

# **Energy-Efficient New Federal Buildings:** *Awareness and Implementation of Federal Building Standards & Case Studies*

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**With support from the Federal Energy Management Program**

**April 2008**



**ALLIANCE TO  
SAVE ENERGY**

*Creating an Energy-Efficient World*

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## Acknowledgements

This report is one of a series of studies prepared by the Alliance to Save Energy under contract with the US Department of Energy, Federal Energy Management Program. The authors would like to thank Matt Gray, Shawn Herrera, Will Lintner, and Cyrus Nasserri for their support and encouragement. However, all opinions expressed in this report are strictly those of the Alliance staff.

*Sponsorship:* This report is based upon work supported by the Department of Energy, Federal Energy Management Program under Award Number DE-AC01-05EE-11123.

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## Summary

This report considers federal agencies' responses to energy efficiency requirements for the design of new construction as defined in the Energy Policy Act of 2005 and the Final Rule issued on December 21, 2007, and also includes a discussion on the Energy Independence and Security Act of 2007.

All of the federal personnel contacted know of the requirements for new building construction, in particular the need to design for achieving 30% or more beyond ASHRAE Standard 90.1-2004. However, certain aspects of the requirements are unclear and varying interpretations are currently being applied. A need exists to provide easily understood guidance to all levels of federal personnel involved in new building design. This report suggests a number of actions that the Federal Energy Management Program and other organizations can undertake to assist federal personnel and to also further the intentions of the requirements

## Overview of Federal Requirements for Building Energy Performance

Section 109 of the Energy Policy Act of 2005 addresses Federal building performance standards. The section states that the Secretary of Energy, within one year of enactment of EPACT 2005, establish standards that require new Federal buildings "be designed to energy consumption levels that are at least 30 percent below the levels established" in ASHRAE Standard 90.1-2004 (applies to commercial and high-rise residential buildings) or the 2004 International Energy Conservation Code (applies to low-rise residential buildings). EPACT 2005 also includes the caveat "if life-cycle cost-effective". Life-cycle cost analysis is defined in 10 CFR Part 436.

In addition, EPACT 2005 requires that sustainable design principles be applied to siting, design, and construction of "new and replacement" buildings. EPACT 2005 also states that water conservation technologies shall be applied whenever water is used to achieve energy efficiency, as long as the technologies are life-cycle cost-effective.

The energy efficiency performance standards were reinforced in the Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding (MOU), signed by the Federal agencies in 2006. This MOU established a set of guiding principles, including a new construction "target" of reducing the "energy cost budget" by 30 percent compared to ASHRAE Standard 90.1-2004. Major renovations are to target reducing the "energy cost budget by 20 percent below pre-renovations 2003 baseline." The MOU also states that buildings must be designed to earn the Energy Star label for new construction and major renovation.

The Department of Energy issued its Final Rule in the December 21, 2007 Federal Register. The rule became effective on January 22, 2008, although the Interim Final Rule was effective for buildings which began design for construction on or after January 3, 2007. For buildings under design on January 3, 2007, the Final Rule clarified that the rule:

“... becomes effective at the design stage when the impact of the rule needs to be accounted for in the procurement process. Specifically, this is the stage when the energy efficiency and sustainability details are either explicitly determined or implicitly included in a project cost specification.”

The Final Rule clarifies that a building being constructed for lease by a federal agency is classified as a “new Federal Building” and subject to the rule, unless it is subject to State or local building codes.

The Final Rule clarifies that the rules apply only to new buildings, and not major renovations. The definition of “new” includes buildings “completely replaced from the foundation up”. The rule notes that major renovation energy efficiency requirements are covered under Executive Order 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*.

The minimum performance requirement of “at least” 30 percent below the levels of ASHRAE Standard 90.1-2004 and IECC 2004, when life-cycle cost-effective, was incorporated into the rule.

The rule maintains the exclusion of receptacle (plug) loads for the purpose of calculating energy savings under the Federal building standards. Also, process loads, such as medical or industrial equipment, are excluded from the calculations.

