



DENVER AMENDMENT PROPOSAL FORM FOR PROPOSALS TO THE 2019 DENVER BUILDING CODE AMENDMENTS AND THE 2021 INTERNATIONAL CODES

DENVER
THE MILE HIGH CITY

2021 CODE DEVELOPMENT CYCLE

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2) One proposal per this document is to be provided with clear and concise information.

Is a separate graphic file provided ("X" to answer): ___ Yes or ___ No

3) Highlight the code and acronym that applies to the proposal

<u>Acronym</u>	<u>Code Name</u>	<u>Acronym</u>	<u>Code Name</u>
DBC-AP	Denver Building Code–Administrative Provisions	IPC	International Plumbing Code
IBC	International Building Code	IRC	International Residential Code
IECC	International Energy Conservation Code	IFGC	International Fuel Gas Code
IEBC	International Existing Building Code	IMC	International Mechanical Code
IFC	International Fire Code	DGC	Denver Green Code

Please provide all the following items in your amendment proposal.

Code Sections/Tables/Figures Proposed for Revision

Instructions: If the proposal is for a new section, indicate (new), otherwise enter applicable code section.

701.5 Performance Approach

CC102 Definitions

Proposal:

Instructions: Show the proposal using ~~strikeout~~, underline format.

Place an "X" next to the choice that best defines your proposal: ___ Revision ___ New Text x___ Delete/Substitute ___ Deletion

**SECTION CC102
DEFINITIONS**

Predicted ENERGY UTILIZATION INTENSITY (pEUI). The annual predicted site energy for ~~either the baseline building or~~ the proposed building divided by the gross *conditioned floor area* plus any semi-heated floor area of the building, in units of kBtu/ft²-yr. ~~For the baseline building, the EUI can be divided between regulated energy use and unregulated energy use.~~

701.5 (7.5) Performance Approach (Project Elective). IECC, Section C401.2, option 3 shall not be used. Buildings shall comply with IECC, Section C401.2, option 1(c) with the following modifications.

701.5.1 (7.5.1) Annual Energy Cost. The Energy Cost Budget option IECC, Section C401.2, option 1(c)(1) shall not be used.

701.5.2 (7.5.2) Annual Source Energy. For buildings that comply with IECC, IECC, Section C401.2, option 1(c)(2),

the Source Energy Index Target (SEIt) shall be calculated in accordance with the following:

$$SEIt = 0.77 \times [BBUSE + (BPF \times BBRSE)] / BBP$$

Buildings that comply with the Denver Green Code Source Energy Index requirement shall be permitted to apply energy production from onsite renewable energy to offset a maximum of 15% of the annual total energy load for multiple-fuel buildings, or to offset a maximum of 20% of the load for all-electric buildings.

Supporting Information

Purpose: this proposal removes the component performance alternative from the Denver Base Code (IECC). This option is unnecessary, since there is already a whole-building performance approach that allows for tradeoffs for projects that do not wish to meet the prescriptive envelope requirements.

Reason: Unregulated loads can constitute as much as 30% to 50% of the total energy use of commercial buildings. As buildings become increasingly stringent through efficiency measures, the fraction of loads that are unregulated increases each code cycle. Unregulated loads include not only plug loads, but also process loads of computer servers and commercial refrigeration, and building-specific equipment such as elevators and air compressors. Denver's commercial building code will not be able to reach long-term goals without addressing plug loads and other unregulated loads.

Plug load efficiency cannot be regulated without post-occupancy verification, since most equipment is installed after the certificate of occupancy. Moreover, there are no regulations that limit the amount of plug loads and appliances that can be installed after a building is occupied. The Denver Green Code and Denver IECC Amendments establish a performance criteria as a percent reduction of both regulated loads and unregulated loads. In practice, demonstration of reduction of unregulated loads against a baseline is impossible because (1) no baseline exists, and (2) verification of plug load and unregulated loads against a baseline would require promises of installation of efficient equipment, post occupancy. The result of this code requirement is that designers and architects have to achieve a reduction in regulated loads that can be much greater than the 23% improvement against IECC. For buildings with large amounts of plug loads, this target is extremely hard to achieve without incorporating onsite renewable energy production.

$$SEIt = 0.77 \times [BBUSE + (BPF \times BBRSE)] / BBP \quad (\text{Equation 1})$$

Effective ways to encourage designers to work towards the Denver Green Code target are (1) relaxing the energy percentage reduction against IECC, (2) removing the requirement for reducing energy use of unregulated loads (Equation 2), or (3) providing additional flexibility of using onsite renewable generation in meeting the target. The third of these options aligns well with Denver's long-term goals, while ensuring a base level of efficiency.

$$SEIt = [BBUSE + 0.77 \times (BPF \times BBRSE)] / BBP \quad (\text{Equation 2})$$

Substantiation:

The proposal does not increase or decrease stringency but adds flexibility to the current requirements. California has recently added a requirement for onsite photovoltaic generation for some building types; studies have shown that the maximum allowed level for production limits exports to a small percentage of generated energy. This ensures that buildings don't install photovoltaic (PV) systems that are not aligned with building peak demand and load profile.

Plug load energy consumption is well-aligned with onsite renewable generation. Recent projects have investigated the potential to use direct-current (DC) power supplies so that PV panels can directly power plug loads in the building.

The slightly higher PV allowance towards building predicted EUI for all-electric buildings is designed to incentivize electrification. Since these buildings will not rely on natural gas consumption, they will be better positioned to run on clean energy as the grid incorporates additional renewable energy sources over time.

Bibliography and Access to Materials (as needed when substantiating material is associated with the amendment proposal):

2022 Title 24 Building Efficiency Standards, California Energy Commission.

Other Regulations Proposed to be Affected

***For proposals to delete content from the 2019 Denver Green Code in conjunction with adding it to other mandatory Denver codes and/or regulations, only.**

Please identify which other mandatory codes or regulations are suggested to be updated (if any) to accept relocated content.

Referenced Standards

N/A

Impact

How will this proposal impact cost and restrictiveness of code? ("X" answer for each item below)

This reduces restrictiveness while maintaining stringency. The design and construction cost could increase or decrease, depending on specific project requirements.

Cost of construction: Increase ___ Decrease ___ No Impact
Cost of design: ___ Increase Decrease ___ No Impact
Restrictiveness: ___ Increase Decrease ___ No Impact