



# 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

1) **Name:** Courtney Anderson **Date:** 10/12/2021  
**Email:** [Courtney.Anderson@denvergov.org](mailto:Courtney.Anderson@denvergov.org) **Representing (organization or self):**  
**City Staff Proposal (check box):**

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
<b>IECC</b>	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

## AMENDMENT PROPOSAL

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.

**C406.1**

*Add definitions as follows:*

**ALL-ELECTRIC PROPERTY.** *A property that contains no permanently installed equipment or appliances that utilize combustion, or plumbing for fuel gas or fuel oil, installed within the building(s) or site.*

**COMBUSTION.** *In the context of this code, refers to the rapid oxidation of fuel accompanied by the production of heat or heat and light.*

*Modify the section as follows:*

**C406.1 Additional energy efficiency credit requirements.** New buildings shall achieve a total of 10 credits from ~~Tables C406.1(1) through C406.1(5) where the table is selected~~ Table C406.1 in accordance with the credit requirements in Table C406.2 based on the use group of the building and from credit calculations as specified in relevant subsections of C406. Where a building contains multiple use groups, credits from each use group shall be weighted by floor area of each group to determine the weighted average building credit. Credits from the tables or calculation shall be achieved where a building complies with one or more of the following:

TABLE C406.1

Additional Energy Efficiency Credits for Denver

<u>Sub-section / Occupancy:</u>	<u>Group B</u>	<u>Group R and I</u>	<u>Group E</u>	<u>Group M</u>	<u>Other<sup>a</sup> Occupancies</u>
<b>C406.2.1: 5% Heating Eff Imprv.</b>	NA	1	2	2	2
<b>C406.2.2: 5% Cooling Eff Imprv.</b>	2	1	1	2	2
<b>C406.2.3: 10 % Heating Eff Imprv.</b>	1	2	4	4	3
<b>C406.2.4: 10 % Cooling Eff Imprv.</b>	5	1	2	3	3
<b>C406.3: Reduced Light Power</b>	8	2	9	14	8
<b>C406.4: Enh. Digital Light Ctrl</b>	2	NA	2	3	3
<b>C406.5.1: On-site Renewable Egv.</b>	9	7	6	7	7
<b>C406.6: Dedicated OA Sys (DOAS)</b>	3	5	NA	3	4
<b>C406.7.2: Recovered/Renew SWH<sub>b</sub></b>	NA	14	1	NA	14
<b>C406.7.3: Eff fossil fuel SWH<sub>b</sub></b>	NA	9	3	NA	9
<b>C406.7.4: Heat Pump SWH<sub>b</sub></b>	NA	5	1	NA	5
<b>C406.8: Enhanced Envelope Perf</b>	7	5	3	5	5
<b>C406.9: Reduced Air Infiltration</b>	4	5	NA	2	4
<b>C406.10 Energy Monitoring</b>	3	1	3	4	3
<b>C406.11 Fault Detection</b>	1	1	1	1	1

- a. Other occupancy groups include all Groups except for Groups B, R, I, E, and M  
b. For occupancy groups listed in C406.7.1.

**TABLE C406.2**  
**DENVER CREDIT REQUIREMENTS**

<u>Building Type</u>	<u>Credit Requirement for All-Electric Properties<sup>a</sup></u>	<u>Credit Requirement for All Other Buildings</u>
Mid-Rise Apartment (R-2) 4-7 stories	<u>10</u>	<u>53</u>
High-Rise Apartment (R-2) 8 or more stories	<u>10</u>	<u>40</u>
Small Hotel (R-1) 0-100,000	<u>10</u>	<u>40</u>
Large Hotel (R-1) 100,000 sf and larger	<u>10</u>	<u>36</u>
Medium Office (Group B) 40,000-100,000 sf	<u>10</u>	<u>31</u>
Large Office (Group B) 100,000 sf and larger	<u>10</u>	<u>48</u>
Retail (Group M)	<u>10</u>	<u>45</u>
School (Group E)	<u>10</u>	<u>40</u>
Warehouse (Group S)	<u>10</u>	<u>48</u>
All Other	<u>10</u>	<u>40</u>
a. Where no less than 75% of the space and water heating loads are served by equipment with a rated COP greater than 1.0		

