DOCKETED	
Docket Number:	24-BSTD-03
Project Title:	2025 Energy Code Compliance Software, Manuals and Forms
TN #:	269979
Document Title:	Peak Cooling Update Memo
Description:	Update to Peak Cooling Memo TN#262800. Updated analysis of peak cooling for building modeling. The results of this analysis are used to support peak cooling allowances in the Alternative Calculation Method Reference Manual.
Filer:	RJ Wichert
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	5/14/2026 2:51:46 PM
Docketed Date:	5/14/2026

California ENERGY COMMISSION

CALIFORNIA NATURAL RESOURCES AGENCY

MEMORANDUM

TO: 2025 Energy Code Compliance Software, Manuals and Forms (24-BSTD-03)

FROM: California Energy Commission

SUBJECT: Updates to Peak Cooling Performance Modeling Approach in the 2025 Energy Code Single-family Alternative Calculation Method Reference Manual

DATE: May 14, 2026

Executive Summary

Newly constructed single-family homes complying with the 2025 Energy Code (California Code of Regulations, Title 24, Part 6) using the performance modeling approach must meet or exceed the budgets for two metrics: Long-term System Cost (LSC) and Source Energy. The 2025 Energy Code Accounting Methodology Report[1] describes the development of these metrics in detail. However, projects meeting or exceeding the budgets for these two Energy Code metrics may still experience unintended peak period cooling energy between 4 pm and 9 pm that is higher than the standard design. These designs may result in exacerbated peak loads on California's electric grid during summer heat waves. This issue was described in a memorandum published to California Energy Commission (CEC) Docket Number 24-BSTD-03[2] on April 25, 2025, referred to as the "2025 Peak Cooling Memo."[3]

The 2025 Energy Code metrics encourage single-family homes to reduce demand during the winter peak and overnight periods. The CEC also finds it critically important for buildings to reduce demand during summer peak period cooling expected to occur in California's near- and medium-term future. To help resolve this issue, the CEC developed a peak cooling performance modeling approach in Section 1.6 of the 2025 Energy Code Single-Family Alternate Calculation Method (ACM) Reference Manual.[4] The ACM Reference Manuals specify the CEC-approved methods for demonstrating compliance with California's Energy Code using the performance modeling approach and are periodically updated to align with Energy Code implementation. The method currently allows up to a 20% increase in peak cooling energy for a proposed design compared to the standard design and is applicable in climate zones 4 and 8 through 15. The analysis supporting the peak cooling energy performance modeling approach was detailed in the 2025 Peak Cooling Memo.

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[1] https://efiling.energy.ca.gov/GetDocument.aspx?tn=255318-1&DocumentContentId=91004
[2] https://efiling.energy.ca.gov/GetDocument.aspx?tn=267721&DocumentContentId=104745, https://efiling.energy.ca.gov/GetDocument.aspx?tn=267726&DocumentContentId=104750, https://efiling.energy.ca.gov/GetDocument.aspx?tn=267728&DocumentContentId=104752
[3] https://efiling.energy.ca.gov/GetDocument.aspx?tn=262800&DocumentContentId=99416
[4] https://www.energy.ca.gov/publications/2025/2025-single-family-residential-alternative-calculation-method-reference-manual

Comments to Docket Number 24-BSTD-03[5] raised an issue with the 20% threshold in the California Building Energy Code Compliance (CBECC) software, CBECC 2025 v2.0. Commenters noticed that newly constructed single-family homes expected to comply with the 2025 Energy Code were exceeding the 20% peak cooling energy for a proposed design. Staff investigated the issue and discovered that an adjustment in threshold is warranted to better align with CBECC 2025 v2.0. In response to these comments, and based on independent analysis performed by the CEC, **the CEC proposes revising the limit to a 30% increase in peak cooling energy for climate zones (CZ) 4, 8, 9, 11, 12, 13, and 15, and up to a 25% increase in climate zones 10 and 14**. Staff also considered additional measure packages for custom homes and accessory dwelling units (ADUs) to demonstrate compliance with the proposed peak cooling performance modeling approach.

