International Energy Conservation Code
Consensus Committee-Commercial

Meeting Agenda (Draft 6/13)

June 15, 2022
2:00 PM Eastern to 5:00 PM Eastern (3 hours)
Webex Link

Committee Chair: Duane Jonlin
Committee Vice Chair: Emily Hoffman

1. Call to order.

2. Meeting Conduct. Staff
    a. Identification of Representation/Conflict of Interest
    b. ICC Council Policy 7 Committees: Section 5.1.10 Representation of Interests
    c. ICC Code of Ethics: ICC advocates commitment to a standard of professional behavior that exemplifies the highest ideals and principles of ethical conduct which include integrity, honesty, and fairness. As part of this commitment it is expected that participants shall act with courtesy, competence and respect for others.
    d. ICC Antitrust Compliance Guideline

3. Roll Call – Hoffman

4. Approval of Agenda

5. Approval of Minutes

6. Administrative issues.
    a. Progress indicators

7. Action Items.
    a. Code Change Proposals

CEPI-75-21 (Data Centers)	(Elec approve 16-0)
CEPI-78-21 (Air Handler Insulation)	(HVACR disapprove 10-0-2)
CEPI-82-21 Part I (Roof Gutter de-icing)	(HVACR as modified 10-0-1)
CEPI-84-21 (Dehumidification horticulture)	(HVACR as modified 11-0)
CEPI-99-21 (Grid Integrated thermostat contl)	(HVACR as modified 9-2-2)
CEPI-218-21 Part I (Alt fuel gas pipe test)	(HVACR disapprove 11-0-2)
CEPI-219-21 (Alteration Duct Testing)	(HVACR as modified 5-2-4)
CEPI-129-21 (Service WH for R-1/R-2)	(HVACR disapprove 7-3-3)
CEPI-227-21 (Alterations HVAC controls)	(HVACR as modified 11-0-3)
CEPI-228-21 (Alt. sizing HVAC equipment)	(HVACR as modified 7-6)
CEPI-22-21 (Electrification)	(Modeling as modified 13-0-1)
CEPI-203-21 (Energy Use Disclosure	(Modeling as modified 15-0-1)

CEPI-217-21 (Ex. Bldgs Add. Efficiency Credit) (Modeling as modified 12-0-1)
CEPI-232-21 (Change of Occupancy) (Modeling as modified 13-0-1)
CEPI-257-21 (Glide Path) (Modeling as modified 13-0-1)
CEPI-255-21 Part I (Above Code Appendix) (Modeling disapprove 12-1-1)

9. Subcommittee & Temporary Work Group reports
    a. Envelope and Embodied Energy- Culp
    b. Electrical Power, Lighting, and Renewables-Jouaneh
    c. HVACR & Water Heating-Shelide
    d. Modeling, Whole-Building Metrics, Zero Energy-Eades

10. Other business.
    a. Public comment on any matters discussed at the meeting (Please limit comments to 2 minutes. Further comments can be directed to the Secretariat following the meeting to be considered at a future meeting.)

11. “3 Minutes of Fame.” Speakers TBD

12. Upcoming meetings. June 22, 2022 2:00 Eastern

13. Adjourn.

FOR FURTHER INFORMATION BE SURE TO VISIT THE ICC WEBSITE:
IECC Commercial Consensus Committee Webpage
https://www.iccsafe.org/products-and-services/i-codes/code-development/cs/iecc-commercial-consensus-committee/
ICC Energy webpage
https://www.iccsafe.org/products-and-services/codes-standards/energy/
Code Change Proposal Submittals
https://energy.cdpaccess.com/login/
Energy Complete Monograph
Monograph

FOR ADDITIONAL INFORMATION, PLEASE CONTACT:

Kristopher Stenger, AIA, Director of Energy Programs
International Code Council
kstenger@iccsafe.org

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-075-21 Data Centers
CDP ID #	64
Code	IECC CE
Code Section(s)	C403.1.2, TABLE C403.1.2(1), TABLE C403.1.2(2) New Section n
Location	base
Proponent	Nicholas O'Neil noneil@energy350.com
Proposal Status	SC rev
Subcommittee	CE Elec, Light
Subcommittee Notes	Reason: Supports greater efficiency in data centers by following the latest (2022) updates in a national standard (90.4).
Recommendation	APPROVE AS SUBMITTED
Vote	16 - 0 - 1
Recommendation Date	April 25, 2022
Next Step	To Subcommittee_____Mechanical_____ To Advisory Group_____ To Consensus Committee_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-078-21 Air Handler insulation and sealing
CDP ID #	459
Code	IECC CE
Code Section(s)	C403.12.1 New Section n
Location	base
Proponent	Anthony Palucci apalucci@annexair.com
Proposal Status	SC rev
Subcommittee	CE HVACR & WH
Subcommittee Notes	• Proponent presented proposal as modified. Air handlers and rooftop units currently don't have to be insulated as well as ductwork. The code requires R-8 ductwork climate zone 0 from 4 and R12 from results 5 through 8. The goal of this proposal to make code insulation requirements consistent between air handlers and duct work. • Subcommittee concerns over cost-effectiveness and justification • Subcommittee concerns over feasibility. Comments that equipment insulation is accounted for and represented already in equipment efficiency test procedures. • Comments that proposal would provide enforcement challenges for building officials, especially when working in different climate zones
Recommendation	Disapprove Reason: Concerns over cost justification and energy savings.
Vote	Motion to Disapprove passed 10-0-2
Recommendation Date	6/2/2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee _X_____
Consensus Committee	

Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

CEPI-78-21 as modified

IECC®: C403.12.1

Proponents:

Anthony Palucci, representing Annexair

2021 International Energy Conservation Code

Add new definition:

C202 Fan cooling unit. Equipment or the portion of equipment that includes a means of mechanically cooling air supplied to *conditioned spaces* where the air movement is caused by a difference in pressure produced by a fan. The heat rejection portion of packaged equipment is not included.

Revise as follows:

C403.12.1 Duct, ~~Air Handlers~~ *fan cooling unit*, and plenum insulation and sealing.

Supply and return air ducts, ~~and~~ plenums, ~~rooftop units and air handlers~~ and *fan cooling units* shall be insulated with not less than R-6 insulation where located in unconditioned spaces and where located outside the building with not less than R-8 insulation in *Climate Zones* 0 through 4 and not less than R-12 insulation in *Climate Zones* 5 through 8. Ducts located underground beneath buildings shall be insulated as required in this section or have an equivalent *thermal distribution efficiency*. Underground ducts utilizing the *thermal distribution efficiency* method shall be *listed* and *labeled* to indicate the *R*-value equivalency. Where located within a building envelope assembly, the duct, plenum~~,~~ ~~rooftop units and/or air handlers~~ shall be separated from the building exterior or unconditioned or exempt spaces by not less than R-8 insulation in *Climate Zones* 0 through 4 and not less than R-12 insulation in *Climate Zones* 5 through 8.

Exceptions:

1. Where ducts are located within equipment.
2. Where the design temperature difference between the interior and exterior of the duct~~,~~ ~~or~~ plenum, or *fan cooling unit* is not greater than 15°F (8°C).
3. ***Fan cooling units* located indoors with a design airflow of less than 5,000 cfm (2,400 L/s)**
4. ***Fan cooling units* with a cooling capacity less than 760,000 Btu/h (223 kW/h) included in Table C403.3.2(1) Electrically Operated Unitary Air Conditioners *and* Condensing Units—Minimum Efficiency Requirements**
5. ***Fan cooling units* with a cooling capacity less than 760,000 Btu/h (223 kW/h) included in Table C403.3.2(2) Electrically Operated Air-Cooled Unitary Heat Pumps—Minimum Efficiency Requirements**
6. ***Fan cooling units* with a cooling capacity less than 760,000 Btu/h (223 kW/h) included in Table C403.3.2(8) Electrically Operated Variable-Refrigerant-Flow Air Conditioners—Minimum Efficiency Requirements**
7. ***Fan cooling units* with a cooling capacity less than 760,000 Btu/h (223 kW/h) included in Table C403.3.2(9) Electrically Operated Variable-Refrigerant-Flow *and* Applied Heat Pumps—Minimum Efficiency Requirements**
8. ***Fan cooling units* with a cooling capacity less than 760,000 Btu/h (223 kW/h) included in Table C403.3.2(10) Floor-Mounted Air Conditioners *and* Condensing Units Serving Computer Rooms—Minimum Efficiency Requirements**
9. ***Fan cooling units* included in Table C403.3.2(12) Electrically Operated Dx-DOAS Units, Single-Package *and* Remote Condenser, Without Energy Recovery—Minimum Efficiency Requirements**

10. *Fan cooling units*) included in Table C403.3.2(13) Electrically Operated DX-DOAS Units, Single-Package *and* Remote Condenser, With Energy Recovery—Minimum Efficiency Requirements
11. *Fan cooling units* with a cooling capacity less than 760,000 Btu/h (223 kW/h) included in Table C403.3.2(14) Electrically Operated Water-Source Heat Pumps—Minimum Efficiency Requirements
12. *Fan cooling units* with a cooling capacity less than 760,000 Btu/h (223 kW/h) included in Table C403.3.2(16) Ceiling-Mounted Computer-Room Air Conditioners—Minimum Efficiency Requirements

Ducts, air handlers and filter boxes shall be sealed. Joints and seams shall comply with Section 603.9 of the International Mechanical Code.

Revise the following:

C403.5 Economizers.

Economizers shall comply with Sections C403.5.1 through C403.5.5.

An air or water economizer shall be provided for the following cooling systems:

1.Chilled water systems with a total cooling capacity, less cooling capacity provided with air economizers, as specified in Table C403.5(1).

2.Individual fan systems with cooling capacity greater than or equal to 54,000 Btu/h (15.8 kW) in buildings having other than a Group R occupancy,

The total supply capacity of all ~~fan cooling units~~ *fan cooling units* not provided with economizers shall not exceed 20 percent of the total supply capacity of all fan cooling units in the building or 300,000 Btu/h (88 kW), whichever is greater.

3.Individual fan systems with cooling capacity greater than or equal to 270,000 Btu/h (79.1 kW) in buildings having a Group R occupancy.

The total supply capacity of all ~~fan cooling units~~ *fan cooling units* not provided with economizers shall not exceed 20 percent of the total supply capacity of all fan cooling units in the building or 1,500,000 Btu/h (440 kW), whichever is greater.

Reason Statement:

There is no code requirement for outdoor HVAC equipment in terms of R-value, or insulation requirement. This change is designed to have the outdoor HVAC equipment match the same R-value as the ductwork it is served by. As outdoor HVAC equipment typically has larger surface area, typically designed around 500 FPM, then the duct it is served by, typically around 1200FPM, there is a great opportunity to save energy by improving the R-value of the HVAC equipment casing

Cost Impact:

The code change proposal will increase the cost of construction.

For many products there would be no change in cost, as R-13 is standard for many manufacturers of outdoor equipment. However, some manufacturer models types would require changes to meet this requirement with a potential increase in cost.

