TITLE 24, PART 6 | 2025 CODE CYCLE

# Pool and Spa Heating

## Codes and Standards Enhancement (CASE) Proposal
## Single-Family, Multifamily and Nonresidential | Water Heating

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May 18, 2023

Utility Sponsored Stakeholder Meeting, Round 2

CALIFORNIA ENERGY CODES & STANDARDS
A STATEWIDE UTILITY PROGRAM

# Acronyms / Expanded Terms

- AHRI = Air-Conditioning Heating and Refrigeration Institute
- BCR = Benefit to Cost Ratio
- CALSSA = California Solar & Storage Association
- CASE = Codes and Standards Enhancement
- CEC = California Energy Commission
- COP = Coefficient of Performance
- CPSA = California Pool and Spa Association
- CSI = California Solar Initiative
- CZ = Climate Zone
- DOE = U.S. Department of Energy
- GHG = Greenhouse Gas
- HPPH = Heat Pump Pool Heater
- ICC-SRCC = International Code Council - Solar Rating & Certification Corporation
- LSC = Long-term Systemwide Cost
- MF = Multifamily Buildings
- NR = Nonresidential Buildings
- NRDC = Natural Resources Defense Council
- NREL = National Renewable Energy Laboratory
- PHTA = Pool & Hot Tub Alliance
- PV = Photovoltaic
- RASS = California Residential Appliance Saturation Study (2019)
- SF = Single-Family Buildings
- TDV = Time dependent Valuation

# Agenda

- Overview of Code Change Proposal
- Summary of Stakeholder Feedback
- Cost-effectiveness, Energy Savings and Statewide Impacts
- Data Gaps and Additional Feedback Requested
- Next Steps

# Code Change Proposal

- Code Change Proposal
- Code Change Language

# Proposed Code Change

*Draft code language for this measure in Handouts.*

*Description of changes:*

- New section 110.4(c) with three options for compliance applicable to SF, MF, and NR applications for new construction and when pool/spa heating is added:
  - Requiring solar thermal pool heating equal to 65% of pool surface area for NR and MF, and 60% for SF; or
  - A minimum COP and sizing provisions for HPPHs prior to May 2028 and an integrated thermal efficiency requirement thereafter, or
  - Deriving at least 60 percent of the annual heating energy from on-site renewable energy or site recovered energy.

    **Note:** existing pool heaters in SF are exempt.

- **Clarifying in section 110.4(a)** that products and equipment not meeting definitions in Appliance Efficiency Regulations shall not be used as pool heaters.
- **Cleanup of section 150.0(p)** to account for federal actions taken on pool pumps.
- Proposing a **new Appendix JA15** with criteria specific to new section 110.4(c).

# Summary of Draft Code Revisions Since Round 1

- HPPH option is revised to account for recently issued DOE pre-published final rule.
  - No longer requiring COP at Low Air Temperature-Mid Humidity rating condition.
  - Referencing the DOE integrated thermal efficiency metric starting in 2028.
- HPPH sizing calculation in JA15 was revised to account for pool volume instead of pool area.
- Solar option updated to:
  - Remove orientation requirements.
  - Reduce required solar collector area.
- Clarifying the intent of Table 100.0-A through proposed revisions to sections associated with NR buildings.

# Poll

Open ended answers: What are your concerns with the proposed code language?

Multiple choice option: Do you support the proposed code language?

- Yes, fully support
- Some minor concerns
- Concerned
- No, opposed to this proposed change
- Undecided or need more information

# Summary of Stakeholder Feedback

- Summary of Feedback Received
- Measure Evolution
- Potential Barriers and Solutions

# Summary of Feedback Received

- Received comments from AHRI, Aquatherm Industries, Inc., ICC-SRCC, PHTA & CPSA, CALSSA, Rheem, FAFCO, Inc, Fluidra, NRDC, UMA Solar and HotSun Industries, Inc. Most comments have resulted in continued dialogue.
- Comments on:
  - Code language
    - The use of “and” vs. “or”
    - Solar collector shading, position, and size
    - Definitions
    - References to applicable standards
    - On-site renewable energy
  - Design guidance for HPPH capacity vs. surface area
  - Pumping guidance and terminology
- THANK YOU!

