



High-Performance Federal Buildings: Meeting EISA Requirements through 2030

Report from a Public/Private Sector Workshop

July 22-23, 2008

Sponsored by the Federal Facilities Council in coordination with



Additional support provided by Environmental and Energy Study Institute and Alliance to Save Energy

Contents of this report reflect the findings and recommendations of the workshop participants and are not necessarily those of the sponsoring organizations or participating agencies.

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Introduction

In December 2007, the U.S. Congress passed the Energy Independence and Security Act (EISA) (Pub. Law 110-140) containing new energy use requirements for federal buildings (see Table 1 for a summary of these requirements). Immediately, program managers in the affected agencies became concerned that the financial, technical, technological, and educational resources necessary to achieve these requirements were not available.

Recognizing the need to identify existing resources and areas of future need, representatives from the Federal Facilities Council¹ and private sector organizations (see front cover for a listing) convened a workshop July 22-23, 2008 in Washington, DC. The first day of the workshop featured a review of the requirements, case studies of new and retrofit net-zero energy buildings, a panel discussion on current activities within federal agencies, an examination of methods for measuring compliance, and a vision for high-performance buildings.

The second day featured small breakout sessions focused on the areas of greatest concern and opportunity: finance and acquisitions, technical and design guidance, technology solutions, and education and training. Each group was facilitated by both a public and private sector representative. The working groups included a diverse mix of participants from both the private and public sector representing numerous federal agencies and practice areas.

This report presents the findings and recommendations of the working groups. These findings were gathered from the workshop participants and do not necessarily reflect the opinions of the sponsoring organizations or the participating federal agencies.

Finance and Acquisitions

In addition to their concerns about the technical feasibility of achieving the new requirements, many agencies were concerned that the funding necessary to meet these new requirements would not be available. Agencies would need to utilize existing mechanisms and obtain new sources of money to implement projects and obtain technology to reach the targets.

Congressional appropriators and oversight committees need to recognize that previous funding patterns may need to change—more funds may be needed initially to implement energy savings, but over the long-term, associated energy costs will fall. Also, with consistent annual energy reduction requirements, agencies will be requesting funding for energy related projects on a regular basis. Congress will need to be prepared to fund these requests.

As recognized in EISA, existing barriers between capital budgets and operating budgets can serve as a disincentive to invest in assets with increased first cost but a decreased life-cycle cost. The Office of Federal High-Performance Green Buildings within GSA was tasked at looking into this issue and identifying opportunities to overcome these barriers.

¹ FFC is a council under the National Academies focused on identifying and advancing technologies, processes, and management practices that improve the performance of federal facilities over their entire life-cycle, from planning to disposal.

Table 1.
Summary of Energy Requirements for Federal Buildings in Energy Independence and Security Act

Section	Requirements
Section 431: Energy Reduction Goals for Federal Buildings	Schedule for reduction of federal building energy use to 30% by 2015.
Section 432: Management of Energy and Water Efficiency in Federal Buildings	One quarter of federal portfolio to undergo energy and water evaluations annually, recommissioning opportunities to be identified. Energy or water saving measures to be implemented. Requires benchmarking of federal building energy use. OMB to issue semiannual scorecards for energy management activities.
Section 433: Federal Building Energy Efficiency Performance Standards	New and major renovations of federal buildings designed to reduce fossil fuel generated energy consumption from 2003 CBECS by 55% in 2010, 65 in 2015, 80 in 2020, 90 in 2025, and 100 in 2030. Sustainable design principles applied to siting, design and construction. Identify a certification system and level most likely to encourage comprehensive and environmentally-sound approach to certification of green buildings.
Section 434: Management of Federal Building Efficiency	Large capital energy investment in existing buildings replacing installed equipment to employ most energy efficient designs, systems, equipment, and controls that are life-cycle cost effective.
Section 435: Leasing	Agencies shall lease space that earned the EnergyStar label.
Section 436: High-Performance Green Federal Buildings	GSA to establish Office of Federal High-Performance Green Buildings. Coordinate with Office of Commercial High-Performance Green Buildings and all relevant agencies. Establish senior level Federal Green Building Advisory Committee. Identify and develop federal high-performance green building standards. Conduct training, identify incentives for implementation. Identify certification system most likely to encourage a comprehensive and environmentally-sound approach to certification of green buildings.
Section 441: Public Building Life-Cycle Costs	Changes timeframe for life-cycle costing from 25 years to 40 years.
Section 514: Permanent Reauthorization [ESPCs]	Makes authority to enter into Energy Savings Performance Contracts permanent.

Existing financial mechanism such as energy savings performance contracts (ESPCs) and utility energy service contracts (UESCs) were identified, but many agencies indicated that their usefulness is limited. Such options were seen as best suited for emergency repair or replacement when other sources of capital are not available. These contracts often are designed for a steady-state environment however, federal buildings typically are not static—mission, personnel, and available technology change frequently. Training procurement officers on the unique qualities of the ESPC and UESC contracting process is necessary to assure proper implementation. Procurement officers also should become familiar with other financing resources including utility sponsored programs and state and local grants.

