DOCKETED	
Docket Number:	24-BSTD-03
Project Title:	2025 Energy Code Compliance Software, Manuals and Forms
TN #:	262800
Document Title:	Peak Cooling Memo
Description:	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.
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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: Peak Period Cooling Energy Calculation Method in the 2025 Energy Code Single-family Alternative Calculation Method Reference Manual

DATE: April 25, 2025

Executive Summary

Newly constructed single-family project designs seeking to comply with the 2025 Energy Code (Title 24, Part 6) using the performance modeling approach are evaluated for compliance using two metrics: Long-term System Cost (LSC) and Source Energy. However, projects meeting the budgets for these two Energy Code metrics can still experience unintended peak period cooling energy between 4 pm and 9 pm that is higher than the standard design. This can result in exacerbating peak loads on California's electric grid during summer heat waves and higher utility bills for consumers.

To help resolve this issue, the California Energy Commission (CEC) proposes updated modeling rules in the 2025 Energy Code Single-Family Alternate Calculation Method (ACM) Reference Manual. The ACM Reference Manuals define the CEC-approved methods for demonstrating modeled compliance with California's Energy Code. The proposed performance modeling rules would allow up to a 20% increase in peak period cooling energy for a proposed design compared to the standard design.

This memo includes analysis that highlights scenarios with excessive peak period cooling increases, identifies a range of potential solutions, and provides rationale for the CEC-selected proposed modeling solution that best results in compliant newly constructed single-family homes without excessive peak period cooling energy increases.

Background

Each code cycle, the CEC develops Long-term System Cost (LSC) hourly factors that reflect a 30-year forecast of the system costs for delivering electricity, natural gas, and propane to California's buildings. These LSC hourly factors are used to develop prescriptive building requirements and allowable trade-offs to make sure that newly constructed and altered buildings are designed to perform optimally from an energy basis for decades to come.

For the 2025 code cycle, the underlying forecasts for LSC included several significant changes particularly for electricity that affect the LSC peak conditions. These include (a) new weather expectations for each of the climate zones that increase winter heating demand, (b) faster deployment of renewable energy including a large amount of energy storage to balance the electricity system, and (c) rapid load growth to serve both electrified buildings and electric vehicles (EVs).

The result of these changes is a shift of the high value LSC hours from mostly summer early evening periods as seen in the 2022 LSC hourly factors (and is typical of today's California grid) to a broader set of periods that includes greater emphasis on overnight and morning periods. For more detail on the 2025 Energy Code performance compliance metrics and overall energy accounting methodologies, please see the 2025 Energy Code Accounting Methodology Report.[1]

In past code cycles the peak hours occurred when the sun set on very hot summer days. These hours coincided with both the highest air-conditioning loads and diminishing solar resources because of the sun setting. The 2025 LSC hourly factors include these peak times in the summer, but they also include periods when limited solar and wind resources are available to serve loads. Some examples of these periods include during night-time charging of EVs, during winter periods with cold temperatures driving heating demand, and during periods when lower amounts of renewable resources are available due to climatic conditions. The peak period for cooling energy assumed in this analysis was from 4 to 9pm, July to November.

While the 2025 LSC hourly factors will encourage buildings to minimize demand during the winter peak and overnight, the CEC also finds it prudent to manage near- and medium-term summer peak generation challenges. Therefore, the CEC explored different options for optimizing peak period cooling energy beyond the standard design. As a result of that analysis, the CEC proposes to update the 2025 Energy Code compliance software to allow up to a 20% increase in peak period cooling energy for a proposed design compared to the minimally code-compliant standard design.

Analysis

Analysis was performed to demonstrate the peak period cooling energy issue and to explore solutions using California Building Energy Code Compliance for Residential Buildings (CBECC-Res). CBECC-Res is a free opensource software tool developed and approved by the CEC to demonstrate compliance with the California Energy Code. Within CBECC-Res a standardized prototype containing the prescriptive features of a code compliant 2,700 ft^2 single-family home was used to represent the home's energy features. This included window and wall area distributions typical of a California production home. The analysis focused on cooling-dominated climate zones: Climate Zones 4 and 8 through 15. The analysis included scenarios with custom home designs and accessory dwelling units (ADUs).

Results in the following analysis are presented in terms of compliance margins, which is the difference when comparing the proposed design to the standard design (also called baseline). Positive LSC margins

[1] CEC 2025 Energy Code Accounting Methodology Report (2024)
https://efiling.energy.ca.gov/GetDocument.aspx?tn=255318-1

represent scenarios where the modeled performance of the proposed design is lower than the standard design and therefore compliant. Negative LSC margins represent scenarios where the modeled performance of the proposed design is higher than the standard design and is noncompliant. In the case of peak period cooling energy a negative kWh or percentage represents a design that uses more peak period cooling energy than the baseline building. All scenarios analyzed met or outperformed the Energy Code's secondary compliance metric, Source Energy. For various building designs with compliant LSC margins, the associated margins were evaluated to highlight potential compliance software solutions to the peak period cooling energy issue.

High Peak Cooling Scenarios – 2,700 ft^2 Prototype

A version of the CBECC-Res prototype baseline model based on the 2025 prescriptive code was created and is shown in Table 1 as "2025 Base Case". To demonstrate the peak period cooling issue, the "2025 Base Case" was modified, with various envelope measures removed and oriented at the worst-case orientation with respect to peak period cooling. These deviations from the 2025 prescriptive base requirements are shown in Table 1 as "2700sf Prototype: Worst-Case".

This "2700sf Prototype: Worst-Case" scenario does not result in a compliant building. Space heating and water heating measures were then added to the noncompliant prototype to reach (or approach) compliance with the 2025 LSC energy metric. These measures are shown in Table 1 as the "Heating Optimized Case."