**TABLE C406.1(1)**  
**Additional Energy Efficiency Credits for Group B Occupancy**

<u>Sub-section/Climate Zone:</u>	<u>0A &amp; 1A</u>	<u>0B &amp; 1B</u>	<u>2A</u>	<u>2B</u>	<u>3A</u>	<u>3B</u>	<u>3C</u>	<u>4A</u>	<u>4B</u>	<u>4C</u>	<u>5A</u>	<u>5B</u>	<u>5C</u>	<u>6A</u>	<u>6B</u>	<u>7</u>	<u>8</u>
C406.2.1: 5% Heating Eff Imprv.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1	NA	NA	1	1	NA	1
C406.2.2: 5% Cooling Eff Imprv.	6	6	5	5	4	4	3	3	3	3	2	2	1	2	2	2	1
C406.2.3: 10 % Heating Eff Imprv.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2	1	1	2	2	NA	1
C406.2.4: 10 % Cooling Eff Imprv.	11	12	10	9	7	7	6	5	6	4	4	5	3	4	3	3	3
C406.3: Reduced Light Power	9	8	9	9	9	9	10	8	9	9	7	8	8	6	7	7	6
C406.4: Enh. Digital Light Ctrl	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	1	1
C406.5.1: On-site Renewable Egv.	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9

C406.6 - Dedicated OA Sys (DOAS)	4	4	4	4	4	3	2	5	3	2	5	3	2	7	4	5	3
C406.7.2: Recovered/Renew SWH	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C406.7.3: Eff fossil fuel SWH	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C406.7.4: Heat Pump SWH	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C406.8: Enhanced Envelope Perf	1	4	2	4	4	3	NA	7	4	5	10	7	6	11	10	14	16
C406.9: Reduced Air Infiltration	2	1	1	2	4	1	NA	8	2	3	11	4	1	15	8	11	6
C406.10 Energy Monitoring	4	4	4	4	3	3	3	3	3	3	2	3	2	2	2	2	2
C406.11 Fault Detection	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1

TABLE C406.1(2)  
Additional Energy Efficiency Credits for Group R and I Occupancies

Sub-section / Climate Zone:	0A & 1A	0B & 1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
C406.2.1: 5% Heating Eff Imprv.	NA	NA	NA	NA	1	NA	NA	1	NA	1	1	1	1	2	1	2	2
C406.2.2: 5% Cooling Eff Imprv.	3	3	3	2	1	1	1	1	1	NA	1	1	NA	1	1	1	NA
C406.2.3: 10 % Heating Eff Imprv.	NA	NA	NA	NA	1	NA	NA	1	1	1	2	2	1	3	2	3	4
C406.2.4: 10 % Cooling Eff Imprv.	5	5	4	3	2	1	1	2	2	1	1	1	1	1	1	1	1
C406.3: Reduced Light Power	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
C406.4: Enh. Digital Light Ctrl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C406.5.1: On-site Renewable Egy.	8	8	8	8	7	8	8	7	7	7	7	7	7	7	7	7	7
C406.6: Dedicated OA Sys (DOAS)	3	4	3	3	4	2	NA	6	3	4	8	5	5	10	7	11	12
C406.7.2: Recovered/Renew SWH	10	9	11	10	13	12	15	14	14	15	14	14	16	14	15	15	15
C406.7.3: Eff fossil fuel SWH	5	5	6	6	8	7	8	8	8	9	9	9	10	10	9	10	11
C406.7.4: Heat Pump SWH	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
C406.8: Enhanced Envelope Perf	3	6	3	5	4	1	4	3	3	4	5	3	5	4	6	6	6
C406.9: Reduced Air Infiltration	6	5	3	11	6	4	NA	7	3	3	9	5	1	13	6	8	3
C406.10 Energy Monitoring	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
C406.11 Fault Detection	1	1	1	1	1	1	NA	1	1	NA	1	1	NA	1	1	1	1

