



DEPARTMENT OF ADMINISTRATIVE SERVICES

PROPOSED CHANGE OF THE CONNECTICUT STATE
BUILDING CODE AND FIRE SAFETY CODE

DATE SUBMITTED: 10/16/24

CODE INFORMATION

Proposed change to: ☒ Building Code ☐ Fire Safety Code

Code section(s): Table R405.4.2(1)

PROPONENT INFORMATION

Name: Eric Lacey

Representing: RECA

Telephone: 202-339-6366

Email: _____

Address: 1850 M Street, NW, Suite 610 Washington DC 20036
Street Address Town State Zip Code

PROPOSAL INFORMATION

Description of change and reason for change (attach additional information as needed):

See attached RECA 2024 IECC CCP-1

Proposed text change, addition or deletion (attach additional information as needed):

See attached RECA 2024 IECC CCP-1

Supporting data and documents (attach additional information as needed)

See attached RECA 2024 IECC CCP-1

☐ **This Proposal is original material.** (Note: Original material is considered to be the submitter's own idea based on or as a result of his/her own experience, thought or research and, to the best of his/her knowledge, is not copied from another source.)

☒ **This Comment is not original material, its source (if known) is as follows:** (such as material / code development proposal from a prior development cycle or proposal submitted to model code committee etc.)

Language is from 2021 IECC and current Connecticut State Building Code

☒ **I would like to make an in-person presentation of my proposal.**

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Proponent's Signature

Eric Lacey

Printed Name

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*Department of Administrative Services
Office of the State Building Inspector
450 Columbus Boulevard, Suite 1303
Hartford, CT 06103
Tel: 860-713-5900 Fax: 860-713-7410
Affirmative Action/Equal Opportunity Employer*

12/29/16

RECA 2024 IECC Code Change Proposal 1

Remove Unnecessary Loopholes in Performance Path

Revise Table R405.4.2(1) of the 2024 IECC as follows:

TABLE R405.4.2(1)

SPECIFICATONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Heating Systems ^{d, e, j, k}	Fuel type/capacity: same as proposed design.	As proposed.
	Product class: same as proposed design.	As proposed.
	Efficiencies: <u>For other than electric heating without a heat pump: same as proposed design.</u> <u>Where the proposed design utilizes electric heating without a heat pump, the standard reference design shall be an air source heat pump meeting the requirements of Section C403 of the IECC – Commercial Provisions.</u>	<u>As proposed.</u>
	Heat pump: complying with 10 CFR § 430.32.	As proposed.
	Fuel gas and liquid fuel furnaces: complying with 10 CFR § 430.32.	As proposed.
	Fuel gas and liquid fuel boilers: complying with 10 CFR § 430.32.	As proposed.
Cooling systems ^{d, f, k}	Fuel type: electric. Capacity: same as proposed design.	As proposed.
	Efficiencies: complying with 10 CFR § 430.32 <u>Same as proposed design.</u>	As proposed.
Service water heating ^{d, g, k}	Use, in units of gal/day = $25.5 + (8.5 \times N_{br})$ where: N_{br} = number of bedrooms.	Use, in units of gal/day = $25.5 + (8.5 \times N_{br}) \times (1 - HWDS)$ where: N_{br} = number of bedrooms. $HWDS$ = factor for the compactness of the hot water distribution system.
		Compactness ratio ⁱ HWDS factor

		1 story	2 or more stories	
		>60%	>30%	0
		>30% to ≤60%	>15% to ≤30%	0.05
		>15% to ≤30%	>7.5% to ≤15%	0.10
		<15%	<7.5%	0.15
	Fuel type: same as proposed design.	As proposed.		
	Rated storage volume: same as proposed design.	As proposed.		
	Draw pattern: same as proposed design.	As proposed.		
	Efficiencies: Uniform Energy Factor complying with 10 CFR § 430.32 Same as proposed design.	As proposed.		
	Tank temperature: 120° F (48.9° C).	Same as standard reference design.		