Table 1: Comparison of Measures in Prototype Analysis

Building Feature	**2025 Base Case**	**2700 ft² Prototype: Worst-Case**	**Heating Optimized Case**
Water Heating - Equipment Type & Efficiency	2.0 UEF Heat Pump Water Heater (HPWH)**	Base**	Base**
Water Heating - Basic Central Domestic Hot Water Credit	No**	Base**	Yes (CZ 8 - 11, 13, 15)++
Space Heating & Cooling - Equipment Type	Heat Pump (HP) **	Base**	Base**
Space Heating & Cooling - Heating Efficiency	7.5 HSPF2**	Base**	9 HSPF2 (CZ 4, 8 - 12, 14)++ 10 HSPF2 (CZ 13, 15)++
Space Heating & Cooling - Cooling Efficiency	14.3 SEER2/11.7 EER2**	Base**	Base**
Space Heating & Cooling - HVAC Fan	0.45 W/cfm**	Base**	Base**

Space Heating & Cooling - Whole House Fan	Yes (CZ 8 - 14) ** No (CZ 4, 15) **	No (CZ 4, 15) ** (CZ 8 - 14)--	No (CZ 4, 15)** (CZ 8 - 14)--
Space Heating & Cooling – Quality Insulation Installation	Yes**	No--	No--
Windows - U-Factor	0.27 (CZ 4, 11 - 14) ** 0.30 (C Z 8 - 10, 15) **	Base**	Base**
Windows – SHGC	0.23 (CZ 4, 8 - 14) ** 0.20 (CZ 15) **	Base**	Base**
Windows - Glazing % of Floor Area	20%**	Base**	Base**
Windows - Glazing % per Side Front/Left/Back/Right	25%/25%/25%/25%**	20%/25%/40%/15%--	Base**
Walls – Insulation	R-21 + R-5**	R-15 + R-4--	Base**
Roof/Attic - Deck Insulation	R-19**	R-4--	R-4--
Roof/Attic - Solar Reflectance (Cool Roof = 0.25)	0.1 (CZ 4, 8) ** 0.2 (CZ 9 - 15) **	0.1 (CZ 4, 8)** (CZ 9 - 15)--	Base**
Roof/Attic - Attic Insulation	R-38**	Base**	Base**

***Meets 2025 prescriptive requirements*

++Above 2025 prescriptive requirements

--Below 2025 prescriptive requirements

The compliance results for the “Heating Optimized Case”, shown in Table 2, demonstrate that in climate zones 4 and 9 through 13, a home can comply with the existing compliance metrics while showing significant increases in peak period cooling energy margins with the largest increase greater than 100%, see results for climate zone 12.

Table 2: LSC and Peak Period Cooling Energy Compliance Results for Heating Optimized Case

Climate Zone	LSC Margin ($/ft2-yr)	LSC Margin % Change from 2025 Base Case	Peak Period Cooling Energy (kWh) Change from 2025 Base Case	Peak Period Cooling Energy Margin % Change from 2025 Base Case
4	0.37	3%	-141	-78%
8	0.03	0%	-205.9	-58%
9	0.14	2%	-186.1	-55%
10	0.11	1%	-205.7	-39%
11	0.11	1%	-317.5	-38%
12	0.17	1%	-273.4	-114%
13	0.1	1%	-357.7	-37%
14	0.06	0%	-232.5	-39%
15	-0.94	-6%	-403.9	-23%

Compliance Options—Prototype Peak Period Cooling Energy Impact

The next phase of analysis evaluated the peak period cooling energy impact of a range of compliant design options. Various packages of measures were assembled that will result in code compliant homes (using the LSC metric), and the peak period cooling energy impact of the proposed package compared to the standard design was calculated. The packages include some measures below prescriptive code requirements, and some measures above prescriptive code requirements. The goal of this phase of analysis was to determine if peak period cooling performance could be adjusted without reducing design flexibility to an unacceptable level.

The packages were designed with input from the public to reflect a wide range of builder-friendly and realistic construction packages for production homes. The packages are described in Table 3 through Table 9 below.

Measure package details and resulting peak period cooling energy margins are shown in Table 10. In addition to the measures listed, all packages include a minimally code-compliant solar photovoltaic (PV) system and no battery.