The Energy Independence and Security Act (EISA) of 2007 created new future energy efficiency performance standards for federal buildings. By fiscal year 2010, buildings are to be designed to reduce fossil fuel-generated consumption by 55%. The percent reduction increases every five years until fiscal year 2030, when no fossil fuel-generated energy may be consumed. The baseline for this requirement is a similar building in fiscal year 2003, as measured by the Commercial Buildings Energy Consumption Survey (CBECS) or the Residential Energy Consumption Survey (RECS) data.

With passage of the EISA legislation in December 2007, federal agencies do have a new set of performance requirements for their new buildings, which must be designed to reduce fossil fuel-generated energy use by 55% as of 2010, increasing to 100% (or a “zero-fossil-fuel” building) by 2030. The baseline for such reductions is energy consumption by a “similar building” in 2003, as reported by the DOE Energy Information Administration’s Commercial (or residential) Energy Consumption surveys (CBECS and RECS). These new requirements are generally consistent with the goals of the Architecture2030 Challenge, and at least in later years are more stringent than the “30% below model energy code” requirements of EAct-2005. However, the EISA statutory

working raises a number of conceptual and practical issues that need to be resolved by DOE rulemaking or by guidelines issued in consultation with the newly created GSA Office of Federal High Performance Green Buildings:

- Baseline – Does the phrase “similar building in 2003” refer to the average building (of that type) in the 2003 stock, or the average newly constructed building?
- Building type – The CBECS and RECS surveys do not include all of the specialized building types in the federal stock and, while some data are reported separately for federal vs. non-federal buildings, energy use information is not available for all building types in the federal stock, or by federal buildings by type and by region. In some cases where RECS or CBECS data are not available in sufficient detail, additional benchmarks will need to be established using computer simulations or additional data gathering.
- End uses – As interpreted by the DOE Final Rule, the 30% savings target in EAct-2005 (compared with the IECC residential model code or the ASHRAE-90.1 commercial standard) applies only to “covered” end-uses, typically space conditioning, lighting, and hot water. However, the EISA targets evidently apply to ALL energy used in the building (and reported in the CBECS and RECS surveys).
- Fuel source – EISA refers to “fossil fuel-generated energy consumption,” which presumably includes fossil fuel used indirectly, at the power plant, to meet a building’s electricity needs. But is the fuel content of electricity determined based on a national average? A regional average? On a marginal basis rather than an average? (i.e., based on the last-added or next-needed generating source) Or on a time-of-use basis? Last, how will the baseline level be set, for fossil-based electricity of a “similar building in 2003”? (i.e., by region, time-of-use, average or marginal fuel mix, etc. – or should that baseline use the 2003 level of electricity but the current-year fuel mix of electricity?)
- Green power – Similarly, how will green power be treated in calculating the reduction in fossil fuel-based energy? For example, could a building qualify without reducing its primary energy use below the baseline – or even increasing it – but simply shifting to an all-electric building that purchases green power from the local utility (or Renewable Energy Certificates)? If green power purchases are allowed to meet part or all of the required reductions in fossil fuel electricity, how would this relate to agencies’ existing purchases of green power? Can a new building simply “claim” some of the green power already being purchased by that agency, or does it have to make incremental purchases in order to count this green power toward meeting its goal of reducing “fossil fuel-generated energy”?
- Net-zero energy – Does the requirement by 2030 of a “100% reduction” in fossil fuel-generated energy mean that a building cannot qualify if it is “net-zero” on an annual basis – i.e., used some fossil fuel-generated electricity from the utility grid but makes up for this by producing excess renewable power at other times (from on-site wind or PV, for example) and supplying this excess energy back to the grid?

For all these reasons, it is not yet clear whether the EISA requirements as of the early years, beginning in 2010, are more stringent or less stringent than the existing EPCAct-2005 requirement. This is the most time-urgent need for additional analysis and guidance from DOE (and now GSA), since many planning and budgeting decisions are already underway for buildings that will begin construction (or renovation) in 2010.

