



## DOE FEMP First Thursday Seminar Learner Guide

# New Developments in Federal Building Energy Efficiency Standards

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### Short Description

Gain knowledge of the current legislative drivers relative to ASHRAE standards and which buildings fall under which standard. Learn about major changes in the most recent versions of ASHRAE Standard 90.1 and the International Energy Conservation Code. Understand the actual requirements of the standards, where to look for conservation measures, and how to determine if a building meets them.

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### Core Course Competencies Addressed in the Training

After successfully completing this seminar you will:

1. When designing a Federal building, determine which Federal Building Energy Efficiency Standards apply for the particular building type.
2. Explain the relationship between the Federal Building Energy Efficiency Standards, ASHRAE 90.1, and the International Energy Conservation Code (IECC).
3. Apply the right parts of the standards (10 CFR 433 and 435) based on when the building design was initiated.
4. When calculating the 30% energy efficiency improvement requirement, explain what is included and excluded in the calculations.
5. Discuss key strategies for meeting the energy efficiency standards through aspects of building design such as building envelope, lighting, service hot water, and technology selection.
6. Discuss key strategies for calculating the improvement, including whole building simulation and life cycle cost analysis.

## Key Resources

Energy Efficiency Standards for Federal Buildings (Department of Energy)  
<https://www.energycodes.gov/energy-efficiency-standards-federal-buildings>

Building Life Cycle Costs Program  
[http://www1.eere.energy.gov/femp/information/download\\_blcc.html](http://www1.eere.energy.gov/femp/information/download_blcc.html)

Energy Plus Building Simulation Software  
<http://apps1.eere.energy.gov/buildings/energyplus/openstudio.cfm>

Open Studio for Whole Building Energy Modeling  
<https://openstudio.nrel.gov/>

## Glossary

**10 CFR 433:** Energy Efficiency Standards for the Design and Construction of New Federal Commercial and Multi-Family High Rise Residential Buildings establishes an energy efficiency performance standard for the new Federal commercial and multifamily high-rise buildings, for which design for construction began on or after January 3, 2007, as required by section 305(a) of the Energy Conservation and Production Act, as amended (42 U.S.C. 6834(a)).

**10 CFR 435:** Voluntary Performance Standards for New Non-Federal Residential Buildings established voluntary energy conservation performance standards for new residential buildings. The voluntary energy conservation performance standards are designed to achieve the maximum practicable improvements in energy efficiency and increases in use of non-depletable sources of energy.

**10 CFR 436:** Federal Energy Management and Planning Programs incorporates the rules for Federal energy management and planning programs to reduce the Federal energy consumption and to promote life cycle cost effective investments in building energy systems and energy and water conservation measures for Federal buildings.

**ASHRAE 90.1:** Standard 90.1 is a benchmark for commercial building energy codes in the United States and a key basis for codes and standards around the world.

**Baseline building performance:** the annual energy cost for a building design intended for use as a baseline for rating above standard.

**Budget building design:** a computer representation of a hypothetical design based on the actual proposed building design. This representation is used as the basis for calculating the energy cost budget.

**Building design:** the development of plans and specifications for human living space.

**Building energy system:** an energy conservation measure or any portion of the structure of a building or any mechanical, electrical, or other functional system supporting the building, the nature of selection of which for a new building influences significantly the cost of energy consumed.

**Design for Construction:** the stage when the energy efficiency and sustainability details are either explicitly or implicitly included in a project cost specification.

**Energy cost budget:** the annual energy cost for the budget building design intended for use in determining minimum compliance with ASHRAE 90.1.

**International Energy Conservation Code (IECC):** The International Energy Conservation Code (IECC) is a building code created by the International Code Council in 2000. It is a model code adopted by many states and municipal governments in the United States for the establishment of minimum design and construction requirements for energy efficiency.

**Investment cost:** the initial cost of owning, operating, and maintaining a building over its useful life (including its fuel and water, energy, labor, and replacement components), determined on the basis of a systematic evaluation and comparison of alternative building

**Life cycle cost:** the total cost related to energy conservation measures owning, operating, and maintaining a building over its useful life as determined in accordance with 10 CFR 436.

**Life cycle cost effective:** the proposed building has a lower life-cycle costs than the baseline building, as described by 10 CFR 436.19, or has a positive estimated net savings, as described by 10 CFR 436.21, or has an adjusted internal rate of return, as described by 10 CFR 436.22 that is estimated to be greater than the discount rate as listed in OMB Circular number A-94.

**Low-rise residential building:** any building three stories or less in height above grade that includes sleeping accommodations where the occupants are primarily permanent in nature (30 days or more).

**New Federal Building:** any building to be constructed by, or for the use of, any Federal agency which is not legally subject to State or local building codes or similar requirements.

**Practicable optimum life cycle energy cost:** the energy cost of the set of conservation measures that has the minimum life cycle cost to the Federal government incurred during a 25 year period and including the costs of construction, maintenance, operation, maintenance, and replacement.

**Process load:** the load on a building resulting from energy consumed in support of a manufacturing, industrial, or commercial process. Process loads do not include energy consumed maintaining comfort and amenities for the occupants of the building (including space conditioning for human comfort).

**Receptacle load:** the load on a building resulting from energy consumed by any equipment plugged into electrical outlets.

**Residential building:** a new building that is designed to be constructed and developed for residential occupancy.

**Set of conservation options:** the combination of envelope design and equipment measures that influences the long term energy use in a building designed to maintain a minimum of ventilation level of 0.7 air changes per hour, including the heating and cooling equipment, domestic hot water equipment, glazing, insulation, refrigerators and air filtration control measures.

**Study period:** the time period covered by the life cycle cost analysis.

**Sunk costs:** costs incurred prior to the time at which the life cycle analysis occurs.