This memo details the updated analysis used to propose the revised peak cooling energy thresholds. The revised peak cooling energy recommendations described in this memo have been incorporated into the California Building Energy Code Compliance (CBECC) 2025.3.0 Peak Cooling Research Version (RV), which is for research only and cannot be used for compliance. The CBECC 2025.3.0 Peak Cooling RV can be downloaded from the California Energy Commission CBECC GitHub project website, https://github.com/california-energy-commission/CBECC/releases. The CEC seeks comments by June 10, 2026 to Docket Number 24-BSTD-03 at https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=24-BSTD-03.

Analysis

To investigate the issue raised by public comments, CEC staff expanded building energy modeling analysis that was completed in the 2025 Peak Cooling Memo. Analysis was performed with an internal version of California Building Energy Code Compliance (CBECC) software, based on CBECC 2025 v2.0 to test revised peak cooling thresholds. CBECC is a free open-source software tool developed and approved by the CEC to demonstrate compliance with the California Energy Code. Within CBECC, a prototype for a 2,700 ft^2 single-family home was used; the same prototype that was used to support the original 2025 Peak Cooling Memo. The prototype included window and wall area distributions typical of California production homes. The analysis also included custom home and accessory dwelling unit (ADU) designs.

Results in the following peak cooling energy analysis are presented in terms of the percentage differences between the proposed design and standard design (compliance margin %). A negative percentage represents a design that uses more peak cooling energy than the baseline building. For building designs with compliant LSC margins, the associated peak cooling margins were evaluated to highlight potential compliance software solutions to the peak cooling energy issue. All scenarios analyzed met or outperformed the Energy Code's Source Energy metric.

The 2025 Peak Cooling Memo analyzed seven packages of measures (documented in tables 3 through 9 in the 2025 Peak Cooling Memo). The packages included some measures below

[5] https://efiling.energy.ca.gov/GetDocument.aspx?tn=267721&DocumentContentId=104745, https://efiling.energy.ca.gov/GetDocument.aspx?tn=267726&DocumentContentId=104750, https://efiling.energy.ca.gov/GetDocument.aspx?tn=267728&DocumentContentId=104752

prescriptive code requirements, and some measures above prescriptive code requirements. The goal of this analysis was to identify peak cooling performance thresholds that would provide designers with sufficient flexibility.

The packages were designed to reflect a wide range of builder-friendly and realistic construction packages for production homes. This memorandum evaluates the same packages as were evaluated in the 2025 Peak Cooling Memo. Tables 1a through 1g summarize these packages. The base case was the standard design. In addition to the measures listed, all packages include a minimally code-compliant solar photovoltaic (PV) system and no battery.

For each measure package, the resulting LSC and peak period cooling energy margins are shown in Table 2.

Table 1a – Package 1 (Peak Cooling Compliant Case with 2x6 Walls) Evaluated in 2025 Peak Cooling Memo for 2,700 ft^2 Single-Family Prototype with Builder-provided Design Specifications

System	Above Prescriptive Requirements	Below Prescriptive Requirements
HVAC	14.3 SEER2, 11.7 EER2, 9 HSPF2 (CZ 4, 8-12, 14) 14.3 SEER2, 11.7 EER2, 10 HSPF2 (CZ 13, 15)	No Whole House Fan (CZ 8-14)
DHW	NEEA Tier 3 HPWH (CZ 4, 12, 14) NEEA Tier 3 HPWH w/ CDHW (CZ 8-11, 13, 15)	N/A
Envelope	N/A	No QII Roof Solar Reflectance: 0.1 Ceiling Insulation: R-38 Roof Insulation: R-4 (below deck)
Overhangs	N/A	N/A

Table 2b – Package 2 (2x6 Walls, High Performance Attic) Evaluated in 2025 Peak Cooling Memo for 2,700 ft^2 Single-Family Prototype with Builder-provided Design Specifications

System	Above Prescriptive Requirements	Below Prescriptive Requirements
HVAC	16 SEER2, 13 EER2, 9 HSPF2	No Whole House Fan (CZ 8-14)
DHW	N/A	N/A
Envelope	Roof Solar Reflectance: 0.25 Window Performance: U=0.27, SHGC=0.20 (CZ 4, 11-14) U=0.30, SHGC=0.20 (CZ 8-10)	N/A
Overhangs	N/A	N/A

