AMENDMENT PROPOSAL

Please provide all the following items in your amendment proposal.

**Code Sections/Tables/Figures Proposed for Revision:**

New DGC Definitions (301.2)
New DGC 701.3.5

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**Add new definitions as follows:**

**All-electric building:** a building whose only utility infrastructure is electricity and all energy systems and appliances are served by electricity.

**Mixed-fuel building:** a building with utility infrastructure for both electricity and natural gas to serve the building’s end uses.

**Section DGC 701.3.5. Requirements for all-electric buildings. To be designated an “all-electric building”, buildings must meet requirements of 701.3.5.1 through 701.3.5.4:**

1. Electric resistance heating shall not be used as the primary heating source of conditioned spaces. Heat pumps used for space heating shall be sized such that the full heating load at the temperature-adjusted heat pump efficiency is met at an outdoor condition of 20°F dry-bulb.
2. Space heating that is met by air-source heat pumps used for space heating shall use cold-climate heat pumps that meet the performance requirements of IECC C406.10. Heat pumps that meet these performance requirements may use supplemental electric resistance heat.
3. Water heating shall be served by heat pump water heaters. Instantaneous electric water heaters shall only be used in buildings with a total heating load of 75 kBtu/h or less. Electric resistance storage water heaters are not permitted in all-electric buildings.
4. All energy consumption devices either enclosed by the building or that serve the building shall utilize only electric heating sources. New buildings shall not have gas service provided to the...
building and shall not have gas lines within 50 feet of the building perimeter on the building property.

**Exception 1.** Electric resistance heating shall be permitted for reheat for variable air volume systems that serve multiple zones, provided that these systems meet the control requirements of IECC Section C403.6.1, and shall include the capability and be configured to reduce the volume of air that is reheated, re-cooled or mixed in each zone to twenty percent of the zone design peak supply airflow. Electric resistance heating shall be permitted for reheat for variable air volume systems that serve multiple zones.

**Exception 2.** Electric resistance water heating is permitted for instantaneous point-of-use water heaters with a rated capacity not exceeding 25 kBtu/h and a storage capacity no greater than 5 gallons.

**Supporting Information:**

**Purpose:** New commercial and multi-family buildings can be designed as all-electric buildings. This greatly reduces onsite emissions from fossil fuels and has the potential to improve indoor air quality. Water heating products with storage that use electric resistance heating elements are roughly three times more inefficient than heat pump water heaters. For space heating, heat pumps provide efficient heating, but when heating needs are greatest, the systems are less efficient, and rely on supplemental electric resistance heating for backup. This measure restricts the use of resistance heating in buildings designed to be all-electric.

**Reason:** Electrification of buildings leads to a large reduction in emissions and reduces dependence on fossil fuel sources for heating appliances and other building needs. Electrification can also provide substantial benefits for indoor air quality. As the energy generation sources become cleaner and cleaner over time, electrification benefits will increase further. Electric resistance has been an option for commercial boilers and service water heating. Heat pumps are approximately three times as efficient as resistance heating and are available both for space heating and for water heating sources. Cold-climate heat pumps are available that provide much better efficiency at peak Denver heating conditions (0-15F outdoor dry-bulb) and can limit the use of supplemental resistance heating to cold winter conditions. This measure provides minimum equipment type requirements for buildings if they decide to go all-electric.

**Substantiation:** Heat pump water heaters are widely available that meet intended efficiency requirements. Heat pumps for space heating can be sized to meet the full load at a lower temperature than current standard practice. This will limit the use of electric resistance heating during the winter months.

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

The 2022 California Title 24 Building Energy Efficiency Requirements limit the use of electric resistance heat as part of the base code.

**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)

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