Table 3: Peak Cooling Compliant Case

Building Feature	**CZ 4**	**CZ 8**	**CZ 9**	**CZ 10**	**CZ 11**	**CZ 12**	**CZ 13**	**CZ 14**	**CZ 15**
QII	No--	No--	No--	No--	No--	No--	No--	No--	No--
Blower Door	No	No	No	No	No	No	No	No	No
Whole House Fan	No	No--	No--	No--	No--	No--	No--	No--	No
Cavity Wall Insulation and Continuous Rigid Insulation	R-21 + R-5	R-21 + R-5	R-21 + R-5	R-21 + R-5	R-21 + R-5	R-21 + R-5	R-21 + R-5	R-21 + R-5	R-21 + R-5
Ceiling/Attic Insulation and Below Roof Deck Insulation	R-38 + R-4--	R-38 + R-4--	R-38 + R-4--	R-38 + R-4--	R-38 + R-4--	R-38 + R-4--	R-38 + R-4--	R-38 + R-4--	R-38 + R-4--
Roof SR	0.1--	0.1--	0.1--	0.1--	0.1--	0.1--	0.1--	0.1--	0.1--
Windows U-Factor/SHGC	0.27/0.23	0.30/0.23	0.30/0.23	0.30/0.23	0.27/0.23	0.27/0.23	0.27/0.23	0.27/0.23	0.30/0.20
Overhangs	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave
HVAC	14.3 SEER2, 11.7 EER2, 9 HSPF2++	14.3 SEER2, 11.7 EER2, 9 HSPF2++	14.3 SEER2, 11.7 EER2, 9 HSPF2++	14.3 SEER2, 11.7 EER2, 9 HSPF2++	14.3 SEER2, 11.7 EER2, 9 HSPF2++	14.3 SEER2, 11.7 EER2, 9 HSPF2++	14.3 SEER2, 11.7 EER2, 10 HSPF2++	14.3 SEER2, 11.7 EER2, 9 HSPF2++	14.3 SEER2, 11.7 EER2, 10 HSPF2++
Duct Insulation/Leakage/Location	R-8/5%/In Attic	R-8/5%/In Attic	R-8/5%/In Attic	R-8/5%/In Attic	R-8/5%/In Attic	R-8/5%/In Attic	R-8/5%/In Attic	R-8/5%/In Attic	R-8/5%/In Attic
Airflow Rate/Fan Efficiency	350 cfm/ton/0.45 W/cfm	350 cfm/ton/0.45 W/cfm	350 cfm/ton/0.45 W/cfm	350 cfm/ton/0.45 W/cfm	350 cfm/ton/0.45 W/cfm	350 cfm/ton/0.45 W/cfm	350 cfm/ton/0.45 W/cfm	350 cfm/ton/0.45 W/cfm	350 cfm/ton/0.45 W/cfm
DHW	NEEA T3 HPWH++	NEEA T3 HPWH with CDHW++	NEEA T3 HPWH with CDHW++	NEEA T3 HPWH with CDHW++	NEEA T3 HPWH with CDHW++	NEEA T3 HPWH++	NEEA T3 HPWH with CDHW++	NEEA T3 HPWH++	NEEA T3 HPWH with CDHW++

++Above 2025 prescriptive requirements

--Below 2025 prescriptive requirements

Table 4: 2x6 Wall, High Performance Attic Alternative

Building Feature	**CZ 4**	**CZ 8**	**CZ 9**	**CZ 10**	**CZ 11**	**CZ 12**	**CZ 13**	**CZ 14**	**CZ 15**
QII	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Blower Door	No	No	No	No	No	No	No	No	No
Whole House Fan	No	No--	No--	No--	No--	No--	No--	No--	No
Cavity Wall Insulation and Continuous Rigid Insulation	R-21 + R-5	R-21 + R-5	R-21 + R-5	R-21 + R-5	R-21 + R-5	R-21 + R-5	R-21 + R-5	R-21 + R-5	R-21 + R-5
Ceiling/Attic Insulation and Below Roof Deck Insulation	R-38 + R-19	R-38 + R-19	R-38 + R-19	R-38 + R-19	R-38 + R-19	R-38 + R-19	R-38 + R-19	R-38 + R-19	R-38 + R-19
Roof SR	0.25++	0.25++	0.25++	0.25++	0.25++	0.25++	0.25++	0.25++	0.25++
Windows U-Factor/SHGC	0.27/0.20++	0.30/0.20++	0.30/0.20++	0.30/0.20++	0.27/0.20++	0.27/0.20++	0.27/0.20++	0.27/0.20++	0.30/0.20
Overhangs	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave
HVAC	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++
Duct Insulation/Leakage/Location	R-8/5%/In Attic	R-8/5%/In Attic	R-8/5%/In Attic	R-8/5%/In Attic	R-8/5%/In Attic	R-8/5%/In Attic	R-8/5%/In Attic	R-8/5%/In Attic	R-8/5%/In Attic
Airflow Rate/Fan Efficiency	350 cfm/ton/0.45 W/cfm	350 cfm/ton/0.45 W/cfm	350 cfm/ton/0.45 W/cfm	350 cfm/ton/0.45 W/cfm	350 cfm/ton/0.45 W/cfm	350 cfm/ton/0.45 W/cfm	350 cfm/ton/0.45 W/cfm	350 cfm/ton/0.45 W/cfm	350 cfm/ton/0.45 W/cfm

Building Feature	CZ 4	CZ 8	CZ 9	CZ 10	CZ 11	CZ 12	CZ 13	CZ 14	CZ 15
DHW	HPWH	HPWH	HPWH	HPWH	HPWH	HPWH	HPWH	HPWH	HPWH

++Above 2025 prescriptive requirements

--Below 2025 prescriptive requirements

Table 5: 2x4 Alternative Overhangs

Building Feature	CZ 4	CZ 8	CZ 9	CZ 10	CZ 11	CZ 12	CZ 13	CZ 14	CZ 15
QII	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Blower Door	No	3 ACH50 ++	No	3 ACH50 ++	3 ACH50 ++	3 ACH50 ++	3 ACH50 ++	3 ACH50 ++	3 ACH50 ++
Whole House Fan	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Cavity Wall Insulation and Continuous Rigid Insulation	R-15 + R-4--	R-15 + R-4--	R-15 + R-4--	R-15 + R-4--	R-15 + R-4--	R-15 + R-4--	R-15 + R-4--	R-15 + R-4--	R-15 + R-4--
Ceiling/Attic Insulation and Below Roof Deck Insulation	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--
Roof SR	0.25++	0.25++	0.25++	0.25++	0.25++	0.25++	0.25++	0.25++	0.25++
Windows U-Factor/SHGC	0.27/0.20++	0.30/0.20++	0.30/0.20++	0.30/0.20++	0.27/0.20++	0.27/0.20++	0.27/0.20++	0.27/0.20++	0.30/0.20
Overhangs	1' Eave	4 ' Overhang Over 50% of Windows on Back Wall++	1' Eave	4 ' Overhang Over 50% of Windows on Back Wall++	4 ' Overhang Over 50% of Windows on Back Wall++	4 ' Overhang Over 50% of Windows on Back Wall++	4 ' Overhang Over 50% of Windows on Back Wall++	4 ' Overhang Over 50% of Windows on Back Wall++	4 ' Overhang Over 50% of Windows on Back Wall++
HVAC	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++
Duct Insulation/Leakage/Location	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++
Airflow Rate/Fan Efficiency	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++
DHW	NEEA T3 HPWH++	HPWH	NEEA T3 HPWH++	HPWH	HPWH	HPWH	HPWH	HPWH	HPWH