Table 3c – Package 3 (2x4 Walls, Windows with Overhangs) Evaluated in 2025 Peak Cooling Memo for 2,700 ft^2 Single-Family Prototype with Builder-provided Design Specifications

System	Above Prescriptive Requirements	Below Prescriptive Requirements
HVAC	16 SEER2, 13 EER2, 9 HSPF2 Low-Leakage AHU Reduced Fan Power: 0.4 W/cfm	N/A
DHW	NEEA Tier 3 HPWH (CZ 4, 9)	N/A
Envelope	Roof Solar Reflectance: 0.25 Window Performance: U=0.27, SHGC=0.20 (CZ 4, 11-14) U=0.30, SHGC=0.20 (CZ 8-10) Blower Door: 3 ACH50 (CZ 8, 10-15)	Wall Cavity Insulation: R-15 Wall Exterior Insulation: R-5 Ceiling Insulation: R-49 Roof Insulation: R-4 (below deck)
Overhangs	4 ft overhang over 50% of windows on back wall (CZ 8, 10-15)	N/A

Table 4d – Package 4 (2x4 Walls, 16 SEER2,13 EER2) Evaluated in 2025 Peak Cooling Memo for 2,700 ft^2 Single-Family Prototype with Builder-provided Design Specifications

System	Above Prescriptive Requirements	Below Prescriptive Requirements
HVAC	16 SEER2, 13 EER2, 9 HSPF2 Low-Leakage AHU Reduced Fan Power: 0.4 W/cfm	No Whole House Fan (CZ 8, 10, 11, 13, 14)
DHW	NEEA Tier 3 HPWH	N/A
Envelope	Roof Solar Reflectance: 0.25 Window Performance: U=0.27, SHGC=0.20 (CZ 4, 11-14) U=0.30, SHGC=0.20 (CZ 8-10)	Wall Cavity Insulation: R-15 Wall Exterior Insulation: R-5 Ceiling Insulation: R-49 Roof Insulation: R-4 (below deck)
Overhangs	N/A	N/A

Table 5e – Package 5 (2x4 Walls with R-6 Exterior Insulation, 16 SEER2, 13 EER2) Evaluated in 2025 Peak Cooling Memo for 2,700 ft^2 Single-Family Prototype with Builder-provided Design Specifications

System	Above Prescriptive Requirements	Below Prescriptive Requirements
HVAC	16 SEER2, 13 EER2, 9 HSPF2 Low-Leakage AHU Reduced Fan Power: 0.4 W/cfm	No Whole House Fan (CZ 8, 10, 11, 13, 14)
DHW	NEEA Tier 3 HPWH	N/A
Envelope	Roof Solar Reflectance: 0.25 Window Performance: U=0.27, SHGC=0.20 (CZ 4, 11-14) U=0.30, SHGC=0.20 (CZ 8-10)	Wall Cavity Insulation: R-15 Wall Exterior Insulation: R-6 Ceiling Insulation: R-49 Roof Insulation: R-4 (below deck)
Overhangs	N/A	N/A

Table 6f – Package 6 (2x4 Walls, 16 SEER2, 11.7 EER2) Evaluated in 2025 Peak Cooling Memo for 2,700 ft^2 Single-Family Prototype with Builder-provided Design Specifications

System	Above Prescriptive Requirements	Below Prescriptive Requirements
HVAC	16 SEER2, 11.7 EER2, 9 HSPF2 Low-Leakage AHU Reduced Fan Power: 0.4 W/cfm	No Whole House Fan (CZ 8, 10, 11, 13, 14)
DHW	NEEA Tier 3 HPWH	N/A
Envelope	Roof Solar Reflectance: 0.25 Window Performance: U=0.27, SHGC=0.20 (CZ 4, 11-14) U=0.30, SHGC=0.20 (CZ 8-10)	Wall Cavity Insulation: R-15 Wall Exterior Insulation: R-5 Ceiling Insulation: R-49 Roof Insulation: R-4 (below deck)
Overhangs	N/A	N/A

Table 7g – Package 7 (2x6 Walls, 14.3 SEER2, 11.7 EER2) Evaluated in 2025 Peak Cooling Memo for 2,700 ft^2 Single-Family Prototype with Builder-provided Design Specifications