TABLE C406.1(3)  
Additional Energy Efficiency Credits for Group E Occupancies

Sub-section / Climate Zone:	0A & 1A	0B & 1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
C406.2.1: 5% Heating Eff Imprv.	NA	NA	NA	NA	1	1	1	1	1	2	1	2	1	2	2	3	4
C406.2.2: 5% Cooling Eff Imprv.	4	4	3	3	2	2	2	2	1	1	1	1	NA	1	1	1	NA
C406.2.3: 10 % Heating Eff Imprv.	NA	NA	NA	1	1	1	1	2	3	4	3	4	3	4	3	5	7
C406.2.4: 10 % Cooling Eff Imprv.	7	8	7	6	5	4	3	4	3	1	2	2	1	2	2	2	1
C406.3: Reduced Light Power	8	8	8	9	8	9	8	9	8	9	8	9	8	7	8	7	7
C406.4: Enh. Digital Light Ctrl	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
C406.5.1: On-site Renewable Egy.	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5	5
C406.6: Dedicated OA Sys (DOAS)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C406.7.2: Recovered/Renew SWH*	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
C406.7.3: Eff fossil fuel SWH*	NA	1	1	1	1	1	1	2	2	3	2	3	2	3	3	3	5
C406.7.4: Heat Pump SWH*	NA	NA	NA	NA	NA	NA	NA	1	NA	NA	1	1	NA	1	1	1	1
C406.8: Enhanced Envelope Perf	3	7	3	4	2	4	1	1	3	1	2	3	NA	4	3	6	9
C406.9: Reduced Air Infiltration	1	1	1	2	NA	NA	NA	NA	NA	1	NA	1	NA	4	1	4	3
C406.10 Energy Monitoring	3	3	3	3	3	3	3	3	3	2	2	3	2	2	2	2	2
C406.11 Fault Detection	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2

a. For schools with showers or full service kitchens

TABLE C406.1(4)  
Additional Energy Efficiency Credits for Group M Occupancy

Sub-section / Climate Zone:	0A & 1A	0B & 1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
C406.2.1: 5% Heating Eff Imprv.	NA	NA	NA	NA	1	1	NA	1	1	2	2	2	2	3	2	3	4
C406.2.2: 5% Cooling Eff Imprv.	5	6	4	4	3	3	1	2	2	1	1	2	NA	1	1	1	NA
C406.2.3: 10 % Heating Eff Imprv.	NA	NA	NA	1	1	1	1	2	2	4	3	4	5	5	3	6	8
C406.2.4: 10 % Cooling Eff Imprv.	9	12	9	8	6	6	3	4	4		2	3	NA	2	2	2	1
C406.3: Reduced Light Power	13	13	15	14	16	14	17	15	15	14	13	14	14	16	14	14	12
C406.4: Enh. Digital Light Ctrl	3	3	4	3	4	3	4	4	4	3	3	3	3	4	4	3	3
C406.5.1: On-site Renewable Egy.	8	8	8	8	8	8	8	8	8	7	7	7	7	7	7	7	6
C406.6: Dedicated OA Sys (DOAS)	3	4	3	3	3	3	1	3	2	2	2	3	2	4	3	4	4
C406.7.2: Recovered/Renew SWH	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C406.7.3: Eff fossil fuel SWH	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C406.7.4: Heat Pump SWH	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C406.8: Enhanced Envelope Perf	4	6	3	4	3	3	1	6	4	4	4	5	4	6	5	8	9
C406.9: Reduced Air Infiltration	1	1	1	2	1	1	NA	3	1	1	3	2	1	7	3	6	3
C406.10 Energy Monitoring	4	5	5	5	5	4	4	4	4	3	3	4	3	4	4	4	3
C406.11 Fault Detection	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	2	2

