

DOCKETED

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Project Title:	2025 Energy Code Rulemaking
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Document Title:	2025 Peak Cooling Energy Calculation Update
Description:	Peak Cooling slides from the September 28, 2023 pre-rulemaking workshop including an update.
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2025 Energy Code – Pre-Rulemaking

Single-Family Peak Cooling

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September 28, 2023



Peak Cooling Considerations

- **Intent:** Ensure that newly constructed buildings do not unnecessarily exacerbate challenges related to weather-driven peak events
- **Challenge:** Weather trends point towards higher frequency of peak events
- **Resiliency:** Higher demand on the grid during high temperature events leads to increased stress on the utility grid
- **Consumers:** Higher demand during peak times and time-of-use utility rates lead to higher costs to consumers



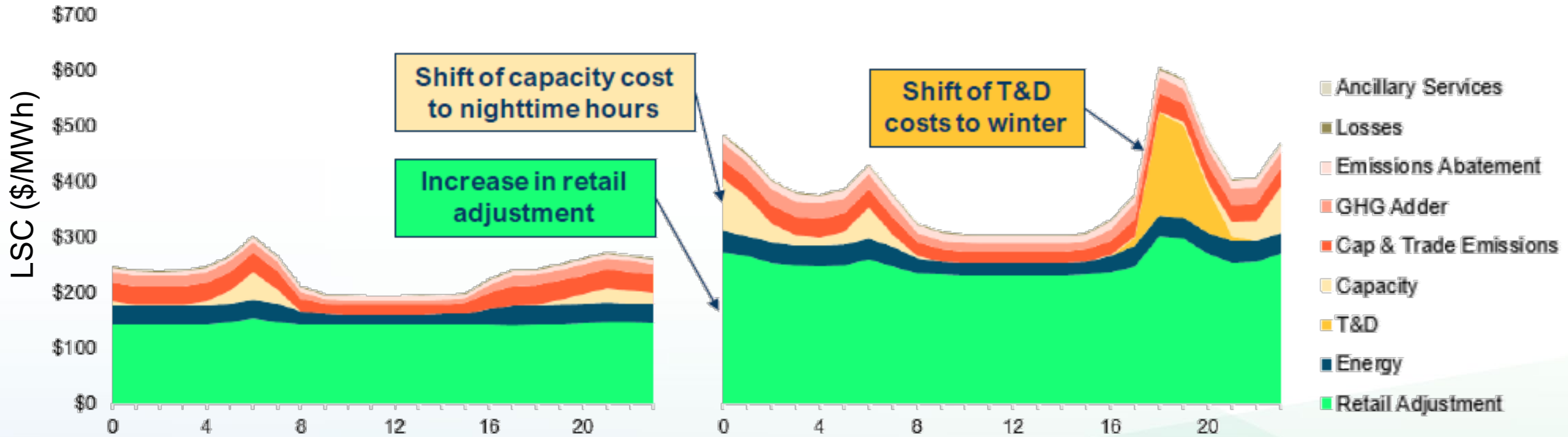
Peak cooling defined as *mechanical cooling during hours of 4pm - 9pm*