System	Above Prescriptive Requirements	Below Prescriptive Requirements
HVAC	Low-Leakage AHU	N/A
DHW	N/A	N/A
Envelope	Blower Door: 3 ACH50	N/A
Overhangs	N/A	N/A

Acronyms for Tables 1a through g:

- ACH50 – air changes per hour at 50 Pascals
- AHU – air handler unit
- CDHW – compact hot water distribution
- cfm – cubic feet per minute
- CZ – climate zone
- DHW – domestic hot water
- EER – energy efficiency ratio
- HP – heat pump
- HPA – high performance attic
- HSPF – heating seasonal performance factor
- HPWH – heat pump water heater
- HVAC – heating, ventilation, and air conditioning
- NEEA – Northwest Energy Efficiency Alliance
- QII – quality insulation installation
- SEER – seasonal energy efficiency ratio
- SHGC – solar heat gain coefficient

Table 8 - Compliance Results: 2,700 ft^2 Single-Family Prototype with Builder-provided Design Specifications

		Package 1		Package 2		Package 3		Package 4		Package 5		Package 6		Package 7	
CZ	**Proposed Peak Cooling Margin Allowance (%)**	**LSC Margin (%)**	**Peak Cooling Margin (%)**	**LSC Margin (%)**	**Peak Cooling Margin (%)**	**LSC Margin (%)**	**Peak Cooling Margin (%)**	**LSC Margin (%)**	**Peak Cooling Margin (%)**	**LSC Margin (%)**	**Peak Cooling Margin (%)**	**LSC Margin (%)**	**Peak Cooling Margin (%)**	**LSC Margin (%)**	**Peak Cooling Margin (%)**
4	**-30%**	6%	-11%	5%	9%	6%	-16%	6%	-19%	7%	-17%	6%	-30%	2%	-30%
8	**-30%**	7%	-32% *	4%	-13%	2%	-22%	5%	-32% *	6%	-31% *	5%	-32% *	0%	-7%
9	**-30%**	7%	-21%	5%	-5%	4%	-8%	4%	-10%	4%	-9%	3%	-14%	0%	-9%
10	**-25%**	7%	-16%	5%	-3%	3%	-9%	5%	-17%	6%	-16%	4%	-23%	1%	-8%
11	**-30%**	7%	-11%	7%	1%	4%	-6%	6%	-12%	7%	-11%	5%	-25%	1%	-12%
12	**-30%**	7%	-54%*#	6%	-28%	4%	5%	7%	-17%	8%	-15%	7%	-28%	2%	-12%
13	**-30%**	9%	-9%	7%	4%	4%	-5%	5%	-10%	6%	-9%	3%	-22%	1%	-9%
14	**-25%**	7%	-5%	7%	6%	6%	2%	8%	-5%	8%	-4%	7%	-14%	3%	-9%
15	**-30%**	3%	-5%	5%	5%	1%	-4%	1%	-7%	2%	-5%	-4%	-22%	0%	-4%

* Indicates that the package does not comply with the proposed peak cooling allowance.

Including a whole house fan in CZ 12 reduces peak cooling energy use, because of the large drop in temperature during summer evenings.

The analysis demonstrates that all of the packages comply with the LSC metric, with most packages resulting in higher peak cooling energy use than the standard design. When compared against the new proposed peak cooling allowances, most of the packages will comply, with only a few exceptions:

- Package 1 (CZ 8,12)
- Package 4 (CZ 8)
- Package 5 (CZ 8)
- Package 6 (CZ 8)

Note that the non-compliant packages in CZ 8 are within 2% of complying with the peak cooling energy allowance.

Custom Homes Analysis

In addition to the single-family home prototype model analysis, analysis was performed on custom home designs, following the approach in the 2025 Peak Cooling Memo. The models were analyzed at the worst-case orientation relative to peak cooling energy. The homes had four to five bedrooms and varied in terms of size, and percentage fenestration relative to conditioned floor area. In the 2025 Peak Cooling Memo, the homes were assumed to have air leakage of 5 ACH50 (meets prescriptive requirement), to not include a whole house fan (below prescriptive requirements), and to use two split system heat pumps with 15.2 SEER2, 12.5 EER2, and 8.9 HSPF2 (above prescriptive requirements).

