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*Comment Received From: Institute for the Building Envelope
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Comments from the Institute for the Building Envelope

Please see attached comments.

Additional submitted attachment is included below.



May 13, 2024

J. Andrew McAllister, Ph.D.
Commissioner
California Energy Commission
715 P Street
Sacramento, CA 95814

Submitted Electronically

RE: 2025 Building Energy Efficiency Standards, Title 24 Parts 1 and 6, Express Terms, 45-day Language (Docket Number: 24-BSTD-01)

Dear Commissioner McAllister,

The undersigned organizations appreciate the opportunity to comment on the California Energy Commission's (CEC) 2025 Building Energy Efficiency Standards, Title 24 Parts 1 and 6, Express Terms (2025 Building Energy Efficiency Standards). We are recommending changes to the proposed 2025 Building Energy Efficiency Standards and the forthcoming CBECC-Res 2025 User Manual. We encourage CEC to adopt a prescriptive unvented (sealed) attic design; update the definition of 'conditioned space, indirectly,' and change the requirements for modeling unvented (sealed) attics in CBECC-Res. These changes will promote the construction of more energy efficient homes without increasing cost and bring the 2025 Building Energy Efficiency Standards and CEC Guidance into alignment with [Senate Bill 837](#), which was signed by Governor Newsom on October 8, 2023.

Recommended Changes to the 2025 Building Energy Efficiency Standards and CBECC-Res 2025 User Manual

A. Creating Prescriptive Unvented (Sealed) Attic Design

Based upon CEC's analysis of unvented (sealed) attics, we are recommending CEC adopt a "high performance attic" design for unvented (sealed) attics. During our recent discussions with CEC, the Commission suggested unvented (sealed) attics with roof deck insulation of R-30 have an equivalent energy performance as compared to the current High-Performance Attic option B. Therefore, we are proposing a new High-Performance Attic with R-30 air impermeable insulation applied to the roof deck, with a whole home airtightness value of less than 3.0 ACH₅₀.

We encourage CEC to adopt the following changes to Section 150.1(c):

1. Insulation.
 - A. Roof and ceiling insulation shall be installed in a ventilated attic with an R-value equal to or greater than that shown in Table 150.1-A meeting options ii ~~or~~ iii, or iv below.
 - i. Option A: RESERVED.
 - ii. Option B: A minimum R-value of insulation installed between the roof rafters in contact with the roof deck and an additional layer of ceiling insulation located between the attic and the conditioned space when meeting Section 150.1(c)9A; or
 - iii. Option C: A minimum R-value of ceiling insulation located between the attic and the conditioned space when meeting Section 150.1(c)9B.
 - iv. Option D: Unvented (sealed) Attics: A minimum R-value of air impermeable insulation applied to the roof deck.
 - B. Updating the Definition of “Conditioned Space, Indirectly”

While there is a strong case that unvented (sealed) attics meet the requirements of ‘CONDITIONED SPACE, INDIRECTLY,’ we are recommending additional changes to the definition of ‘CONDITIONED SPACE, INDIRECTLY’ to comply with SB 837 and clarify that unvented (sealed) attics meet the definition. We encourage CEC to adopt the following changes:

CONDITIONED SPACE, INDIRECTLY is enclosed space that (1) is not directly conditioned space; and (2) either (a) has a thermal transmittance area product (UA) to directly conditioned space exceeding that to the outdoors or to unconditioned space and does not have fixed vents or openings to the outdoors or to unconditioned space, ~~or~~ (b) is a space through which air from directly conditioned spaces is transferred at a rate exceeding three air changes per hour, or (c) meeting the requirements of the high performance unvented (sealed) attic, per option D section 150.1.

- C. Updating the CBECC-Res 2025 User Manual

Finally, we are recommending CEC update the note regarding unvented attics in the CBECC-Res 2025 User Manual. We suggest the following changes:

NOTE: Ducts located in a high performance unventilated (sealed) attic ~~do not~~ qualify as ducts in conditioned space and should be modeled as “ducts located in a conditioned attic (~~ventilated or unventilated~~)”.

Background of Unvented (or Sealed) Attics

Unvented (sealed) attics are a modern construction assembly, which (generally) use air impermeable insulation to encapsulate and seal the attic space. Unvented (sealed) attics are insulated on the underside of the roof deck and the attic eaves are insulated and sealed from the environment. Unvented (sealed) attics should be as airtight as the other sections of the building thermal envelope.