All requests for funding of new construction or renovation must include funds for commissioning. Budgets also must recognize future financial needs to assure proper operations and maintenance—if the investments are not maintained, they will not perform at the specified level.

New opportunities for funding energy related projects also were identified. A government-wide revolving fund for energy improvements and energy efficient equipment purchases should be established. The fund can be financed by the energy savings an agency receives due to the improvements made by the agency. Both the Energy Policy Act of 2005 (EPAct) and EISA already have mechanisms for federal agencies to retain the savings achieved through energy use reductions.

Agencies also could be given the flexibility to assess their portfolios, sell unneeded assets, and retain the resulting funds for agency use—particularly to improve existing assets.

Technical and Design Guidance

In tandem with the existence of a funding mechanism, agencies need the technical and design guidance to implement effective solutions that accomplish their energy goals. Utilizing an integrated design and procurement process was identified as a key requirement. Within the integrated design process, consideration must be given to all aspects of high-performance buildings, not just energy use. Design guidance also should reflect this multi-faceted approach. The Whole Building Design Guide² is an excellent resource for technical guidance—federal agencies and private sector organizations should continue to support its development.

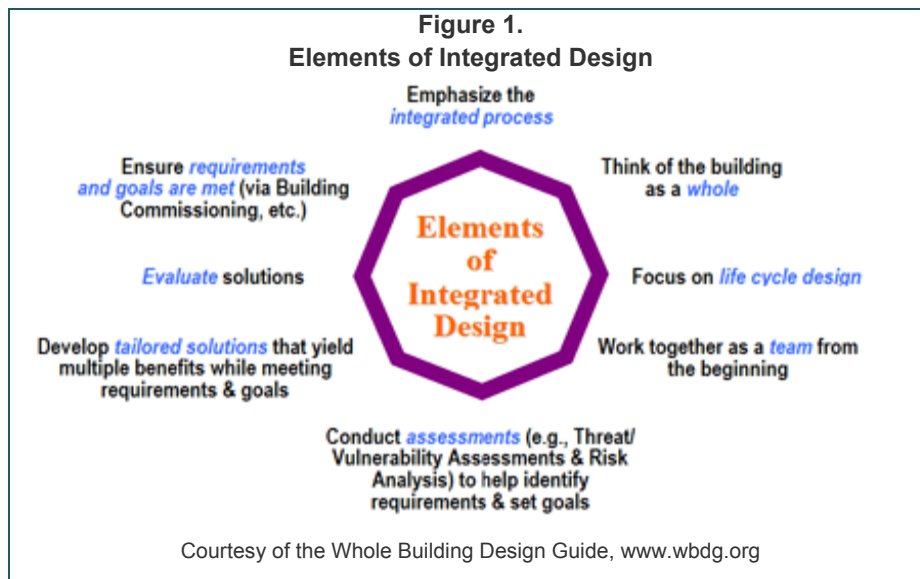
The development and widespread distribution of case studies can assist agencies and the private sector in developing best practices and learning from previous projects. A robust database of case studies could encourage greater adoption of new technologies and practices both within the federal agencies and in the private sector. In addition to comprehensive case studies, agencies need a forum to catalog lessons learned and discuss the options for pending projects. The Department of Commerce National Technical Information Service (NTIS) was identified as a possible home for such a forum.

Effective case studies will rely on measurement and verification of energy use and other data of interest. Metering with sufficient granularity is important to obtaining useful data for measurement and verification. A guide on methodologies for rating building performance in both new and existing buildings—including on performance of energy audits—is needed. Publications from the Laboratories

² See www.wbdg.org.

for the 21st Century (Labs 21)³ program were identified as a good resource. Future technical and design guides should provide a mechanism for post-construction feedback.

Commissioning and retro-commissioning are essential pieces in the performance of energy assessments—guidance, training, and funding are necessary to assure they are included in all future assessments.



Design and operation guides covering specific building types typically constructed for federal agencies should be developed. Some participants felt existing design guides are ambiguous and overwhelming. They also identified a correlation between the gaps in research with areas of weakness within design guides. Funding for research and development will be necessary to fill these gaps and produce more effective guidance.

Resources for portfolio management need to be developed and should include mechanisms for both inter- and intra-agency benchmarking and tracking. Every building or campus should be assigned an energy manager. Also, building managers must be empowered to become more proactive in identifying opportunities for energy savings and should receive incentives to do so.

Technology Solutions

Workshop participants identified numerous existing technologies that could be utilized to assist agencies in meeting new energy requirements. The recommendations covered energy management, mechanical systems, lighting and daylighting, and building envelopes (see Table 2).

Beyond discussion of particular technology options, participants examined the conditions necessary to encourage adoption of these technologies. Some agencies already perform technology validations for new products, but questions were raised about how widely these are distributed across the federal government. The existing procurement system for these technologies was discussed—many

³ See www.labs21century.gov.

products for new construction and major renovations are not procured on the GSA schedule, often foregoing the potential cost or validation benefits. An overarching concern was how new products can get into the procurement system and be fairly evaluated and specified.