## **Analysis Methodology and Information Sources**

Based on guidance received from FEMP staff, the Alliance to Save Energy researched a variety of internet resources and contacted personnel representing many federal agencies. Internet resources included

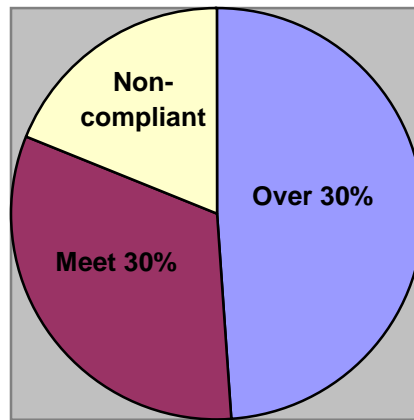
- [DOE High Performance Buildings database](#)
- [FEMP Federal Showcase annual awards](#)
- [GSA Sustainable Design Program](#)
- [Office of the Federal Environmental Executive Closing the Circle awards](#)
- [Labs21](#)
- [American Institute of Architects Top Ten annual awards](#)
- [New Buildings Institute Getting to Fifty database](#)
- [Greener Buildings web site](#)
- [Building Green web site](#)
- [DOE Building Technology Program](#)
- [Construction Weblinks](#)
- [Whole Building Design Guide](#)
- [The U.S. Green Building Council website](#)
- [Designbuild Network](#)
- [California Department of General Services](#)
- [Savings By Design](#)

Resources did not allow for complete analysis of all guidance and procedures in place at all agencies. The federal personnel contacted represent only a sampling of personnel involved in federal new construction activities, and included personnel at the agency headquarters level, regional and sub-agency level, and at the facility level.

Since case studies or project summaries exist for most of the facilities identified, the Alliance did not attempt to develop new project summaries or case studies, or to verify the predictions made in existing project summaries and case studies.

A draft FEMP spreadsheet of new building construction projects authorized in FY07 was reviewed. This spreadsheet consisted of worksheets provided by each of the agencies to FEMP. A wide range of building types are represented in the spreadsheet, and most are non-residential. Of the 438 projects listed, 49% were listed as being designed to meet or exceed ASHRAE Standard 90.1-2004. 32% were listed as having designs that will not meet the standard, and 19% of the projects either did not calculate a value or stated that the value is "to be determined". It should be noted that most (112 out of 141) of the

projects not meeting the standard were from the one agency reporting in detail, which indicated all 112 projects will not comply.



Given the limited information contained in this spreadsheet, it is not practical to draw many conclusions. Several of the projects listed included notes stating that funding is not yet secured, and new construction projects are often delayed or cancelled for funding and other reasons. Also, structure of the spreadsheet does not allow for easy determination of the building type, or even new construction vs. renovation. Further, the listings do not include building size or estimated cost.

Research also revealed that the federal solicitations (FedBizOpps) for the new construction do not always explicitly express the requirement to comply with a specific regulation. Often, the term “energy efficiency” is used as a requirement. Also, the term “Sustainable Design” is used as an aggregated term referring to various compliance documents. The FedBizOpps solicitations would often state that design will be to meet “LEED-certification ratings”, but reference to EPA 2005 or ASHRAE 90.1-2004 were not found.

## Recently Constructed Federal Projects

The federal government occupies and owns a wide variety of building types. Many of these building types are represented in the growing number of completed energy-efficient buildings. A listing of recent exemplary energy-efficient federal office buildings is provided in Table 1 of Appendix A. A listing of exemplary laboratory buildings is shown in Table 2. Table 3 includes courthouses, visitor centers, and other buildings that now serve as showcases for new federal buildings. These buildings typically include energy-efficient lighting and HVAC, along with daylighting and other energy-savings design approaches. Most include energy-efficiency as an important component of sustainable design, and many have pursued Leadership in Energy and Environmental Design (LEED) certification. For example, GSA lists 25 of its recently completed buildings that have achieved LEED certification ([see link](#)).

Additional examples of energy-efficient laboratories can be found through the Labs21 program, sponsored by the Department of Energy and the Environmental Protection Agency. Labs21 has developed best practices for the design of energy-efficient laboratories, and develops case studies of exemplary designs ([see link](#)).

These federal buildings have been recognized for their energy-efficient designs. Lacking in the literature is information on how these buildings are actually performing. The savings figures provided in the project summaries and case studies are based on calculations and simulations, not actual building performance. Although the buildings seeking LEED certification will receive commissioning, none of the project summaries or case studies mention the existence of long-term monitoring and verification.