Unvented (sealed) attics are more energy efficient than traditional attics because the HVAC equipment and ductwork are operating in conditioned space at a temperature that is essentially equivalent to the occupied space.

Unvented (sealed) attics have been approved for use in the International Residential Code (IRC) since the 2004 IRC Supplement. Unvented (sealed) attics are considered conditioned space in the 49 other states.

CEC should promote the use of unvented attics in California to cost-effectively increase energy efficiency.

CEC Modeling Guidance for Unvented Attics

Currently, the CEC does not consider unvented (sealed) attics conditioned space, although, this is not clearly articulated in Title 24, Part 6. It is outlined in the CBECC-Res User Manual.

Section 5.2.2 of the [CBECC-Res 2022 User Manual](#) states:

NOTE: Ducts located in an unventilated attic do not qualify as ducts in conditioned space and should be modeled as “ducts located in attic (ventilated or unventilated)”.

Title 24, Part 6 includes 3 definitions related to conditioned space:

CONDITIONED SPACE is an enclosed space within a building that is directly conditioned or indirectly conditioned.

CONDITIONED SPACE, DIRECTLY is an enclosed space that is provided with wood heating, mechanical heating that has a capacity exceeding 10 Btu/hr-ft², or mechanical cooling that has a capacity exceeding 5 Btu/hr-ft². Directly conditioned space does not include process space. (See “process space.”)

CONDITIONED SPACE, INDIRECTLY is enclosed space that (1) is not directly conditioned space; and (2) either (a) has a thermal transmittance area product (UA) to directly conditioned space exceeding that to the outdoors or to unconditioned space and does not have fixed vents or openings to the outdoors or to unconditioned space, or (b) is a space through which air from directly conditioned spaces is transferred at a rate exceeding three air changes per hour.

We believe that Unvented (sealed) attics fall within the definition of “CONDITIONED SPACE, INDIRECTLY” because the attic space is indirectly conditioned from the adjacent occupied space below. Therefore, complying with subsection (1) because Unvented (sealed) attics are not directly conditioned and subsection (2) because more conditioned air is moving across the ceiling between the occupied space and the attic than across the building envelope separating the attic from the exterior. Figure 1 demonstrates the airtightness of several attics in Florida. (Note: the current airtightness requirement in Florida is 7 ACH₅₀.)

There is no insulation on the attic floor and any penetrations such as recessed can lights or plumbing or wiring are not air sealed. This enables the two spaces to communicate via air leakage from the occupied space below. Typically, the Unvented (sealed) attic space maintains a temperature and relative humidity very close to the space below. This communication prevents the ductwork from being surrounded by very hot temperatures in the summer season and cold temperatures in the winter season, thus reducing the Delta T across the duct insulation. Additionally, any duct leakage in the unvented (sealed) attic stays inside the thermal envelope, thus reducing overall air infiltration and energy loss.

Figure 1: Zone Depressurization Test on Attics in Florida¹

Table 2. Standard Multi-Point House Air Tightness Leakage Test

House ID	House CFM50	House ACH50	House wrt Attic dP (Pa)*	Attic wrt Out dP (Pa)*	House to attic leak factor	House CFM50/ft ² **	House conditioned floor area ft ²	House conditioned volume ft ³
1	657	2.40	-3.0	-47.0	6.0	0.361	1822	16398
2	1473	2.82	-4.0	-46.0	4.9	0.456	3232	31350
3	545	0.86	-15.4	-34.6	1.7	0.154	3541	38243
4	1123	2.31	-9.9	-40.1	2.5	0.417	2695	29106
5	546	1.48	-5.0	-45.0	4.2	0.247	2208	22080
6	894	2.55	-7.5	-42.5	3.1	0.412	2168	21030
Average	873	2.07	-7.5	-42.5	3.7	0.341	2611	26368

* When house wrt out = -50 Pa

** Leakage per conditioned floor area ft²

Conclusion

Unvented (sealed) attics are like putting a hat on a home. These keep attics cool in the summer and warm in the winter. They reduce energy usages and save homeowners money, without increasing construction costs. CEC can increase the effectiveness of Title 24; Part 6 by promoting the use of unvented (sealed) attics. Accordingly, we encourage CEC to adopt the following three changes:

1. Create a prescriptive high-performance unvented (sealed) attic.
2. Update the definition of 'conditioned space, indirectly.'
3. Update the CBECC-Res 2025 User Manual

Please contact us with any questions.

Sincerely,

The Institute for the Building Envelope

¹ [Survey of Unvented Attics in Climate Zone 2A - FSEC-CR-2106-21](#)