Table 2.
Technologies for Achieving Energy Requirements

Energy Management & Controls	Mechanical Systems	Lighting & Daylighting	Building Envelope
<ul style="list-style-type: none"> • Enterprise Energy Management Systems • Wireless Metering • Metering Based Commissioning • System Diagnostics • Sub-metering 	<ul style="list-style-type: none"> • Dedicated heat recovery chillers • Geothermal (including pipe-in-pipe for urban settings) • Thermal Storage Systems • Duct Sealants • Combined Heat and Power • Dedicated Ventilation Systems • Radiant Heating & Cooling • Variable Refrigerant Volume Systems • Right-Sizing Equipment and Transformers 	<ul style="list-style-type: none"> • Light Shelves • Daylight Controls • Occupancy Sensors • Super T-8 Lighting • Scotopic Lighting • LED Lighting • Space Planning 	<ul style="list-style-type: none"> • Air and Wind Controls/Sun Shading • Vegetated or Reflective Roofs • Building Orientation • High-Performance Insulation and Roofing

Some agencies have been able to procure technologic solutions based on life-cycle costs rather than first-cost—other agencies should learn how and begin specifying based on life-cycle costs.

As these new technologies are implemented, training—particularly of operations and maintenance staff—is necessary to assure these technologies operate at their ideal state to achieve energy savings. Training and support on new technology options is necessary for other agency personnel including procurement officials, project managers, and design teams.

Education and Training

As agencies apply more complex technologies and implement new requirements, education and training are key to achieving the desired result. Education and training must be conducted for all agency employees with a focus on their particular roles within the organization—whether as building occupants, facilities management personnel, or procurement officers. Requiring relevant personnel certifications can assure employees have the requisite up-to-date body of knowledge to fulfill their responsibilities.

In order to meet the requirements of EISA and other federal mandates, agency personnel will need to understand the requirements and how they apply to their particular agency. Clarity of goals, whether for carbon reductions, energy use, or water use is necessary. Identifying the goals and who is responsible is the first step in assuring their implementation. Education will be necessary to make certain agency personnel are aware of the specific requirements and how they affect their job functions.

EDUCATION, TRAINING imply a discipline and development by means of study and learning. EDUCATION is the development of the abilities of the mind (learning to know): *a liberal education*. TRAINING is practical education (learning to do) or practice, usually under supervision, in some art, trade, or profession: *training in art, teacher training*.

“education.” *Dictionary.com Unabridged (v 1.1)*. Random House, Inc. 14 Oct. 2008.
<Dictionary.com <http://dictionary.reference.com/browse/education>>.

Ongoing training and education is essential to counter employee turnover and keep employees abreast of best practices. Complexity and content of employee training should be linked with the Office of Management and Budget’s (OMB’s) job classifications. All GS-12, 13, and 14 employees should receive an introduction to management. Procurement and portfolio managers in particular should receive a broad level of training with modules on life-cycle costing, specifying appropriate criteria in requests for proposals (RFPs), available energy saving technologies, and the ESPC (energy saving performance contract) and UESC (utility energy savings contract) contracting process and other energy saving opportunities including enhanced use leases (EULs).

Training and simulation exercises should be conducted with participants representing all facets of building procurement and management. This will facilitate greater understanding and collaboration across the team. Such trainings should include sessions on the project development process. Also, there are opportunities for agencies to collaborate on trainings—thus providing networking opportunities, sharing of lessons learned, and effective use of limited resources. The General Services Administration through the Office of Federal High-Performance Green Buildings could serve as the facilitator and clearinghouse for federal agency building training programs.

The impending retirement of large segments of the federal workforce in the coming years provides a significant challenge to assuring the availability of necessary personnel. However, this provides an opportunity to train new personnel who may already be comfortable with technology and sustainability issues. Making sure this future workforce is available will require focus on students to attract them to the building and facilities management disciplines. Private sector organizations and federal agencies should cooperate to develop programs to peak student interest in these disciplines. An increased focus on issues related to sustainability can drive more interest into the building related professions. Training and engagement tools must reflect the needs and expectations of the target

audience—today’s students respond to technology-based training including podcasts, webinars and online training.

Conclusion

Facing new requirements on their energy use, federal agencies are examining the resources necessary to achieve these requirements. A coordinated effort by the agencies, private sector organizations, government contractors, and Congress is necessary to realize these energy savings. Both new construction and renovations need to utilize an integrated process with involvement from appropriators, procurement officers, design and construction teams, facility managers, project managers, training teams, and building occupants.

Additional workshops like the workshop that is the basis of this report should be conducted to work through both new and existing challenges. Existing groups like the Federal Facilities Council and the High-Performance Building Congressional Caucus Coalition and ad hoc groups like the one formed to sponsor this workshop can provide valuable outlets to assist agencies in meeting these and future goals.