

Baseline Energy Efficiency Standards Updates for All New Federal Buildings (10 CFR 433 and 435)

April 2022



Background on DOE Authority

What is the statutory authority for DOE to issue Federal building energy efficiency standards?

Statutory Origin: 42 USC 6834(a)(1)

- DOE is required to **establish the building energy efficiency standards for all new Federal buildings** pursuant to section 305 of the Energy Conservation and Production Act (ECPA), as amended by Section 109 of the Energy Policy Act of 2005.
- **Not later than one year after the date of approval of each subsequent revision of the ASHRAE Standard or the International Energy Conservation Code**, as appropriate, DOE must determine whether to amend the baseline Federal building standards with the revised voluntary standard based on the cost-effectiveness of the revised voluntary standard.
 - The referenced voluntary consensus code is the
 1. American National Standards Institute (ANSI)/American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. **(ASHRAE) Standard 90.1.** in the case of commercial and multi-family high rise buildings; or
 2. International Energy Conservation Code **(IECC)** in the case of (low-rise) residential buildings
- Additionally, the Federal building energy efficiency performance standards for new Federal buildings must require that such buildings be designed to achieve **energy consumption levels that are at least 30 percent below** the levels established in the referenced code (the baseline Federal building standard), **if life-cycle cost-effective.**

Drivers for Updates to Regulation 10 CFR 433 and 435

Commercial (10 CFR 433)

1. The publication of ASHRAE 90.1-2019.
2. DOE's Commercial Building Energy Code Determination
 - See 86 FR 40543 (July 28, 2021)
3. DOE's analysis of the updated ASHRAE Standard 90.1 as applied to the Federal sector and found that the **2019 version of Standard 90.1 would have energy cost, source energy, and site energy savings.**

Residential (10 CFR 435)

1. The publication of IECC 2021.
2. DOE's Residential Building Energy Code Determination
 - See 86 FR 40529 (July 28, 2021) for final determinations
3. DOE's analysis of the updated IECC 2021 as applied to the Federal sector and found that **the 2021 version of IECC would have energy cost, source energy, and site energy savings.**

NOTE: The assumptions and methodology for the cost-effectiveness of the Federal building standards are based on DOE's Building Energy Codes Program (BECP) published final determinations and cost-effectiveness analysis of ASHRAE Standard 90.1-2019 and IECC 2021.

Summary of Updates to DOE Federal Building Efficiency Rules

What are the updated Federal Building Efficiency Standards?

CFR	Federal Efficiency Rules	Published Rule Updates	Effective Date	Enforcement Date
10 CFR 433	<p>Baseline Energy Efficiency Standards Update for New Federal Commercial and Multi-Family High-Rise Residential Buildings (ASHRAE Rule)</p> <p><i>(§109 of EAct 2005)</i></p>	<p>Requires all Federal agencies design new Federal buildings that are commercial and multi-family high-rise residential buildings*, for which design for construction began on or after one year after publication of the rule,</p> <ol style="list-style-type: none"> 1. Meet ASHRAE 90.1-2019, 2. If life-cycle cost-effective, achieve energy consumption levels that are at least 30 percent below*** the levels of the ASHRAE Baseline Building 2019. 	<p>June 6, 2022: Final Rule – Update to ASHRAE Standard 90.1-2019 - 87 FR 20267</p>	<p>April 7, 2023</p>
10 CFR 435	<p>Energy Efficiency Standards for the Design and Construction of New Federal Low-Rise Residential Buildings Baseline Standards Update (IECC Rule)</p> <p><i>(§109 of EAct 2005)</i></p>	<p>Requires all Federal agencies design new Federal buildings that are low-rise residential buildings**, for which design for construction began on or after one year after publication of the rule,</p> <ol style="list-style-type: none"> 1. Meet IECC 2021, 2. If life-cycle cost-effective, achieve energy consumption levels that are at least 30 percent below*** the levels of the IECC 2021 Baseline Building. 	<p>June 6, 2022: Final Rule – Update to 2021 IECC -87 FR 19595</p>	<p>April 5, 2023</p>

**By default this covers ALL BUILDINGS except low rise residential. Also includes industrial and manufacturing buildings although some specific industrial and manufacturing process loads can be exempt.*