++Above 2025 prescriptive requirements

--Below 2025 prescriptive requirements

Table 6: 2x4 Alternative 16 SEER2/13 EER2

Building Feature	CZ 4	CZ 8	CZ 9	CZ 10	CZ 11	CZ 12	CZ 13	CZ 14	CZ 15
QII	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Blower Door	No	No	No	No	No	No	No	No	No
Whole House Fan	No	No--	Yes	No--	No--	Yes	No--	No--	No
Cavity Wall Insulation and Continuous Rigid Insulation	R-15 + R-5--	R-15 + R-5--	R-15 + R-5--	R-15 + R-5--	R-15 + R-5--	R-15 + R-5--	R-15 + R-5--	R-15 + R-5--	R-15 + R-5--
Ceiling/Attic Insulation and Below Roof Deck Insulation	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--

Building Feature	CZ 4	CZ 8	CZ 9	CZ 10	CZ 11	CZ 12	CZ 13	CZ 14	CZ 15
Roof SR	0.25++	0.25++	0.25++	0.25++	0.25++	0.25++	0.25++	0.25++	0.25++
Windows U-Factor/SHGC	0.27/0.20++	0.30/0.20++	0.30/0.20++	0.30/0.20++	0.27/0.20++	0.27/0.20++	0.27/0.20++	0.27/0.20++	0.30/0.20
Overhangs	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave
HVAC	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++
Duct Insulation/Leakage/Location	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++
Airflow Rate/Fan Efficiency	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++
DHW	NEEA T3 HPWH++	NEEA T3 HPWH++	NEEA T3 HPWH++	NEEA T3 HPWH++	NEEA T3 HPWH++	NEEA T3 HPWH++	NEEA T3 HPWH++	NEEA T3 HPWH++	NEEA T3 HPWH++

++Above 2025 prescriptive requirements

--Below 2025 prescriptive requirements

Table 7: 2x4 Alternative R-6 Walls 16 SEER2/13 EER2

Building Feature	CZ 4	CZ 8	CZ 9	CZ 10	CZ 11	CZ 12	CZ 13	CZ 14	CZ 15
QII	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Blower Door	No	No	No	No	No	No	No	No	No
Whole House Fan	No	No--	Yes	No--	No--	Yes	No--	No--	No
Cavity Wall Insulation and Continuous Rigid Insulation	R-15 + R-6--	R-15 + R-6--	R-15 + R-6--	R-15 + R-6--	R-15 + R-6--	R-15 + R-6--	R-15 + R-6--	R-15 + R-6--	R-15 + R-6--
Ceiling/Attic Insulation and Below Roof Deck Insulation	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--
Roof SR	0.25++	0.25++	0.25++	0.25++	0.25++	0.25++	0.25++	0.25++	0.25++
Windows U-Factor/SHGC	0.27/0.20++	0.30/0.20++	0.30/0.20++	0.30/0.20++	0.27/0.20++	0.27/0.20++	0.27/0.20++	0.27/0.20++	0.30/0.20
Overhangs	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave
HVAC	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++	16 SEER2, 13 EER2, 9 HSPF2++
Duct Insulation/Leakage/Location	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++
Airflow Rate/Fan Efficiency	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++
DHW	NEEA T3 HPWH++	NEEA T3 HPWH++	NEEA T3 HPWH++	NEEA T3 HPWH++	NEEA T3 HPWH++	NEEA T3 HPWH++	NEEA T3 HPWH++	NEEA T3 HPWH++	NEEA T3 HPWH++

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Table 8: 2x4 Alternative 16 SEER2/11.7 EER2

Building Feature	**CZ 4**	**CZ 8**	**CZ 9**	**CZ 10**	**CZ 11**	**CZ 12**	**CZ 13**	**CZ 14**	**CZ 15**
QII	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Blower Door	No	No	No	No	No	No	No	No	No
Whole House Fan	No	No--	Yes	No--	No--	Yes	No--	No--	No
Cavity Wall Insulation and Continuous Rigid Insulation	R-15 + R-5--	R-15 + R-5--	R-15 + R-5--	R-15 + R-5--	R-15 + R-5--	R-15 + R-5--	R-15 + R-5--	R-15 + R-5--	R-15 + R-5--
Ceiling/Attic Insulation and Below Roof Deck Insulation	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--	R-49 + R-4--
Roof SR	0.25++	0.25++	0.25++	0.25++	0.25++	0.25++	0.25++	0.25++	0.25++
Windows U-Factor/SHGC	0.27/0.20++	0.30/0.20++	0.30/0.20++	0.30/0.20++	0.27/0.20++	0.27/0.20++	0.27/0.20++	0.27/0.20++	0.30/0.20
Overhangs	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave
HVAC	16 SEER2, 11.7 EER2, 9 HSPF2++	16 SEER2, 11.7 EER2, 9 HSPF2++	16 SEER2, 11.7 EER2, 9 HSPF2++	16 SEER2, 11.7 EER2, 9 HSPF2++	16 SEER2, 11.7 EER2, 9 HSPF2++	16 SEER2, 11.7 EER2, 9 HSPF2++	16 SEER2, 11.7 EER2, 9 HSPF2++	16 SEER2, 11.7 EER2, 9 HSPF2++	16 SEER2, 11.7 EER2, 9 HSPF2++
Duct Insulation/Leakage/Location	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++
Airflow Rate/Fan Efficiency	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++	350 cfm/ton/0.40 W/cfm++
DHW	NEEA T3 HPWH++	NEEA T3 HPWH++	NEEA T3 HPWH++	NEEA T3 HPWH++	NEEA T3 HPWH++	NEEA T3 HPWH++	NEEA T3 HPWH++	NEEA T3 HPWH++	NEEA T3 HPWH++