The three tables also list exemplary non-federal public buildings and private buildings identified through the same sources discussed in Section 3. These example buildings also include building types such as schools and dormitories. These buildings can serve as models or examples for the federal sector. Since many municipalities are adopting energy efficiency and sustainable building design criteria, the number and variety of exemplary non-federal public buildings will be expanding significantly over the next few years.

## **Awareness and Extent of Implementation of New Standards**

Federal personnel from a cross-section of federal agencies were contacted via phone and asked a range of questions. Appendix B provides typical questions asked. Personnel contacted were at the headquarters, regional, and the facility levels. All federal personnel contacted were aware of EAct 2005 and the provisions to design for achieving 30% or more beyond ASHRAE Standard 90.1-2004. However, there are several different interpretations of the application of the provisions. For example, some agencies have revised their FY07 authorized designs to incorporate the 30% beyond ASHRAE 90.1-2004 requirement, while others have chosen to begin meeting this requirement in FY09.

Other areas of confusion include:

- Whether or not to include plug loads
- How to make energy-intensive facilities (such as hospitals, labs) comply
- Using a metric or “energy consumption” vs. “energy cost method”
- Exempting smaller (under \$10M) projects

Several federal agencies do not conduct construction procurement directly. Instead, they are leasing the buildings from US GSA. The latter in its turn, designs the specifications for procurement, and as a rule, incorporates the requirements of the corresponding agency into the specification. As a result, the bidders – architectural and construction firms – will qualify for the new construction only if they comply with the federal requirements. The Energy Star compliance and requirement for a building to exceed 30% of ASHRAE 90.1-2004 has become a standard in these specifications.

For a variety of reasons, the actual construction does not always comply with the 30% increased energy efficiency requirement. Often, the health and safety and energy efficiency requirements go cross purpose. For example, some laboratories are experiencing difficulties complying with 30% over the code requirement because they must use outside air for ventilation. This presents a technical challenge in reducing the power consumption of the fans.

Personnel were asked if the new requirements impact the design and construction costs of new federal construction. The feedback was mixed. Many feel the requirements force the agencies to request additional funding to cover the increased design costs, or else force cutting back on other design elements. Some others say the impact is minimal, or that it just requires design firms to “design smarter.”

## **Additional Findings**

Data in the available literature made comparison between newly constructed buildings difficult. This is in part due to the different baselines used by the agencies or design teams. Referenced baselines included ASHRAE 90.1-1999, ASHRAE 90.1-2004, California’s Title 24, and unspecified “comparable” buildings. Also, the literature typically did not provide information on the cost or cost-effectiveness of the various energy efficiency or green measures.

With the exception of one or two Labs21 case studies, the literature did not describe efforts to measure and verify energy consumption of these new buildings once they are placed into use.

## **Recommendations**

While awareness of new EAct 2005 requirements for building energy efficiency is very high, there is much uncertainty and some confusion regarding the applicability and execution of the requirements. Based on our analysis, and discussions with a variety of federal personnel involved in both the policy and implementation of the new requirements, the following recommendations are provided for consideration by FEMP:

### ***Education & Outreach***

1. FEMP should organize an educational forum that includes personnel from all agencies representing both the policy and implementation offices at the headquarters, regional, and facility level. This forum can be a one- or two-day event that clarifies the issues and concerns discussed in Section 5 earlier in the report.
  - a. This forum could be co-hosted by the GSA Office of High Performance Green Buildings, a new office established by EISA.
  - b. Presentations overviewing showcase federal projects can be included.

- c. With the additional requirements of EISA looming, FEMP may consider making the forum an annual event.
2. FEMP should consider developing training and/or certification programs for federal personnel involved in the design and construction of new buildings. Alternatively, FEMP can encourage personnel to pursue the new ASHRAE High-Performance Building Design Professional Certification. FEMP may wish to consider securing budgetary funding that can be distributed to federal design staff at the facility level to ensure participation.