*** Also includes privatized military family housing*

****Per current regulations in 10 CFR 433 and 435, if a 30 percent reduction is not LCC effective, the design of the proposed building shall be modified so as to achieve an energy consumption level at or better than the maximum level of energy efficiency that is LCC effective, but at a minimum complies with the version of the standard reference in the rule.*

10 CFR 433 - Summary of Regulatory Changes

Key updates in regulatory text:

- Amending the **definition for “Federal buildings”** to match what is found in 42 U.S.C. 6832(6). EISA 2007 (Pub. L. 110–140, 121 Stat. 1614 (Dec. 19, 2007)) updated the definition to include **privatized military family housing and leased buildings**. In order to bring 10 CFR part 433 into agreement with 42 U.S.C. 6832(6), DOE also updating the definition of “New Federal building” to mean *“any new building (including a complete replacement of an existing building from the foundation up) to be constructed by, or for the use of, any Federal agency. Such term shall include new buildings (including a complete replacement of an existing building from the foundation up) built for the purpose of being leased by a Federal agency, and privatized military housing.”*
- Updating the **referenced standard to ASHRAE 90.1-2019**
- Accounting for changes to Appendix G equation while still providing mission allowances.
 - The Appendix G PRM equation requires Federal agencies to **include energy use traditionally unregulated by ASHRAE** (i.e., process loads and receptacle loads not within the scope of ASHRAE Standard 90.1) when calculating the 30 percent improvement beyond ASHRAE Standard 90.1, **EXCEPT** DOE allows for the exclusion of energy-intensive process loads that are:
 - **(i) driven by mission and operational requirements, not necessarily buildings, and**
 - **(ii) not influenced by conventional building energy conservation measures.**

The preamble of the Final Rule also includes answers and clarifications to frequently asked questions for implementing part 433. These clarifications do not represent changes to the regulatory text

- Clarify how Federal agencies use the revised Appendix G Performance Rating Method (PRM), as updated by ASHRAE 90.1-2019. This includes details on how:
 - Federal agencies, per updates made by ASHRAE, **may now use the PRM** to demonstrate compliance with Standard 90.1-2019, in addition to two other methods, the prescriptive path or the ECB method and,
 - Federal agencies, consistent with ASHRAE, **must continue to only use the PRM** for calculating the 30% beyond ASHRAE Standard 90.1 for all types of projects.
- Clarify that Federal agencies, not DOE, are the “building/code official” for purposes of implementing Standard 90.1 and determining if any exemptions under the Standard are applicable.

10 CFR 433 - Quick Update on Key Points

Due to a change made by ASHRAE in Standard 90.1– 2016, and retained in ASHRAE Standard 90.1–2019, unregulated process and receptacle loads must be accounted for in the whole building analysis to determine whether a Federal building design complies with, or meets, ASHRAE Standard 90.1–2019, **AND** in the whole building simulation used to establish the baseline for calculating the 30 percent improvement beyond ASHRAE Standard 90.1 (applying the Appendix G Performance Rating Method). *NOTE: While unregulated loads are included, they are still NOT regulated. (i.e. don't count against you)*

Regulated Energy Use (per ASHRAE)	Unregulated energy use (per ASHRAE)	Excluded Energy-Intensive Process Loads (per DOE)
<p>ASHRAE defines “regulated energy use” as “energy used by building systems and components with requirements prescribed in sections 5 through 10.”</p> <ul style="list-style-type: none"> Includes energy used by HVAC, lighting, SWH, motors, transformers, vertical transportation, refrigeration equipment, computer-room cooling equipment, and other building systems, components, and processes with requirements in sections 5 through 10. 	<p>ASHRAE defines “unregulated energy use” as “energy used by building systems and components that is not regulated energy use.”</p> <ul style="list-style-type: none"> ASHRAE considered plug loads such as computers, printers, copiers, and other electronic devices to be “unregulated energy use” for purposes of ASHRAE Standard 90.1. While automatic receptacle control for plug loads is required by Section 8.4.2 of ASHRAE Standard 90.1, the actual plug loads themselves are not regulated. 	<p>energy intensive process loads that are:</p> <ul style="list-style-type: none"> (i) Driven by mission and operational requirements, not necessarily buildings, and (ii) not influenced by conventional building energy conservation measures
<p>For purposes of clarity and this rule, DOE notes that the definition of “regulated energy use” should include SWH used for pools, both interior lighting and exterior lighting, and service water pressure booster systems.</p>	<p>For purposes of clarity and this rule, cooking equipment other than refrigeration equipment should be considered “unregulated energy use” as well.</p> <p><i>NOTE: Both plug loads and cooking equipment are covered by Federal energy efficient product procurement requirements in 10 CFR part 436.</i></p>	<p>Examples would include training simulators, health-care equipment, facilities which generate and/or transmit electricity or steam, waterway shipping locks, and transmitters and other types of electronic installations.</p> <p>This exception aligns with DOE’s exception for certain assumed exclusions of structures and processes under the Federal energy performance and reporting requirements of section 543 of the National Energy Conservation Policy Act (NECPA), as amended by EAct. (See 42 U.S.C. 8253(a))</p>

