



Testimony of Ellen Larson Vaughan
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Good morning. I am Ellen Vaughan, Policy Director for the Environmental and Energy Study Institute (EESI) in Washington, DC. I would like to thank Chairwoman Watson, Ranking Member Bilbray, and members of the Subcommittee for the opportunity to present our views on the state of high performance green buildings within the federal government.

EESI is a nonprofit policy-education organization dedicated to developing innovative solutions to climate change and other critical energy and environmental challenges. We bring sound science and technology information to policymakers through briefings, publications and other activities. Founded by members of a bi-partisan Congressional study conference, EESI has been an independent organization since 1984 and is funded primarily through foundation grants and charitable contributions.

I lead EESI's High Performance/Green Building Initiative, which helps to educate policymakers and stakeholders about the enormous impact of building construction and operation on our environment, economy, and quality of life. Accounting for more than 40 percent of our energy consumption and greenhouse gas emissions, the building sector can either be our worst enemy or our best ally in the battle for a sustainable future. We bring together building science expertise, policy development, and stakeholder outreach in a way that allows decision makers—whether policymakers, building owners or mayors—to articulate what they want their buildings to achieve. We are developing connections among a variety of stakeholders, including building scientists, policymakers, advocates for energy efficiency and renewable energy, industry practitioners, affordable

housing advocates, and others to increase their understanding of high performance building principles and benefits.

Lead by Example

The federal government owns and operates nearly 500,000 facilities and can establish its own performance goals, above and beyond what Congress has already required. With about 3 billion square feet of floor space, federal buildings have a substantial environmental footprint, consuming 1.6 percent of the nation's total energy use at an annual cost of \$24.5 billion, according to the Federal Energy Management Program (FEMP). How these buildings are constructed, renovated, and operated also has considerable impact on the environment, on the health and safety of building occupants, on access by disabled individuals, and on the ability of the federal workforce to function at a high level. Fortunately, we are rapidly attaining the ability to balance all of these building attributes in an optimal way. The federal government has the authority and opportunity to set high-performance goals and requirements for its own portfolio of buildings, the responsibility to demonstrate and disseminate best practices and cost effectiveness, and the ability to stimulate a market for high performance buildings through its procurement specifications. There is no single technology, rating system, or magic bullet that achieves high performance buildings; rather, it is a holistic approach from project planning to building operation that can provide measurably better performance for a range of metrics. To achieve high-performing buildings, federal agencies must have clear and consistent performance goals and metrics, adequate funding, and policies that enable them to provide buildings that perform over their lifetimes.

Shades of Green

The terms *high performance* and *green* have evolved substantially over the years. We are grateful that your committee in Section 401 of the Energy Independence and Security Act of 2007 (EISA) defined high performance green buildings for the purposes of the activities of the Department of Energy and General Services Administration in a way that captures best current thinking. These definitions challenge the government to design, construct, and operate its buildings at the state of the art and pave the way for these agencies to show leadership over the next two decades, a period during which we will need higher performance from federal and other buildings than ever before.

In the 1970s, the era of our first energy crisis, public and private sector building programs focused on energy and water efficiency. The Federal Energy Management Program (FEMP) originated in this era. The Passive Solar Industries Council (PSIC) was promoting the interdependence of building systems, components and design strategies and energy modeling to integrate and optimize “whole building” energy performance. Forward-thinking building professionals were creating homes and buildings that used far less fossil fuel energy than conventional buildings by integrating passive design

strategies, energy efficient appliances and equipment, and renewable energy technologies.

Unfortunately, the majority of builders and consumers continued traditional, wasteful building and energy-use practices while countries such as Switzerland and Germany learned from our experiment, perfected ways to further “design out” inefficiency and now are building thousands of structures that are 60 to 90 percent more energy efficient than conventional buildings.