CEPI-78-21

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-082-21 Part I Roof Gutter de-icing
CDP ID #	437
Code	IECC CE
Code Section(s)	C403.13.2, C403.13.3 (New), C403.13.3 New Section y
Location	base
Proponent	Nick Thompson nick.thompson@cityofaspen.com
Proposal Status	SC rev
Subcommittee	CE HVACR & WH
Subcommittee Notes	• Proponent introduced proposal, including editorial modifications. Also added a daylight sensor as an option for shutting off at night. • Subcommittee discussion about need and issues with shutting off systems at night. Option 1 provides another option to address this (moisture sensors).
Recommendation	Approve As Modified Reason (referenced from As Modified proposal): The intent of roof and gutter deicing is to prevent ice dams from causing water damage to the building. Ice dams occur when roof eaves, valleys, and gutters get ice buildup from a combination of flowing water and freezing conditions. Ice on a roof or gutter is not a problem in and of itself. The problem is when liquid water flow occurs and is blocked from draining properly by ice. Water flow during freezing conditions occurs chiefly from the sun, thus the provision for controls to shut off the system at night. A moisture sensor is provided as an option for the designer if there is concern for free water flow during nighttime hours. If there is no water flow (moisture), there is no need to keep drainage pathways clear as there is no water to drain. To clarify the original reason statement, ice damming can occur even on new buildings built to current code provisions, such as warm roofs that are unvented. Modifications were made by the Commercial HVACR Subcommittee.
Vote	Motion to approve as modified passes 10-0-1
Recommendation Date	5/26/2022
Next Step	To Subcommittee_____ To Advisory Group_____

	To Consensus Committee __X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

CEPI-82-21 Part I AS MODIFIED

IECC®: C403.13.2, C403.13.3 (New), C403.13.3

Proponents:
Nick Thompson, City of Aspen, representing Colorado Chapter of the ICC (nick.thompson@cityofaspen.com)

THIS IS A 2 PART PROPOSAL. PART I WILL BE HEARD BY THE IECC-COMMERCIAL COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL COMMITTEE.

2021 International Energy Conservation Code

C403.13.2 Snow- and ice-melt system controls.
Snow- and ice-melting systems shall include automatic controls configured to shut off the system when the pavement temperature is above 50°F (10°C) and precipitation is not falling, and an automatic or manual control that is configured to shut off when the outdoor temperature is above 40°F (4°C).

Add new text as follows:

C403.13.3 Roof and gutter deicing controls.

Roof and gutter deicing systems, including but not limited to self-regulating cable, shall include automatic controls that are configured to shut off the system when the outdoor temperature is above 40°F (4.8°C) ~~maximum~~ and ~~shall~~ that include one of the following:

1. A moisture sensor configured to shut off the system in the absence of moisture, or
2. ~~A programmable timer configured to shut off the system for 8 hours minimum at night.~~
2. A daylight sensor or other means configured to shut off the system between sunset and sunrise.

Revise as follows:

~~C403.13.3~~ C403.13.4 Freeze protection system controls.

Freeze protection systems, such as heat tracing of outdoor piping and heat exchangers, including self-regulating heat tracing, shall include automatic controls configured to shut off the systems when outdoor air temperatures are above 40°F (4°C) or when the conditions of the protected fluid will prevent freezing.

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-084-21 Dehumidification Horticulture
CDP ID #	193
Code	IECC CE
Code Section(s)	C403.15 New Section y
Location	base
Proponent	Diana Burk diana@newbuildings.org
Proposal Status	SC rev
Subcommittee	CE HVACR & WH
Subcommittee Notes	• The purpose of this code amendment is to reduce that energy use of indoor agriculture and green houses. • The proposal provides options for solid or liquid desiccant dehumidification systems, for utilizing recover energy and integrated HVAC systems, and for chilled water systems that can meet humidification making needs. • Modifications made to clarify the intention and language of the proposal, including inclusion of “indoor grow” definition, along with editorial changes.
Recommendation	Approve As Modified Reason (referenced from original proposal): Indoor agriculture energy usage is projected to grow significantly nationwide in this decade, driven in large part by state legalization of medical and recreational marijuana across the country. Energy use by HVAC systems in indoor horticulture facilities can account for 30 to 65% of energy use - primarily because these systems must maintain specific humidity and temperature levels to promote plant growth. Section 403 already requires HVAC systems meet a certain efficiency threshold but does not address the efficiency of dehumidification systems. The proposed language provides projects with a range of efficient dehumidification strategies.
Vote	Motion to Approve As Modified Passed 11-0-0
Recommendation Date	6/2/2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee _X_____

Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

CEPI-84-21, as modified in subcommittee

IECC®: SECTION 202 (New), C403.15 (New), DOE Chapter 06

Proponents:

Diana Burk, New Buildings Institute, representing New Buildings Institute (diana@newbuildings.org)

2021 International Energy Conservation Code

Add new definition as follows:

C202 DESSICANT DEHUMIDIFICATION SYSTEM. A mechanical dehumidification technology that uses a solid or liquid material to remove moisture from the air.

C202 INTEGRATED HVAC SYSTEM. An HVAC system designed to handle both sensible and latent heat removal. Integrated HVAC systems ~~may~~ include, but are not limited to, HVAC systems with a sensible heat ratio of 0.65 or less and the capability of providing cooling, dedicated outdoor air systems, single package air conditioners with at least one refrigerant circuit providing hot gas reheat, and *dehumidifiers* modified to allow external heat rejection.

C202 DEHUMIDIFIER. A self-contained, electrically operated, and mechanically encased product with the sole purpose of dehumidifying the space consisting of:

1. A refrigerated surface (evaporator) that condenses moisture from the atmosphere,
2. A refrigerating system, including an electric motor,
3. An air-circulating fan, and
4. A means for collecting or disposing of the condensate.

A dehumidifier does not include a portable air conditioner, room air conditioner, or packaged terminal air conditioner.

C202 INDOOR GROW. a space, other than a greenhouse, used exclusively for, and essential to horticultural production, cultivation or maintenance.

Add new text as follows:

C403.15 Dehumidification in spaces for plant growth and maintenance.

Equipment that dehumidifies ~~building~~ *indoor grow* and *greenhouse* spaces ~~used for plant growth and maintenance~~ shall ~~comply with~~ be one or more of the following:

1. *Dehumidifiers* ~~regulated under federal law in accordance with DOE 10 CFR 430 and~~ tested in accordance with the test procedure listed in DOE 10 CFR 430 and DOE 10 CFR 430, Subpart B, Appendix X or X1 ~~as applicable~~.
2. *Integrated HVAC system* with on-site heat recovery designed to fulfill ~~at least~~ not less than 75 percent of the annual energy for dehumidification reheat;
3. Chilled water system with on-site heat recovery designed to fulfill ~~at least~~ not less than 75 percent of the annual energy for dehumidification reheat; or
4. Solid or liquid *desiccant dehumidification system* for system designs that require dewpoint of not more than 50°F (10°C) ~~or less~~.

Revise as follows:

DOE US Department of Energy c/o Superintendent of Documents 1000 Independence Avenue SW Washington DC 20585 Energy Conservation Program for Consumer Products: Test Procedures and Certification and Enforcement Requirement for Plumbing Products; and Certification and Enforcement Requirements for Residential Appliances; Final Rule	Table C403.3.2(1), Table C403.3.2(2), Table C403.3.2(5), Table C403.3.2(6), Table C403.3.2(14), Table C404.2, C403.15
10 CFR, Part 430-2015	

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-099-21 Grid Integrated Thermostat Controls
CDP ID #	172
Code	IECC CE
Code Section(s)	C403.4.1.6 New Section y
Location	base
Proponent	Kim Cheslak kim@newbuildings.org
Proposal Status	SC rev
Subcommittee	CE HVACR & WH
Subcommittee Notes	• Proponent (NBI) introduced as-modified proposal. Trying to align with concurrent US DOE, AHRI processes. Modifications have been made to try to achieve consensus. • Subcommittee questions about application to fossil fuel equipment and associated controls. Concerns that proposed language would inadvertently make fossil fuel equipment and controls impermissible, which is not the intent of the proposal. Modifications made to clarify and address this issue. HVACR SC modifications to exclude controls that only serve fossil fuel equipment from requirement. • Subcommittee discussion about utility demand-response program availability and proposal applicability where DR is not available. • Proposal doesn't require anybody to actually use demand response, only that covered equipment is capable. • Issues with deadband and adjusting cooling setpoints and a DR system inadvertently kicking a system into heating mode, and vice versa. Potential to address these in public comments.
Recommendation	Approve As Modified Reason (referenced from original proposal): HVAC system control, often through thermostats, has been at the center of demand response (DR) programs for decades. DR programs continue to rely deeply on thermostat control strategies, but the need for such controls is fast growing. As electricity systems transform to include more variable wind and solar energy, demand flexibility becomes increasingly critical to both grid operation and further transformation. Building systems that can use energy when it is abundant, clean, and low-cost not only help decarbonize

	the entire energy system, they also insulate their owners from future increases in demand charges and peak hour energy rates – a current and accelerating trend.
Vote	Motion to Approve As Modified Passed 9-2-2
Recommendation Date	6/2/2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee _X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

CEPI-99-21 AS MODIFIED (complete replacement)

Replacement of CEPI-99 as submitted Revision / Coordination with AHRI, NBI, DOE and REPI-70/71

IECC®: SECTION 202 (New), C403.4.1.6 (New)

Proponents:

Kim Cheslak, NBI, representing NBI (kim@newbuildings.org); Josh Keeling, representing Cadeo Group (jkeeling@cadeogroup.com);Ben Rabe, representing Fresh Energy (rabe@fresh-energy.org); Bryan Bomer, representing Department of Permitting Services (bryan.bomer@montgomerycountymd.gov); Lauren Urbanek, representing Natural Resources Defense Council (lurbanek@nrdc.org); Howard Wiig, representing Hawaii State Energy Office (howard.c.wiig@hawaii.gov); Kim Burke, representing Colorado Energy Office (kim.burke@state.co.us); Brad Smith, representing City of Fort Collins (brsmith@fcgov.com); Matt Tidwell, representing Portland General Electric (matthew.tidwell@pgn.com); Chris Castro, representing City of Orlando (chris.castro@orlando.gov); Amber Wood, representing ACEEE (awood@aceee.org)

Add new definitions as follows:

DEMAND RESPONSE SIGNAL. A signal that indicates a price or a request to modify electricity consumption.

DEMAND RESPONSIVE CONTROL. A control capable of receiving and automatically responding to a *demand response signal*.

Revise text as follows:

C403.4 Heating and cooling systems controls. ~~Each h~~Heating and cooling systems shall be provided with controls in accordance with Sections C403.4.1 through C403.4.~~5~~6.

Add new text as follows:

C403.4.6 Demand responsive controls. Buildings shall be provided with *demand responsive controls* capable of executing the following actions in response to a *demand response signal*:

1. Automatically increasing the zone operating cooling set point by the following values: 1°F (0.5°C), 2°F (1°C), 3°F (1.5°C), and 4°F (2°C).
2. Automatically decreasing the zone operating heating set point by the following values: 1°F (0.5°C), 2°F (1°C), 3°F (1.5°C), and 4°F (2°C).