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--Below 2025 prescriptive requirements

Table 9: 2x4 Alternative 14.3 SEER2/11.7 EER2

Building Feature	**CZ 4**	**CZ 8**	**CZ 9**	**CZ 10**	**CZ 11**	**CZ 12**	**CZ 13**	**CZ 14**	**CZ 15**
QII	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Blower Door	3 ACH50++	3 ACH50++	3 ACH50++	3 ACH50++	3 ACH50++	3 ACH50++	3 ACH50++	3 ACH50++	3 ACH50++
Whole House Fan	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Cavity Wall Insulation and Continuous Rigid Insulation	R-21 + R-5	R-21 + R-5	R-21 + R-5	R-21 + R-5	R-21 + R-5	R-21 + R-5	R-21 + R-5	R-21 + R-5	R-21 + R-5
Ceiling/Attic Insulation and Below Roof Deck Insulation	R-38 + R-19	R-38 + R-19	R-38 + R-19	R-38 + R-19	R-38 + R-19	R-38 + R-19	R-38 + R-19	R-38 + R-19	R-38 + R-19
Roof SR	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Windows U-Factor/SHGC	0.27/0.23	0.30/0.23	0.30/0.23	0.30/0.23	0.27/0.23	0.27/0.23	0.27/0.23	0.27/0.23	0.30/0.20
Overhangs	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave	1' Eave
HVAC	14.3 SEER2, 11.7 EER2, 7.5 HSPF2	14.3 SEER2, 11.7 EER2, 7.5 HSPF2	14.3 SEER2, 11.7 EER2, 7.5 HSPF2	14.3 SEER2, 11.7 EER2, 7.5 HSPF2	14.3 SEER2, 11.7 EER2, 7.5 HSPF2	14.3 SEER2, 11.7 EER2, 7.5 HSPF2	14.3 SEER2, 11.7 EER2, 7.5 HSPF2	14.3 SEER2, 11.7 EER2, 7.5 HSPF2	14.3 SEER2, 11.7 EER2, 7.5 HSPF2

Building Feature	**CZ 4**	**CZ 8**	**CZ 9**	**CZ 10**	**CZ 11**	**CZ 12**	**CZ 13**	**CZ 14**	**CZ 15**
Duct Insulation/Leakage/Location	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++	R-8/5%/In Attic/Low Leakage Air Handler Unit++
Airflow Rate/Fan Efficiency	350 cfm/ton/0.45 W/cfm	350 cfm/ton/0.45 W/cfm	350 cfm/ton/0.45 W/cfm	350 cfm/ton/0.45 W/cfm	350 cfm/ton/0.45 W/cfm	350 cfm/ton/0.45 W/cfm	350 cfm/ton/0.45 W/cfm	350 cfm/ton/0.45 W/cfm	350 cfm/ton/0.45 W/cfm
DHW	HPWH	HPWH	HPWH	HPWH	HPWH	HPWH	HPWH	HPWH	HPWH

++Above 2025 prescriptive requirements

--Below 2025 prescriptive requirements

Table 10: Compliance Results

Package	CZ	LSC Margin ($/ft2-yr)	LSC Margin % Change from 2025 Base Case	Peak Period Cooling Energy (kWh) Change from 2025 Base Case	Peak Period Cooling Energy Margin % Change from 2025 Base Case
Peak Cooling Compliant Case	4	1.5	13%	23	14%
Peak Cooling Compliant Case	8	1.1	16%	14	4%
Peak Cooling Compliant Case	9	1.2	16%	19	6%
Peak Cooling Compliant Case	10	1.2	15%	34	7%
Peak Cooling Compliant Case	11	2	14%	31	4%
Peak Cooling Compliant Case	12	1.7	14%	-1	-1%
Peak Cooling Compliant Case	13	2.2	16%	48	5%
Peak Cooling Compliant Case	14	1.8	13%	44	7%
Peak Cooling Compliant Case	15	1.4	9%	-1	0%
2x6 Wall, High Performance Attic Alternative	4	0.5	5%	42	23%
2x6 Wall, High Performance Attic Alternative	8	0.5	8%	37	10%
2x6 Wall, High Performance Attic Alternative	9	0.6	8%	41	12%
2x6 Wall, High Performance Attic Alternative	10	0.6	8%	34	7%
2x6 Wall, High Performance Attic Alternative	11	1.1	8%	31	4%
2x6 Wall, High Performance Attic Alternative	12	0.8	7%	-3	-1%
2x6 Wall, High Performance Attic Alternative	13	1.1	8%	47	5%
2x6 Wall, High Performance Attic Alternative	14	1.1	7%	41	7%
2x6 Wall, High Performance Attic Alternative	15	1.2	8%	67	4%
2x4 Alternative Overhangs	4	0.7	6%	3	2%
2x4 Alternative Overhangs	8	0.2	3%	37	10%
2x4 Alternative Overhangs	9	0.5	7%	1	0%
2x4 Alternative Overhangs	10	0.3	4%	34	7%
2x4 Alternative Overhangs	11	0.7	5%	10	1%
2x4 Alternative Overhangs	12	0.4	3%	13	5%