**TABLE C406.1(5)**  
**Additional Energy Efficiency Credits for Other<sup>a</sup> Occupancies**

Sub-section / Climate Zone:	0A & 1A	0B & 1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
C406.2.1: 5% Heating Eff Imprv.	NA	NA	NA	NA	1	1	1	1	1	2	1	2	1	2	2	3	3
C406.2.2: 5% Cooling Eff Imprv.	5	5	4	4	3	3	2	2	2	1	1	2	1	1	1	1	1
C406.2.3: 10 % Heating Eff Imprv.	NA	NA	NA	1	1	1	1	2	2	3	3	3	3	4	3	5	5
C406.2.4: 10 % Cooling Eff Imprv.	8	9	8	7	5	5	3	4	4	2	2	3	2	2	2	2	2
C406.3: Reduced Light Power	8	8	9	9	9	9	10	8	9	9	7	8	8	8	8	8	7
C406.4: Enh. Digital Light Ctrl	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	1
C406.5.1: On-site Renewable Egy.	8	8	8	8	8	8	8	8	8	7	7	7	7	7	7	7	7
C406.6: Dedicated OA Sys (DOAS)	3	4	3	3	4	3	2	5	3	3	5	4	3	7	5	7	6
C406.7.2: Recovered/Renew SWH <sup>b</sup>	10	9	11	10	13	12	15	14	14	15	14	14	16	14	15	15	15
C406.7.3: Eff fossil fuel SWH <sup>b</sup>	5	5	6	6	8	7	8	8	8	9	9	9	10	10	9	10	11
C406.7.4: Heat Pump SWH <sup>b</sup>	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
C406.8: Enhanced Envelope Perf	3	6	3	4	3	4	1	5	4	3	5	5	4	7	6	9	10
C406.9: Reduced Air Infiltration	3	2	2	4	4	2	NA	6	2	2	6	4	1	10	5	7	4
C406.10: Energy Monitoring	3	3	3	3	3	3	3	3	3	3	2	3	2	2	2	3	2
C406.11: Fault Detection	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1

b. Other occupancy groups include all Groups except for Groups B, R, I, E, and M  
c. For occupancy groups listed in C406.7.1er

**Denver Green Code:**

The Denver Green Code requires the following minimum number of credit points, in addition to meeting all applicable prescriptive requirements in 704.1. Compliance with the prescriptive path requires the installation on site PV generation.

**TABLE C406.2**  
**DENVER GREEN CODE CREDIT REQUIREMENTS**

<u>Building Type</u>	<u>Credit Requirement for All Other Buildings</u>
<u>Mid-Rise Apartment (R-2)</u> <u>4-7 stories</u>	<u>93</u>
<u>High-Rise Apartment (R-2)</u> <u>8 or more stories</u>	<u>83</u>
<u>Small Hotel (R-1)</u> <u>0-100,000</u>	<u>90</u>
<u>Large Hotel (R-1)</u> <u>100,000 sf and larger</u>	<u>76</u>
<u>Medium Office (Group B)</u> <u>40,000-100,000 sf</u>	<u>71</u>
<u>Large Office (Group B)</u> <u>100,000 sf and larger</u>	<u>88</u>
<u>Retail (Group M)</u>	<u>85</u>
<u>School (Group E)</u>	<u>80</u>
<u>Warehouse (Group S)</u>	<u>88</u>
<u>All Other</u>	<u>80</u>

**Supporting Information (Required):**

All proposals must include a written explanation and justification as to how they address physical, environmental, and/or customary characteristics that are specific to the City and County of Denver. The following questions must be answered for a proposal to be considered.

- Purpose: What does your proposal achieve?

The purpose of this proposal is to calibrate the number of points required by IECC Section C406 to meet the performance goals set by the City of Denver for the next cycle of the Denver Energy Code in “Denver’s Net Zero Energy (NZE) New Buildings & Homes Implementation Plan.” It also sets specific targets based on building type in order to allow Denver to move all building types toward Denver’s NZE goal at a level rate.

- Reason: Why is your proposal necessary?

The 2021 edition of the IECC replaced the C406 package options with credits options. Rather than requiring projects to choose one of a list of efficiency packages, C406 now sets a credits target and offers a list of efficiency options with “efficiency credits” that vary by climate zone and building type. A building chooses one or more of these measures to achieve the credit target. This was done for two primary reasons:

- The existing packages delivered widely inconsistent savings across different building types and climate zones (from less than 1% to over 5% according to an analysis by the Pacific Northwest National Laboratory). By establishing different credit values for the measures for different building types in different climate zones, the credits approach delivers more consistent savings from Section C406.
- The credit target would make it easier for jurisdictions to increase the stringency of the prescriptive path in a way that was consistent and credible.