Where a *demand response signal* is not available the heating and cooling system controls shall be capable of performing all other functions. Where thermostats are controlled by *direct digital control* including, but not limited to, an energy management system, the system shall be capable of *demand responsive control* and capable of adjusting all thermal setpoints to comply. The demand responsive controls shall comply with one of the following:

C403.4.6.1 Air conditioners and heat pumps with two or more stages of control and cooling capacity of less than 65,000 Btu/h. Thermostats for Air conditioners and heat pumps with two or more stages of control and a cooling capacity less than 65,000 Btu/h shall be provided with a *demand responsive control* that complies with the communication and performance requirements of AHRI 1380.

C403.4.6.2 All other HVAC systems. Thermostats for HVAC systems ~~that do not meet the requirements of Section C403.4.6.1~~ shall be provided with a *demand responsive control* that complies with one of the following:

1. Certified OpenADR 2.0a VEN, as specified under Clause 11, Conformance
2. Certified OpenADR 2.0b VEN, as specified under Clause 11, Conformance
3. Certified by the manufacturer as being capable of responding to a *demand response signal* from a certified OpenADR 2.0b VEN by automatically implementing the control functions requested by the VEN for the equipment it controls
4. IEC 62746-10-1
5. The communication protocol required by a controlling entity, such as a utility or service provider, to participate in an automated demand response program
6. The physical configuration and communication protocol of CTA 2045-A or CTA 2045-B.

Exceptions:

1. Group I occupancies
2. Group H occupancies
3. Controls serving *data center systems*
4. Occupancies or applications requiring precision in indoor temperature control as *approved* by the *code official*
5. Controls that serve only fossil fuel equipment

Add new standard(s) as follows:
Air-Conditioning, Heating, & Refrigeration Institute, 2111 Wilson Blvd, Suite 500, Arlington, VA 22201

1380 -2019 Demand Response through Variable Capacity HVAC Systems in Residential and Small Commercial Applications

ANSI American National Standards Institute 25 West 43rd Street, 4th Floor New York NY 10036

ANSI/CTA-2045-A – 2018 Modular Communications Interface for Energy Management

ANSI/CTA-2045-B – 2019 Modular Communications Interface for Energy Management

IEC IEC Regional Centre for North America 446 Main Street 16th Floor Worcester MA 01608
IEC International Electrotechnical Commission.

IEC 62746-10-1 - 2018 Systems interface between customer energy management system and the power management system – Part 10-1: Open automated demand response

OpenADR OpenADR Alliance 111 Deerwood Road Suite 200 San Roman CA 94583
OpenADR OpenADR Alliance

OpenADR 2.0a and 2.0b – 2019: Profile Specification Distributed Energy Resources

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-218-21 Part I Alterations fuel gas pipe testing
CDP ID #	283
Code	IECC CE
Code Section(s)	C502.3.3.1, C503.1.1 New Section y
Location	base
Proponent	Sean Denniston sean@newbuildings.org
Proposal Status	SC rev
Subcommittee	CE HVACR & WH
Subcommittee Notes	• In conflict with the fuel gas code. Suggest that if this language is proposed anywhere (prefer in IFGC), then certain piping materials don't have the same leakage issues shouldn't be required to meet this. • Proposal has issues, shouldn't be going forward.
Recommendation	Disapprove Reason: The proposal belongs in the IFGC, also reference ICC staff note from monograph: *"Staff Note: The code change proposals could be considered to be outside the scope of the energy code. The proposal will impose requirements for elements of the building that are regulated by the IFGC. It would cause a conflict with Section 102.2 through 102.4 and Sections 406.1 through 416.3 of the IFGC. Considering the life safety aspect of the code change proposal, it may be more appropriate and effective to put it in the IEBC"*
Vote	Motion to Disapprove Passed 11-0-2
Recommendation Date	6/2/2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee __X_____
Consensus Committee	

Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-219-21 Alteration Duct Testing
CDP ID #	285
Code	IECC CE
Code Section(s)	C502.3.3.1, C503.3.1 New Section y
Location	base
Proponent	Sean Denniston sean@newbuildings.org
Proposal Status	SC rev
Subcommittee	CE HVACR & WH
Subcommittee Notes	• Proponent introduced proposal. Made changes to the original proposal to align with a similar proposal that went through the residential subcommittee. This proposal wouldn't prevent anyone from just continuing to use an existing duct system. It would only be triggered when extensive changes are made to an existing duct system, and then it would need to meet this performance criteria. • As Modified version limits application to high pressure ducts and sets a performance requirement at 3 times what is required of new construction. • Some discussion and comments around application and scope of proposal • Subcommittee discussion of static pressure threshold for applicability • Editorial revisions were made
Recommendation	Approve As Modified Reason (reference from original proposal): Duct tightening can be a very cost-effective energy retrofit. The replacement of equipment or substantial expansion of existing ductwork present prime opportunities to undertake this testing and will provide project teams and building owners important information about the relative need and savings opportunity that could come from duct tightening projects. It will also give project teams important information for configuring new equipment and ductwork to ensure the whole system performs effectively
Vote	Motion to Approve As Modified Passed 5-2-4
Recommendation Date	6/2/2022

Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee _X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

CEPI-219-21, as modified

IECC®: C502.3.3.1 (New), C503.3.1 (New)

Proponents:

Sean Denniston, representing New Buildings Institute (sean@newbuildings.org)

2021 International Energy Conservation Code

Add section as follows:

C503.3.2 Duct Testing. Ducts and plenums designed to operate at static pressures ~~equal to or greater~~ not less than 3 inches water gauge (747 Pa) that serve an *alteration* shall be tested in accordance with this section where the *alteration* includes any of the following.

1. ~~Where 25 percent % or more orf terminals orf the registers that are part of the duct system are relocated.~~
2. Where 25% or more of the total length of the ducts in the system are relocated.
3. Where the total length of all ducts in the system is increased by 25% or more.

Ducts and plenums shall be leak tested in accordance with the SMACNA HVAC Air Duct Leakage Test Manual and shown to have a rate of air leakage (CL) less than or equal to 12.0 as determined in accordance with Equation 4-8 of section C403.12.2.3. Documentation shall be ~~furnished~~available demonstrating that representative sections totaling not less than 25 percent of the duct area has~~ve~~ been tested and that all tested sections comply with the requirements of this section.

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-129-21 Service WH for R-1 and R-2
CDP ID #	403
Code	IECC CE
Code Section(s)	C404.2.1, C404.2.2, C404.2.2.1, C404.2.2.2, C406.7.4 New Section y
Location	base
Proponent	Evan Green evan@ecotope.com
Proposal Status	SC rev
Subcommittee	CE HVACR & WH
Subcommittee Notes	• HVACR Subcommittee first discussed this proposal on 5/12/2022. It was disapproved 8-7-3 due to significant issues with the language and application and also issues with federal preemption. • The proposal was subsequently brought to the E4C committee and returned to HVACR subcommittee for additional review and modification. • The proponent worked with stakeholders and made modifications to the proposal and it was brought back to HVACR on 6/2/2022, then subsequently tabled until 6/9/2022 for the proponent to provide additional cost analysis materials. • HVACR Subcommittee discussed the proposal on 6/9/2022. Now focused only on R1, R2 occupancies based on feedback from subcommittee. Proposal now focuses only on central systems, based on SC feedback. • Proponent distributed cost analysis based on work that was done in the state of WA. This analysis only includes multifamily and two climate zones (4C, 5B) • Subcommittee discussion about cost effectiveness. Based on the proponent's energy analysis, the operational annual utility cost of a required system under this proposal (heat pump water heater) would be approximately the same or more than the current code (gas) baseline, even if considering the social cost of carbon. After considering the high first cost premium, the proposal would not be cost effective and would add significant costs to multifamily construction. • Subcommittee had significant concerns over the cost justification of the proposal.

	• Discussion of opportunity for additional modifications, but since these would not likely impact the cost effectiveness a motion was made and seconded for disapproval.
Recommendation	Disapprove Reason: The proposal is not cost effective.
Vote	Disapprove 7-3-3
Recommendation Date	6/9/2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee __X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

CEPI-129-21, as modified

IECC®: SECTION 202 (New), ~~C404.2.1,~~ C404.2.2 (New), C404.2.2.1 (New), C404.2.2.2 (New), ~~C406.7.4~~

Proponents:

Evan Green, representing Ecotope, Inc; Kevin Rose, representing Northwest Energy Efficiency Alliance (NEEA) (krose@neea.org)

2021 International Energy Conservation Code

Add new definition as follows:

C202 MULTI-PASS. A heat pump water heater control strategy requiring multiple passes of water through the heat pump to reach the final target storage water temperature.
C202 PRIMARY SERVICE WATER HEATING EQUIPMENT. Service water heating equipment intended to supply the majority of the service water heating load.
C202 SINGLE-PASS. A heat pump water heater control strategy using variable flow or variable capacity to deliver water from the heat pump at the final target storage water temperature in a single pass through the heat exchanger with variable incoming water temperatures.
C202 SUPPLEMENTAL SERVICE WATER HEATING EQUIPMENT. Equipment intended to heat any service water heating load that is not successfully heated by the primary service water heating equipment.
C202 TEMPERATURE MAINTENANCE. The system used to maintain the temperature of the building domestic hot water delivery system, typically by circulation and reheating or by a heat trace system.

Revise as follows:

C404.2.1 High input service water-heating systems for groups other than R-1 and R-2 occupancies.

Gas-fired water-heating equipment installed in new buildings in other than Group R-1 and Group R-2 occupancies with central service hot water heating systems shall be in compliance with this section. Where a singular piece of water-heating equipment serves the entire building and the input rating of the equipment is 1,000,000 Btu/h (293 kW) or greater, such equipment shall have a thermal efficiency, E_t, of not less than 92 percent. Where multiple pieces of water-heating equipment serve the building and the combined input rating of the water-heating equipment is 1,000,000 Btu/h (293 kW) or greater, the combined input- capacity-weighted-average thermal efficiency, E_t, shall be not less than 90 percent.

Exceptions:

1. **Where not less than 25 percent of the annual service water-heating requirement is provided by on-site renewable energy or site-recovered energy, the minimum thermal efficiency requirements of this section shall not apply.**
2. **The input rating of water heaters installed in individual dwelling units shall not be required to be included in the total input rating of service water-heating equipment for a building.**
3. **The input rating of water heaters with an input rating of not greater than 100,000 Btu/h (29.3 kW) shall not be required to be included in the total input rating of service water-heating equipment for a building.**

Add new text as follows:

C404.2.2 Service water heating for Group R-1 and R-2 occupancies with central service hot water systems.

~~In buildings that include~~ For Group R-1 or R-2 occupancies with central service water heating systems serving not less than six *dwelling units* or *sleeping units*, the *primary service water heating equipment* for the residential uses shall not use direct combustion fossil fuel or electric resistance heating. Not less than 80 percent of ~~annual~~ installed building service hot water output capacity shall be provided by air-source heat pump water heating systems. *Supplemental service water heating equipment* shall be permitted in accordance with Section C404.2.2.1.