2025 Energy Code Winter Electricity Valuation

Winter 2022 Average Electricity

Winter 2025 Average Electricity

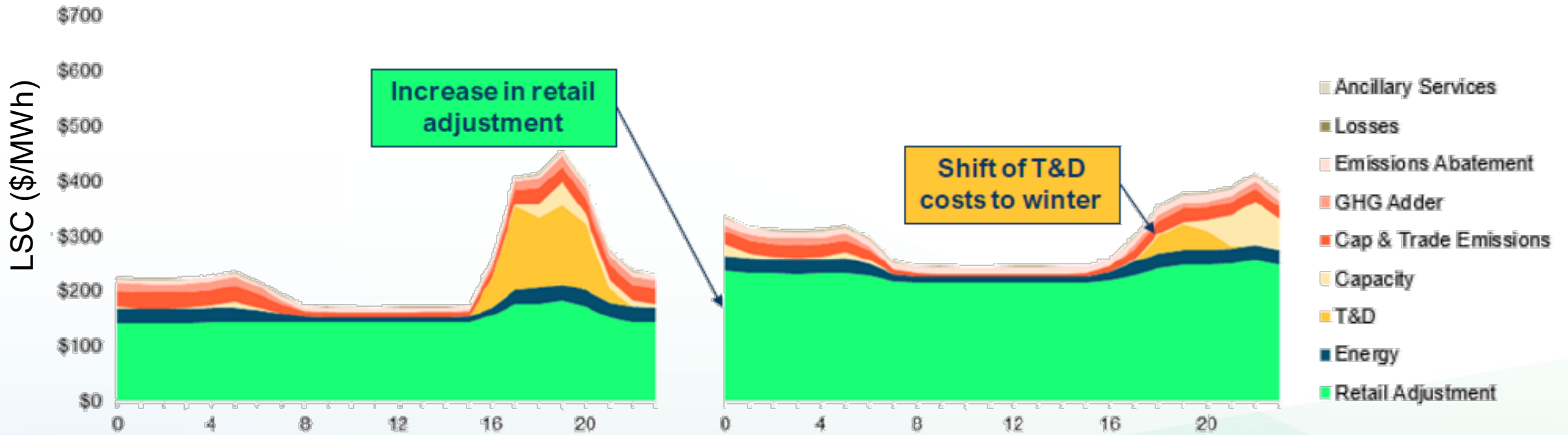




2025 Energy Code Summer Electricity Valuation

Summer 2022 Average Electricity

Summer 2025 Average Electricity



Shift in electricity value peaks to winter could allow energy tradeoffs that result in significantly higher summer peak cooling for some buildings



Strategy to Limit Peak Cooling

1. Isolate mechanical cooling loads that occur during peak demand times
 - Grid challenges and time-of-use rates occur generally between 4pm and 9pm
2. Identify buildings that can have high variances in mechanical cooling loads
 - Mechanical cooling loads found to increase significantly with varying efficiency tradeoffs
3. Identify climate zones where higher mechanical cooling demand exists
4. Determine performance target for buildings to be covered by limit



Building Types Covered: Single-Family

Peak cooling limit proposed to apply only to single-family buildings

- CEC analyzed building compliance and effects of performance trade-offs
- Conclusions:
 - **Single-family analysis:** Trade-offs could lead to 4x increase in mechanical cooling site energy use
 - Pursuing limit on peak cooling for single-family buildings
 - **Multifamily and nonresidential building analysis:** Effects not found to be as significant
 - Not pursuing peak cooling limit for multifamily and nonresidential buildings

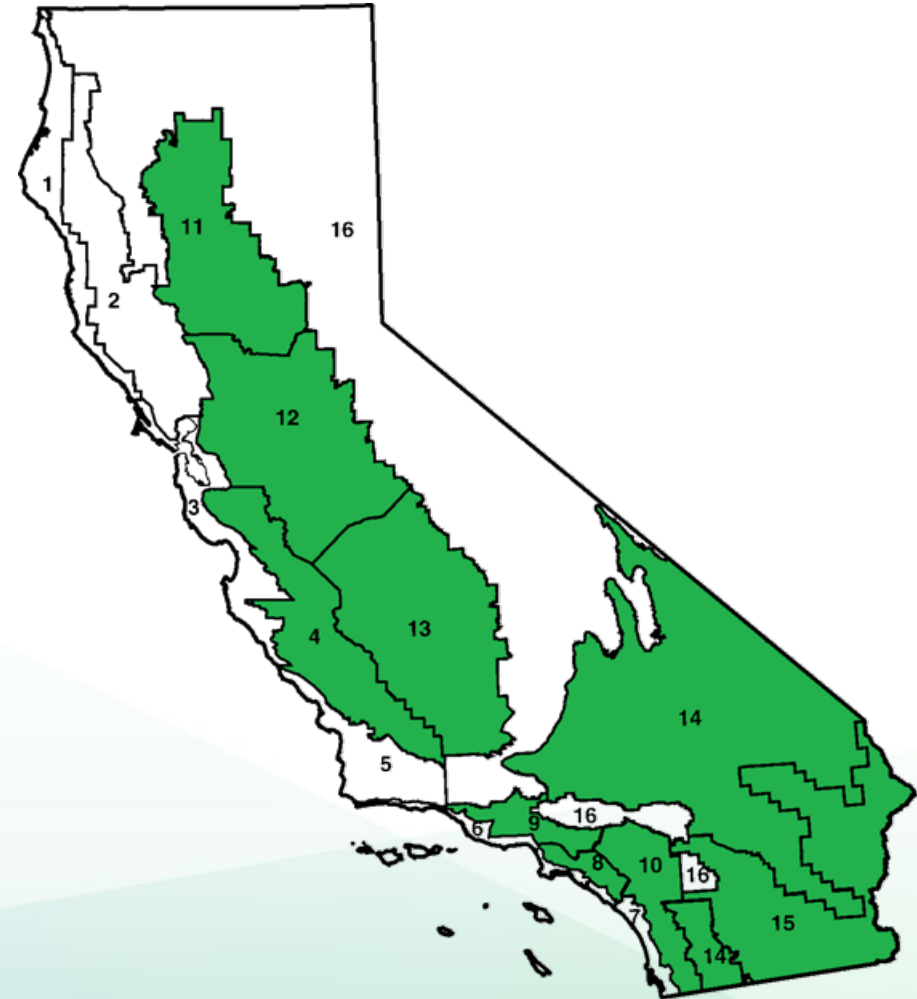


Single-Family Peak Cooling Limit: Climate Zones

Limit peak cooling in climate zones (CZ) with higher demand

- Climate zones 4, and 8-15 have higher mechanical cooling loads
 - Proposing limit to apply to only these CZs
- Climate zones 1-3, 5-7, and 16, have minimal mechanical cooling

