

# Highlights of Published Energy Code Changes

Mapping the 2021 IECC to the 2024 IECC, *Commercial Requirements Only*

## Summary

This guide, relevant to the City of Austin (COA), covers what are considered, at this time, to be the major changes to the published commercial energy code (IECC). Used with the Summary of Local Amendments, it is a roadmap for the development community to better understand what to expect when the new energy codes become effective.

Many more changes than are represented here have been made. Some of those not listed have been requirements in Austin for some time and are now part of the national code. Others are considered relatively insignificant or are not applicable to Austin's climate zone. Each change, whether summarized below or not, will have differing impacts on each project so it is encouraged that practitioners become familiar with the published code.

## Significant Changes in the 2024 IECC

The ICC Board changed the development framework of the 2024 IECC and versions going forward from a governmental consensus process to a standards development process that changed the timeline and removed governmental consensus voting from the process. The code was developed through committees and subcommittees consisting of different stakeholder categories including the public, government, manufacturers, and utilities, among others. The version of the 2024 IECC voted upon by the consensus committee was appealed by various stakeholders and went through a process that ended with final decisions by the ICC board to move certain parts of the code to optional appendices that could be adopted by local jurisdictions.

The 2024 IECC includes many new components that provide pathways for local jurisdictions to meet climate goals. The Department of Energy's analysis of the ASHRAE Standard 90.1-2022 (a compliance pathway allowed in the IECC) estimates that the average savings within our climate zone from the new code will be 8.4% by energy cost and 8.8% by carbon emissions. When savings from renewable energy systems are included, the average savings within our climate zone are 14% by energy cost and 13.8% by carbon emissions.

### Highlights of major changes:

- Mandatory renewable energy systems
- Electric vehicle charging infrastructure appendix (proposed for local adoption)
- Electric-ready commercial building provisions appendix (proposed for local adoption)
- Demand responsive controls appendix (proposed for local adoption)
- Electrical energy storage system appendix (proposed for local adoption)

## Section 402: Building Thermal Envelope Requirements

### Additional Configuration Options for Insulation Requirements

**Section:** C402.1.3 Insulation component R-value method

**Status:** Modification

**What it says:** Additional options for insulation configuration are given that do not change the stringency of insulation requirements for walls – eg, continuous insulation could be installed without cavity insulation.

**Rationale and notes:** This proposal does not change the stringency of the insulation requirements for walls. It provides additional equivalent prescriptive R-value options for all climate zones that address the three primary insulation strategies or locations on framed assemblies (cavity insulation only, cavity + continuous insulation, and continuous insulation only).

### Air Leakage

**Section:** C402.6 Air leakage—building thermal envelope

**Status:** Modification

**What it says:** Several modifications under this section rearrange Section C402.5 from the 2021 IECC to reduce redundancy and improve the clarity of the section. It also increases the stringency of air leakage requirement, from 0.3 cfm/ft<sup>2</sup> to 0.27 cfm/ft<sup>2</sup> for Group R and I occupancies and from 0.4 cfm/ft<sup>2</sup> to 0.35 cfm/ft<sup>2</sup> for all other occupancies. The documentation and inspection option for Group R and I occupancies to document compliance is also removed.

**Rationale and notes:** The increased stringency reflects advances in industry practice and technology. Air leakage can be a significant source of energy waste in buildings, and testing is the most reliable means of limiting unintended energy waste.

## Section 403: Building Mechanical Systems

### HVAC Efficiency

**Section:** C403.3.2

**Status:** Modification

**What it says:** This section gives minimum efficiency requirements for HVAC equipment that match ASHRAE 90.1-2022.

**Rationale and notes:** Aligns the IECC tables to match the ASHRAE tables, which were updated to match new DOE regulations and to increase the efficiency for some systems.

### Humidity Controls

**Section:** C403.4.8

**Status:** Addition

**What it says:** HVAC systems that are controlled explicitly to maintain humidity cannot dehumidify or humidify beyond the requirements for human comfort and health. Exceptions that allow designers to meet other code or accreditation requirements are included. These requirements do not apply when the space is only controlled by a thermostat and dehumidification is incidental to the cooling.

**Rationale and notes:** These requirements have been in ASHRAE 90.1 for a few code cycles and the proposed language matches what is in ASHRAE 90.1-2019.

## Parking Ventilation

**Section:** C403.7.2

**Status:** Modification

**What it says:** Restrictions on parking garage ventilation system power and airflow are added.

**Rationale and notes:** The changes to C403.7.2 are based on addendum d to ASHRAE 90.1-2019 for parking garage ventilation. This proposal increases stringency for these systems, with additional requirements for pollutant sensors and fan variable speed drives.