Exceptions:

1. Systems supplying ~~80 percent of annual~~ building service hot water output capacity using renewable energy generated on site or site recovered energy.
2. Systems supplying ~~80 percent of annual~~ building service hot water output capacity using gas-fired ~~absorption~~ heat pumps ~~(GAHP)~~ with a COP greater than 1.0.
3. Solar thermal, wastewater heat recovery, and other approved waste heat recovery, biomass, ground source heat pump, other water-source heat pump system utilizing waste heat, and combinations thereof, ~~may be used to~~ shall offset up to 100~~%~~ percent of the required air source ~~HPWH~~ heat pump water heater capacity where these systems comply with this code and with the International Plumbing Code.

C404.2.2.1 Supplemental service water heating equipment.

Total supplemental water heating equipment shall not have an output capacity greater than the *primary service water heating equipment* at 40°F(4.4°C) and shall not exceed the capacity restrictions below. Supplemental water heating is permitted for the following uses:

1. Temperature maintenance of heated-water circulation systems~~,~~ that are physically separate from the primary service water heating equipment. Temperature maintenance capacity shall be no greater than the primary water heating capacity at 40°F and shall be installed per manufacturer's recommendations.
2. Heat tracing of piping for freeze protection or for temperature maintenance in lieu of recirculation of hot water.
3. Supplemental hot water heating where all of the following are true:
   - 3.1. The supplemental heating capacity is no greater than the primary service water heating capacity at 40°F (4.4°C).
   - 3.2. During normal operations the supplemental heating is controlled to operate only when the entering air temperature at the air-source heat pump is below 40°F (4.4°C), and the primary ~~HPWH~~ heat pump water heater compressor continues to operate together with the supplemental heating when the entering air temperature is below 40°F (4.4°C) and within the manufacturer's acceptable temperature range.
   - 3.3. The primary water heating equipment cannot satisfy the system load due to equipment failure or entering air temperature below 40°F(4.4°C).
4. Supplemental heating downstream from a multi-pass heat pump water heater system, no greater than the nominal output capacity of the heat pump water heaters.
5. Electric resistance or ~~condensing,~~ gas-fired water heaters ~~serving single zones~~ with a combined capacity no greater than 12 kW or 35,000 Btu/h input capacity.
6. Defrost of compressor coils during defrost mode.

C404.2.2

.2

Alarms.

The control system shall be capable of and configured to send automatic error alarms to building or maintenance personnel upon detection of equipment faults, low leaving water temperature from primary storage tanks, or low hot water supply delivery temperature to building distribution system.

~~Revise as follows:~~

~~**C406.7.4 High efficiency heat pump water heater.**~~

~~**Where electric resistance water heaters are allowed, all service hot water system heating requirements shall be met using heat pump technology with a combined input-capacity-weighted-average EF of 3.0. Air-source heat pump water heaters shall not draw conditioned air from within the building, except exhaust air that would otherwise be exhausted to the exterior.**~~

Reason Statement:

Requiring the use of heat pump water heaters will significantly reduce the amount of energy required for service water heating. Studies of real buildings utilizing current heat pump water heating technology have shown that heat pump water heaters can provide service water heating with efficiencies greater than 300%, which would cut energy usage down to less than 1/3 of the energy required by a gas-fired or electric resistance water heater. This technology is readily available and has been successfully applied across a wide range of R1 and R2 applications throughout the United States.

Cost Impact:

The code change proposal will increase the cost of construction.

The service water heating equipment cost will increase, but substantial energy efficiency gains will result. Furthermore, if electric heat pump water heaters allow installers to forego the installation of gas infrastructure in a building, the money saved from gas infrastructure permit and installation will offset the increased cost of water heating equipment.

CEPI-129-21

International Energy Conservation Code

Code Change Proposal Tracking Sheet

Proposal #	CEPI-227-21 Alterations HVAC controls
CDP ID #	319
Code	IECC CE
Code Section(s)	C503.3.2 New Section y
Location	base
Proponent	Sean Denniston sean@newbuildings.org
Proposal Status	SC rev
Subcommittee	CE HVACR & WH
Subcommittee Notes	• Introduced by proponent. Proposal is meant to close a loophole for the interpretation that if you don't alter controls, then you don't need to make controls improvements if you're replacing equipment that uses those controls. • Replacing equipment without sufficient and improve controls can lead to wasted energy (economizer operation, setbacks, etc.) and inability of the equipment to function properly • Subcommittee discussion and review of controls provisions that should be included in alteration requirements, with subsequent modifications to language
Recommendation	Approve As Modified Reason (reference from original proposal): The current IECC only requires that new portions of HVAC systems comply with the requirements for new construction. This leaves unaltered portions of the HVAC system unaffected, including controls. Controls are a vital component of effective and efficient operation of heating and cooling systems and older controls that do not meet current code requirements significantly hamper efficiency in buildings.
Vote	Approve As Modified 11-0-3
Recommendation Date	6/9/2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee _X_____
Consensus Committee	

Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

CEPI-227-21 as modified

IECC®: C503.3.2 (New)

Proponents:

Sean Denniston, representing New Buildings Institute (sean@newbuildings.org)

2021 International Energy Conservation Code

Add new text as follows:
C503.3.2 Controls.

New heating and cooling equipment that are part of the *alteration* shall be provided with controls that comply with the control requirements in Section C403.4 and Section C403.5 other than the requirements of Section C403.4.3.3 and Section 403.4.4.

Exceptions:

1. Systems with direct digital control of individual zones reporting to a central control panel.
2. The replacement of individual components of multiple-zone VAV systems.

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-228-21 Alterations sizing hvac equipment
CDP ID #	278
Code	IECC CE
Code Section(s)	C503.3.2 New Section y
Location	base
Proponent	Sean Denniston sean@newbuildings.org
Proposal Status	SC rev
Subcommittee	CE HVACR & WH
Subcommittee Notes	• Proposal intent is to require load calculations and proper sizing for HVAC equipment for alterations (compared to rule-of-thumb or simply replacing with similarly sized equipment) • Some concern about difficulty in obtaining as-built information for load calculations and whether this requirement would be likely to affect actual practice • Subcommittee discussion on applicability and enforcement
Recommendation	Approve As Modified Reason: "Right-sizing" HVAC equipment can lead to more efficient and effective systems and reduce first costs.
Vote	Approve As Modified 7-6 (chair voting)
Recommendation Date	6/9/2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee _X_____
Consensus Committee	
Committee Response	

Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

CEPI-228-21 as modified

IECC®: C503.3.2 (New)

Proponents:

Sean Denniston, representing New Buildings Institute (sean@newbuildings.org)

2021 International Energy Conservation Code

Add new text as follows:
C503.3.2 System sizing.

New heating and cooling equipment that is part of an *alteration* shall be sized in accordance with Section C403.~~4~~3.1 based on the existing *building* features as modified by the *alteration.*

Exceptions:

1. Where is has been demonstrated to the *code official* that compliance with this section would result in heating or cooling equipment that is incompatible with the rest of the heating or cooling system.
2. Where it has been demonstrated to the *code official* that the additional capacity will be needed in the future.

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-022-21 Electrification
CDP ID #	190
Code	IECC CE
Code Section(s)	C401.2, C404.8.1, C405.5.3, TABLE C406.1(1), TABLE C406.1(2), TABLE C406.1(3), TABLE C406.1(4), TABLE C406.1(5), C406.7.3 New Section y
Location	base
Proponent	Kim Cheslak kim@newbuildings.org
Proposal Status	SC rev
Subcommittee	CE Model, Metrics
Subcommittee Notes	This proposal includes an electric-ready provision for combustion systems in the main body of the code and an all-electric appendix. The purpose of this proposal is to reduce carbon emissions.
Recommendation	Approve as modified (see attached)
Vote	Approve- 13, Disapprove-0, Abstain-1
Recommendation Date	
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee_____✓_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

CEPI-022 Electric-Ready Mandate and All-Electric Appendix Proposal

Add new text as follows:

C103.2.2 Electrification system. The construction documents shall provide details for additional electric infrastructure, including branch circuits, conduit, or pre-wiring, panel capacity, and electrical service capacity in compliance with the provisions of this code.

Revise text as follows:

C105.2.5 Electrical system. Inspection shall verify lighting system controls, components, ~~and~~ meters, and additional electric infrastructure as required by the code, approved plans and specifications.

Add new definitions as follows:

ALL-ELECTRIC BUILDING. A *building* that contains no *combustion equipment*, or plumbing for *combustion equipment,* installed within the *building* or *building site.*

APPLIANCE. A device or apparatus that is manufactured and designed to utilize energy and for which this code provides specific requirements.

COMBUSTION EQUIPMENT. Any *equipment* or *appliance* used for space heating, *service water heating*, cooking, clothes drying and/or lighting that uses *fuel gas* or *fuel oil*.

COMMERCIAL COOKING APPLIANCES. Appliances used in a commercial food service establishment for heating or cooking food and which produce grease vapors, steam, fumes, smoke or odors that are required to be removed through a local exhaust ventilation system. Such appliances include deep fat fryers, upright broilers, griddles, broilers, steam-jacketed kettles, hot-top ranges, under-fired broilers (charbroilers), ovens, barbecues, rotisseries, and similar appliances. For the purpose of this definition, a food service establishment shall include any building or a portion thereof used for the preparation and serving of food.

FUEL GAS. A natural gas, manufactured gas, liquified petroleum gas or a mixture of these.

FUEL OIL. Kerosene or any hydrocarbon oil having a flash point not less than 100°F (38°C).

MIXED-FUEL BUILDING. A *building* that contains *combustion equipment* or includes piping for such *equipment*.

Revise text as follows:

C405.5.3 Gas lighting. Gas-fired lighting appliances shall not be ~~equipped with continuously burning pilot ignition systems~~ permitted.

Add new text as follows:

C405.16 Additional electric infrastructure. Buildings that contain *combustion equipment* and end-uses shall be required to install electric infrastructure in accordance with this section.

C405.16.1 Combustion space heating. Spaces containing *combustion equipment* for space heating shall comply with either C405.16.2.1 or C405.16.2.2

C405.16.1.1 Low-capacity heating. Spaces containing warm-air furnaces with a capacity less than 225,000 Btu/h and gas- and oil-fired boilers with a capacity less than 400,000 Btu/h shall be provided with a designated exterior location(s) that complies with the following:

1. Natural drainage for condensate from cooling equipment operation or a condensate drain located within 3 feet (914 mm) of the location of the space heating equipment, and

2. A dedicated branch circuit in compliance with NFPA70 Section 424.4 based on heat pump space heating equipment sized in accordance with the requirements of Section C403.1.1 and terminating within 3 feet (914 mm) of the location of the space heating equipment with no obstructions. Both ends of the branch circuit shall be labeled “For Future Heat Pump Space Heater.”

Exception: Where an electrical circuit in compliance with NFPA70 Sections 440.4(B) and 440.35 exists for space cooling equipment.

