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

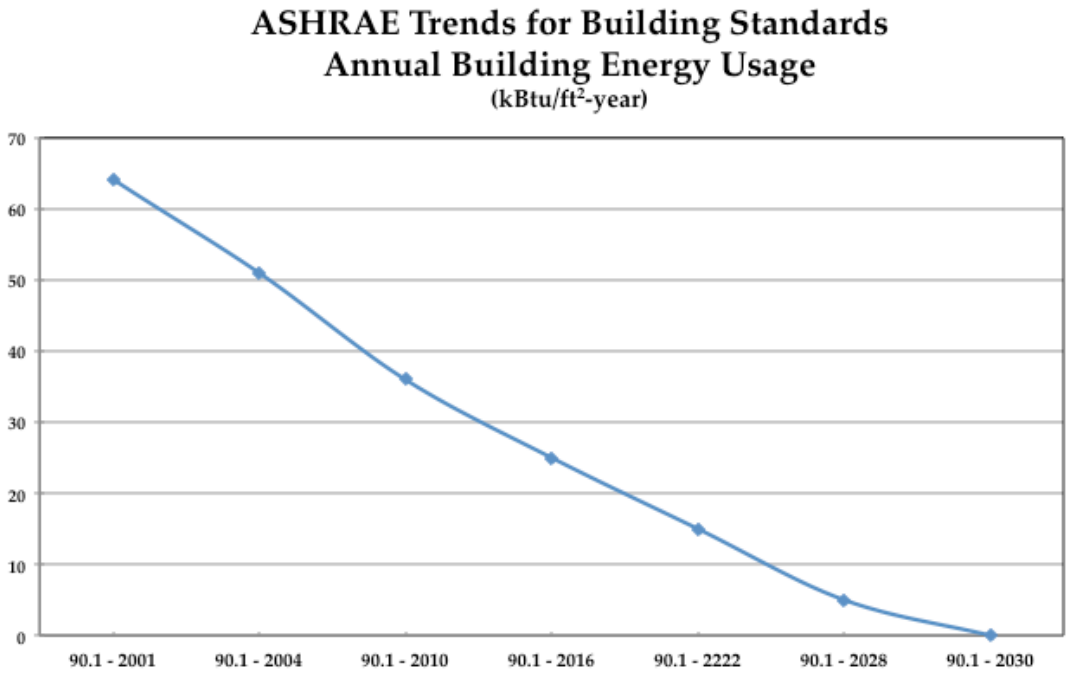
Over the years, RMI has guided projects designing highly efficient new buildings, including net zero buildings, as well as deep energy retrofits for a variety of existing building types. These buildings work very well, and those done for the Federal government can meet EISA criteria. A recent example 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.

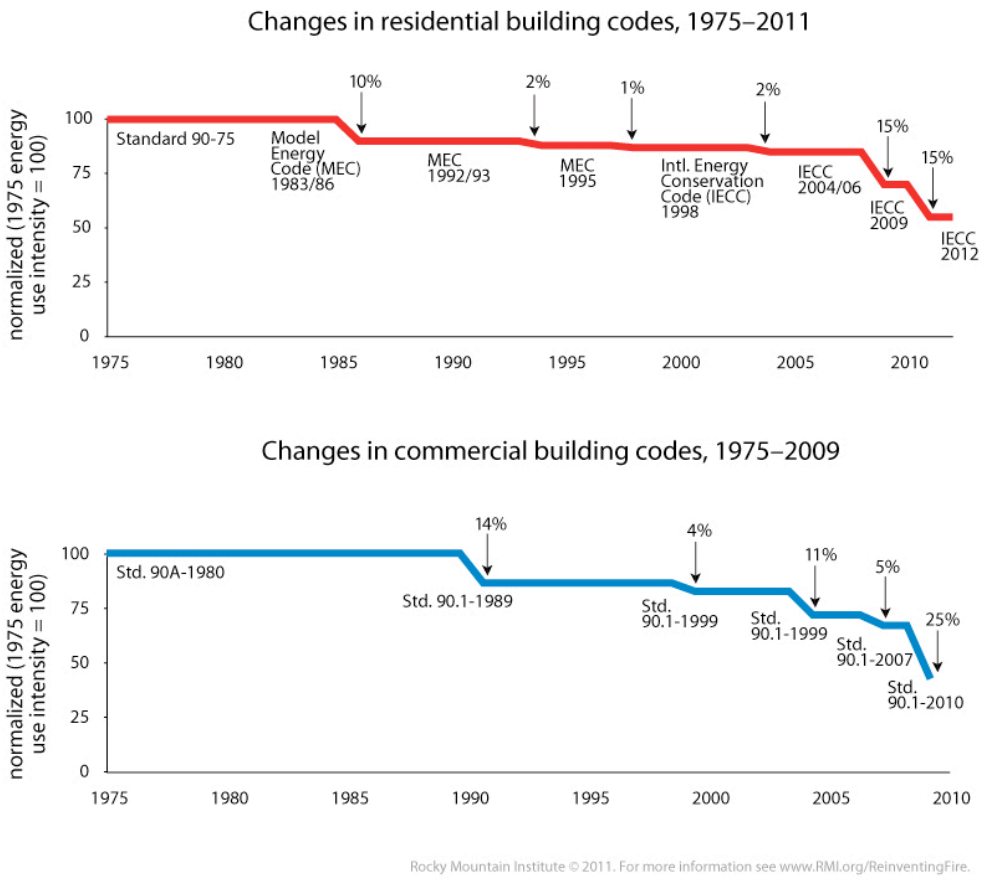
**2. The EISA standards help support increasingly stringent private industry standards**