Other building features, such as envelope, equipment efficiencies, and presence of PV and/or batteries, are described in Tables 3a through 3g. These include details of packages analyzed in the 2025 Peak Cooling Memo, and additional packages analyzed to support the expanded analysis in this memo. Packages 1, 2, and 3 represent three different custom home designs analyzed in climate zone 12 with inputs matching those used in the 2025 Peak Cooling Memo. Climate zone 12 was chosen because it represents a median California climate with both cooling and heating loads. Additional variants of Package 1 were added to the analysis. Several of these variants included large window overhangs that are often designed in modern custom homes with walls of glass from floor to ceiling. Package 1b in Table 3c includes a whole house fan. The base case was the standard design.

Analysis results for the custom home packages 1, 2, and 3 are summarized in Table 4a. Results for the additional variants are shown in Table 4b.

Table 9a – Package 1 Evaluated in 2025 Peak Cooling Memo for Custom Homes

System	Above Prescriptive Requirements	Below Prescriptive Requirements
HVAC	15.2 SEER2, 12.5 EER2, 8.9 HSPF2 ERV Ducts: In Conditioned Space Except <12 ft, 5%	No Whole House Fan (CZ 12)
DHW	NEEA Tier 4, 80-gallon HPWH, DR	N/A
Envelope	Roof Solar Reflectance: 0.5 Roof Deck Insulation: R 38 Cathedral Ceiling cavity plus R-10 continuous above deck	No QII Total Glazing: 38%

Package 1 detail: 2 stories, 5,686 ft^2, 5 bedrooms, zero slope roof, cathedral ceiling, 6 kW of rooftop PV, 10 kWh BESS self-utilization credit

Table 10b – Package 1(a) – Package 1 with 7 ft Overhangs on All Windows

System	Above Prescriptive Requirements	Below Prescriptive Requirements
HVAC	15.2 SEER2, 12.5 EER2, 8.9 HSPF2 ERV Ducts: In Conditioned Space Except <12 ft, 5%	No Whole House Fan (CZ 12)
DHW	NEEA Tier 4, 80-gallon HPWH, DR	N/A
Envelope	Roof Solar Reflectance: 0.5 Roof Deck Insulation: R 38 Cathedral Ceiling cavity plus R 10 continuous above deck	No QII Total Glazing: 38%
Overhangs	7 ft on all windows	N/A

Table 11c – Package 1(b) – Package 1 with 12 ft Overhangs on West-facing Windows, QII and Whole House Fan

System	Above Prescriptive Requirements	Below Prescriptive Requirements
HVAC	15.2 SEER2, 12.5 EER2, 8.9 HSPF2 ERV Ducts: In Conditioned Space Except <12 ft, 5%	N/A
DHW	NEEA Tier 4, 80-gallon HPWH, DR	N/A
Envelope	Roof Solar Reflectance: 0.5 Roof Deck Insulation: R 38 Cathedral Ceiling cavity plus R 10 continuous above deck	Total Glazing: 38%
Overhangs	12 ft on West windows only	N/A

Table 12d – Package 1(c) – Package 1 with 5 ft Overhangs on All Windows and Improved HVAC

System	Above Prescriptive Requirements	Below Prescriptive Requirements
HVAC	ERV VCHP: 19 SEER2, 12 EER2, 9.5 HSPF2 Verified low-leakage ducts entirely in conditioned space	No Whole House Fan (CZ 12)
DHW	NEEA Tier 4, 80-gallon HPWH, DR	N/A
Envelope	Roof Solar Reflectance: 0.5 Roof Deck Insulation: R 38 Cathedral Ceiling cavity plus R 10 continuous above deck	No QII Total Glazing: 38%
Overhangs	5 ft on all windows	N/A

Table 13e – Package 1(d) – Package 1 with Window Area Reduced to 20% and Improved HVAC

System	Above Prescriptive Requirements	Below Prescriptive Requirements
HVAC	ERV Ducts: In Conditioned Space Except <12 ft, 5% VCHP: 19 SEER2, 12 EER2, 9.5 HSPF2	No Whole House Fan (CZ 12)
DHW	NEEA Tier 4, 80-gallon HPWH, DR	N/A
Envelope	Roof Solar Reflectance: 0.5 Roof Deck Insulation: R 38 / Cathedral Ceiling cavity plus R 10 continuous above deck	No QII Total Glazing: 20%