C405.16.1.2 High-capacity heating. Spaces containing all other space heating *equipment* shall be provided with conduit that is continuous between a junction box located within 3 feet (914 mm) of the *equipment* and an electrical panel. The junction box, conduit and bus bar in the electrical panel shall be rated and sized to accommodate a branch circuit with sufficient capacity for an equivalent electric *equipment* with an equivalent equipment capacity. The electrical junction box and electrical panel shall have labels stating, "For Future Electric Space Heating Equipment".

C405.16.2 Combustion water heating. Spaces containing *combustion equipment* for water heating shall comply with either C405.16.3.1 or C405.16.3.2

C405.16.2.1 Low-capacity water heating. Spaces containing water heaters with a capacity less than 300,000 Btu/h (88 kW) shall comply with the following:

1. A dedicated 208/240-volt branch circuit with a minimum capacity of 30 amps terminating within 3 feet (914 mm) from the water heater shall be provided and be accessible to the water heater with no obstructions. Both ends of the branch circuit shall be labeled with the words "For Future Heat Pump Water Heater" and be electrically isolated,

2. A condensate drain that is no more than 2 inches (51 mm) higher than the base of the installed water heater and allows natural draining without pump assistance shall be installed within 3 feet (914 mm) of the water heater,

3. The space shall meet minimum dimensions of 3 feet (914 mm) by 3 feet (914 mm) by 7 feet (2134 mm) high, and

4. The space shall meet a minimum volume of 700 cubic feet (20,000 L) or the equivalent of one 16-inch (406 mm) by 24-inch (610 mm) grill to a heated space and one 8-inch (203 mm) duct of no more than 10 feet (3048 mm) in length for cool exhaust air.

Exception: Where items 1 and 2 are be provided at an exterior location capable of serving an outdoor compressor for a split-system heat pump water heater and a chase that is sized to accommodate refrigerant lines is provided between the outdoor location and the space required in item 3.

C405.16.2.2 High-capacity water heating. Spaces containing water heaters with a capacity greater than or equal to 300,000 Btu/h (88 kW) shall comply with the following:

1. Conduit that is continuous between a junction box located within 3 feet (914 mm) of the *equipment* and an electrical panel shall be provided. The junction box, conduit and bus bar in the electrical panel shall be rated and sized to accommodate a branch circuit with sufficient capacity for an equivalent electric *equipment* with an equivalent equipment capacity. The electrical junction box and electrical panel shall have labels stating, "For Future Electric Water Heating Equipment", and

2. A condensate drain that is no more than 2 inches (51 mm) higher than the base of the installed water heater and allows natural draining without pump assistance shall be installed within 3 feet (914 mm) of the water heater,

C405.16.3 Combustion cooking. Spaces containing combustion equipment for cooking shall comply with either C405.16.4.1 or C405.16.4.2

C405.16.3.1 Commercial cooking. Spaces containing *commercial cooking appliances* shall be provided with a dedicated branch circuit with a minimum capacity of 12 kVA per 1 kBtu of appliance input capacity. The branch circuit shall terminate within 3 feet (914 mm) of the appliance with no obstructions. Both ends of the branch circuit shall be labeled with the words "For Future Electric Cooking Equipment" and be electrically isolated.

C405.16.3.2 Light and medium duty cooking. Spaces containing light- and medium duty cooking *equipment* not designated as *commercial cooking appliances* shall be provided with a dedicated branch circuit in compliance with NFPA 70 Section 422.10. The branch circuit shall terminate within 6 feet (1829 mm) of fossil fuel ranges, cooktops and ovens and be accessible with no obstructions. Both ends of the branch circuit shall be labeled with the words "For Future Electric Cooking Equipment" and be electrically isolated.

C405.16.4 Combustion clothes drying. Spaces containing combustion equipment for clothes drying shall comply with either C405.16.5.1 or C405.16.5.2

C405.16.4.1 Commercial drying. Spaces containing clothes drying *equipment,* and end-uses for commercial laundry applications shall be provided with conduit that is continuous between a junction box located within 3 feet (914 mm) of the *equipment* and an electrical panel. The junction box, conduit and bus bar in the electrical panel shall be rated and sized to accommodate a branch circuit with sufficient capacity for an equivalent electric *equipment* with an equivalent equipment capacity. The electrical junction box and electrical panel shall have labels stating, "For Future Electric Clothes Drying Equipment", and

C405.16.4.2 Residential drying. Spaces containing clothes drying *equipment, appliances,* and end-uses serving multiple *dwelling units* or sleeping areas with a capacity less than or equal to 9.2 cubic feet shall be provided with a dedicated 240-volt branch circuit with a minimum capacity of 30 amps shall terminate within 6 feet (1829 mm) of fossil fuel clothes dryers and shall be accessible with

no obstructions. Both ends of the branch circuit shall be labeled with the words "For Future Electric Clothes Drying Equipment" and be electrically isolated.

Revise text as follows:

C406.1.1 Additional energy efficiency credit requirements for all-electric buildings.

All-electric buildings shall comply with measures from C406.2 to achieve not less than the number of required efficiency credits from Table C406.1.1 based on building occupancy group and climate zone.

Where a project contains multiple occupancies, credits in Table C406.1.1 from each building occupancy shall be weighted by the conditioned floor area to determine the weighted average project energy credits required. Accessory occupancies shall be included with the primary occupancy group for purposes of Section C406.

Exceptions:

1. Unconditioned parking garages that achieve 50% of the credits required for use groups S-1 and S-2 in Table C406.1.1.

2. Portions of buildings devoted to manufacturing or industrial use.

Add text as follows:

C406.1.2 Additional energy efficiency credit requirements for mixed-fuel buildings.

Mixed-fuel buildings shall comply with measures from C406.2 to achieve not less than the number of required efficiency credits from Table C406.1.2 based on building occupancy group and climate zone.

Where a project contains multiple occupancies, credits in Table C406.1.2 from each building occupancy shall be weighted by the conditioned floor area to determine the weighted average project energy credits required. Accessory occupancies shall be included with the primary occupancy group for purposes of Section C406.

Exceptions:

1. Unconditioned parking garages that achieve 50% of the credits required for use groups S-1 and S-2 in Table C406.1.2.
2. Portions of buildings devoted to manufacturing or industrial use.

Table C406.1.2
Energy Credit Requirements by Building Occupancy Group for Mixed Fuel Buildings

Building Occupancy Groups	Climate Zone																		
	0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
R-2, R-4, and I-1	134	130	141	147	150	150	150	150	150	150	150	150	144	150	150	150	150	150	150
I-2	58	56	54	53	60	67	75	63	67	72	62	67	74	67	72	80	79	97	87
R-1	79	75	82	78	81	91	92	93	98	102	96	102	117	104	110	128	118	135	132
B	85	82	84	86	81	80	87	83	85	94	88	92	101	93	93	114	106	114	105
A-2	62	60	61	61	64	64	81	68	72	94	74	83	110	87	84	120	107	122	113
M	84	84	90	88	92	95	87	87	99	81	75	69	74	100	93	128	109	112	102
E	68	71	68	75	72	75	78	78	75	84	82	82	90	87	91	98	99	94	98
S-1 and S-2	81	79	83	81	81	81	66	79	81	100	75	97	150	107	92	150	142	141	111
All Other	40	39	41	42	42	45	45	45	47	51	45	48	54	51	51	63	59	63	58

Add new Appendix as follows:

APPENDIX CD ALL-ELECTRIC COMMERCIAL BUILDINGS

About this appendix: *Appendix CD requires the installation of all-electric equipment and appliances in new construction in order to reduce carbon emissions and improve the safety and health of commercial buildings.*

Section CD101

GENERAL

CD101.1 Intent. The intent of this Appendix is to amend the *International Energy Conservation Code* to reduce greenhouse gas emissions and improve the safety and health of buildings by not permitting *combustion equipment* in buildings.

CD101.2 Scope. This appendix applies to new commercial buildings.

Section CD102

ALL-ELECTRIC COMMERCIAL BUILDINGS

CD102.1 Application. Commercial buildings shall be *all-electric buildings* and comply with Sections C401.2.1 or C401.2.2.

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-203-21 Post-Occupancy Energy Monitoring
CDP ID #	453
Code	IECC CE
Code Section(s)	C407.2 New Section n
Location	base
Proponent	Helen Sanders helen.sanders@Technoform.com
Proposal Status	SC rev
Subcommittee	CE Model, Metrics
Subcommittee Notes	Requires new buildings >25,000 sf be equipped with equipment to measure, monitor, record and report energy consumption data. A proposed annual consumption by energy type and disclosure report shall be submitted as part of the CDs.
Recommendation	Approve the proposal as modified. (see attached)
Vote	Approve – 13, Disapprove – 0, Abstain – 1
Recommendation Date	6/6/22
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee_____✓_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

Revision of CEPI-203-21

Proponents:

Helen Sanders, Façade Tectonics Institute/Technoform North America

2021 International Energy Conservation Code:

Revise as follows:

C405.12 Energy monitoring. New buildings with a gross conditioned floor area of 25,000 square feet (2322 m2) or larger shall be equipped to measure, monitor, record and report energy consumption data in compliance with Sections C405.12.1 through C405.12.5. A plan for quantifying annual energy type and use disclosure in compliance with Sections C405.12.1 through C405.12.8 shall be submitted with the construction documents..

Exception: R-2 occupancies and individual tenant spaces are not required to comply with this section provided that the space has its own utility services and meters and has less than 5,000 square feet (464.5 m2) of conditioned floor area.

C405.12.1 Electrical energy metering. For all electrical energy supplied to the building and its associated site, including but not limited to site lighting, parking, recreational facilities and other areas that serve the building and its occupants, meters or other measurement devices shall be provided to collect energy consumption data for each end-use category required by Section C405.12.2.

C405.12.2 End-use electric metering categories. Meters or other approved measurement devices shall be provided to collect energy use data for each end-use category indicated in Table C405.12.2. Where multiple meters are used to measure any end-use category, the data acquisition system shall total all of the energy used by that category. Not more than 5 percent of the measured load for each of the end-use categories indicated in Table C405.12.2 shall be permitted to be from a load that is not within that category.

Exceptions:

1. HVAC and water heating equipment serving only an individual dwelling unit shall not require end-use metering.

2. End-use metering shall not be required for fire pumps, stairwell pressurization fans or any system that operates only during testing or emergency.

3. End-use metering shall not be required for an individual tenant space having a floor area not greater than 2,500 square feet (232 m2) where a dedicated source meter complying with Section C405.12.3 is provided.

TABLE C405.12.2 ELECTRICAL ENERGY USE CATEGORIES

TABLE C405.12.2
ENERGY USE CATEGORIES

LOAD CATEGORY	DESCRIPTION OF ENERGY USE
Total HVAC system	Heating, cooling and ventilation, including but not limited to fans, pumps, boilers, chillers and water heating. Energy used by 120-volt equipment, or by 208/120-volt equipment that is located in a building where the main service is 480/277-volt power, is permitted to be excluded from total HVAC system energy use.
Interior lighting	Lighting systems located within the building.
Exterior lighting	Lighting systems located on the building site but not within the building.
Plug loads	Devices, appliances and equipment connected to convenience receptacle outlets.
Process load	Any single load that is not included in an HVAC, lighting or plug load category and that exceeds 5 percent of the peak connected load of the whole building, including but not limited to data centers, manufacturing equipment and commercial kitchens.
Building operations and other miscellaneous loads	The remaining loads not included elsewhere in this table, including but not limited to vertical transportation systems, automatic doors, motorized shading systems, ornamental fountains, ornamental fireplaces, swimming pools, in-ground spas and snow-melt systems.