Sustainability and our understanding of what is possible in buildings took a leap forward in the early 1990s when practitioners and groups like PSIC (then evolving into the Sustainable Buildings Industry Council) began to add other values on top of energy efficiency, including healthful indoor air quality, low environmental impact development, nontoxic/recycled/recyclable building materials, and waste reduction. This forward momentum continued with the establishment of green building rating and certification systems such as LEED and Green Globes that provided a much-needed framework for building green.

Federal agencies have been improving the energy and water efficiency of their buildings for years and have embraced green building design enthusiastically in spite of multiple directives, process inefficiency, and inadequate training opportunities and technical tools. They have evolved as the green, high performance building industry has evolved. The contributions of passive-solar design pioneers and energy efficiency advocates, manufacturers of energy efficient products and innovative technologies, creators of materials assessment criteria, and green rating systems that have made green understandable and marketable, are substantial—and they also are evolving. The federal government often has been an early adopter of these advances.

In more recent times, there has been a strong emphasis on whole building design, which statutorily is known as high performance green buildings. Over the years, safety, security, accessibility, and other values became statutory requirements for federal buildings, and life cycle costs of buildings have received stronger emphasis. All of these values are important, but can be costly if not incorporated into the original building planning and design process. Fortunately, your definition in EISA sets the stage for us to think of buildings holistically and to begin to reap the savings and the increased utility that countries like Switzerland have already shown to be possible.

The evolution of information and computer technology is a major reason that we are finally reaching the point where high performance green buildings make economic as well as environmental sense. It is now possible to design the software to help us find the win-win situations in building design *and* to display the results in three dimensions. Education, design standards, and interactive design and educational tools will make it possible to go from evolution to revolution. GSA has focused on the intersection of sustainability and security in federal projects from ports of entry to the Alfred R. Murrah building replacement in Oklahoma City. And other departments with mission-critical criteria for security and energy independence understand the value of whole building

design. Like many others, EESI believes that our goal for a sustainable energy future is more likely to be embraced and achieved if it is considered in context with other critical goals. A green building that is destroyed by hurricane-force winds is not sustainable. Fortunately, we now are developing green buildings that are durable, that can withstand severe weather, and that are likely to cost less than conventional buildings over their long lifetimes, due to reduced utility and maintenance costs. Clearly, holistic planning across government agencies that considers multiple performance goals simultaneously and shows project managers how best to achieve them is a much more efficient use of taxpayer dollars.

The legal framework for buildings has evolved over the years and much of it has not evolved to the high performance green level. The model codes, which are the technical basis for most local building codes, are a lowest common denominator that functions well below what we are capable of doing in terms of energy efficiency and environmental protection. In fact, in much of the country, the local building codes, if they exist at all, are based on outdated versions of the model code. This would be largely rectified in terms of energy efficiency by the building code provisions contained in the House-passed American Clean Energy and Security Act of 2009 (H.R. 2454). Even this bill, however, would not bring us to the high performance level that requires the **integration** of requirements for energy efficiency, sustainability, accessibility, safety, security, and others.

There is an important web site, the Whole Building Design Guide, which is used by federal agencies as a source of information on these topics, but as Henry Green of NIBS has testified, there are not yet **integrated** standards or a design tool to aid in the design and construction of high performance green buildings. The knowledge clearly exists to create them, and I hope that a way can be found to accelerate the work that NIBS and its many public and private sector partners have begun.

Raise the Floor, Raise the Ceiling

EESI believes there is a full spectrum of opportunities for the building industry to shrink its environmental impact and become stewards of the natural systems on which we all depend, while enhancing comfort, saving money, and achieving multiple goals through good design. The persistence of entrenched barriers and resistance to change have made it difficult but not impossible: It demands both incremental progress and bold innovation. We must “raise the floor” with building codes and appliance standards and “raise the ceiling” through R&D, innovation, testing, demonstration, performance measurement and verification, and procurement. We applaud the many public and private sector initiatives and steady progress in improving building energy efficiency over the last four decades and the more recent explosion of interest in “building green” to ensure minimal impact on the environment and support of occupant health and productivity. We believe that the threat of climate change and irreversible damage to ecosystems and biodiversity demands a measured approach to development and constant intention to sustain our environment for future generations. Low-energy design strategies and technologies, use of renewable

energy, water-efficient systems and environmentally preferable, nontoxic materials must become the benchmark for all building construction and renovation, and be maximized in retrofits.