## **Guidance**

3. FEMP should develop “plain language” guidance on the application of EPC Act 2004 and the Final Rule issued by DOE. This guidance should be prominently displayed on a FEMP web page dedicated to new construction, and FEMP should encourage the federal agencies, especially GSA and the DOD services, to add the guidance to their web sites or other materials readily available by personnel involved in new construction.
  - a. The guidance should clearly state baselines.
  - b. The guidance should clearly state effective dates.
  - c. The new FEMP web page can link relevant resources, such as the portions of the Whole Building Design Guide relevant to federal buildings.
4. FEMP should collaborate with the military services to integrate the new energy requirements into the Uniform Facilities Guide Specifications and collaborate with EPA to integrate the requirements into the Federal Green Construction Guide for Specifiers. Additionally, the specifications need to be reviewed to identify and modify design requirements that unnecessarily impact energy use.
  - a. For example, a requirement to achieve a certain ratio of net-to-gross floor area can result in smaller mechanical equipment rooms and tighter shafts for ductwork. The result can be the installation of less efficient HVAC, and small ductwork, which requires higher horsepower fans.
  - b. Based on discussions with energy design personnel, current specification language for topics such as building envelope and security can be counterproductive to energy optimization.
5. FEMP should investigate the feasibility of establishing a pre-approved listing of architectural and engineering firms competent in designing and constructing high performance buildings.
6. FEMP should develop design guide packages, similar to the ASHRAE Advanced Energy Design Guide series, but for the types of facilities not covered by the ASHRAE guides. For example, design guides can be developed for federal prisons, postal distribution centers, and medical centers.
7. FEMP should develop internet resources that help agencies and facilities identify sources of assistance from other parties, such as state energy programs and utility design assistance programs.

## ***Emerging Technologies***

8. FEMP should collaborate with other DOE programs to promote the adoption of emerging technologies related to high performance buildings (for recommendations see the separate Alliance to Save Energy report on new and emerging energy-saving technologies).

## ***Measurement & Verification***

9. FEMP can lead a federal effort to adopt the use of measurement and verification protocols by the federal agencies. This can include making standard practice whole building metering, and submetering of certain systems or areas when practical and appropriate, based on building size, energy intensity, utility rates, and other factors.
10. The federal sector needs a mechanism to track the energy performance of new buildings as they enter service and in the years that follow. FEMP can create such a mechanism. This will benefit both the government and private sectors as a database of predicted vs. measured performance is populated.

## ***Demonstration Program***

11. FEMP should consider collaborating with the DOE Building Technologies Program and federal agencies to establish a long-term demonstration program that engages the architectural and engineering community, suppliers, and other stakeholders. The objective will be to design and build a series of demonstration projects that, with the EISA-directed zero energy buildings in mind, highlight the leading edge design strategies and technologies that demonstrate what will become standard practice 10 years out. Such a program will require a dedicated funding source, but the federal cost can be minimized if the program is leveraged with utility companies or other parties.

## ***Tax Credits***

12. FEMP should work to assure that the re-authorization of commercial tax credits includes the provision which allows the credits to go to the architectural and engineering firms designing high performance federal buildings. Additionally, FEMP should encourage the development of IRS guidelines that clearly describe baselines and scenarios in which the architectural and engineering firms are eligible for the tax credits.

## ***Dealing with EISA Requirements***

13. The new EISA requirements need to be reconciled with EPLA 2005 and the FEMP Final Rule, so that federal agencies can properly plan and budget for new

construction and renovation projects. This will require considerable attention from FEMP and the agencies since CBECS and RECS have not been used as baselines in the past. For example, how will DOE determine the average energy consumption for each building type? What is the CBECS and RECS data include plug and other equipment loads, whereas the current energy-efficiency requirements exempt plug and equipment loads from the calculations.

## ***Suggested Next Steps***

FEMP can play a leading role in addressing the issues and concerns expressed by the federal personnel we interviewed. FEMP's experience in outreach and training within the federal sector can be tapped to educate federal personnel involved in building design and construction process. FEMP also has the opportunity to work closely with GSA through its new Office of High Performance Green Buildings to jointly develop guidance, training, and other resources related to the EISA requirements. The educational forum mentioned in the Recommendations section can provide a good opportunity to establish a working relationship with this new GSA office.

FEMP is also positioned well to inform federal building design and construction personnel of emerging technologies and the roles these technologies can play in improving building energy efficiency. FEMP's efforts to inform federal agencies of the new metering requirements can be expanded to encourage measurement and verification at federal facilities. Existing M&V protocols can be adopted, so the government does not need to develop any new standards or protocols.