Package	CZ	LSC Margin ($/ft2-yr)	LSC Margin % Change from 2025 Base Case	Peak Period Cooling Energy (kWh) Change from 2025 Base Case	Peak Period Cooling Energy Margin % Change from 2025 Base Case
2x4 Alternative Overhangs	13	0.6	4%	6	1%
2x4 Alternative Overhangs	14	0.7	5%	32	5%
2x4 Alternative Overhangs	15	0.7	5%	12	1%
2x4 Alternative 16 SEER2/13 EER2	4	0.6	5%	-2.1	-1%
2x4 Alternative 16 SEER2/13 EER3	8	0.6	9%	-15.6	-4%
2x4 Alternative 16 SEER2/13 EER4	9	0.5	6%	-6.7	-2%
2x4 Alternative 16 SEER2/13 EER5	10	0.6	8%	-28	-6%
2x4 Alternative 16 SEER2/13 EER6	11	0.9	6%	-71.4	-9%
2x4 Alternative 16 SEER2/13 EER7	12	0.8	7%	-35.1	-14%
2x4 Alternative 16 SEER2/13 EER8	13	0.8	6%	-80.9	-9%
2x4 Alternative 16 SEER2/13 EER9	14	1	7%	-26.2	-4%
2x4 Alternative 16 SEER2/13 EER10	15	0.5	4%	-106.2	-7%
2x4 Alternative R-6 Walls 16 SEER2/13 EER2	4	0.8	7%	2.2	1%
2x4 Alternative R-6 Walls 16 SEER2/13 EER3	8	0.6	10%	-11	-3%
2x4 Alternative R-6 Walls 16 SEER2/13 EER4	9	0.5	7%	-1.9	-1%
2x4 Alternative R-6 Walls 16 SEER2/13 EER5	10	0.7	9%	-21.7	-4%
2x4 Alternative R-6 Walls 16 SEER2/13 EER6	11	1.1	8%	-61.1	-8%
2x4 Alternative R-6 Walls 16 SEER2/13 EER7	12	0.9	8%	-29.1	-12%
2x4 Alternative R-6 Walls 16 SEER2/13 EER8	13	0.9	7%	-69	-8%
2x4 Alternative R-6 Walls 16 SEER2/13 EER9	14	1.2	8%	-18.4	-3%
2x4 Alternative R-6 Walls 16 SEER2/13 EER10	15	0.7	5%	-87	-6%
2x4 Alternative 16 SEER2/11.7 EER2	4	0.6	5%	-17	-9%
2x4 Alternative 16 SEER2/11.7 EER3	8	0.5	8%	-24.2	-7%
2x4 Alternative 16 SEER2/11.7 EER4	9	0.4	5%	-19.3	-6%
2x4 Alternative 16 SEER2/11.7 EER5	10	0.5	6%	-55.4	-11%

Package	CZ	LSC Margin ($/ft2-yr)	LSC Margin % Change from 2025 Base Case	Peak Period Cooling Energy (kWh) Change from 2025 Base Case	Peak Period Cooling Energy Margin % Change from 2025 Base Case
2x4 Alternative 16 SEER2/11.7 EER6	11	0.6	4%	-148.8	-19%
2x4 Alternative 16 SEER2/11.7 EER7	12	0.7	6%	-57	-23%
2x4 Alternative 16 SEER2/11.7 EER8	13	0.4	3%	-169.9	-19%
2x4 Alternative 16 SEER2/11.7 EER9	14	0.8	5%	-72.2	-12%
2x4 Alternative 16 SEER2/11.7 EER10	15	-0.4	-3%	-272.4	-17%
2x4 Alternative 14.3 SEER2/11.7 EER2	4	0.5	0%	-37.1	-20%
2x4 Alternative 14.3 SEER2/11.7 EER3	8	0.1	0%	-49.2	-14%
2x4 Alternative 14.3 SEER2/11.7 EER4	9	0.1	0%	-46	-14%
2x4 Alternative 14.3 SEER2/11.7 EER5	10	0.1	0%	-54.2	-11%
2x4 Alternative 14.3 SEER2/11.7 EER6	11	0.4	0%	-99.9	-13%
2x4 Alternative 14.3 SEER2/11.7 EER7	12	0.4	0%	-44.8	-18%
2x4 Alternative 14.3 SEER2/11.7 EER8	13	0.2	0%	-94.3	-11%
2x4 Alternative 14.3 SEER2/11.7 EER9	14	0.6	0%	-60.2	-10%
2x4 Alternative 14.3 SEER2/11.7 EER10	15	0.2	0%	-70.7	-4%

The analysis demonstrates that many of the packages are compliant with the LSC metric while resulting in lower peak period cooling energy use than the standard design, while other LSC compliant packages show an increase in peak period cooling of up to around 20%, for example see results for climate zone 12.