# Evolution of the Measure

- Insulation and variable speed pumping requirements will not be included for this code cycle, interested in gathering information for future code cycles
- Code language clean up included to align with DOE consumer pool heaters, dedicated-purpose pool pumps, and portable electric spa rulemakings
- Code language has been heavily modified since the February 1 stakeholder meeting based on stakeholder comments and the DOE consumer pool heater standard pre-published final rule.
- Looking for further stakeholder comment on the analysis, assumptions, and results

# Barriers and Solutions

- Stakeholder comment that solar thermal collectors would compete for roof space with photovoltaic (PV) panels mandated by all electric codes.
- Statewide CASE team analyzed the roof space of the CEC SF building prototypes.
- Statewide CASE team reduced required solar collector area to improve ability of building to accommodate PV and solar collector requirements.

| Building Prototype | Model Picture | Approximate Roof Size (Sq ft) | Useable roof size (sq ft) (1/3 of roof size) | Size of Photo Voltaic Array (sq ft) | Size of Solar Thermal Array (sq ft) | Excess or deficit roof area (sq ft) |
|---|---|---|---|---|---|---|
| 2100 New Construction |  | 2235 | 745 | 105-225 | 264 | 256-376 excess space |
| 2700 sq ft new construction |  | 1437 | 478 | 105-225 | 264 | 109 excess to 11 deficit |
| 1665 sq ft exist. building |  | 1756 | 585 | 105-225 | 264 | 96 to 216 excess |

# Poll

Open ended question: Are there other barriers or concerns we need to address?

# Cost Effectiveness and Energy Savings

## *Methodology and Assumptions*

- Energy Savings Methodology and Results
- Cost Impacts Methodology and Results
  - Incremental costs
  - Energy cost savings

# Preliminary Energy Savings Estimates - Per Pool

| Metric | NR and MF New Construction & Additions | NR and MF Alterations | SF New Construction & Additions | SF Alterations |
|---|---|---|---|---|
| Benefit-Cost Ratio Range (varies by climate zone and building type) | 1.2- 10.3 | 1.2- 10.3 | 0.5- 3.9 | 0.5- 3.9 |
| First-year Statewide Electricity Savings (GWh) | - | - | - | - |
| First-year Statewide Peak Electrical Demand Reduction (MW) | - | - | - | - |
| First-year Statewide Natural Gas Savings (million therms) | 0.8 | 7.2 | 1.5 | 3.3 |
| First-year Statewide Source Energy Savings (million kBtu) | 70 | 650 | 140 | 300 |
| First-year Statewide LSC Electricity Savings (million 2026 PV$) | - | - | 0 | 0 |
| First-year Statewide LSC Gas Savings (million 2026 PV$) | 40 | 380 | 170 | 380 |
| First-year Statewide Total LSC Savings (million 2026 PV$) | 40 | 380 | 170 | 380 |
| First-year Statewide Avoided GHG Emissions (Metric Tons CO2e) | 4,400 | 40,000 | 9,000 | 20,000 |
| First-year Statewide Monetary Value of Avoided GHG Emissions ($) | 550,000 | 4,900,000 | 1,100,000 | 2,500,000 |

**Key Assumptions:**

- Continuous heating for NR and MF
- Varied heating for SF
- Analyzed Indoor, Outdoor, Covered, Uncovered, Average and Olympic-sized pools

# Incremental Per 30,000 Gallon Pool Cost

*Over 30 Year Period of Analysis*

| Incremental First Cost | |
|---|---|
| Equipment and Installation | $5,250 |
| Commissioning | $0 |
| Other | $0 |

| Incremental Maintenance Cost | |
|---|---|
| Equipment Replacement | $5,250 |
| Annual Maintenance | $53 |

Cost data came from:

- CSI Thermal Program Solar Water Heating Database

Total incremental cost over 30-year period of analysis: **$8,713 ($2026 Present Value)**

# Incremental Per Olympic Pool Cost

*Over 30 Year Period of Analysis*

| Incremental First Cost | |
|---|---|
| Equipment and Installation | $139,214 |
| Commissioning | $0 |
| Other | $0 |

