

2. Total Building Performance. The Total Building Performance Option requires compliance with Section C407 or Appendix PT.

Appendix PT
Modeling to a Performance Target

PT101 Scope. This section establishes criteria for demonstrating compliance utilizing a modeled performance target.

PT101.1 Relationship to Energize Denver. The requirements of this section are intended to support the *buildings*’ future compliance with the requirements of the Energize Denver Building Energy Performance Requirements when the *building* is operated efficiently.

PT102 Mandatory requirements. *Buildings* complying with this appendix shall comply with section C407.2.

PT103 Modeled Performance target. Projects of the types listed in Table PT103 shall be permitted to demonstrate compliance based on a modeled performance target. The modeled performance target shall be calculated in accordance with this appendix. The *pEUI* of the *building* shall be less than or equal to the values in Table PT103. For *buildings* with multiple occupancy types, the modeled performance target shall be a weighted average of the floor area of each occupancy type.

PT103.1 Modeling procedures. The *pEUI* of the proposed design shall be calculated utilizing the energy modeling procedures of Appendix G of ASHRAE 90.1-2019 for proposed building performance as modified by the “Denver Modeling Rules and Procedures” document available from the Denver Community Planning and Development.

TABLE PT103
MODELED PERFORMANCE TARGETS

<u>Building Type</u>	<u>Modeled Performance Target (kbtu/sf/yr)</u>
<u>Apartment (R-2)</u>	<u>38</u>
<u>Hotel (R-1)</u>	<u>55</u>
<u>Office (Group B)</u>	<u>43</u>
<u>Retail</u>	<u>39</u>
<u>Restaurant/Bar</u>	<u>175</u>
<u>Parking garages</u>	<u>3</u>

PT104 Documentation. Permit submittals shall include a report documenting that the proposed design has annual energy use less than or equal to the energy target required in Section PT103.1. The compliance documentation shall include the information identified in the *Denver Modeling Rules and Procedures*.

PT105 Renewable Energy. The reduction in energy of the proposed design associated with on-site renewable energy is limited to 10% when following the Fixed Performance Target.

PT106 Excluded Energy Use. Energy used for data centers, manufacturing and EV charging equipment shall be permitted to be excluded from the total pEUI of the building provided the load is metered separately from the rest of the building loads.

Note: Show the proposal using ~~strikeout~~, underline format. At the start of each section, give one of the following instructions:

- Revise as follows:
- Add new text as follows:
- Delete and substitute as follows:
- Delete without substitution:

Supporting Information:

Reason:

The Energy Modeling Working Group met over a series of 4 meetings and recommended the addition of a modeling compliance path based on a target EUI. Members of the WG wanted a modeling path that was more closely connected with Energize Denver. This proposal is based on a proposal the City had developed for a target-based modeling approach prior to the code development cycle with contribution from the original Group 14 proposal. The WG then made refined the proposal. The resulting new proposal includes several features:

- **Appendix format.** The compliance path is an appendix, so that the details of compliance do not get mixed up with the other modeling paths.
- **Building Types.** The proposal only allows the target-based approach for certain building types. These are the building types for which there is the most performance data for setting targets and the building types that have the most consistent EUIs across projects. If a project is a building type does not have a target, that project will not be able to use this compliance path.
- **Mandatory requirements.** The proposal utilizes the same mandatory requirements as C407 for consistency.
- **Targets.** The stringency levels in this proposal are based on the performance goals set for the 2022 DEC by *Denver's Net Zero Energy (NZE) New Buildings & Homes Implementation Plan*. That performance target was set by plotting a trajectory from the 2019 DEC to NZE levels of performance. The NZE end target was set by surveying multiple published datasets of modeled and measured NZE potential.¹ The EUI targets were generated by taking the EUIs of the national prototype models for each building type and adjusting it to meet Denver's performant target for the DEC-2022. There are two exceptions:
 - The target for restaurants is a 10% reduction from the target for Energize Denver. The national prototype EUI represents a very high energy intensity restaurant. As determined by Energize Denver, Denver restaurants tend to use far less energy.
 - The target for garages is also from Energize Denver and represents the expected energy usage of an open garage. Buildings with partially or fully enclosed garages will need to implement efficiency in the garage or associated building to make up for the additional ventilation loads. The WG through this was the most-straightforward and understandable way to allow for garages in buildings in this path.
- **Modeling Rules and Procedures.** The appendix utilizes a rules and procedures document that lives outside the code. This policy document will not be voted on by the code committee, but was generated from input from the working groups. This is an enhanced version of the rules and procedures used in Boulder. The document lives outside the code because this is a new approach to modeled compliance that does not have the track history that the reference model approach in Appendix G does. Having these rules and procedures in a separate document allows them to be more easily updated to meet the needs of the market or enforcement. There are a couple of key features of this document:

¹ Resources included the NBI Getting to Zero Database, the ASHRAE Advanced Energy Design Guides, The City of Toronto Zero Emissions Buildings Framework, GARD's "Development of Maximum Technically Achievable Energy Targets for Commercial Buildings," ARUP's "Technical Feasibility of Zero Net Energy Buildings in California," and "Built to Perform: An industry led pathway to a zero carbon ready building code."

- **Schedules and densities.** In a target-based approach, variables like schedules and densities are critical to regulate since they will not be neutralized by a reference model. These schedules and densities are based on COMNet, a widely accepted source for these variables. The one exception is that the plug load densities for multifamily are based on the EnergyStar Multifamily Rules and Procedures as the WG felt those better reflected reality. Projects are allowed to utilize more energy intensive schedules and densities, but not less intensive.
- **Swimming pools.** The procedures include an allowance for onsite swimming pools that is based on the allowance utilized in Energize Denver.
- **Elevation Efficiency.** The document requires that gas equipment be de-rated to account for Denver's elevation in accordance with the 2020 ASHRAE Handbook – HVAC Systems and Equipment.

- **Purpose:** To align new construction energy compliance metrics with Energize Denver to help meet Denver's carbon reduction goals and remain on track for Denver's energy savings goals.
- **Reasons:** Projects can meet Denver energy code without meeting the necessary EUI to meet Energize Denver. This amendment would align Energize Denver and the Denver Energy Code.
- **Substantiation:** The 2020 City of Boulder Energy Conservation Code Section C407.3.2 has a fixed performance target pathway. Energize Denver is setting 2030 target EUI's that buildings have to perform to. It makes sense to align the energy code with Denver's existing building targets so that buildings comply with the 2030 targets and do not have to invest more later to meet the targets or pay penalties.
- **Bibliography:** Include a bibliography when substantiating material is associated with the amendment proposal. The proponent shall make the substantiating materials available for review.

Referenced Standards:

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

Impact:

Note: Discuss the impact of this proposal in this section AND indicate the impact of this amendment proposal for each of the following:

- The effect of the proposal on the cost of construction: Increase Reduce No Effect
- The effect of the proposal on the cost of design: Increase Reduce No Effect
- Is the proposal more or less restrictive than the I-codes: More Less Same

Departmental Impact: (To be filled out by CPD staff)

Note: CITY STAFF ONLY. Discuss the impact of this proposal in this section AND indicate the impact of this amendment proposal for each of the following:

- The effect of the proposal on the cost of review: Increase Reduce No Effect
- The effect of the proposal on the cost of enforcement/inspection: Increase Reduce No Effect