Revise Table R405.4.2(1) of the 2024 IECC as follows:

TABLE R405.4.2(1)

SPECIFICATONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN				PROPOSED DESIGN
Thermal distribution systems	Duct insulation: in accordance with Section R403.3.3.				Duct insulation: as proposed. ^m
	Duct location: same as proposed design.				Duct location: as proposed. ^l
	Foundation type	Slab-on-grade	Unconditioned crawl space	Basement or conditioned crawl space	--
	Duct location (supply and return)	On-story building: 100% in unconditioned attic. All other: 75% in unconditioned attic and 25% inside	One-story building: 100% in unconditioned crawl space. All other: 75% in unconditioned crawl space and 25%	75% inside conditioned space 25% unconditioned attic.	Duct system leakage to outside: The measured total duct system leakage rate shall be entered into the software as the duct system leakage to outside rate. Exceptions: 1. Where duct system leakage to

		conditioned space:	inside conditioned space:		outside is tested in accordance with ANSI/RESNET/ICC 380 or ASTM E1554, the measured value shall be permitted to be entered.
		Duct system leakage to outside: for duct systems serving > 1,000 ft ² of conditioned floor area, the duct leakage to outside rate shall be 4 cfm per 100 ft ² of conditioned floor area. For duct systems serving ≤ 1,000 ft ² of conditioned floor area, the duct leakage to outside rate shall be 40 cfm.			2. Where total duct system leakage is measured without space conditioning equipment installed, the simulation value shall be 4 cfm per 100 ft ² of conditioned floor area.
		Distribution system efficiency (DSE): for hydronic systems and ductless systems, a thermal DSE of 0.88 shall be applied to both the heating and cooling system efficiencies.			Distribution system efficiency (DSE): for hydronic systems and ductless systems, DSE shall be as specified in Table R405.4.2(2).

Reason:

This proposal will reverse the largest efficiency rollbacks incorporated into the 2024 *IECC* and maintain Connecticut's current performance path approach to efficiency trade-offs for heating, cooling, and water heating equipment. It will also eliminate an unnecessary new credit for duct location. All of these new trade-off credits were included in the 2024 *IECC* as part of a large compromise among *IECC*-R Development Committee Members referred to as the "omnibus." However, significant portions of the omnibus related to electrification and decarbonization were removed from the 2024 *IECC* by the ICC Board of Directors, leaving in place several material efficiency rollbacks. These rollbacks would not have been approved in the 2024 *IECC* but for the omnibus compromise, and we recommend that Connecticut eliminate these trade-off credits to be consistent with the 2021 *IECC* and the current State Building Code approach to equipment efficiency in the performance path.

Equipment trade-offs were correctly eliminated in the 2009 version of the *IECC* and were consistently rejected in every *IECC* code update cycle until the Committee-developed 2024 *IECC*. Nearly every state that adopts the *IECC* has eliminated these trade-offs as well,

including Connecticut. Equipment trade-offs reduce building efficiency because commonly installed cooling, heating, and water heating equipment typically exceeds the federal minimum efficiencies, but states are unable to set more reasonable efficiency requirements (or assumptions in the standard reference design baseline) because of federal preemption. **The result is an unwarranted trade-off credit that allows buildings to be constructed 11-22% less efficient overall than if the trade-offs were not allowed.**¹

Although proponents of equipment trade-offs argue that they are “energy neutral,” the reality is that they are a short-term trade-off that will have long-term negative impacts on homeowners –who are often unaware that such trade-offs are taking place. For example, if a trade-off is permitted for water heater efficiency, an instantaneous natural gas water heater would allow the builder to reduce the efficiency of the rest of the home by an average of 9%.² The remaining home will be 9% less efficient for its entire useful lifetime. As the water heater is replaced every 10-15 years, the envelope of that home will continue to underperform by 9%. By contrast, under the current State Building Code (and the 2021 *IECC*), no trade-off credit is awarded for the instantaneous water heater, which means the rest of the home will be built to meet the code. As the water heater is swapped out in future years, a home built to the current State Building Code home will outperform a home built using a water heater performance trade-off allowed by 9%.