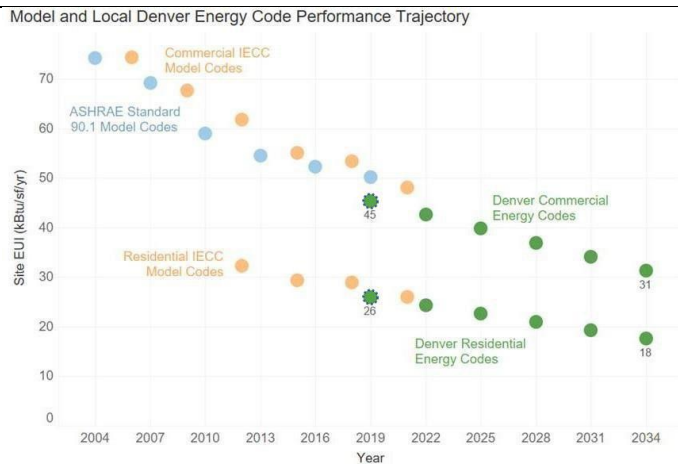
This structure has several advantages for Denver’s effort to increase the stringency of the energy code to meet the City’s climate goals:

- It allows the stringency of the prescriptive compliance path to be quickly and easily calibrated to Denver’s goals by simply changing the number of points required.
- It provides the maximum flexibility possible for projects using the prescriptive path since project teams will be able to choose which credit options are the most effective and cost effective for their particular project.
- It allows the custom elements of Denver’s code to be confined to Section C406, which offers related benefits:
  - It keeps Denver’s code requirements more aligned with those of neighboring jurisdictions since the efficiency requirements in the main body of the code remain the same. This will make compliance easier for the market, which will make enforcement easier for the City.
  - It requires little to no change to standard code compliance tools like COMCheck. In the 2019 code cycle, Denver adopted multiple amendments to the 2018 IECC, and had to work with the Department of Energy and Pacific Northwest National Lab to create a custom version of COMCheck. Denver had to wait while the modifications were made to COMCheck before it could be used. Additionally, while this task was paid for using state code support dollars from DOE, the budget for those dollars is fixed and may not be available after adoption.

- Substantiation: Why is your proposal valid? (i.e. technical justification)

### Target Setting

This proposal sets a new credit target for the 2021 edition of the Denver Energy Code that aligns with the performance goal set for the 2021 DEC by “Denver’s Net Zero Energy (NZE) New Buildings & Homes Implementation Plan” (see chart below). The existing IECC delivers different levels of performance for different building types, with some building types closer to Denver’s NZE goal than others. Based on an analysis of building performance by New Buildings Institute, Denver’s *Implementation Plan* includes the percent savings that will need to be achieved in each code cycle to ultimately achieve Denver’s NZE goal (see table below and the “Energy Performance Targets in Code” section of the *Implementation Plan* for more information). The DEC -2019 is about 7% more efficient than the IECC-2021. This relationship between the DEC-2019 and IECC-2021 and the performance improvements in the *Implementation Plan* for the DEC-2021 can be combined to calculate the improvement that is required beyond the IECC-2021 for each building type.



The proposal includes a separate set of targets for all-electric buildings. All-electric buildings only have to meet the 10-credit target from the 2021-IECC. Due to the decarbonization requirements of XCEL’s electrical supply by 2050, building electrification has a greater carbon benefit for all Denver building types over 50-year service life than the increased efficiency in “Denver’s Net Zero Energy (NZE) New Buildings & Homes Implementation Plan.” Therefore, the credit targets have been maintained at IECC-2021 levels for all-electric buildings.

### The Proposal

One significant change that the proposal makes is that it restructures the tables that contain the credit values for each credit option. The IECC-2021 has a separate table for each building type with columns for each climate zone. Since Denver is in a single climate zone, these tables have been combined into a single table that only has the credit values for Denver’s climate zone, with each column representing a separate building type from the original tables.

Since the different building types are achieving different levels of performance under the IECC-2021 and are closer or further from Denver’s NZE goal, the proposal also replaces the single credit target in the IECC-2021 with a table that contains custom credit targets for each building type that will keep them moving on the trajectory required to meet Denver’s NZE goal.