10 CFR 433 - New Requirements

In creating Standard 90.1–2019, ASHRAE published 88 addenda in total, of which:

- 29 are expected to decrease energy use (i.e., increased energy savings);

(1) Modified exceptions to exhaust air energy recovery requirements.
(2) Changes the term “ventilation air” to “outdoor air” in multiple locations. Adds an exception to allow systems intended to operate continuously not to install motorized outdoor air dampers. Changes return air dampers to require low leakage ratings.
(3) Provides a definition of “occupied standby mode” and adds new ventilation air requirements for zones served in occupied standby mode.
(4) Clarifies that exhaust air energy recovery ventilators (ERVs) should be sized to meet both heating and cooling design conditions unless one mode is specifically excluded by existing exceptions.
(5) Revises the exception to demand control ventilation (DCV) requirements to clarify that the exception only applies to systems with ERV required to meet section 6.5.6.1.
(6) Revises the definition of “networked guest room control system” and aligns HVAC and lighting time-out periods for guest rooms.
(7) Expands the exterior lighting power density (LPD) application table to cover additional exterior spaces that are not in the exterior LPD table.
(8) Adds heat recovery for the space conditioning requirement targeted specifically at in-patient hospitals.
(9) Restructures commissioning and functional testing requirements in all sections of Standard 90.1 to require verification or testing for smaller and simpler buildings and commissioning for larger and more complex buildings.
(10) Adds indoor pool dehumidifier energy recovery requirement.
(11) Implements Federal clean water pump requirements.
(12) Replaces Fan Energy Grade metric with Fan Energy Index metric.
(13) Revises supply air temperature reset controls.
(14) Eliminates the requirement that zones with direct digital control (DDC) have air flow rates that are no more than 20 percent of the zone design peak flow rate.
(15) Revises the prescriptive fenestration U-factor and solar heat gain coefficient (SHGC) requirements and makes them material neutral.

(16) Provides separate requirements for non-transient dwelling unit exhaust air energy recovery.
(17) Changes the interior LPD requirements for many space types.
(18) Adds a new chiller table for heat pump and heat recovery chillers.
(19) Revises the computer room air conditioner (CRAC) requirements to clarify these are for floor mounted units and adds a new table for ceiling mounted units.
(20) Adds a definition of Standby Power Mode Consumption. Increases the furnace efficiency requirements.
(21) Adds a new Table F–5 to specify DOE covered residential water boiler efficiency requirements and notes that requirements in Table 6.8.1–6 apply only to products used outside the United States. Adds standby mode and improved efficiency as of January 15, 2021.
(22) Adds dry cooler efficiency requirements and slightly increases efficiency requirements for evaporative condensers.
(23) Combines the commercial refrigerator and freezer table with the refrigerated casework table into a single table. Increases efficiency requirements.
(24) Revises LPDs using the Building Area Method.
(25) Makes a similar change to the variable air volume (VAV) box minimums as Addendum au to 90.1–2016, but in exception 1 to section 6.5.2.1 where the same 20 percent requirement still existed.
(26) Cleans up the outdated language regarding walk-in cooler and walk-in freezer requirements and makes the requirements consistent with current Federal regulations.
(27) Adds new normative references and updates existing ones with new effective dates, including several addenda to ASHRAE Standard 62.1–2016.
(28) Updates the lighting control requirements for parking garages in section 9.4.1.2.
(29) Changes the daylight responsive requirements from continuous dimming or stepped control to continuous dimming required for all spaces and adds a definition of continuous dimming.