Regarding duct location, the current State Building Code does not award performance path trade-off credit for ducts located inside conditioned space. Although it is generally good building practice to locate all ducts and air handlers inside conditioned space, the vast majority of builders in Connecticut likely already do this. For example, a NYSERDA Residential Compliance Study completed in 2014 found that among the projects surveyed in New York, 86% had ducts inside conditioned space.³ **That means that if a credit is added to the performance path for ducts inside conditioned space, roughly 86% of homes would be eligible to reduce insulation and window efficiency without making any change to the building design.** We expect that the results would be similar in Connecticut. This unnecessary new credit is a step in the wrong direction for the state.

The 2024 *IECC* already provides another performance-based alternative that provides credit for equipment efficiency and duct location (the Energy Rating Index), as well as multiple credits for equipment and duct location in Table R408.2. Both of these compliance paths do not carry such a high risk of free ridership (and reduced overall efficiency) as the proposed performance path credits. The simulated performance path lacks

¹ See ICF International, *Review and Analysis of Equipment Trade-offs in Residential Energy Codes*, at ii (Sep. 23, 2013) available at <https://imt.org/resources/analysis-of-equipment-trade-offs-in-residential-energy-codes/>

² *Id.*

³ See NYSERDA, *New York Energy Code Compliance Study*, at I-19 (Jan. 2014) available at <http://gelfny.org/wp-content/uploads/2015/05/New-York-Energy-Code-Compliance-Study.pdf>.

several of the built-in protections of the ERI path, and thus cannot guarantee an equivalent level of performance. We strongly recommend eliminating these loopholes from the performance path and implementing provisions consistent with the 2021 *IECC*.

Submitted via Email to DAS.CodesStandards@ct.gov

October 16, 2024

Louis J. Free
Chairman, Code Amendments Subcommittee
Department of Administrative Services
Office of the State Building Inspector
450 Columbus Boulevard, Suite 1303
Hartford, CT 06103

RE: Comments of the Responsible Energy Codes Alliance Supporting the Adoption of the 2024 IECC and Recommending Additional Amendments

Dear Chairman Free,

The Responsible Energy Codes Alliance (RECA)¹ generally supports the incorporation of the 2024 International Energy Conservation Code (*IECC*) residential and commercial provisions into the Connecticut State Building Code. **While the 2024 *IECC* will result in an efficiency increase in many cases, we strongly recommend adopting key amendments to reverse efficiency rollbacks incorporated into the 2024 *IECC* residential chapters and improve upon the base efficiency of the current State Building Code.**

In order for Connecticut to achieve its energy and climate goals, and to help maintain consistency with a range of national programs and tax credits, we recommend adopting the most efficient provisions from both the 2021 and 2024 *IECC* and no substantive weakening amendments. To facilitate the consideration of our recommendations, we are submitting three code change proposals to maintain certain 2021 *IECC* residential provisions, copies of which are included at the end of these comments.

Adopting the 2021 *IECC* has provided many benefits for Connecticut

Connecticut was one of the first states to adopt the 2021 *IECC* without substantive weakening amendments, and several states have followed. The 2021 *IECC* is widely recognized as a cost-effective policy tool that states and local governments can use to improve efficiency and reduce greenhouse gas emissions. For many years, and through the development of the

¹ RECA is a national coalition of building products manufacturers, trade associations, environmental groups, regional efficiency advocates and other organizations that support the adoption of the latest model energy codes across the country.

2021 *IECC*, the *IECC* was developed under the International Code Council's Code Development Process, which is the process used to update all other I-Codes. Thousands of governmental members participated directly in the development of the 2021 *IECC* and voted in record numbers to improve nearly every aspect of the *IECC*. The efficiency improvements adopted into the 2021 *IECC* were endorsed by a broad range of organizations, including mayors, code officials, state energy officials, sustainability directors, and other governmental representatives from every region of the U.S.