## Ventilation Occupied Standby Controls

**Section:** C403.7.8

**Status:** Addition

**What it says:** Systems serving zones that have spaces required to have lighting occupancy sensors shall be able to reduce ventilation air to zero. These sensors will respond to movement, which will reduce the system's energy consumption when the building is unoccupied.

**Rationale and notes:** This addition brings a requirement already introduced in ASHRAE to the IECC.

## Section 404: Service Water Heating

### Water Heating Efficiency Table

**Sections:** C404.2, C404.2.1

**Status:** Modification

**What it says:** Residential water heater efficiency requirements updated to Uniform Energy Factor (UEF) to reflect changes in how residential water heaters are rated. High capacity SWH efficiencies were updated to align with ASHRAE 90.1, making some changes to how multiple water heaters are considered.

**Rationale and notes:** Updates align with industry practice and ASHRAE 90.1.

### Service water heating insulation

**Section:** C404.4

**Status:** Modification

**What it says:** Pipe insulation thickness in inches is given for various pipe or tube sizes.

**Rationale and notes:** The existing pipe insulation thickness requirements for service water heating piping come from Table C403.12.3, which was developed primarily for space heating. The major change in this proposal is to include a pipe insulation wall thickness table in the service water heating section of the IECC.

## Section 405: Electrical Power and Lighting Systems

### Interior Lighting Power Density

**Section:** C405.3

**Status:** Modification

**What it says:** Interior lighting power density allowances are lowered for most space types.

**Rationale and notes:** Aligns with ASHRAE 90.1 -2022 and power use of available technology.

### Sleeping Unit and Dwelling Unit Luminaire Efficacy

**Section:** C405.3.3

**Status:** Modification

**What it says:** Removes the lighting power density compliance option for sleeping units and dwelling units.

**Rationale and notes:** Removes a complicated pathway that was not widely adopted.

### Daylighting Control

**Section:** C405.2.4

**Status:** Modification

**What it says:** Reduces threshold for spaces where daylight-responsive controls are required

**Rationale and notes:** Aligns with requirements in ASHRAE 90.1-2022. Dimmable drivers are more prevalent for LED lighting and will result in energy cost savings from less lighting use.

### Energy Monitoring

**Section:** Table C405.13

**Status:** Modification

**What it says:** Threshold for energy monitoring systems has been lowered from 25,000 ft<sup>2</sup> to 10,000 ft<sup>2</sup> and loads due to electric vehicle charging are added to the loads that shall be separately metered.

**Rationale and notes:** Energy monitoring systems allow buildings to comply with benchmarking regulations and provide building owners more information about the energy separate systems are using. As EV adoption increases and become a larger load, monitoring EVs as a separate electrical load will allow owners to understand the EV charging use separate from the base building uses. It is far more

cost-effective to sub-meter these loads during new construction than to try to isolate them and add additional sub-meters as part of a retrofit.

## Mandatory On-Site Renewable Energy Generation

**Section:** C405.15 Renewable energy system

**Status:** Addition

**What it says:** New buildings are required to generate renewable energy (such as solar) on site, with options for off-site generation if onsite is not possible.

**Rationale and notes:** This section adds on-site renewables to the IECC for reduced consumer cost and societal protection. The size of the renewable energy system is based on the combined gross conditioned floor area of the three largest floors to accommodate tall buildings with limited roof space. Off-site renewable energy systems, renewable energy certificate purchases, and green tariff participation are options to projects where renewable energy systems are not feasible. The section is similar to additions to ASHRAE 90.1-2022.

## Lighting Unfinished Spaces

**Section:** C405.3.2.2

**Status:** Modification

**What it says:** Reduces lighting power allowance in unfinished spaces

**Rationale and notes:** Clarifications to how to consider lighting in unfinished spaces was introduced in the last code cycle. This update further reduced the allowance and clarifies that lighting power between finished and unfinished areas cannot be traded.

## Exterior Lighting Updates

**Section:** C405.5.2

**Status:** Modification

**What it says:** Reduces lighting power allowances for exterior lighting.

**Rationale and notes:** Since 2018, exterior lighting device efficacy has increased by 20 - 40%. This change reflects both lighting technology and practices that allow for lower lighting power density values.