- none are expected to increase energy use (i.e., decreased energy savings), and;

- 59 are expected to have no direct impact on energy savings (such as administrative or clarifications or changes to alternative compliance paths).

10 CFR 433 - Useful Links

- **Federal Register notice**
 - <https://www.federalregister.gov/documents/2022/04/07/2022-06949/baseline-energy-efficiency-standards-update-for-new-federal-commercial-and-multi-family-high-rise>
- **Docket**
 - <https://www.regulations.gov/document/EERE-2022-BT-STD-0013-0001>
- **Building Energy Codes Program (BCEP) Technical Support Documents for Standards 90.1-2016 and 90.1-2019**
 - https://www.energycodes.gov/sites/default/files/2021-07/02202018_Standard_90.1-2016_Determination_TSD.pdf
 - https://www.energycodes.gov/sites/default/files/2021-07/Standard_90.1-2019_Final_Determination_TSD.pdf
- **BCEP Training on Standard 90.1-2019**
 - <https://www.energycodes.gov/technical-assistance/training/courses/ansiashraeies-standard-901-2019>
- **Read-Only Online Version of Standard 90.1-2019 from ASHRAE**
 - Go to <https://www.ashrae.org/technical-resources/standards-and-guidelines> and scroll down to select Standard 90.1-2019 under “Preview ASHRAE Standards and Guidelines”.
- **FEMP Guidance on 10 CFR 433 – Coming Soon!**

10 CFR 435 - Summary of Regulatory Changes

Key updates in regulatory text:

- Updating the referenced standard to IECC 2021

2021 IECC Update

- Update to climate zones for consistency with other ASHRAE and ICC energy codes
- Improve High-Efficacy Lighting
- Increase Wall Insulation
- Increase Slab Insulation
- Increase Ceiling Insulation
- Improve Fenestration U-Factor
- Improve Mechanical Ventilation Fan Efficacy
- Add Heat Recovery Ventilation
- Add Exterior Lighting Allowances
- Add Additional Efficiency Package

2018 IECC Update

- Adds Log Home Requirements
- Add Requirements for Buried Ducts in Attics
- Adds HRV/ERV-Specific Fan Efficacy Requirements

10 CFR 435 - Useful Links

- **Federal Register notice**
 - <https://www.federalregister.gov/documents/2022/04/05/2022-07138/energy-efficiency-standards-for-the-design-and-construction-of-new-federal-low-rise-residential>
- **Docket**
 - <https://www.regulations.gov/document/EERE-2022-BT-STD-0013-0001>
- **Building Energy Codes Program (BCEP) Technical Support Documents for 2018 and 2021 IECC Determinations**
 - <https://www.energycodes.gov/sites/default/files/2021-07/EERE-2018-BT-DET-0014-0008.pdf>
 - https://www.energycodes.gov/sites/default/files/2021-07/2021_IECC_Final_Determination_AnalysisTSD.pdf
- **BCEP Training on 2021 IECC**
 - <https://www.energycodes.gov/technical-assistance/training/courses/residential-provisions-2021-iecc>
- **Read-Only Online Version of 2021 IECC from ICC**
 - <https://codes.iccsafe.org/content/IECC2021P1>
- **FEMP Guidance on 10 CFR 435 – Coming Soon!**

Summary of Federal Cost, Energy and Emissions Benefits

FEMP Summary Determinations	90.1-2013 to 90.1-2019 Savings	IECC 2015 to IECC 2021 Savings
Energy cost (per sq.ft)	11.3%	9.0 %
Source energy (per sq.ft)	11.3%	9.1 %
Site energy (per sq.ft)	11.2%	9.5 %

Cumulative FFC Emissions Reduction (Total FFC Emissions)	ASHRAE 90.1-2019	IECC 2021
CO ₂ (million metric tons)	4.5	1.3
SO ₂ (thousand tons)	1.6	0.4
NO _x (thousand tons)	6.9	2.3
Hg (tons)	0.01	0.002
CH ₄ (thousand tons)	33.5	10.8
N ₂ O (thousand tons)	0.04	0.01

Additional Key Points

Reporting Requirements:

- Adjustments will be made for the FY 2023 reporting workbook to capture this update. FEMP will be reviewing opportunities to streamline data reporting for this element as well

Additional Active Rulemaking

- Update on related rules pertaining to new Federal buildings and major renovations
- Next iteration - ASHRAE 90.1-2022

Questions?