Table 14f – Package 2 Evaluated in 2025 Peak Cooling Memo for Custom Homes

System	Above Prescriptive Requirements	Below Prescriptive Requirements
HVAC	Ducts: R-8, 5%, Crawlspace Low-Leakage AHU Reduced Fan Power: 0.4 W/cfm	No Whole House Fan (CZ 12)
DHW	NEEA Tier 4, 80-gallon HPWH, DR, Recirculation	N/A
Envelope	Floor Insulation: R-30 Over Crawlspace Ceiling Insulation: R-38 Roof Insulation: R-21 (below deck)	Wall Cavity Insulation: R-21 Window Performance: U=0.32, SHGC=0.23 Roof Solar Reflectance: 0.1 Total Glazing: 22%

Package 2 detail: 1 story, 4,546 ft^2, 4 bedrooms, 4.5 kW rooftop PV

Table 15g – Package 3 Evaluated in 2025 Peak Cooling Memo for Custom Homes

System	Above Prescriptive Requirements	Below Prescriptive Requirements
HVAC	Ducts: R-6, 5%, Attic and Crawlspace Low-Leakage AHU Reduced Fan Power: 0.4 W/cfm	No Whole House Fan (CZ 12)
DHW	NEEA T4 80 gallons HPWH, DR, Recirculation	N/A
Envelope	Floor Insulation: R-30 Over Crawlspace	Wall Cavity Insulation: R-21 Window Performance: U=0.32, SHGC=0.24 Ceiling Insulation: R-38 / Roof Insulation: R-13 (below deck) Total Glazing: 17%

Package 3 detail: 2 stories, 5,402 ft^2, 5 bedrooms, 4.8 kW rooftop PV, 5 kWh BESS self-utilization credit

Acronyms for Tables 3a through 3g:

- BESS – battery energy storage system
- DHW – domestic hot water
- DR – demand response
- EER – energy efficiency ratio
- ERV – energy recovery ventilator
- HP – heat pump
- HSPF – heating seasonal performance factor
- HPWH – heat pump water heater
- HVAC – heating, ventilation, and air conditioning
- NEEA – Northwest Energy Efficiency Alliance
- QII – quality insulation installation
- PV - photovoltaics
- SEER – seasonal energy efficiency ratio
- SHGC – solar heat gain coefficient
- VCHP – ductless variable capacity mini-split heat pump
- VLLDCS – very low leakage ducts in conditioned space.

Table 16a - Compliance Results: Custom Homes

		Package 1		Package 2		Package 3	
CZ	**Proposed Peak Cooling Margin Allowance (%)**	**LSC Margin (%)**	**Peak Cooling Margin (%)**	**LSC Margin (%)**	**Peak Cooling Margin (%)**	**LSC Margin (%)**	**Peak Cooling Margin (%)**
12	**-30%**	7.5%	-119%*	5%	-141% *	3%	-85% *

* Indicates that the package does not comply with the proposed peak cooling allowance.

Table 4b - Compliance Results: additional custom home packages

		Package 1a		Package 1b		Package 1c		Package 1d	
CZ	**Proposed Peak Cooling Margin Allowance (%)**	**LSC Margin (%)**	**Peak Cooling Margin (%)**	**LSC Margin (%)**	**Peak Cooling Margin (%)**	**LSC Margin (%)**	**Peak Cooling Margin (%)**	**LSC Margin (%)**	**Peak Cooling Margin (%)**
12	**-30%**	10.9%	-16.7%	15%	-28.4%	18.3%	-22%	17.6%	-27%

Analysis of the custom homes indicates that compliance with the peak cooling energy allowance can be achieved with various packages of measures.

Accessory Dwelling Units Analysis

Analysis was performed on an accessory dwelling unit (ADU) in four climates zones, following the approach in the 2025 Peak Cooling Memo. The analysis used a 623 ft^2, one-bedroom ADU with 33% total glazing with the largest window exposure facing East. The ADU assumes quality insulation installation (QII), walls with R-21 cavity insulation and R-5 exterior insulation, R-38 ceiling insulation, R-19 below roof deck insulation, no PV system, no battery energy storage system, and floors that are slab on grade exposed which outperforms 2025 Energy Code prescriptive requirements.