The 2021 *IECC* and *ASHRAE* Standard 90.1-2019 also form the baseline for several national programs, tax credits, and other incentives. As a result, Connecticut has already set up homebuilders, design professionals, and the owners of residential and commercial buildings for success by adopting the 2021 *IECC*, and by reference, *ASHRAE* Standard 90.1-2019. The following are examples of national programs that reference the 2021 *IECC*:

- **Energy Standard for Federally-Insured Mortgages** – Earlier this year, the U.S. Department of Housing and Urban Development (HUD) and the U.S. Department of Agriculture (USDA) issued a Final Determination requiring new homes in about a dozen federally-insured mortgage programs (including FHA loans) to meet or exceed the 2021 *IECC* or *ASHRAE* Std. 90.1-2019 by late 2025.²
- **Inflation Reduction Act** - U.S. Congress allocated up to \$1 billion in the Inflation Reduction Act to states that adopt the 2021 *IECC*, *ASHRAE* 90.1-2019 (or equivalent), and/or net-zero codes with no weakening amendments.³
- **Infrastructure Investment and Jobs Act** - U.S. DOE has begun awarding competitive grants to state partnerships focused on building energy code updates, part of \$225 million available through the Infrastructure Investment and Jobs Act.⁴
- **Homebuilder Tax Credits** – Under Internal Revenue Code § 45L, homebuilders may claim tax credits of up to \$2,500 for constructing dwellings that meet the Energy Star Homes program criteria⁵ and up to \$5,000 for dwellings that meet the U.S. DOE Zero Energy Ready Homes Program.⁶ Both of these programs include envelope backstops essentially based on the 2021 *IECC*.
- **Homeowner Tax Credits** – Under Internal Revenue Code § 25C, tax credits up to \$1,200 are available to homeowners that install certain insulation products that meet

² See U.S. Department of Housing and Urban Development and Department of Agriculture, *Notice of final determination*, 89 Fed. Reg. 33112 (Apr. 26, 2024).

³ See <https://www.energy.gov/scep/technical-assistance-adoption-building-energy-codes>.

⁴ See [https://www.energycodes.gov/RECI#:~:text=As%20outlined%20in%20Section%2040511,years%20\(FY22%2DFY26\)](https://www.energycodes.gov/RECI#:~:text=As%20outlined%20in%20Section%2040511,years%20(FY22%2DFY26)).

⁵ See https://www.energystar.gov/about/federal_tax_credits/federal_tax_credit_archives/tax_credits_home_builders.

⁶ See <https://www.energy.gov/eere/buildings/section-45l-tax-credits-zero-energy-ready-homes>.

the requirements of the 2021 *IECC*.⁷ Unlike other credits listed above, these credits apply to existing buildings, the requirements for which are based on the prescriptive envelope requirements in the current State Building Code.

Qualified Support for the Adoption of the 2024 *IECC*

Connecticut will continue to make progress on its energy saving and greenhouse gas reduction goals by adopting the most recent edition of the *IECC*, but we recommend a few key amendments to help avoid backsliding. Building energy code improvements can continue to play a significant role in helping Connecticut achieve the greenhouse gas reduction targets established by the General Assembly in Public Act No. 22-5.⁸ Governor Lamont's Executive Order No. 21-3 calls for the adoption of "Energy efficient and climate resilient building codes," including the most recent edition of the *IECC*, in order to help meet Connecticut's efficiency and greenhouse gas reduction goals.⁹ The Governor's Council on Climate Change also made several policy recommendations aimed at improving the built environment, including specific references to energy code updates:

d. Proactively use building codes to accelerate energy efficiency. The State should continue to keep pace with adopting the International Energy Conservation Code (*IECC*) and consider strategies to further enhance opportunities to improve energy efficiency through high-performance and stretch codes and construction and renovation practices.¹⁰

It is clear that building energy codes have, and must continue to, play a central role in Connecticut's efforts to meet efficiency and greenhouse gas reduction goals.