The new EISA requirements will significantly alter the way federal buildings are designed and constructed. The federal agencies will look to FEMP for guidance and clarifications, and this will likely require a rigorous, sustained effort to address. The recommended demonstration program can be a part of this effort. Some specific activities to consider that address EISA requirements include:

- Working with the American Institute of Architects and others (coordinating with the Commercial Buildings Initiative) to develop operational guidance, by building type, on requirements for 55% reduction in fossil fuel-generated energy consumption,
- Assisting DoD, Energy Star, GSA, and others in developing criteria that insures sustainable, energy-efficient design of DoD privatized military housing and leased buildings,
- Developing guidance on incorporating energy-efficiency into the design of large capital investments that may not meet the definition of "major renovation", and also developing a process for reviewing the capital investment decisions,
- Developing guidelines for metering natural gas and steam,
- Initiate a scoping study for meeting 30% of domestic hot water loads from solar water heating,
- Developing guidelines, tools, and training (coordinated with the Commercial Buildings Initiative) related to building performance assurance, benchmarking, and web-based training.

**Appendix A**  
**Examples of Energy Efficient Construction**

**Table 1**  
**Office Buildings**

Building Name	Location	Agency/ Owner	Completion Date	Floorspace (ft <sup>2</sup> )	Energy Intensity (kBtu/ft <sup>2</sup> )	Estimated % Savings	% above 90.1-2004	e-e HVAC	e-e Lighting	Daylighting	e-e Envelope	Other e-e Features	Sustainability Features	Web Links
<b><i>Federal Buildings</i></b>														
Wayne L. Morse Courthouse	Eugene, OR	GSA	Nov. 2006	308,919	30.5	38%		X	X			Water-efficient landscaping; 43.2% water use reduction; 59% potable water consumption reduction	RECs, hi-effic. irrigation, low VOCs	<a href="#">web-link</a>
One and Two Potomac Yard	Arlington, VA	EPA	May 2006	654,000	37.1	38%		X	X	X	X	Purchase grid-source green power for one full year or 50% of the green power costs for two years	LEED-Silver; Renewable materials	<a href="#">web-link</a>
Alfred A Arraj U.S. Courthouse	Denver, CO	GSA	Nov. 2002	320,000	101	40%				X		Underfloor air dist	PV, water savings, renewable materials	<a href="#">web-link</a>
San Francisco Federal Building	SF, CA	GSA		575,000	??	50%		X	X	X	X			<a href="#">web-link</a>
<b><i>Non-Federal Buildings</i></b>														
Brooklyn Supreme and Family Courthouse, New York	Brooklyn, New York	City of New York	2005	1,100,000	??					X	X		LEED	<a href="#">web-link</a>
Capitol Area East End complex, Block 225	Sacramento, CA	CA Dept. of General Services	June 2005	336,008	??	40% over Title 24		X	X	X	X	underfloor air, variable speed chillers, daylighting, e-e lighting, operable windows, R-6 low-e glazing	PV	<a href="#">web-link</a>
Pennsylvania Department of	Phillipsburg, PA	Pennsylvania EPA		14,500	??	30%	30%	X	X	X	X	passive comfort control and fresh air enhancement	LEED-Gold	<a href="#">web-link</a>

Environmental Protection												strategy: Raised floor HVAC system complying with ASHRAE 55		
Collaborative Innovation Center	Pittsburgh, PA	Carnegie Mellon University	Jan-2005	260,600	??		22%	X	X	X	X	56.4% water saving	LEED-CS Gold	<a href="#">web-link</a>