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).

.






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.

---

[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.

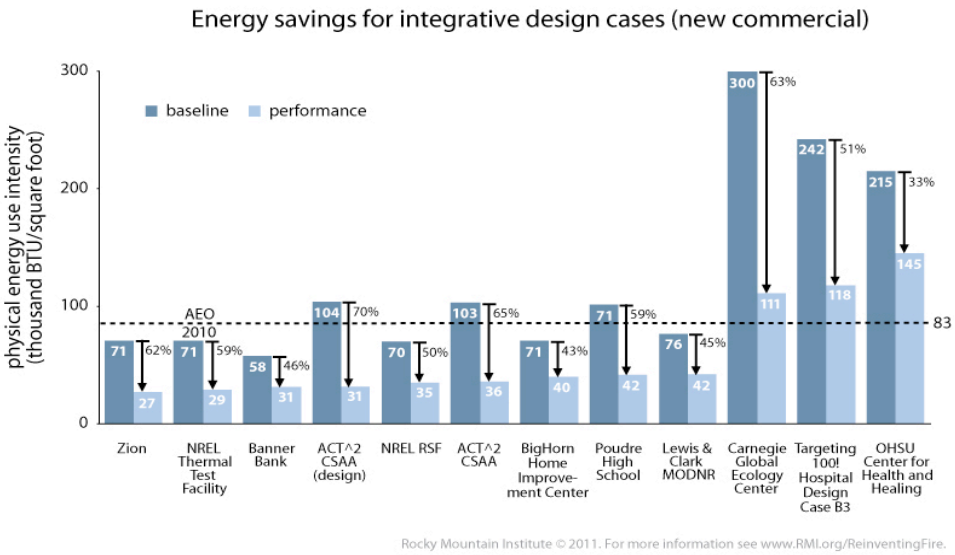
The New Buildings Institute recently published [3]a report on the status of net-zero energy office buildings in the U.S, finding defensible data for 60 projects that were net-zero or net-zero capable. The data showed that net-zero buildings are already feasible and achievable with current technologies 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**

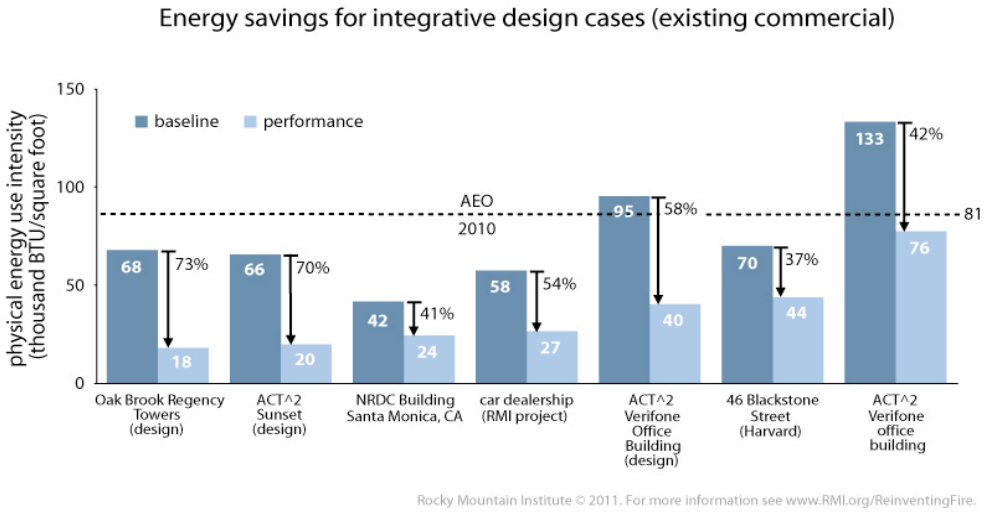
The technology and design and construction practices enabling highly efficient buildings improve each year, and further solidify building efficiency as the leading path in the US economy to profitable energy-saving opportunities. According to AIA, EISA Sec. 433 goals are helping spur the development 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.




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.



**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.

---

[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