBS Was Developed Using Consensus Standards

Federal agencies are required by law to recognize and incorporate existing consensus standards in policy initiatives (National Technology Transfer and Advancement Act of 1995). Consensus standards are essential in the development process of any standard. They allow for all relevant stakeholders and field experts to participate and offer their knowledge and expertise, while also protecting against special interest groups hoping to prioritize one particular product or technique over another. This process does not over-promote or exclude products or stakeholders.

While many can call themselves a consensus-based system, without a formal, independent, third-party approval, it is hard to know if the process was truly consensus based.

The American National Standards Institute (ANSI) is one such organization that ensures appropriate standards are met. ANSI is the chief organization that oversees the development of voluntary consensus standards and conformity assessment systems. ANSI has approved approximately 9,500 standards across various industries. By mandating strict balance requirements, with equal representation by stakeholder groups, this accreditation guarantees openness, balance, consensus and due process. It cannot be controlled by any one interest.

The NGBS is the first and only residential green building rating system to undergo the full consensus process and receive approval from ANSI. It underwent a two year development process, including collaboration amongst various stakeholders, including building code officials, the Department of Energy, the Environmental Protection Agency, the U.S. Navy, regional green building programs, builders, suppliers, manufacturers, and various environmental organizations. There were also over 2,000 public comments.

*The standard is currently being revised, through the consensus process and in-line with ANSI. It can be viewed: http://www.nahbrc.com/technical/standards/ngbs2012.aspx

It is important to note that although LEED claims to provide an open and transparent process, LEED is not ANSI-certified nor does it use a consensus based development process. It is developed by the USGBC, with a review conducted by the paid membership organizations.

NGBS Prioritizes Energy Efficiency

Most green rating systems have three overall goals and benefits: to use fewer resources, lower operating costs, and have a smaller impact on the environment. However, they vary significantly as to how they accomplish this. The NGBS has minimum performance levels for every category of green building practices AND for a building to be certified at higher levels, it must improve in every category. This is not necessarily the case with other rating systems.

During the development of the National Green Building Standard, the consensus committee worked with the Department of Energy to benchmark the amount of energy that was expected to be saved for each green building practice in the Energy Efficiency Chapter of the Standard. As a result, each point awarded in the Energy Efficiency Chapter is expected to produce a 0.05% reduction in energy use. Buildings that achieve the Bronze certification level are expected to save approximately 15% above the 2006 IECC (energy code). Silver, Gold, and Emerald certification levels are expected to save 30%, 50%, and 60%, respectively.

NGBS is Inclusive of All Building Types and Provides for Flexibility in Wide Geographies and Market Conditions

The NGBS applies to all land development and residential buildings, including single-family and multi-family homes. It also applies to both new construction, as well as remodels. Unfortunately many rating systems focus exclusively on new construction. While this is helpful, real energy use reductions need to be targeted towards older buildings – the real "gas guzzlers" of the built environment. The ICC 700 National Green Building Standard not only applies to renovations of existing residential buildings, but also provides a streamlined path for buildings that were built before 1980 and that use the most energy. To be certified these buildings have to be renovated to become more energy efficient, more water efficient, and because they will eventually be more energy efficient and the building envelop might be tighter, the renovation must include five practices aimed at ensuring the indoor air quality is not impaired. Certification is strictly performance based. A home that can attain a 20% reduction in energy and water use can attain a Bronze certification, and a home that achieves up to a 50% reduction in water and energy use can achieve an Emerald certification.

Conclusion

NAHB recommends that this committee ask the GSA and DOE to conduct a revise, more comprehensive review of all legitimate rating systems, including the ICC 700 National Green Building Standard, and that takes into consideration various building types.

NAHB also believes that any federal legislation, rulemaking, guidance or any other policy forum should include all legitimate rating systems. No rating system has been proven to achieve greater energy efficiency. Each system has strengths and as such, various agencies should be able to select from a host of rigorous systems that meet the needs of each particular project. No rating system should have a monopoly on the government. The USDA has managed to adopt multiple rating systems. This is a good model, but it is very important to note that most agencies will simply follow the lead of GSA and DOE and for this reason it is essential that any federal review be inclusive of all systems.

NAHB thanks the committee for this opportunity. We look forward to working with government to reduce energy use in the built environment and welcome any further engagement.

STATEMENT FOR THE RECORD BY SUBCOMMITTEE RANKING MEMBER PAUL D. TONKO

Statement of Rep. Paul D. Tonko
Ranking Member
Subcommittee on Investigations and Oversight
Hearing on: The Science Behind Green Building Rating Systems

May 8, 2012

Using energy efficiently in buildings is one of our greatest challenges. Buildings stand for decades and the materials and systems used in their construction must be durable and functional. Because they last for such a long time, attention to their operation costs in the initial design can pay dividends in energy saving for many years. We spend a great deal of time in buildings, and our indoor environments must provide safe and healthy places for us to live and work. We have an excellent opportunity to save energy, create jobs, and improve the environment by renovating existing buildings and constructing new buildings that incorporate materials and systems that reduce energy consumption.

The development and evolution of standards for high performance buildings by private sector groups: the U.S. Green Business Council, the Green Building Initiative, the International Living Building Institute, the American Institute of Architects, and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) has inspired significant adoption of design principles, materials, and systems to deliver more energy and water efficiently in buildings. The goals set in the 2005 and 2007 federal energy legislation and Executive Orders have moved research, design and adoption of building technologies forward. The federal government, through its procurement and management of buildings is helping to shape the market while reducing operating costs. These efforts have also increased awareness of the impact that buildings have on our environment that go well beyond the space they occupy.

Mr. Chairman, I recognize that not all groups with an interest in green buildings could be represented at the witness table today. In recognition of the importance of heating and air conditioning in buildings and the contribution that ASHRAE and its members make to the improvement of the energy performance of these systems, I have attached a statement from ASHRAE to my statement for inclusion in the record. The federal government uses standards developed by ASHRAE in its programs to improve building energy efficiency. They are certainly an important partner in the effort to increase buildings' environmental performance.

As we will hear from our witnesses today, the specific standards for designing and measuring the environmental performance of buildings continues to evolve. Ultimately, the only way we will know if we are meeting the performance goals for buildings is to monitor them to confirm that heating, cooling, and lighting systems are indeed providing a comfortable, functional indoor environment and saving energy in the process. Analysis of individual materials, systems, and building components must be accompanied by an understanding of how all these things function together in the completed structure. Continued collaboration and cooperation between the government and the private sector is essential to achieving better environmental performance and reduced operating costs of buildings.

We have an excellent group of witnesses here today to provide us with information on the current status of green building standards and some suggestions on how we can verify that green buildings are living up to their labels by achieving better environmental performance. Thank you for participating in today's hearing, and I look forward to your testimony.

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