The federal building stock largely reflects the era in which it was built, in addition to some retrofit encouraged by FEMP. More recent buildings are often built to achieve LEED or other green certifications, but only recently has there been an attempt to bring commissioning and operations up to comparable levels. The High Performance Green Building Office at GSA and DOE's zero-energy buildings initiatives now are faced with the challenge of moving federal buildings the next step forward.

Retrofit is very important because new construction adds only a very small percentage to our national building inventory each year. Therefore, if we are to have a significant number of high performance green buildings in our lifetimes, much of the work will have to be retrofits of existing buildings.

Action Opportunities

Congress and the White House, over several administrations, have recognized and acted on the critical need to make federal buildings better environmental citizens and provide healthy, comfortable, safe and secure places to work by setting performance targets through statutes and Executive Orders. Federal agencies have worked hard implement these requirements through rulemakings, "memoranda of understanding" (MOUs), interagency meetings and conferences, procurement specifications for energy- and water-saving technologies, and progressive contracting and financing instruments.

Another bold step forward is the Notice of Proposed Rulemaking published by the Department of Energy on May 28, 2010, which seeks to implement the sustainable building design provisions of EISA. We were pleased to see that the proposed rule utilized the Guiding Principles originally adopted in the Federal Leadership in High Performance and Sustainable Building MOU signed by most federal agencies what Executive Order 13514 already requires in order to minimize the regulatory burden on agencies. In addition to streamlining multiple requirements, this also is a positive step toward holistic planning and design. Congress and the federal agencies have the opportunity to address various performance goals at the same time (in a holistic manner) and thereby take advantage of synergies that 1) ensure important goals are not left out and 2) improve efficiency and reduce costs.

We were disappointed that DOE, in the May rulemaking, decided to defer action to implement Section 433 of EISA, which requires agencies to reduce their use of fossil-fuel generated energy. Again, we believe that greenhouse gas emission reduction is a critical goal for high performance buildings and central to helping meet the global carbon-reduction goals called for by scientists to avoid catastrophic climate change. And again, we believe that building performance goals should be addressed holistically. Moreover, the federal government needs to understand what will be required in terms of renewable

energy supply in order to meet its goals for net-zero energy buildings or a Zero Environmental Footprint.

The tools to move to high performance green buildings are not all in place. There is a strong need for design tools that permit architects and engineers to make the tradeoffs that optimize the buildings for a variety of performance goals throughout their useful life and permit them to easily be modified as the needs of the building occupants change. Building operators and the behavior of occupants also are central to building performance. There is a rule of thumb that 25 percent of energy savings are directly related to the way the building is used. Therefore, it is imperative to involve building operators and users in the planning, design, or retrofit process and provide user-friendly educational tools.

Federal buildings also are potentially a powerful educational tool in and of themselves, because they may well be the only way that many people experience a high performance green building first hand.

Unfortunately, the United States no longer is the most advanced country in building design or energy savings. We have much to learn from others around the world, especially in Europe. It is very important that those who will be responsible for the Offices of High Performance Green Buildings and for updating federal building regulations and Executive Orders take time to learn from the experience of others. In some countries, such as Germany and Switzerland, the process of optimizing buildings has been going on for 20 years or more and continues to improve.

Energy remains first among equals in high performance building values, but optimization of overall high performance is the way to obtain the most value for each dollar spent on federal buildings and to ensure buildings are durable and fit for their intended purposes. This is a long-term process requiring continuous improvement, a process crucial to achieving our climate and energy goals, and a process that will succeed only if it receives appropriate resources.

The federal government has an opportunity and responsibility to lead by example, and this will allow the revolution in the buildings industry to truly get underway.

EESI applauds the leadership of this Subcommittee in advancing the design and performance of federal buildings, and we appreciate the opportunity to contribute our ideas.