Although the adoption of the 2024 *IECC* in Connecticut would likely result in several efficiency improvements, we strongly encourage the Committee to amend the model code to eliminate a few significant loopholes and rollbacks. The 2024 *IECC* was developed under a new standard development process created by the ICC Board of Directors and used exclusively for the energy code. Instead of subjecting all code change proposals to a final vote by governmental representatives, the 2024 *IECC* was developed by committees appointed by the ICC Board. Although governmental representatives made up roughly 1/3 of the residential and commercial committees, the influence of state and local governments in the development of the 2024 *IECC* was substantially limited compared to previous editions. The 2024 *IECC* was also the subject of several appeals to the ICC Board, which resulted in the Board changing a

⁷ See https://www.energystar.gov/about/federal_tax_credits/insulation.

⁸ See An Act Concerning Climate Change Mitigation, Public Act No. 22-5 (May 10, 2022).

⁹ See Exec. Order No. 21-3 (Dec. 16, 2021).

¹⁰ See Governor's Council on Climate Change, *Taking Action on Climate Change and Building a More Resilient Connecticut for All*, at 33 (Jan. 2021).

number of substantive provisions of the *IECC* after the standard development process had concluded.

Although state-level analyses of the 2024 *IECC* and *ASHRAE* Standard 90.1-2022 have not yet been released by U.S. DOE,¹¹ we believe that many of the changes incorporated into the 2024 *IECC* in the new process are positive for Connecticut. However, as a result of the new process and the post-appeal actions by the ICC Board, not every change in the 2024 *IECC* is an improvement over the 2021 *IECC*. **Indeed, several changes are straightforward reductions in efficiency as compared to the 2021 *IECC* and some provisions would result in less efficiency than the current State Building Code.** Therefore, in order to avoid rolling back current efficiency requirements, and to meet or exceed the efficiency level of the 2021 *IECC*, we recommend that Connecticut adopt three key amendments to the residential chapters of the 2024 *IECC*. Copies of the proposed amendments and reason statements are attached to these comments as RECA 2024 *IECC* CCP-1, CCP-2, and CCP-3.

Summary of RECA Recommended Amendments to 2024 *IECC*

- **RECA 2024 *IECC* CCP-1** - Remove Unnecessary Loopholes in Performance Path
- **RECA 2024 *IECC* CCP-2** - Remove Wall Insulation Trade-off in R408
- **RECA 2024 *IECC* CCP-3** – Restore Prescriptive Ceiling Insulation Requirements of 2021 *IECC*

Conclusion

RECA's members and supporters have been involved in energy code development and adoption for decades, and we offer our assistance and experience as you work to maximize energy efficiency in residential and commercial buildings. Please contact us if you have any questions or would like to discuss how RECA can be of assistance.

Sincerely,

Eric Lacey
RECA Chairman

¹¹ U.S. DOE has released an analysis of national energy savings associated with *ASHRAE* Standard 90.1-2022, indicating a national average energy cost savings of 8.9% as compared to Standard 90.1-2019. *See Determination Regarding Energy Efficiency Improvements in ANSI/ASHRAE/IES Standard 90.1-2022; Notification of determination*, 89 Fed. Reg. 15983, (Mar. 2024), available at <https://www.regulations.gov/document/EERE-2023-BT-DET-0017-0001>. For code users who comply with the commercial energy code via the *ASHRAE* Standard 90.1 compliance option, the energy savings are substantial. However, it is not yet clear how the commercial provisions of the 2024 *IECC* compare with those of the 2021 *IECC*.

RECA is a broad coalition of energy efficiency professionals, regional efficiency organizations, product and equipment manufacturers, trade associations, and environmental organizations with expertise in the development, adoption, and implementation of building energy codes nationwide. RECA is dedicated to improving the energy efficiency of homes throughout the U.S. through greater use of energy efficient practices and building products. It is administered by the Alliance to Save Energy, a non-profit coalition of business, government, environmental and consumer leaders that supports energy efficiency as a cost-effective energy resource under existing market conditions and advocates energy-efficiency policies that minimize costs to society and individual consumers. Below is a list of RECA Members that endorse these comments.