The packages in the following categories comply with the LSC metric and show a decrease or neutral impact on peak period cooling energy:

- Peak Cooling Compliance Case
- 2x6 Wall, High Performance Attic (HPA) Alternative
- 2x4 Alternative Overhangs

The packages in the following categories comply with the LSC metric and, for most of the cases, show an increase in peak period cooling energy less than 10% (peak period cooling energy increase in Climate Zone 12 is slightly above 10%):

- 2x4 Alternative, 16 SEER2 / 13 EER2 HVAC equipment
- 2x4 Alternative, R-6 walls, 16 SEER2 / 13 EER2 HVAC equipment

The packages in the following categories comply with the LSC metric and, for most of the cases, show an increase in peak period cooling energy less than 20%:

- 2x4 Alternative, 16 SEER2 / 11.7 EER2 HVAC equipment (the peak period cooling energy increase in Climate Zone 12 is slightly above 20%)
- Low Leakage Air Handler, 3ACH50 Infiltration

Custom Homes Analysis

In addition to the prototype model analysis, several custom homes were also analyzed, again at the worst-case orientation relative to peak period cooling energy. The homes had four to five bedrooms and varied in terms of size, and percentage fenestration relative to conditioned floor area. The homes were assumed to not have been blower door tested, do not include a whole house fan, and used 2 split heat pumps with 15.2 SEER2, 12.5 EER2 and 8.9 HSPF/AFUE which outperforms 2025 prescriptive requirements. Other building features spanning envelope, equipment efficiencies, and presence of PV and/or batteries are described in Table 11. When the homes were altered to reach minimum LSC compliance, associated peak period cooling energy margins ranged from -2% to -106%. Design details and results from the custom homes analysis are shown in Table 12.

Table 11: Custom Homes

Custom Home Description	QII	Floor	Walls	Attic	Roof SR	Windows	Ducts	IAQ	HVAC Fans	DHW	PV	Battery
2 Story/5,686 ft2/5 Bedroom/South Facing/Total Glazing 38%	No--	R-19 Over Crawl	R-21 + R-5	R-38 Cathedral	0.5++	0.3/0.23	In Conditioned Space Except <12ft, 5%--	ERV++	350 cfm/ton/0.45 W/cfm	2 x NEEA T4 40 gallon HPWH, Demand Response (DR)	6 kW	10 kWh Self Utilization Credit (SUC)
1 Story/4,546 ft2/4 Bedroom/East Facing/Total Glazing 22%	Yes	R-30 Over Crawl++	R-21--	R-38 + R-21++	0.1--	0.32+/0.23+--	R-8, 5%, Crawlspace, LLAHU++	Minimum	350 cfm/ton/0.4 W/cfm++	NEEA T4 80 gallons HPWH, DR, Recirculation+++	4.5 kW	None
2 Story/5,402 ft2/5 Bedroom/North Facing/Total Glazing 17%	Yes	R-30 Over Crawl++	R-21--	R-38 + R-13--	0.2	0.32+/0.24+--	R-6, 5%, Attic and Crawl, LLAHU++	Minimum	350 cfm/ton/0.4 W/cfm++	NEEA T4 80 gallons HPWH, DR, Recirculation+++	4.8 kW--	5 kWh SUC++

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--Below 2025 prescriptive requirements

Table 12: Custom Home Compliance Results

Package	LSC Margin ($/ft2-yr)	LSC Margin % Change from 2025 Base Case	Peak Period Cooling Energy (kWh) Change from 2025 Base Case	Peak Period Cooling Energy Margin % Change from 2025 Base Case
2 Story/5,686 ft2/5 Bedroom/South Facing/Total Glazing 38%	0.5	4%	-635	-106%
1 Story/4,546 ft2/4 Bedroom/East Facing/Total Glazing 22%	0	0%	-409.6	-89%
2 Story/5,402 ft2/5 Bedroom/North Facing/Total Glazing 17%	0.1	1%	-15.7	-2%

Accessory Dwelling Units Analysis

A 1 story, 623 ft2, 1 bedroom accessory dwelling unit (ADU) with 33% total glazing was also analyzed in four climates zones. The ADU assumes quality insulation installation (QII), R-21+R-5 walls, R-38+R-19 attics, no PV system, no battery energy storage system, and floors that are slab on grade exposed, which outperforms 2025 prescriptive requirements. Additional ADU building features are described in Table 13. The analysis indicates that peak period cooling energy increases are not as extreme for ADUs as with the larger home models. The increases in peak period cooling energy can be adjusted with a range of measures as shown in Table 14.

Table 13: Custom Home Compliance Results

ADU Description	CZ	Blower Door	WHF	Roof SR	Windows	HVAC Type	Ducts	IAQ	HVAC Fans	DHW
Original Model	4	No	No	0.1	0.3/0.23	Split HP SEER2 17/EER2 13/HSPF or AFUE 7.5[++]	R-8, 5%, In Attic	Minimum	350 cfm/ton/0.45 W/cfm	NEEA T4 50 gallons HPWH with Point of Use (POU) distribution[++]
Original Model	10	No	No[--]	0.1[--]	0.3/0.23	Split HP SEER2 17/EER2 13/HSPF or AFUE 7.5[++]	R-8, 5%, In Attic	Minimum	350 cfm/ton/0.45 W/cfm	NEEA T4 50 gallons HPWH with POU[++]
Original Model	12	No	No[--]	0.1[--]	0.3/0.23	Split HP SEER2 17/EER2 13/HSPF or AFUE 7.5[++]	R-8, 5%, In Attic	Minimum	350 cfm/ton/0.45 W/cfm	NEEA T4 50 gallons HPWH with POU[++]
Original Model	15	No	No	0.1[--]	0.3/0.23	Split HP SEER2 17/EER2 13/HSPF or AFUE 7.5[++]	R-8, 5%, In Attic	Minimum	350 cfm/ton/0.45 W/cfm	NEEA T4 50 gallons HPWH with POU[++]
Original Model + Cool Roof + 0.2 SHGC Windows	4	No	No	0.25[++]	0.3/0.2[++]	Split HP SEER2 17/EER2 13/HSPF or AFUE 7.5[++]	R-8, 5%, In Attic	Minimum	350 cfm/ton/0.45 W/cfm	NEEA T4 50 gallons HPWH with POU[++]
Original Model + Cool Roof + 0.2 SHGC Windows	10	No	No[--]	0.25[++]	0.3/0.2[++]	Split HP SEER2 17/EER2 13/HSPF or AFUE 7.5[++]	R-8, 5%, In Attic	Minimum	350 cfm/ton/0.45 W/cfm	NEEA T4 50 gallons HPWH with POU[++]
Original Model + Cool Roof + 0.2 SHGC Windows	12	No	No[--]	0.25[++]	0.3/0.2[++]	Split HP SEER2 17/EER2 13/HSPF or AFUE 7.5[++]	R-8, 5%, In Attic	Minimum	350 cfm/ton/0.45 W/cfm	NEEA T4 50 gallons HPWH with POU[++]
Original Model + Cool Roof + 0.2 SHGC Windows	15	No	No	0.25[++]	0.3/0.2[++]	Split HP SEER2 17/EER2 13/HSPF or AFUE 7.5[++]	R-8, 5%, In Attic	Minimum	350 cfm/ton/0.45 W/cfm	NEEA T4 50 gallons HPWH with POU[++]