**Table 2  
Laboratory Buildings**

Building Name	Location	Agency/ Owner	Completion Date	Floorspace (ft <sup>2</sup> )	Energy Intensity (kBtu/ft <sup>2</sup> )	Estimated % Savings	% above 90.1-2004	e-e HVAC	e-e lighting	daylighting	e-e envelope	Other Key EE Features	Sustainability features	Web Links
<b><i>Federal Buildings</i></b>														
LBNL Molecular Foundry	Berkeley, CA	LBNL	April 2006	89,224	207	35%	35%	X		X	X	energy-efficient chiller and boiler plant; low-emissions construction materials	Commissioning; construction waste management, and indoor/outdoor water use efficiency	<a href="#">web-link</a>
NREL Science and Technology Facility	Golden, CO	NREL	August 2006	81,517	110	41%				X		reflective roof, low-flow fume hoods	Water savings	<a href="#">web-link</a>
Louis Stokes Laboratories Building 50	Bethesda, MD	NIH	April 2001	294,532	230	40%		X	X	X		energy recovery ventilation, VFDs, VAV hoods	Lighting control	<a href="#">web-link</a>
Process and Environmental Technology Laboratory	Albuquerque, NM	Sandia National Lab	June 2000	151,435	341	40%		X	X			VAV exhaust, heat recovery, thermal storage, e-e motors	Chilled water storage; EMS	<a href="#">web-link</a>
<b><i>Non-Federal Buildings</i></b>														
Philadelphia Forensic Science Center	Philadelphia PA	Philadelphia Police Dept.	July 2003	58,700	??	67%		X		X	X	PV, lighting controls, HVAC controls, heat recovery ventilation	Recycled content, low-VOCs	<a href="#">web-link</a>

**Table 3  
Other Building Types**

<b>Building Name</b>	<b>Location</b>	<b>Agency/ Owner</b>	<b>Completion Date</b>	<b>Floorspace (ft<sup>2</sup>)</b>	<b>Energy Intensity (kBtu/ft<sup>2</sup>)</b>	<b>Estimated % Savings</b>	<b>% above 90.1-2004</b>	<b>e-e HVAC</b>	<b>e-e lighting</b>	<b>daylighting</b>	<b>e-e envelope</b>	<b>Other Key EE Features</b>	<b>Sustainability features</b>	<b>Web Links</b>
<b><i>Federal Buildings</i></b>														
Baca/Dlo'ayazhi Community School	Prewitt, NM	Bureau of Indian Affairs	Aug. 2003	78,900	33	20%				X	X	30% water savings; light paint	LEED-NC	<a href="#">web-link</a>
Bremerton BEQ Building 1044	Bremerton, WA	U.S. Navy	Dec. 2004	99,800	46.2	35%		X	X			VSDs on chilled water pumps	LEED Certified	<a href="#">web-link</a>
Blackfeet Indian Health Service Hospital Renovation	Browning, MT	Health & Human Services	Renovation completed Dec. 2001	126,000	152.7			X					Energy Star label	<a href="#">web-link</a>
<b><i>Non-Federal Buildings</i></b>														
Great River Medical Center	West Burlington, IA	Great River Health Systems	April 2001	700,000	??			X	X			geothermal heating & cooling, variable speed pumps		<a href="#">web-link</a>
Children's Museum of Pittsburgh	Pittsburgh, PA	Children's Museum of Pittsburgh	Jan. 2004	80,000	??			X	X		X	Dual flush toilets, low flow urinals and aerators; 3kWh photovoltaic system	LEED-NC Silver	<a href="#">web-link</a>
Bronx Library Center New York, NY	New York, NY	The New York Public Library	2006	178,000	??	20%		X	X	X	X	ENERGY STAR roofing	LEED-Silver	<a href="#">web-link</a>
Sidwell Friends Middle School	Washington, DC	Sidwell Friends School	2006	72,500	20	60%			X	X	X	90% water saving	LEED -Platinum;	<a href="#">web-link</a>
Rinker Hall, University of Florida	Gainesville, FL	University of Florida	March 2003	47,300	30.1	57%		X	X	X	X	occupancy sensors, shading, thermal wall	LEED-Gold	<a href="#">web-link</a>

**Appendix B**  
**Sample Questions Used in Telephone Interviews**

1. Are you aware of the EPACT-05 requirement for the 30% EE increase compared to ASHRAE Standard 90.1-2004?
2. Do you incorporate this requirement into new solicitations?
3. How does this requirement as well as other EE requirements impact the cost?
4. How is sustainability requirement addressed in new construction?
5. What other regulations are incorporated in new projects (LEED, Energy Star, etc)?
6. How is the implementation of the requirement enforced?
7. What were the constraints? (lack of support, lack of awareness, technical capacity, other?)
8. What measures did you offer to improve building efficiency?
9. Was a monitoring system integrated into design? How will the performance be measured and monitored?
10. What do you think FEMP can do to improve and facilitate compliance with the new standards?