

Guide for Attaining LEED Energy & Atmosphere Credits

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Sustainable Design & Development in Federal Facilities

The Federal Government:

- Owns 445,000 buildings with a total floor space of over 3 billion square feet
- In addition, leases an additional 57,000 buildings comprising over 374 million square feet of floor space.
- These structures and their sites affect our natural environment, our economy, and the productivity and health of the workers and visitors that use these buildings.

Federal Leadership in High Performance and Sustainable Buildings

EPACT 05

- Includes Energy and Conservation in Homes and Commercial Businesses
- Includes Energy Efficiency and Conservation in Government Buildings

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- High performance buildings to include sustainability principles such as LEED
- Energy Performance for New Construction to be 30% better than ASHRAE Standard 90.1-2004
- Water Conservation
- Renewable power generation
- Procurement to include requirements for energy efficiency, recycled content, biobased fuels and environmentally preferable materials.
- Energy Glidpath now at a 3% per year reduction from FY03

Agencies Respond

Adopt LEED for New Construction, NC, at the Silver Level with self certification.

Adopt LEED for Existing Buildings at the Certified level pending further study.

In NC, Require 30% Better than ASHRAE 90.1-2004 for Energy Efficiency.

Why 30% better? – it was decided that it is about the highest efficiency possible with relatively conventional solutions for building envelope and equipment.

For Example, the Army, Air Force and Navy issued Policy Statements requiring the use of LEED for sustainable design & development, SD&D.

LEED Energy & Atmosphere Prerequisites

- Fundamental Commissioning of Building Energy Systems
- Minimum Energy Performance – used to be simply compliance with ASHRAE 90.1-2004, but as of July 1, 2007; must earn 2 Credits i.e. 14% better than 90.1
- Fundamental Refrigerant Management – zero use of CFCs

Optimize Energy Performance

Up to 10 Credits possible

- 2 Credits are the new prerequisite @ 14% Better
- 28% better gets 6 credits
- 31.5% better gets 7 credits
- Federal requirements are 30% better – which would be 6 credits, why not go for the 7?

Other Energy Related Credits

- Onsite Renewable Energy – up to 3 Credits – 2.5% is 1 cr, 7.5% is 2 cr and 12.5% is 3 cr
- Enhanced Commissioning – 1 Credit
- Enhanced refrigerant Management – 1 Credit
- Measurement & Verification – 1 Credit
- Purchase Green Power – 1 Credit

Compliance with ASHRAE 90.1-2004 Prescriptive Vs Performance Methods

Prescriptive:

- Use the prescriptive path as outlined in the 90.1 Users Manual – but this is minimal compliance, zero LEED Credits
- Use the ASHRAE Small Building, 20,000 sq ft, Design Guide for 30% better but based upon 90.1-1999, not 2004. Thus would earn only 4 cr.
- ASHRAE actively developing more prescriptive design guides but not released yet

Performance Compliance

“Performance Rating Method”

Relies upon building simulation software. Acceptable are DOE-2 based programs such as eQUEST (free to download), VisualDOE, Trane Trace 700, Carrier HAP-E20 II, EnergyPlus and there are others. This will be the method the we in the Federal sector will be using.

Process:

- Develop a “baseline” building design that meets the minimum requirements of 90.1 and model it’s operation using approved modeling tools from above. The output value given in annual energy cost data will be the baseline that we target for reduction.
- Develop an efficient design and model that. Continue to make improvements and iterations until the new design is at least 30% lower.

Components to be Included

- Building Envelope including semi-heated spaces
- HVAC, including parking garage ventilation, freeze protection, exhaust air energy recovery, and condenser heat recovery for water heating
- Service water heating including swimming pools
- Electrical Power including all building power distribution systems
- Lighting including exits, building exterior, grounds, and parking garages.
- Other equipment including all permanently wired electrical motors.

Four Fundamental Strategies to Improve Performance

- Accomplish demand reduction by optimizing orientation, reducing internal loads, daylight lighting dimming and load shifting.
- Harvest site energy including daylight, solar heating, solar PV, and wind power.
- Increase efficiency through better building envelope and HVAC.
- Recover waste energy through exhaust air heat recovery, graywater heat recovery and cogeneration.

Principles to Keep in Mind

- Focus on the integrated design process, all design professionals working together as one. Use the design charrette process of LEED.
- Don't forget the impact that building orientation and efficiency have on HVAC equipment sizing and first costs.
- High Performance Buildings are not a collection of technologies.
- They are not a collection of parts flying in close formation.
- They are a single unified system designed, constructed and operated as a unit to serve the purpose for which they were built.



For More Information

- Would you like to know more about this session?
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Questions?

Thank You



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