Additional ADU design package features are described in Tables 5a through 5h. These include details of packages analyzed in the 2025 Peak Cooling Memo, and additional packages analyzed for this memo. ADU packages 1, 2, and 3 match the inputs used in the 2025 Peak Cooling Memo and were analyzed in four climate zones (see Tables 5a, 5c, 5g). Additional variants of each package were added to the analysis with a focus on climate zone 12. As mentioned above, climate zone 12 was chosen because it represents a median California climate with both cooling and heating loads. The base case was the standard design.

Analysis results for the ADU packages 1, 2, and 3 are shown in Table 6a. Results for the additional variants are shown in Table 6b.

Table 17a – Package 1 Evaluated in 2025 Peak Cooling Memo for ADUs

System	Above Prescriptive Requirements	Below Prescriptive Requirements
HVAC	Split HP: 17 SEER2, 13 EER2, 7.5 HSPF	No Whole House Fan (CZ 10, 12, 15)
DHW	NEEA Tier 4, 50-gallon HPWH with Point of Use (POU) distribution	N/A
Envelope	N/A	Roof Solar Reflectance: 0.1 (CZ 10, 12, 15)

Table 5b – Package 1(a) – Package 1 with Decreased Window Area and Increased Roof Reflectance

System	Above Prescriptive Requirements	Below Prescriptive Requirements
HVAC	Split HP: 17 SEER2, 13 EER2, 7.5 HSPF	No Whole House Fan (CZ 10, 12, 15)
DHW	NEEA Tier 4, 50-gallon HPWH with Point of Use (POU) distribution	N/A
Envelope	Roof Solar Reflectance: 0.25 (CZ 10,12,15) Window Area: 20%	N/A

Table 18c – Package 2 Evaluated in 2025 Peak Cooling Memo for ADUs

System	Above Prescriptive Requirements	Below Prescriptive Requirements
HVAC	Split HP: 17 SEER2, 13 EER2, 7.5 HSPF	No Whole House Fan (CZ 10, 12, 15)
DHW	NEEA Tier 4, 50-gallon HPWH with POU	N/A
Envelope	Roof Solar Reflectance: 0.25 Window Performance: U=0.3, SHGC=0.20	N/A

Table 5d – Package 2(a) – Package 2 Oriented with Largest Window Exposure Facing West

System	Above Prescriptive Requirements	Below Prescriptive Requirements
HVAC	Split HP: 17 SEER2, 13 EER2, 7.5 HSPF	No Whole House Fan (CZ 10, 12, 15)
DHW	NEEA Tier 4, 50-gallon HPWH with POU	N/A
Envelope	Roof Solar Reflectance: 0.25 Window Performance: U=0.3, SHGC=0.20	N/A

Table 5e – Package 2(b) – Package 2 with Improved Envelope and 3 ft Overhangs

System	Above Prescriptive Requirements	Below Prescriptive Requirements
HVAC	Split HP: 17 SEER2, 13 EER2, 7.5 HSPF	No Whole House Fan (CZ 10, 12, 15)
DHW	NEEA Tier 4, 50-gallon HPWH with POU	N/A
Envelope	Roof Solar Reflectance: 0.25 Window Performance: U=0.3, SHGC=0.20 Ceiling Insulation: R-42 Roof Insulation: R-19 (below deck) Air leakage: 3 ACH50	N/A
Overhangs	3 ft overhangs for west-facing windows (largest exposure area)	N/A

Table 5f – Package 2(c) – Package 2(b) without Reduced Air Leakage

System	Above Prescriptive Requirements	Below Prescriptive Requirements
HVAC	Split HP: 17 SEER2, 13 EER2, 7.5 HSPF	No Whole House Fan (CZ 10, 12, 15)
DHW	NEEA Tier 4, 50-gallon HPWH with POU	N/A
Envelope	Roof Solar Reflectance: 0.25 Window Performance: U=0.3, SHGC=0.20 Ceiling Insulation: R-42 Roof Insulation: R-19 (below deck)	N/A
Overhangs	3 ft overhangs for west-facing windows (largest exposure area)	N/A