Insert in table 405.12.2:

Electric hot water heating	Electricity used to generate hot water. Exception: Electric water heating with design capacity that is less than 10% of building service rating

C405.12.3 Electric Meters. Meters or other measurement devices required by this section shall be configured to automatically communicate energy consumption data to the data acquisition system required by Section C405.12.4. Source meters shall be allowed to be any digital-type meter. Lighting, HVAC or other building systems that can self-monitor their energy consumption shall be permitted instead of meters. Current sensors shall be permitted, provided that they have a tested accuracy of ±2 percent. Required metering systems and equipment shall have the capability to provide at least hourly data that is fully integrated into the data acquisition system and graphical energy report in accordance with Sections C405.12.4 and C405.12.5. Non-intrusive load monitoring (NILM) packages that extract energy consumption data from detailed electric waveform analysis can be substituted for individual meters if the equivalent data can be made available for collection in C405.12.4 and reporting in C405.12.5

C405.12.4 Electrical energy ~~D~~data acquisition system. A data acquisition system shall have the capability to store the data from the required meters and other sensing devices for a minimum of 36 months. The data acquisition system shall have the capability to store real-time energy consumption data and provide hourly, daily, monthly and yearly logged data for each end-use category required by Section C405.12.2. The data acquisition system shall have the capability of providing building total peak electric demand and the time(s) of day and time(s) of year at which the peak occurs. Peak demand shall be integrated over the same time period as the underlying meter reading rate, which is typically 15 minutes but shall be no longer than one hour.

C405.12.5 Graphical energy report. A permanent and readily accessible reporting mechanism shall be provided in the building that is accessible by building operation and management personnel. The reporting mechanism shall have

the capability to graphically provide the electrical energy consumption for each end-use category required by Section C405.12.2 at least every hour, day, month and year for the previous 36 months. The graphical report shall also incorporate natural gas interval data or the ability to enter gas utility bills into the report.

C40~~6~~5.12.6 Non-electrical energy: Consumption of non-electrical energy such as gas, district heating or cooling, unregulated fuel sources, or other non-renewable energy shall be automatically metered or a method developed for usage calculation ~~at least~~ annually or more frequently from energy bills ~~developed~~. Natural gas usage shall be monitored ~~hourly~~ through on site interval metering or from utility interval data.

C40~~6~~5.12.7 Renewable energy: The ability to measure the production of on-site renewable energy shall be provided with ~~at least~~ the same or greater frequency as metered systems.

C40~~6~~5.12.8 Plan for disclosure: The plan for annual energy use data gathering and disclosure shall include the following

1. Property information including building type, total gross floor area, year built or year planned for construction completion, and occupancy type

2. Total annual building site energy use per unit area (square foot) of gross floor area as collected or documented through C40~~6~~5.12.5 (electrical) and C40~~6~~5.12.6 (non-electrical) sources, separated by energy type (electric, gas, district cooling or heating, unregulated fuel sources etc.). Electrical energy shall be further broken down by load type as identified in Table C405.12.2.

3. Annual site generated renewable energy per unit area (square foot) of gross floor area

4. Peak electric demand per unit area (square foot) of gross floor area, with an estimate of relative building system contribution to that peak, and the time and date of the peak.

5. For projects using the section C407 Total Building Performance approach to show compliance, include the following information from the building simulation:

5.1 Modeling software used
5.2 Assumptions made that impact the simulated annual energy use per unit (square foot or square meter) of gross floor area (e.g. occupancy schedules, daylighting assumptions, climate file, plug loads, envelope performance including use of shading systems).
5.3 Simulated annual energy use per unit (square foot or square meter) of gross floor area
5.4 Peak load, the time of date and time of peak and the hourly load profile on the day that experiences peak load.

Reason Statement:

Historically, energy efficiency has been a means to address concerns over oil and fuel shortages, using demand reduction to limit our “vulnerability to energy supply disruptions”[1]. Over the past five decades, however, the role of energy efficiency has morphed into something even more critical – playing a key part in slowing down the rate of anthropogenic climate change highlighted by the IPCC’s most recent Sixth Assessment Report and mitigating the impacts that climate change is already manifesting with dire consequences. As the International Code Council’s Energy Efficiency website itself states, “The International Code Council family of solutions is helping our communities forge a path forward on energy and sustainability to confront the impacts of a changing climate.”[2]

With buildings making up nearly 40% of the total greenhouse gas emissions globally [3], it is imperative that we start creating the ability to measure, monitor and disclose actual building energy use to inform actions to improve performance and feedback into the design process, rather than continue to rely on predicted energy consumption, which may not accurately reflect the building’s true energy consumption.

With building performance disclosure and reporting legislation for existing buildings becoming more widespread in the U.S., to address this issue of building energy use, it is important for the IECC, which covers the design and construction of new buildings, to prepare buildings and their owners for being able to easily comply with these requirements for energy monitoring and disclosure, and support the movement to a net zero carbon building future.

Of course, operational energy is not the only option we should pursue to mitigate the risks of climate change, but we should consider this a reasonable starting point, in line with the trajectory of the IECC. We need to close the information loop on building energy performance, and we need to do it fast. If we don't provide the ability to, and start to track actual energy use now, and correlating that to design intent, how will we know what aspects of building design, operations, and maintenance require our focus and dedication to rectify or improve upon?

This proposal is for the 2024 code cycle, which means we only have two additional opportunities beyond this cycle to implement tangible step changes before we hit 2030, the target date for achieving zero energy buildings. Furthermore, in the context of the current COVID-19 pandemic, we are seeing significant shifts in the way buildings are being used, with more flexibility in office schedules, hotdesking or hoteling, variable occupancy levels, and the need for more (natural) ventilation. These shifts make it even harder for energy models to predict energy use in a meaningful and informative way using current best standards and methods.

Preparing buildings for ongoing post-occupancy measurement and verification is the only way to reliably track and manage energy use. Without data, we cannot glean information and turn that into knowledge and even wisdom of how our buildings operate. We are already seeing the following costs/risks associated with Business As Usual (BAU) here in the US and in Canada:- Shifting map of hurricane zones such that more areas are experiencing higher risks [4] (e.g., Hurricane Sandy affecting New England) - More extreme wildfires that create their own weather systems, making it even harder to contain them [5] (e.g., Bootleg Fire in Oregon) - Heat domes that exceed scientific predictions, even accounting for climate change [6] (e.g., Pacific NW in early 2021) Some are calling this the "social" cost of carbon, but it all boils down to a financial cost to humans – often inequitably – in the end. Fabia Jeddere-Fisher, Senior Lecturer in Energy Engineering of University of the West of England (UWE) Bristol, Department of Architecture & Built Environment who is in charge of "metering, monitoring, and reporting energy use" and "identifying and setting targets for energy/carbon savings across the UWE estate" noted that Display Energy Certificate ratings do in fact impact the way building users interact with the buildings.

IECC Scope limitations - Plan for disclosure

Since the scope of the IECC is only through design and construction and does not extend beyond the issue of the certificate of occupancy, we have modified our existing proposal to require design teams to create a plan for disclosure of key energy and carbon emission related data. This builds on an existing energy metering section, adding requirements for collecting non-electric energy usage, on-site renewable energy production, disclosing simulation data if projects follow the total performance path to allow for comparison, and a requirement to plan for estimating carbon emissions based on the sources of energy usage using best available data from utilities and other sources.

We originally suggested a 50,000 sq.ft. as the building size limit because of the relatively large impact that large buildings have on the overall energy usage, yet these comprise a relatively small number of actual buildings, but the current limit in this energy monitoring section is already 25,000 sqft, so we have not proposed making changes to the existing required size for simplicity in this section.

Note that the CBECS database indicates there are approximately 6 million commercial buildings with an average size of 16K sq.ft. Buildings of size greater than 50,000 sq.ft. represent a very small portion, ~5%, of the building stock in number, but around 50% of the floor area, and thus 50% of the energy impact. The 2018 Commercial Building Energy Consumption Survey [7] indicates that the top 3% of the largest buildings use 34% of the energy nationwide.

Supporting disclosure ordinances and providing owners data

We believe that addressing energy measurement and setting up a plan for disclosure for the big buildings first is much easier both logistically and administratively, while not giving up much impact or savings. The intent of this proposal is for preparing buildings to be able to comply with building disclosure and energy performance ordinances which is growing throughout the country and to remove barriers to disclosure [8,9]. It is intended to allow for future benchmarking of energy use, provide more transparency for building tenants, provide a needed feedback loop for energy simulation improvement, and to get the infrastructure in place for future measurement and verification opportunities, such as the possibility of spotting trends and providing insight into potential areas of improvement. By also including a requirement for the energy simulation data in the disclosure plan, this will also provide the necessary data for providing the feedback loop to improving simulation assumptions and accuracy which is important for closing the as-simulated to as-built performance gap.

Energy to Carbon:

With the focus on carbon and the decarbonization of electricity grids happening at different rates across the country, and the use of on-site renewable energy, simply measuring electrical energy usage is not sufficient as a proxy for carbon. Positioning the building's owners and local jurisdictions to be able to translate electrical energy usage, minus on-site renewable electricity, and non-electrical fossil fuel usage into estimated carbon emissions is very important. Since procedures for translating energy usage to carbon emissions are not uniform and it may be more appropriate to leave this translation to local jurisdictions. As a result, this proposal requires the plan for disclosure to include non-electrical energy source usage and net electrical usage from the grid so that sufficient information is available to estimate the building's carbon emissions.

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6. https://www.theguardian.com/environment/2021/jul/02/canadian-inferno-northern-heat-exceeds-worst-case-climate-models

7. 2018 Commercial Building Energy Consumption Survey: https://www.eia.gov/consumption/commercial/pdf/CBECS%202018%20Preliminary%20Results%20Flipbook.pdf

8. https://www.osti.gov/servlets/purl/1168594 8https://database.aceee.org/state/building-energy-disclosure

9. https://www.imt.org/public-policy/building-performance-policy-center/

Cost Impact:

The code change proposal will neither increase nor decrease the cost of construction. Reporting data that is already available from utility bills, construction documents, and building simulations already submitted for code compliance and so will not change the cost of construction. If there is any administrative cost to disclosure, it should be minimal in the budget of a 25,000 sq.ft. building.

CEPI-203-21

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-217-21 Existing Buildings Additional Efficiency Credits
CDP ID #	408
Code	IECC CE
Code Section(s)	C502.2.7.1, C503.7 (New), SECTION C506, C506 New Section y
Location	base
Proponent	Sean Denniston sean@newbuildings.org
Proposal Status	SC rev
Subcommittee	CE Model, Metrics
Subcommittee Notes	This proposal requires that additions and alterations to existing buildings achieve C406 efficiency credits.
Recommendation	Approve as modified (see attached)
Vote	Approve – 12, Disapprove – 0, Abstain – 1
Recommendation Date	6/6/22
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee_____✓_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

CEPI-217-21 Revision

Add definition as follows:

EXTERIOR WALL ENVELOPE. A system or assembly of exterior wall components, including exterior wall finish materials, that provides protection of the building structural members, including framing and sheathing materials, and conditioned interior space, from the detrimental effects of the exterior environment.