Air Barrier Association of America

Alliance to Save Energy

American Chemistry Council

American Council for an Energy-Efficient Economy

CertainTeed LLC

Energy Efficient Codes Coalition

EPS Industry Alliance

Extruded Polystyrene Foam Association

Institute for Market Transformation

Johns Manville Corporation

Knauf Insulation

National Fenestration Rating Council

North American Insulation Manufacturers Association

Owens Corning

Polyisocyanurate Insulation Manufacturers Association

RECA 2024 IECC Code Change Proposal 1

Remove Unnecessary Loopholes in Performance Path

Revise Table R405.4.2(1) of the 2024 IECC as follows:

TABLE R405.4.2(1)

SPECIFICATONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Heating Systems ^{d, e, j, k}	Fuel type/capacity: same as proposed design.	As proposed.
	Product class: same as proposed design.	As proposed.
	Efficiencies: <u>For other than electric heating without a heat pump: same as proposed design.</u> <u>Where the proposed design utilizes electric heating without a heat pump, the standard reference design shall be an air source heat pump meeting the requirements of Section C403 of the IECC – Commercial Provisions.</u>	<u>As proposed.</u>
	Heat pump: complying with 10 CFR § 430.32.	As proposed.
	Fuel gas and liquid fuel furnaces: complying with 10 CFR § 430.32.	As proposed.
	Fuel gas and liquid fuel boilers: complying with 10 CFR § 430.32.	As proposed.
Cooling systems ^{d, f, k}	Fuel type: electric. Capacity: same as proposed design.	As proposed.
	Efficiencies: complying with 10 CFR § 430.32 <u>Same as proposed design.</u>	As proposed.
Service water heating ^{d, g, k}	Use, in units of gal/day = $25.5 + (8.5 \times N_{br})$ where: N_{br} = number of bedrooms.	Use, in units of gal/day = $25.5 + (8.5 \times N_{br}) \times (1 - HWDS)$ where: N_{br} = number of bedrooms. $HWDS$ = factor for the compactness of the hot water distribution system.
		Compactness ratio ⁱ factor HWDS

		1 story	2 or more stories	
		>60%	>30%	0
		>30% to ≤60%	>15% to ≤30%	0.05
		>15% to ≤30%	>7.5% to ≤15%	0.10
		<15%	<7.5%	0.15
	Fuel type: same as proposed design.	As proposed.		
	Rated storage volume: same as proposed design.	As proposed.		
	Draw pattern: same as proposed design.	As proposed.		
	Efficiencies: Uniform Energy Factor complying with 10 CFR § 430.32 Same as proposed design.	As proposed.		
	Tank temperature: 120° F (48.9° C).	Same as standard reference design.		

Revise Table R405.4.2(1) of the 2024 *IECC* as follows:

TABLE R405.4.2(1)

SPECIFICATONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN				PROPOSED DESIGN
Thermal distribution systems	Duct insulation: in accordance with Section R403.3.3.				Duct insulation: as proposed. ^m
	Duct location: <u>same as proposed design.</u>				Duct location: as proposed. ^l
	Foundation type	Slab-on-grade	Unconditioned crawl space	Basement or conditioned crawl space	--
	Duct location (supply and return)	On-story building: 100% in unconditioned attic. All other: 75% in unconditioned attic and 25% inside	One-story building: 100% in unconditioned crawl space. All other: 75% in unconditioned crawl space	75% inside conditioned space 25% unconditioned attic.	Duct system leakage to outside: The measured total duct system leakage rate shall be entered into the software as the duct system leakage to outside rate. Exceptions:

		conditioned space:	and 25% inside conditioned space:		
		Duct system leakage to outside: for duct systems serving > 1,000 ft ² of conditioned floor area, the duct leakage to outside rate shall be 4 cfm per 100 ft ² of conditioned floor area. For duct systems serving ≤ 1,000 ft ² of conditioned floor area, the duct leakage to outside rate shall be 40 cfm.			1. Where duct system leakage to outside is tested in accordance with ANSI/RESNET/ICC 380 or ASTM E1554, the measured value shall be permitted to be entered. 2. Where total duct system leakage is measured without space conditioning equipment installed, the simulation value shall be 4 cfm per 100 ft² of conditioned floor area.
		Distribution system efficiency (DSE): for hydronic systems and ductless systems, a thermal DSE of 0.88 shall be applied to both the heating and cooling system efficiencies.			Distribution system efficiency (DSE): for hydronic systems and ductless systems, DSE shall be as specified in Table R405.4.2(2).