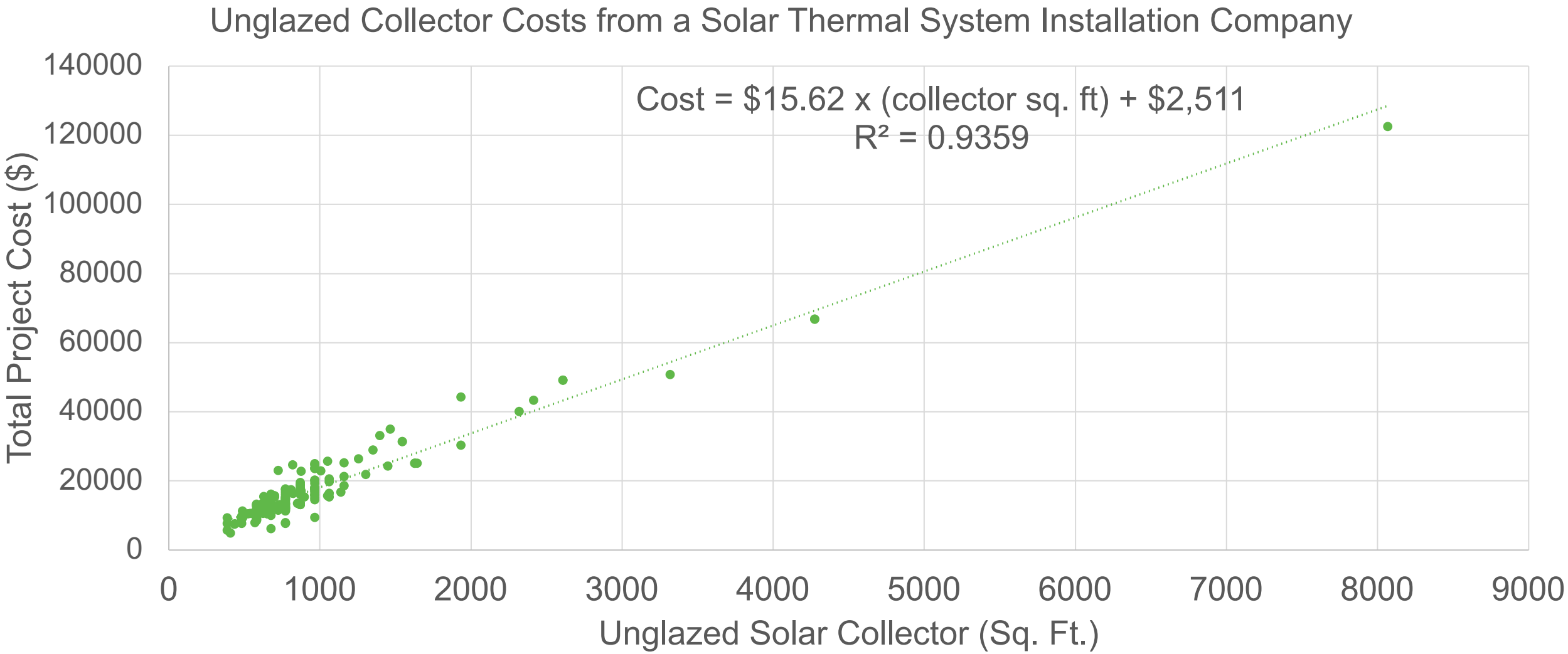
| Incremental Maintenance Cost | |
|---|---|
| Equipment Replacement | $139,214 |
| Annual Maintenance | $1,437 |

Cost data came from:

- CSI Thermal Program Solar Water Heating Database

Total incremental cost over 30-year period of analysis:
**$231,053 ($2026 Present Value)**

# CSI Thermal Solar Collector Project Costs



# MF and NR Cost Effectiveness

| Climate Zone | Nonresidential | | |
|---|---|---|---|
| | Benefits<br>Life Cycle Energy Cost Savings + Other PV Savings (2026 Present Value$) | Costs<br>Total Incremental PV Costs (2026 Present Value$) | Benefit-to-Cost Ratio |
| 1 | 38,284 | 18,786 | 2.0 |
| 2 | 99,740 | 18,786 | 5.3 |
| 3 | 63,681 | 18,786 | 3.4 |
| 4 | 125,875 | 18,786 | 6.7 |
| 5 | 74,100 | 18,786 | 3.9 |
| 6 | 75,320 | 18,786 | 4.0 |
| 7 | 78,738 | 18,786 | 4.2 |
| 8 | 117,385 | 18,786 | 6.2 |
| 9 | 120,703 | 18,786 | 6.4 |
| 10 | 123,466 | 18,786 | 6.6 |
| 11 | 111,074 | 18,786 | 5.9 |
| 12 | 104,567 | 18,786 | 5.6 |
| 13 | 118,059 | 18,786 | 6.3 |
| 14 | 134,192 | 18,786 | 7.1 |
| 15 | 150,548 | 18,786 | 8.0 |
| 16 | 102,804 | 18,786 | 5.5 |