WORK AREA. That portion or portions of a building consisting of all reconfigured spaces as indicated on the construction documents. Work area excludes other portions of the building where incidental work entailed by the intended work must be performed and portions of the building where work not initially intended by the owner is specifically required by this code.

Modify the Section as follows:

C502.3 Compliance. *Additions* shall comply with Sections C502.3.1 through ~~C502.3.6.2~~C502.3.7.

Add sections as follows:

C502.3.7 Additional energy efficiency credits. *Additions* shall comply with measures from sections C406.2 and C406.3 to achieve not less than 50 percent the number of required efficiency credits from Table C406.1.1 based on building occupancy group and climate zone. Where a project contains multiple occupancies, credits in Table C406.1.1 from each building occupancy shall be weighted by the gross floor area to determine the weighted average project energy credits required. Accessory occupancies shall be included with the primary occupancy group for purposes of this section. *Alterations* to the existing building that are not part of an *addition*, but permitted with an *addition*, may be used to achieve the required credits.

Exceptions:

1. *Buildings* in Utility and Miscellaneous Group U, Storage Group S, Factory Group F, High-Hazard Group H
2. *Additions* less than 1,000 ft^2 and less than 50% of existing floor area.
3. *Additions* that do not include the addition or replacement of equipment covered by Tables C403.3.2(1) through C403.3.2(16) or C404.2.

4. *Additions* that do not contain *conditioned space*.
5. Where the *addition* alone or the existing building and *addition* together comply with Section C407

C503.6 Additional energy efficiency credits. *Alterations* shall comply with measures from sections C406.2 and C406.3 to achieve not less than 10 percent the number of required efficiency credits from Table C406.1.1 based on building occupancy group and climate zone. Where a project contains multiple occupancies, credits in Table C406.1.1 from each building occupancy shall be weighted by the gross floor area to determine the weighted average project energy credits required. Accessory occupancies shall be included with the primary occupancy group for purposes of this section.

Exceptions:

1. *Alterations* that include replacement of no more than one of the following:
   - 1.1. HVAC unitary systems or HVAC central heating or cooling equipment serving the *work area* of the *alteration*.
   - 1.2. Water heating equipment serving the *work area* of the *alteration.*
   - 1.3. 50% or more of the lighting fixtures in the *work area* of the *alteration*.
   - 1.4. 50% or more of the area of interior surfaces of the *thermal envelope* in the *work area* of the *alteration.*
   - 1.5. 50% or more of the area of the *building's exterior wall envelope,* including fenestration.
2. *Alterations to buildings* in Utility and Miscellaneous Group U, Storage Group S, Factory Group F, High-Hazard Group H
3. *Alterations* that do not contain conditioned space.
4. Portions of buildings devoted to manufacturing or industrial use.
5. Buildings in CZ 0A.
6. *Alterations* that are permitted with an *addition* complying with section C502.3.7.
7. *Alterations* that comply with Section C407.

Reason for Revision

The revised proposal provides clarifications to the approach in the original proposal and aligns the proposal with action taken by the committee in approving CEPI-193.

Additions

- The proposal sets the credit target for additions in a way that is compatible with CEPI-193. It is effectively a version of C406.1.1 for additions. It requires that an addition achieve half the credits required by Section C406.2, but it does not require any of the

credits required by C406.3. However, it does allow the addition to count credits from C406.3 to meet that requirement. The intent is to maximize the flexibility of C406 for application to additions.

- It includes exemptions for structures and spaces exempted from C406 and for multiple types of additions that would likely struggle to achieve even half the credits of a whole new building, including those that do not include space conditioning or water heating equipment, small additions and unconditioned additions.
- It allows an alteration and an addition to comply together when they are on the same permit in order to simplify design and compliance for those projects.

Alterations

The modifications to the alterations section do several things:

Threshold:

It provides a clearer threshold to ensure that the requirements only apply to substantial alterations. The proposal introduces the definition of "work area" from the IEBC in order to clearly delineate the portion of the building that is part of the alteration. Only alterations that include replacement of more than 50% of two or more of the major energy systems of the building – envelope, HVAC, water heating, lighting - would be subject to the requirement. Each of these items are themselves substantial alterations of the major energy systems in a building. 50% was chosen because it is a common threshold used for requirements in the IEBC, such as the area threshold for Level 3 alterations. It leverages the definition for "exterior wall envelope" from the IBC for alterations to the exterior of the thermal envelope to provide a consistent way to talk about building re-skinning activities.

This approach was chosen over the Level 1-3 approach in the IEBC because those thresholds are not well-tuned to the energy systems. Those thresholds are concerned primarily with egress and accessibility, so they are framed in terms of reconfiguration of spaces, particularly the moving of doors or windows. A building could be completely gutted, completely reskinned, with all lighting, space conditioning and water heating equipment replaced and still only be considered a Level 1 alteration as long as no door or windows were moved/added and the equipment replacements did not include additional equipment. Conversely, an alteration might be considered Level 3 because it includes substantial alterations to egress paths but include only minimal impacts to energy systems. This sets a threshold appropriate to the IECC.

Credit Target:

The proposal sets a target for covered alterations of just 10% of the efficiency credits of C406. 10% was chosen based on an assessment of the available credits to create a reasonable target for the worst-case alteration subject to this requirement. The worst-case was defined as a project with alterations to the two energy systems with the lowest average credit value available. We calculated the average credit value for each building energy system subject to the alteration threshold: envelope, space conditioning, water heating, lighting. We then added the total of the two categories with the lowest average credit value to represent the worst-case scenario.

When compared to the credits required by Table C406.1.1 in terms of percentage, the total value of the two worst category averages was 10% or more for all building types and all climate zones except 0A (which is why the proposal includes an exception for that climate zone).

Figure 1: Summary of the credits available to the "worst-case" alteration.

	Climate Zone																		
	0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
Average of all building types	13%	31%	31%	31%	28%	30%	35%	31%	23%	32%	31%	29%	30%	29%	29%	28%	30%	29%	26%
Mean of all building types	11%	21%	24%	24%	24%	23%	30%	28%	22%	28%	30%	26%	25%	27%	27%	24%	30%	27%	24%
Min of all building types	4%	17%	18%	18%	19%	20%	18%	18%	11%	12%	16%	13%	10%	12%	12%	10%	10%	10%	10%
Max of all building types	38%	100%	84%	97%	63%	70%	87%	69%	36%	83%	63%	57%	76%	61%	53%	67%	78%	69%	59%

This is a conservative target threshold. A project would never have to achieve more credits than the average credit value of each energy system category impacted by the alteration. This ensures that there is still flexibility and that a project would never have to utilize all of the credits available to their alteration.,

Other Exceptions:

The proposal brings over exemptions from CEPI-193 such as garages and manufacturing areas. It also exempts alterations that are part of an addition that complies with the additional efficiency requirements for additions in order to simplify compliance for those projects. And it excludes projects that comply with C407.

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-232-21 Change of Occupancy
CDP ID #	277
Code	IECC CE
Code Section(s)	C505.1, TABLE C505.2.2, TABLE C505.2.3 , TABLE C505.2.4 New Section y
Location	base
Proponent	SEHPCAC sehpcac@iccsafe.org
Proposal Status	SC rev
Subcommittee	CE Model, Metrics
Subcommittee Notes	This proposal ensures that spaces that undergo a change from F, H, S or U occupancies to a more energy intensive occupancy comply with C503, if alterations are included, or C502.2 if not
Recommendation	Accept the proposal as published in the monograph with the following exceptions highlighted in red. **Add new definition as follows:** C202 ENERGY USE INTENSITY (EUI). The metric indicating the total amount of energy consumed by a building in one year divided by the total gross floor area of the building. **Revise as follows:** C505.1 General. Spaces undergoing a change in occupancy ~~that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code. Where the use in a space changes from one use in Table C405.3.2(1) or C405.3.2(2) to another use in Table C405.3.2(1) or C405.3.2(2), the installed lighting wattage shall comply with Section C405.3. Where the space undergoing a change in occupancy or use is in a building with a fenestration area that exceeds the limitations of Section C402.4.1, the space is exempt from Section C402.4.1 provided that there is not an increase in fenestration area.~~ from F, H, S, or U occupancy classification shall comply with Section C503. Buildings or portions of buildings undergoing a change of occupancy without alterations shall comply with Section C502.2.
Vote	Approve- 13, Disapprove-0, Abstain-1
Recommendation Date	6/6/22
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee_____✓_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-257-21 Glide Path
CDP ID #	541
Code	IECC CE
Code Section(s)	X New Section y
Location	glide
Proponent	Duane Jonlin duane.jonlin@seattle.gov
Proposal Status	SC rev
Subcommittee	CE Model, Metrics
Subcommittee Notes	This proposed appendix establishes a pathway to net-zero energy consumption by 2030
Recommendation	Approve as modified. (see attached)
Vote	Approve – 13, Disapprove – 0, Abstain – 1
Recommendation Date	6/6/22
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee_____✓_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

CEPI-257-21 The Glide Path Appendix 6/7/22 Revision strikeout and underline text

X.1 Prescriptive compliance.

Where compliance is demonstrated using the Prescriptive Compliance option in Section C401.2.1, the ~~number of~~ additional efficiency credits required by Section C406.1 shall be ~~XX, rather than 10~~ 83%* higher than that required by Table C406.1.1.

**NOTE: This number of credits to be finalized when the energy use reduction of the 2024 IECC base code can be estimated, so that it results in a net ~~10%~~ 13% energy cost reduction compared with the 2021 IECC. This 83% figure assumes 8% base code progress and 6.5% overall savings from the energy credit system, leaving 5% to be made up with additional efficiency credits.*

X.2 Total Building Performance compliance.

Where compliance is demonstrated using the Total Building Performance option of Section C401.2.1, the PAEC (percentage of annual energy cost, applied to standard reference design) referenced in Equation 4-23 shall be multiplied by 0.95** ~~Item 2 in Section C407.2 shall require the proposed design energy cost to be XX percent rather than 80 percent of the standard reference design energy cost~~.

***NOTE: This percentage to be finalized when the energy use reduction of the 2024 IECC base code can be estimated, so that it results in roughly a net ~~10%~~ 13% energy cost reduction compared with the 2021 IECC. This 0.95 figure assumes 8% base code progress and 6.5% overall savings from the energy credit system, leaving 5% to be made up through the energy modeling process.*

X.3 On-site renewable electricity systems ~~Renewable energy~~.