Climate Zone	2025 Standard Design Annual Peak Cooling kWh
1	0
2	0
3	0
4	86
5	0
6	16
7	49
8	249
9	231
10	351
11	576
12	123
13	676
14	433
15	1,330
16	48





Proposed Peak Cooling Limit

Buildings covered:

- Single-family buildings in climate zones 4 and 8 through 15

Limit set to:

- Proposed performance target to be set to resulting peak cooling of 2025 standard design building
- Software will produce standard design peak cooling (in kWh), and will produce peak cooling of proposed design building
- If peak cooling of proposed design is \leq standard design, building complies



Next Steps

Software Updates

- 2025 CBECC-Res research version will be updated with peak cooling limit reflecting proposal
 - Updated version will be found at:
<http://www.bwilcox.com/BEES/cbecc2025.html>
- Notice of Availability will be docketed when updated version is available
 - Docket can be found at:
<https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=22-BSTD-01>
- 2025 Single-Family Residential ACM Reference Manual will be updated to reflect peak cooling limit



Draft 2025 Energy Code Express Terms referred to Peak Cooling

SUBCHAPTER 8 SINGLE-FAMILY RESIDENTIAL BUILDINGS - PERFORMANCE AND PRESCRIPTIVE COMPLIANCE APPROACHES

SECTION 150.1 – PERFORMANCE AND PRESCRIPTIVE COMPLIANCE APPROACHES FOR SINGLE-FAMILY RESIDENTIAL BUILDINGS

(b) **Performance approach standards.** A building complies with the performance approach standards if the energy consumption calculated for the proposed design building is no greater than the energy budget calculated for the standard design building using Commission-certified compliance software as specified by the Alternative Calculation Methods Approval Manual.

1. **Newly constructed buildings Energy Budget** The Energy Budget for newly constructed buildings is expressed in terms of the Energy Design Ratings, which are based on Source Energy, and Long-Term System Cost (LSC), and Peak Cooling time dependent valuation (TDV) energy.

A. **Long-term System Cost (LSC)**-The LSC energy budget is determined by applying the mandatory and prescriptive requirements of the standard design to the proposed design building and has two components, the Efficiency LSC and the Total LSC.

i. The Efficiency LSC energy is the sum of the LSC energy for space-conditioning, water heating, and mechanical ventilation.

ii. The Total LSC energy is the sum of the Efficiency LSC energy and LSC energy from the photovoltaic system, battery storage systems, lighting, demand flexibility, and other plug loads.

The Energy Design Rating 1 (EDR1) is based on source energy. The Energy Design Rating 2 (EDR2) is based on TDV energy and has two components, the Energy Efficiency Design Rating, and the Solar Electric Generation and Demand Flexibility Design Rating. The total Energy Design Rating shall account for both the Energy Efficiency Design Rating and the Solar Electric Generation and Demand Flexibility Design Rating. The proposed building shall separately comply with the Source Energy Design Rating, Energy Efficiency Design Rating and the Total Energy Design Rating.

Source:

<https://efiling.energy.ca.gov/GetDocument.aspx?tn=252915&DocumentContentId=88051>



Status Update - Single-Family Peak Cooling

Post Pre-Rulemaking Workshop Activities

- After the pre-rulemaking workshop, staff collaborated with various stakeholders including the building industry and energy consultants.
- Staff determined that additional flexibility is needed to address orientation, fenestration allocations, and varying construction practices.

New Proposed Performance Path Peak Cooling Energy Calculation:

- New calculations for peak cooling energy in specified climate zones achieving **120%** or less of the peak cooling energy of the 2025 single family prototype used in the prescriptive path would be used to demonstrate compliance.

While the Peak Cooling Energy Calculation was mentioned in Draft 2025 Energy Code Express Terms, staff now proposes that this calculation is more appropriate for 2025 Single-Family Residential ACM Reference Manual.



CBEEC-Res Status Update

Software Updates

- The 2025 CBEEC-Res research version has been updated with the new proposed performance path Peak Cooling Energy Calculation

- Updated version will be found at:

<https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2025-energy-code-compliance-software>