ADU Description	CZ	Blower Door	WHF	Roof SR	Windows	HVAC Type	Ducts	IAQ	HVAC Fans	DHW
Original + Minimum Efficiency WH and HVAC + VLLDCS + 3 ACH50 + 0.4 W/cfm Fan + CDHW + Verified AC Charge + HRV	4	Yes++	No	0.1	0.3/0.23	Split HP SEER2 14.3/EER2 11.7/HSPF or AFUE 7.5	Verified Low Leakage Ducts in Conditioned Space (VLLDCS)	HRV	350 cfm/ton/0.4 W/cfm++	HPWH (2.0 UEF) with POU
Original + Minimum Efficiency WH and HVAC + VLLDCS + 3 ACH50 + 0.4 W/cfm Fan + CDHW + Verified AC Charge + HRV	10	Yes++	No--	0.2	0.3/0.23	Split HP SEER2 14.3/EER2 11.7/HSPF or AFUE 7.5	VLLDCS	HRV	350 cfm/ton/0.4 W/cfm++	HPWH (2.0 UEF) with POU
Original + Minimum Efficiency WH and HVAC + VLLDCS + 3 ACH50 + 0.4 W/cfm Fan + CDHW + Verified AC Charge + HRV	12	Yes++	No--	0.2	0.3/0.23	Split HP SEER2 14.3/EER2 11.7/HSPF or AFUE 7.5	VLLDCS	HRV	350 cfm/ton/0.4 W/cfm++	HPWH (2.0 UEF) with POU
Original + Minimum Efficiency WH and HVAC + VLLDCS + 3 ACH50 + 0.4 W/cfm Fan + CDHW + Verified AC Charge + HRV	15	Yes++	No	0.2	0.3/0.23	Split HP SEER2 14.3/EER2 11.7/HSPF or AFUE 7.5	VLLDCS	HRV	350 cfm/ton/0.4 W/cfm++	HPWH (2.0 UEF) with POU

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Table 14: ADU Compliance Results

ADU Description	CZ	LSC Margin ($/ft2-yr)	LSC Cooling Margin % Change from 2025 Base Case	Peak Period Cooling Energy (kWh) Change from 2025 Base Case	Peak Period Cooling Energy Margin % Change from 2025 Base Case
Original Model	4	2	9%	-33.3	-29%
Original Model	10	1.9	12%	-75.7	-33%
Original Model	12	1.1	5%	-92.5	-62%
Original Model	15	0.1	1%	-180.9	-28%
Original Model + Cool Roof + 0.2 SHGC Windows	4	1.7	8%	-5.2	-5%
Original Model + Cool Roof + 0.2 SHGC Windows	10	2.2	14%	-35.9	-16%
Original Model + Cool Roof + 0.2 SHGC Windows	12	1.3	6%	-41.1	-27%
Original Model + Cool Roof + 0.2 SHGC Windows	15	1.2	5%	-123.2	-19%
Original + Minimum Efficiency WH and HVAC + VLLDCS + 3 ACH50 + 0.4 W/cfm Fan + CDHW + Verified AC Charge + HRV	4	1.3	0.1%	-24.4	-23%

ADU Description	CZ	LSC Margin ($/ft2-yr)	LSC Cooling Margin % Change from 2025 Base Case	Peak Period Cooling Energy (kWh) Change from 2025 Base Case	Peak Period Cooling Energy Margin % Change from 2025 Base Case
Original + Minimum Efficiency WH and HVAC + VLLDCS + 3 ACH50 + 0.4 W/cfm Fan + CDHW + Verified AC Charge + HRV	10	0.1	0%	-75.4	-53%
Original + Minimum Efficiency WH and HVAC + VLLDCS + 3 ACH50 + 0.4 W/cfm Fan + CDHW + Verified AC Charge + HRV	12	0.5	0%	-88.7	-13%
Original + Minimum Efficiency WH and HVAC + VLLDCS + 3 ACH50 + 0.4 W/cfm Fan + CDHW + Verified AC Charge + HRV	15	0.9	0%	-88.7	-13%

Proposed Adjustment to Peak Period Cooling Energy

The package analysis shows that a wide range of design options can be used to comply with the current metrics and minimize the increase in peak period cooling energy. The vast majority of the compliant packages analyzed do not exceed 20% increase in peak period cooling energy for the 2,700 ft^2 prototype model, or ADU models. **Therefore, it is recommended the Single-Family ACM Reference Manual, and corresponding Energy Code compliance software (CBECC-Res), be updated to allow up to a 20% increase in peak period cooling energy for a proposed design compared to the minimally code-compliant standard design**. This allows for builder/designer flexibility across a wide range of system types, including flexibility on decisions related to orientation and fenestration allocations.