~~In addition to any renewable energy required or provided to comply with other sections of this code, 2.4 watts of on-site renewable energy per square foot of conditioned space, and 0.8 watts of on-site renewable energy per square foot of semi-heated or unconditioned space, shall be provided.~~

~~X3.1 Site-recovered energy. Waste energy recovered on site is permitted to substitute for all or part of the renewable energy required by Section X.3. Waste energy consists of thermal energy that would otherwise be lost to the ground, atmosphere, or sewer.~~

Buildings shall install equipment for on-site renewable electricity generation with a direct current (DC) nameplate capacity rating of not less than that computed using Equation X-2:

AA = CA + SNA/3 Equation X-1

Where:

AA = Adjusted area, in ft^2 (m^2)
CA = Conditioned area, in ft^2 (m^2)
SNA = Semi-heated and nonconditioned area, in ft^2 (m^2)

REQ = AA x CF Equation X-2

Where:

REQ = Required on-site capacity, in DC watts
AA = Adjusted area from Equation X-1, in ft^2 (m^2)
CF = Capacity factor from Table X-3, in watts/ft^2 (m^2)

Exceptions. 1. Any required renewable electricity generation capacity in excess of 10 W/ft^2 (108 W/m^2) of net available roof area is permitted to be provided using an off-site renewable energy system in accordance with Section X.4. For the purposes of this section, net available roof area is the gross roof area minus the roof area occupied by any combination of skylights, mechanical equipment, vegetated space, required access pathways, vehicle parking, and occupied roof terrace area.

2. The following buildings are permitted to provide off-site renewable energy generation in accordance with Section X.4 in lieu of all or part of the on-site renewable energy generation capacity required by Section X.3.

a. Any building where more than 50% of roof area would be shaded from direct-beam sunlight by existing natural objects or by structures that are not part of the building for more than 2500 annual hours between 8:00 a.m. and 4:00 p.m.

b. A building with gross conditioned floor area less than 1,000 square feet (93 m^2).

c. A building whose primary roof slope is greater than 2 in 12.

3. Alternate forms of on-site *renewable energy generation capacity* are permitted where the annual energy generation is calculated using an *approved* methodology to be no less than that produced by the required solar capacity.

4. All or part of the required *renewable energy generation capacity* is permitted to be replaced by other efficiency measures projected to reduce the annual energy consumption of the building by an amount no less than that which would otherwise be produced annually by the required renewable energy capacity, as calculated using the total building performance compliance path in Section C407 and *approved* methodologies for solar production.

Table X.3 On-site renewable electricity

Climate Zone	Capacity Factor
1A, 2B, 3B, 3C, 4B, and 5B	2.0 W/ft2 (22 W/m2)
0A, 0B, 1B, 2A, 3A, and 6B	2.3 W/ft2 (25 W/m2)
4A, 4C, 5A, 5C, 6A, and 7	2.6 W/ft2 (29 W/m2)

X.4 Off-site renewable energy.

~~Off-site renewable energy is permitted to be substituted where the off-site renewable energy production is 1.25 times the required amount of on-site renewable energy production and the renewable energy is located in the same US EPA eGRID subregion as the project.~~

Buildings that qualify for one or more of the exceptions to Section X.3 and do not fully comply with Section X.3 with the on-site renewable energy system, shall procure off-site renewable electrical energy, in accordance with Sections X.4.1, X.4.2 and X.4.3, that shall not be less than the total off-site renewable electrical energy determined in accordance with Equation X-4.

DEF = REQ – INSTL Equation X-3

Where:

DEF = Renewable capacity deficit, in DC watts
REQ = Required on-site capacity in DC watts, from Equation X-2
INSTL = Installed on-site capacity, in DC watts

OFF = 4.4 x DEF Equation X-4

Where:

OFF = Off-site renewable energy to be procured, in kWh/year

~~X.4.1 Documentation requirements for off-site renewable energy systems.~~

~~Off-site renewable energy delivered or credited to the building project shall be subject to a legally binding contract to procure qualifying off-site renewable energy. Qualifying off-site renewable energy shall meet the following requirements:~~

~~1. Documentation of off-site renewable energy procurement shall be submitted to the code official.~~

~~2. The purchase contract shall have a duration of not less than 15 years. The contract shall be structured to survive a partial or full transfer of ownership of the building property.~~

~~3. Records on renewable power purchased by the building owner from the off-site renewable energy generator that specifically assign the RECs to the building owner shall be retained or retired by the building owner on behalf of the entity demonstrating financial or operational control over the building seeking compliance to this standard and made available for inspection by the code official upon request.~~

~~4. Where multiple buildings in a building project are allocated energy procured by a contract subject to this section, the owner shall allocate for not less than 15 years the energy procured by the contract to the buildings in the building project. A plan on operation shall be developed which shall indicate how renewable energy produced from on-site or off-site systems that is not allocated before issuance of the certificate of occupancy will be allocated to new or existing buildings included in the building project.~~

~~5. The plan shall include provisions to use a REC tracking system that meets the requirements of Section V.B of the Green-e Framework for Renewable Energy Certification. The plan shall describe how the building owner will procure alternative qualifying renewable energy in the case that the renewable energy producer ceases operation.~~

X.4.1 Off site procurement. The building owner as defined in the International Building Code shall procure and be credited for the total amount of off-site renewable electrical energy, not less than required in accordance with Equation X-1, with one of the following:

1. Community *renewables energy facility*
2. *Financial renewable energy power purchase agreement*
3. *Physical renewable energy power purchase agreement*
4. *Direct ownership*
5. *Renewable Energy Investment Fund*

X.4.2 Off-site contract. The renewable energy shall be delivered or credited to the building site under an energy contract with a duration of not less than 10 years. The contract shall be structured to survive a partial or full transfer of ownership of the building property. The total required off-site renewable electrical energy shall be procured in equal installments over the duration of the off-site contract.

X.4.3 Renewable energy certificate (REC) documentation. The property owner or owner's authorized agent shall demonstrate that where RECs are associated with on-site and off-site renewable energy production required by Sections X.3 and X.4, all of the following criteria for RECs shall be met:

1. They are retained and retired by or on behalf of the property owner or tenant for a period of not less than 10 years or the duration of the contract in X.4.2, whichever is less;

2. They are created within a 12-month period of the use of the REC; and

3. They represent a generating asset constructed no more than 5 years before the issuance of the certificate of occupancy.

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-255-21 Part I Above Base Energy Code Appendix
CDP ID #	470
Code	IECC CE
Code Section(s)	X New Section y
Location	appendix
Proponent	Hope Medina hmedina@coloradocode.net
Proposal Status	SC rev
Subcommittee	CE Model, Metrics
Subcommittee Notes	Proposed appendix to exceed base IECC requirements. Projects that comply with the IgCC or achieve a LEED silver rating will also be in compliance with the proposed appendix. Specific requirements describe continuous air barriers, air leakage testing, outdoor heating and swimming pools. Several SC members expressed concern that the number of proposed appendices could be confusing, that many provisions, e.g., air barriers and leakage, and the proposed Appendix CD – Energy Credits, are already addressed elsewhere in the code
Recommendation	Disapprove as modified. (see attached)
Vote	1 – Approve, 12- Disapprove, 1- Abstain
Recommendation Date	6/6/22
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee_____✓_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____

Date	

CEPI-255 – modified Above Base Energy Code Provisions

~~X101.1 Scope.~~

~~The provisions of this appendix shall apply to new construction.~~

X101.1 New construction shall comply with the requirements of ~~the~~ this code and one of the following:

1. This appendix,
2. The International Green Construction Code,
3. The National Green Building Standard, at a silver, gold, or emerald level of certification

~~for new construction and shall comply with the provisions of this appendix. Alternatively, new Construction shall comply with this appendix, the *International Green Construction Code*, or the ICC-700 *National Green Building Standard* at a silver, gold, or emerald certification.~~

~~Exception: Projects that comply with the International Green Construction Code or obtain a silver certification from the National Green Building Standard shall be deemed to comply with the provisions of this appendix.~~

X102.1 Air ~~barriers~~ leakage.

~~Air barrieriWhere an air barrier is not required by section C402.5.1, a~~ A continuous *air barrier* shall be provided throughout the *building thermal envelope*. The continuous air barriers shall be located on the inside or outside of the *building thermal envelope*, located within the assemblies composing the *building thermal envelope*, or any combination thereof. The air barrier shall comply with Sections C402.5.1.1, and~~/or~~ C402.5.1.2.

X102.1.1 Air barrier verification.

All air barriers components and systems shall be verified in accordance with Section ~~C402.5.1.5~~C402.5.2.

~~X102.1.1.1 Testing~~

~~The building, dwelling, or sleeping unit shall be tested for air leakage in accordance with Sections C402.5.2 or C402.5.3.~~ Where required by the code official, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the code official.

~~1. Buildings or portions of buildings, including Group R and I occupancies, shall meet the provisions of Section C402.5.2.~~

~~2. Buildings or portions of buildings other than Group R and I occupancies shall meet the provisions of Section C402.5.3.~~

~~X103.1 Heating outside uses.~~

~~Mechanical systems providing a heat source outside of the thermal envelope of a building shall comply with Sections X103.1.1 through X103.1.3~~

X103.1~~.1~~ Snow and ice melt systems.

~~Snow and ice melt systems shall install a minimum R-10 insulation located below the tubing and or piping utilized in the heating system for snow and ice melt systems.~~

~~Exception: snow and ice melt systems located on roof when the location of the thermal envelope is not located at the roof, but at the ceiling.~~

Snow and ice melt systems shall ~~install~~ have insulation of not less than ~~a minimum~~ R-10 ~~insulation~~ located below ~~tubing and or~~ thermal elements or piping utilized in the heating system. ~~for snow and ice melt systems.~~

Exception: Snow and ice melt systems located on roofs ~~when the location of~~ outside of the thermal envelope. ~~is not located at the roof , but at the ceiling.~~

~~X103.1.2 Swimming pools and spas.~~

~~Permanent swimming pools and spas shall have insulation on the sides and bottom surfaces located on the exterior. The type of insulation shall be impermeable and impervious to water logging or saturation and unaffected by water, mold, mildew, and have capability to resist compression. The insulation value shall be a minimum of R-15.~~

~~X103.1.3 Automatic Covers.~~

~~Permanent swimming pools and spas shall have insulation on the sides and bottom surfaces located on the exterior. The type of insulation shall be impermeable and impervious to water logging or saturation and unaffected by water, mold, mildew, and have capability to resist compression. The insulation value shall be a minimum of R-15.~~

~~Automatic covers. Swimming pools and spas located inground shall have an automatic motorized non-permeable pool cover that covers the entire pool surface.~~

X104.1 Appliances.

The following appliances shall meet ENERGY STAR performance criteria or equivalent.

1. Water coolers
2. Commercial Fryer
3. Commercial hot food holding cabinets
4. Commercial steam cookers
5. Commercial dishwashers

6. Commercial Griddles

7. Commercial ovens

8. Commercial refrigerator and/or freezers

X105.1 Additional efficiency package options.

Projects complying with this appendix shall be required to achieve an additional 5 credits ~~for a total of 15 points~~ from Tables C406.1(1) through C406.1(5).

Add new standard(s) as follows:

ICC

International Code Council, Inc.

500 New Jersey Avenue NW 6th Floor

Washington, DC 20001

IgCC - ~~2024~~ 2021 International Green Construction Code

700-2020 National Green Building Standard