The energy credit targets for the Denver Green Code represent a 10% whole building energy use improvement over the Denver base code. Compliance with the prescriptive approach can be demonstrated with a portion of the available energy credits, and may require either electrification of space heating and water heating loads, or additional onsite generation beyond the 50% Denver Green Code minimum (see proposal #4).

### Related Proposals

Related proposals are also being submitted to increase the number of credits available for projects to use. This will provide increased flexibility in Section C406 for projects that need to meet a higher credit target. These include proposals to adjust the value of the existing infiltration reduction credits, to raise the cap on the number of points that can be obtained from efficient equipment, partial building electrification and to add credit options for higher performance thermal envelopes and further infiltration reduction.

If all of those additional proposals are approved, Table C406.1 would look like this:

TABLE C406.1  
Additional Energy Efficiency Credits for Denver

Sub-section / Occupancy:	Group B	Group R and I	Group E	Group M	Other <sup>a</sup> Occupancies
C406.2.1: 5% Heating Eff Imprv.	1	1	1	2	1
C406.2.2: 5% Cooling Eff Imprv.	2	1	1	1	1
C406.2.3: 10 % Heating Eff Imprv.	2	2	3	3	3
C406.2.4: 10 % Cooling Eff Imprv.	4	1	2	2	2
C406.3: Reduced Light Power	7	2	8	12	7
C406.4: Enh. Digital Light Ctrl	2	NA	2	3	2
C406.5.1: On-site Renewable Egy.	9	7	6	7	7
C406.6: Dedicated OA Sys (DOAS)	5	8	NA	2	5
C406.7.2: Recovered/Renew SWH <sub>b</sub>	NA	14	1	NA	14
C406.7.3: Eff fossil fuel SWH <sub>b</sub>	NA	9	2	NA	9
C406.7.4: Heat Pump SWH <sub>b</sub>	NA	5	1	NA	5
C406.8.1: Reduced envelope UA	10	4	2	4	5
C406.8.2: Further reduced envelope UA	15	6	3	6	8
C406.9.1: Reduced Air Infiltration	4	5	NA	2	4
C406.9.2: Further Reduced Air Infiltration	7	8	NA	3	7

<b>C406.10 Energy Monitoring</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>2</b>
<b>C406.11 Fault Detection</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>
<b>C406.12.1 Electric Space Heating</b>	<b>21</b>	<b>30</b>	<b>30</b>	<b>35</b>	<b>NA</b>
<b>C406.12.2 Electric Water Heating</b>	<b>21</b>	<b>30</b>	<b>23</b>	<b>6</b>	<b>NA</b>

- a. Other occupancy groups include all Groups except for Groups B, R, I, E, and M
- b. For occupancy groups listed in C406.7.1 and schools with showers or full-service kitchens

These options provide plenty of opportunities for meeting the Denver credit target without employing on-site renewables. And with additional on-site renewables as allowed under section C406.5.1, projects also have the flexibility to use renewable energy to meet the requirement.

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

Hart, Reid, Chandrasekharan Nambiar, Chitra, Tyler, Matthew T., Xie, YuLong, and Zhang, Jian. Relative Credits for Extra Efficiency Code Measures. United States: N. p., 2018. Web. doi:10.2172/1489162.  
[https://www.pnnl.gov/main/publications/external/technical\\_reports/PNNL-28370.pdf](https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-28370.pdf)

**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.  
**None**

**Referenced Standards:**

List any new referenced standards that are proposed to be referenced in the code.

**None**

**Impact:**

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

The proposal will increase the cost of construction through the increased stringency requirement. However, by leveraging C406 framework instead creating a suite of mandatory/prescriptive requirements throughout the rest of the code, buildings will have maximum flexibility to meet the increased efficiency requirements in the way that is most cost effective for each specific design.

Cost of construction:     Increase    \_\_\_ Decrease    \_\_\_ No Impact  
Cost of design:             Increase    \_\_\_ Decrease    \_\_\_ No Impact  
Restrictiveness:          Increase    \_\_\_ Decrease    \_\_\_ No Impact

**Departmental Impact (City use only):**

This amendment proposal increases/decreases/is neutral to the cost of plans review.  
This amendment increases/decreases/is neutral to the cost of inspections.