Table 19g – Package 3 Evaluated in 2025 Peak Cooling Memo for ADUs

System	Above Prescriptive Requirements	Below Prescriptive Requirements
HVAC	Split HP: 17 SEER2, 13 EER2, 7.5 HSPF Verified Low Leakage Ducts in Conditioned Space HRV Reduced Fan Power: 0.4 W/cfm	No Whole House Fan (CZ 10, 12, 15)
DHW	N/A	N/A
Envelope	Blower Door: 3 ACH50	N/A

Table 5h – Package 3(a) – Package 3 with Higher Efficiency Heat Pump

System	Above Prescriptive Requirements	Below Prescriptive Requirements
HVAC	Ductless VCHP: 27 SEER2, 16 EER2, 11.2 HSPF HRV	No Whole House Fan (CZ 10, 12, 15)
DHW	N/A	N/A
Envelope	Blower Door: 3 ACH50	N/A

Acronyms for Tables 5a through 5h:

- ACH50 – air changes per hour at 50 Pascals
- ADU – accessory dwelling unit
- DHW – domestic hot water
- EER – energy efficiency ratio
- HP – heat pump
- HRV – heat recovery ventilator
- HSPF – heating seasonal performance factor
- HPWH – heat pump water heater
- HVAC – heating, ventilation, and air conditioning
- NEEA – Northwest Energy Efficiency Alliance
- POU – point of use
- SEER – seasonal energy efficiency ratio
- SHGC – solar heat gain coefficient
- VCHP – ductless variable capacity mini-split heat pump
- VLLDCS – very low leakage ducts in conditioned space

Table 20a - Compliance Results: ADUs

		Package 1		Package 2		Package 3	
CZ	**Proposed Peak Cooling Margin**	**LSC Margin (%)**	**Peak Cooling Margin (%)**	**LSC Margin (%)**	**Peak Cooling Margin (%)**	**LSC Margin (%)**	**Peak Cooling Margin (%)**
4	**-30%**	-0.3% **	-33% *	2%	-7%	2%	-32% *
10	**-25%**	-0.3% **	-34% *	4%	-20%	4%	-36% *
12	**-30%**	-1.0% **	-74% *	2%	-45% *	2%	-80% *
15	**-30%**	-0.3% **	-13%	2%	-21%	-0.1% **	-28%

* Indicates that the package does not comply with the proposed peak cooling allowance.
** Indicates that the package does not comply with the LSC metric.

Table 21b - Compliance Results: Additional ADU packages

		Package 1a		Package 2a		Package 2b		Package 2c		Package 3a	
CZ	**Proposed Peak Cooling Margin Allowance (%)**	**LSC Margin (%)**	**Peak Cooling Margin (%)**	**LSC Margin (%)**	**Peak Cooling Margin (%)**	**LSC Margin (%)**	**Peak Cooling Margin (%)**	**LSC Margin (%)**	**Peak Cooling Margin (%)**	**LSC Margin (%)**	**Peak Cooling Margin (%)**
12	**-30%**	3.9%	-27%	1.8%	10%	2.3%	-14%	2.4%	-15%	5.5%	19%

Analysis of the ADUs indicates that compliance with the peak cooling energy allowance can be achieved with various packages of measures.

Proposed Adjustment to Peak Cooling Performance Modeling Approach

This updated analysis shows that a wide range of design options can be used to comply with the 2025 Energy Code metrics – LSC and Source Energy – using the performance modeling approach, while also minimizing peak cooling energy. Most of the compliant packages analyzed do not exceed a 25%-30% threshold in peak cooling energy (percentage dependent on climate zone) for newly constructed single-family homes as represented by the 2,700 ft^2 prototype model, custom home, and ADU packages. **Therefore, the CEC proposes to update the Single-Family ACM Reference Manual, and corresponding Energy Code compliance software (CBECC), to revise the peak cooling performance modeling threshold up from 20% to 30% for climate zones 4, 8, 9, 11, 12, 13, 15 and up from 20% to 25% for climate zones 10 and 14**. These modifications will provide added flexibility to single-family homebuilders and designers when using the performance modeling approach to comply with the 2025 Energy Code.