Reason:

This proposal will reverse the largest efficiency rollbacks incorporated into the 2024 *IECC* and maintain Connecticut’s current performance path approach to efficiency trade-offs for heating, cooling, and water heating equipment. It will also eliminate an unnecessary new credit for duct location. All of these new trade-off credits were included in the 2024 *IECC* as part of a large compromise among *IECC*-R Development Committee Members referred to as the “omnibus.” However, significant portions of the omnibus related to electrification and decarbonization were removed from the 2024 *IECC* by the ICC Board of Directors, leaving in place several material efficiency rollbacks. These rollbacks would not have been approved in the 2024 *IECC* but for the omnibus compromise, and we recommend that Connecticut

eliminate these trade-off credits to be consistent with the 2021 *IECC* and the current State Building Code approach to equipment efficiency in the performance path.

Equipment trade-offs were correctly eliminated in the 2009 version of the *IECC* and were consistently rejected in every *IECC* code update cycle until the Committee-developed 2024 *IECC*. Nearly every state that adopts the *IECC* has eliminated these trade-offs as well, including Connecticut. Equipment trade-offs reduce building efficiency because commonly installed cooling, heating, and water heating equipment typically exceeds the federal minimum efficiencies, but states are unable to set more reasonable efficiency requirements (or assumptions in the standard reference design baseline) because of federal preemption. **The result is an unwarranted trade-off credit that allows buildings to be constructed 11-22% less efficient overall than if the trade-offs were not allowed.**¹²

Although proponents of equipment trade-offs argue that they are “energy neutral,” the reality is that they are a short-term trade-off that will have long-term negative impacts on homeowners –who are often unaware that such trade-offs are taking place. For example, if a trade-off is permitted for water heater efficiency, an instantaneous natural gas water heater would allow the builder to reduce the efficiency of the rest of the home by an average of 9%.¹³ The remaining home will be 9% less efficient for its entire useful lifetime. As the water heater is replaced every 10-15 years, the envelope of that home will continue to underperform by 9%. By contrast, under the current State Building Code (and the 2021 *IECC*), no trade-off credit is awarded for the instantaneous water heater, which means the rest of the home will be built to meet the code. As the water heater is swapped out in future years, a home built to the current State Building Code home will outperform a home built using a water heater performance trade-off allowed by 9%.

Regarding duct location, the current State Building Code does not award performance path trade-off credit for ducts located inside conditioned space. Although it is generally good building practice to locate all ducts and air handlers inside conditioned space, the vast majority of builders in Connecticut likely already do this. For example, a NYSERDA Residential Compliance Study completed in 2014 found that among the projects surveyed in New York, 86% had ducts inside conditioned space.¹⁴ **That means that if a credit is added to the performance path for ducts inside conditioned space, roughly 86% of homes would be eligible to reduce insulation and window efficiency without making any**

¹² See ICF International, *Review and Analysis of Equipment Trade-offs in Residential Energy Codes*, at ii (Sep. 23, 2013) available at <https://imt.org/resources/analysis-of-equipment-trade-offs-in-residential-energy-codes/>

¹³ *Id.*

¹⁴ See NYSERDA, *New York Energy Code Compliance Study*, at I-19 (Jan. 2014) available at <http://gelfny.org/wp-content/uploads/2015/05/New-York-Energy-Code-Compliance-Study.pdf>.

change to the building design. We expect that the results would be similar in Connecticut. This unnecessary new credit is a step in the wrong direction for the state.

The 2024 *IECC* already provides another performance-based alternative that provides credit for equipment efficiency and duct location (the Energy Rating Index), as well as multiple credits for equipment and duct location in Table R408.2. Both of these compliance paths do not carry such a high risk of free ridership (and reduced overall efficiency) as the performance path credits adopted into the 2024 *IECC*. The simulated performance path lacks several of the built-in protections of the ERI path, and thus cannot guarantee an equivalent level of performance. We strongly recommend eliminating these loopholes from the performance path and implementing provisions consistent with the 2021 *IECC*.