## Section 406: Additional Efficiency, Renewable, and Load Management

### Expanded Additional Efficiency Requirements

**Section:** C406 Additional Efficiency, Renewable, and Load Management Requirements

**Status:** Modification

**What it says:** Buildings must achieve a minimum number of credits based on their occupancy group by incorporating additional energy efficiency measures. Large buildings must also achieve a minimum

number of credits based on their occupancy group by incorporating renewable and load management measures.

**Rationale and notes:** Additional energy efficiency requirements have been a component of the IECC for several code cycles, allowing building designers and engineers to choose from a selection of methods to increase the energy efficiency of their project. The 2024 IECC builds upon the point system introduced in the 2021 IECC by requiring more credits, providing a wider range of efficiency measures, and requiring projects larger than 5,000 sq ft to incorporate renewable and load management measures in addition to energy efficiency measures.

## Section 407: Simulated Building Performance

### Percentage of Annual Energy Cost

**Section:** C407.2

**Status:** Modification

**What it says:** Rather than a static reduction of energy cost, the calculation of the percentage of annual energy cost (PAEC) gives the reduction of the standard reference design that the project design must meet.

**Rationale and notes:** The compliance metric needed to change with the differentiation of additional efficiency credits needed by occupancy type under C406.

## Section 408: Maintenance Information and System Commissioning

### Commissioning Size Threshold

**Section:** C408.2

**Status:** Modification

**What it says:** Exceptions to required commissioning are limited to buildings with less than 10,000 square feet gross conditioned floor area and combined heating, cooling and service water heating capacity of less than 960,000 Btu/h

**Rationale and notes:** The floor area limit for the exception was introduced, and the heating, cooling and service water heating capacity limit was combined. This is the approach taken in ASHRAE 90.1 and also supports building performance standard approaches.

## Section 409: Calculation of HVAC Total System Performance

**Section:** C409

**Status:** Addition

**What it says:** This is a new section that details how buildings may perform a wholistic model of an HVAC system rather than looking specifically at components in a more prescriptive way. It could be a path to better capture carbon emissions.

**Rationale and notes:** HVAC System Performance is a discipline performance path and provides a simpler solution to HVAC system evaluation compared to whole building performance, while keeping tradeoffs limited to specific building systems. The Total System Performance Ratio (TSPR) is a metric for evaluation of overall system efficiency instead of individual component efficiency, a solution that could also eventually facilitate the transition to a 100% performance-based code structure. TSPR is a ratio that compares the annual heating and cooling load of a building to the annual energy consumed by the building's HVAC system.

## Appendix CG – Electric Vehicle Charging Infrastructure

**Status:** Addition

**What it says:** New parking facilities are required to provide EV power transfer infrastructure based on occupancy type.

**Rationale and notes:** Retrofit costs for EV charging stations can be anywhere from 2 – 4 times more than the costs of including the infrastructure at the time of construction, owing to potential demolition, conduit runs, and electric service upgrades. Residential occupancies must include a percentage of EV Ready parking spaces.

## Appendix CH – Electric-Ready Commercial Building Provisions

**Status:** Addition

**What it says:** Buildings with combustion space heating, service water heating, cooking, or clothes drying equipment are required to install the electrical infrastructure for electric equipment.

**Rationale and notes:** Retrofits costs for buildings converting from gas to electric equipment can be prohibitive. The requirements to provide physical space and electrical infrastructure for electric equipment at the time of construction allows building owners to choose the fuel type used in equipment in the future.

## Appendix CI – Demand Responsive Controls

**Status:** Addition

**What it says:** Heating and cooling systems, electric storage water heaters, and lighting systems must be provided with demand responsive controls.

**Rationale and notes:** Buildings whose controls include two-way communication capability, will be better able to participate in demand response programs. The current COA Energy Code requires water heater

timers on electric water heaters and Open ADR compatibility in HVAC and lighting systems. Demand responsive controls are now included in the model code as an appendix. The requirements given provide more detail on how the demand response controls are to be implemented.

## Appendix CJ – Electrical Energy Storage System

**Status:** Addition

**What it says:** New buildings need to either store electricity on site or have the infrastructure in place for future capability.

**Rationale and notes:** As the U.S. increases the amount of electricity generated from renewables, buildings must be prepared to aid in this transition by storing energy to match grid demands. Ensuring buildings are energy-storage ready now will allow them to cost effectively install storage systems in the future and take advantage of these programs. Requiring buildings to be storage-ready will ensure communities are more resilient by allowing buildings to cost effectively install storage which can operate for a short-period of time without relying on the electricity grid.