RECA 2024 IECC Code Change Proposal 2

Remove Wall Insulation Trade-off in R408

Revise Section R408.2.9 of the 2024 *IECC* as follows:

R408.2.9 Opaque walls. For *buildings* in Climate Zones 4 and 5, the maximum *U-factor* of 0.060 shall be permitted to be used for wood-framed walls for compliance with **Table R402.1.2** where complying with one or more of the following:

1. Primary space heating is provided by a heat pump that meets one of the efficiencies in **Section R408.2.2**;
2. All installed water heaters are heat pumps that meet one of the efficiencies in **Section R408.2.3**;
3. In addition to the number of credits required by **Section R408.2**, three additional credits are achieved;
4. *Renewable energy* resources are installed to meet the requirements of **Section R408.2.7**.

Reason:

2024 *IECC* Section R408.2.9 is a new efficiency loophole incorporated into the 2024 *IECC* with potential long-term negative impacts. It allows a reduction in wall insulation where one of four conditions is met. However, none of the specific measures will provide efficiency for as long as the wall insulation being traded off. Measures 1 and 2 have significantly shorter useful lifetimes than wall insulation; measure 4 creates an efficiency trade-off for renewable energy, which is not allowed in either the prescriptive or performance paths of the *IECC*; and measure 3 allows a code user to select 3 more credits from Table R408.2, effectively creating a prescriptive envelope trade-off for 40+ measures that may or may not match the longevity or efficiency of wall insulation. Moreover, even if these measures are valuable on their own, the charging language does not clarify whether measures 1, 2, and 4 are *in addition to* measures already used to comply with Section R408.2, or whether a code user may simply double-count these measures and reduce envelope efficiency. And measure 3 would simply allow a code user to use excess credits for measures already incorporated as a means of reducing wall insulation. This entire section is problematic, and will only lead to reduced efficiency. We strongly recommend deleting the entire section.

RECA 2024 IECC Code Change Proposal 3

Restore Prescriptive Ceiling Insulation Requirements of 2021 IECC

Revise Tables R402.1.2 and R402.1.3 as follows:

**TABLE R402.1.2
MAXIMUM ASSEMBLY U-FACTORS^a AND FENESTRATION REQUIREMENTS**

CLIMATE ZONE	0	1	2	3	4 EXCEPT MARINE	5 AND MARINE 4	6	7 AND 8
Ceiling U-factor	0.035	0.035	<u>0.026</u> 0.030	<u>0.026</u> 0.030	<u>0.024</u> 0.026	<u>0.024</u> 0.026	<u>0.024</u> 0.026	<u>0.024</u> 0.026

**TABLE R402.1.3
INSULATION MINIMUM R-VALUES AND FENESTRATION REQUIREMENTS BY COMPONENT^a**

CLIMATE ZONE	0	1	2	3	4 EXCEPT MARINE	5 AND MARINE 4	6	7 AND 8
Ceiling R-value	30	30	<u>49</u> 38	<u>49</u> 38	<u>60</u> 49	<u>60</u> 49	<u>60</u> 49	<u>60</u> 49

Reason:

This proposal reverses an efficiency rollback incorporated into the 2024 IECC by restoring ceiling insulation R-values to R-60 for Connecticut's climate zone (which is the current requirement in the Connecticut State Building Code). This requirement was rolled back in the 2024 IECC as part of a large compromise among IECC-R Development Committee Members referred to as the "omnibus." However, significant portions of the omnibus related to electrification and decarbonization were removed from the 2024 IECC by the ICC Board of Directors, leaving in place several material efficiency rollbacks. These rollbacks would not have been approved in the 2024 IECC but for the omnibus compromise, and we recommend that Connecticut adopt prescriptive envelope requirements at least as efficient as the 2021 IECC. Ceiling insulation is one of the longest-lasting efficiency measures in a building and will provide comfort and energy savings for occupants in all seasons, as well as improved passive survivability in the event of natural disasters and long-term power outages.