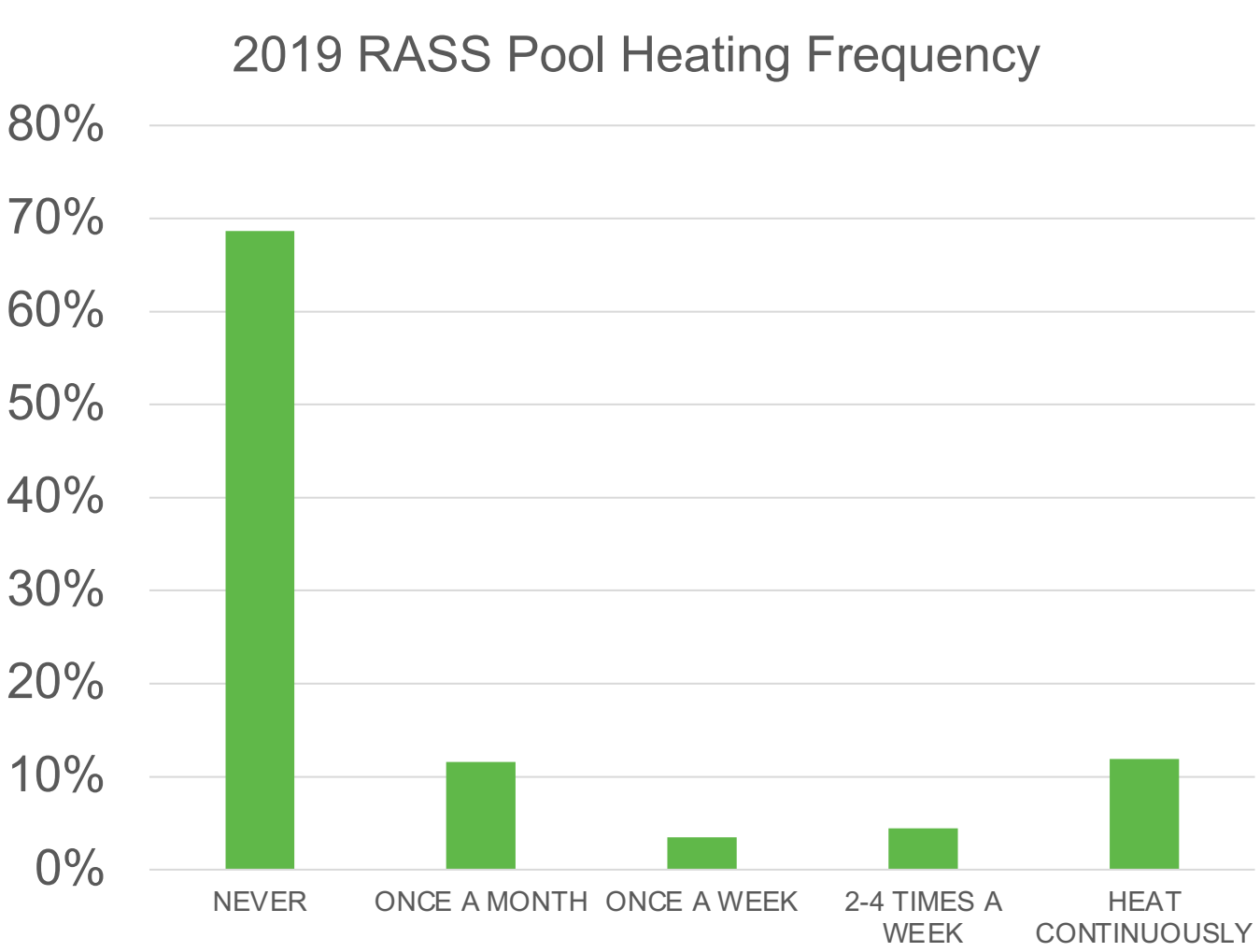
High baseline duty cycle due to continuous year-round heating leads to high BCR values.

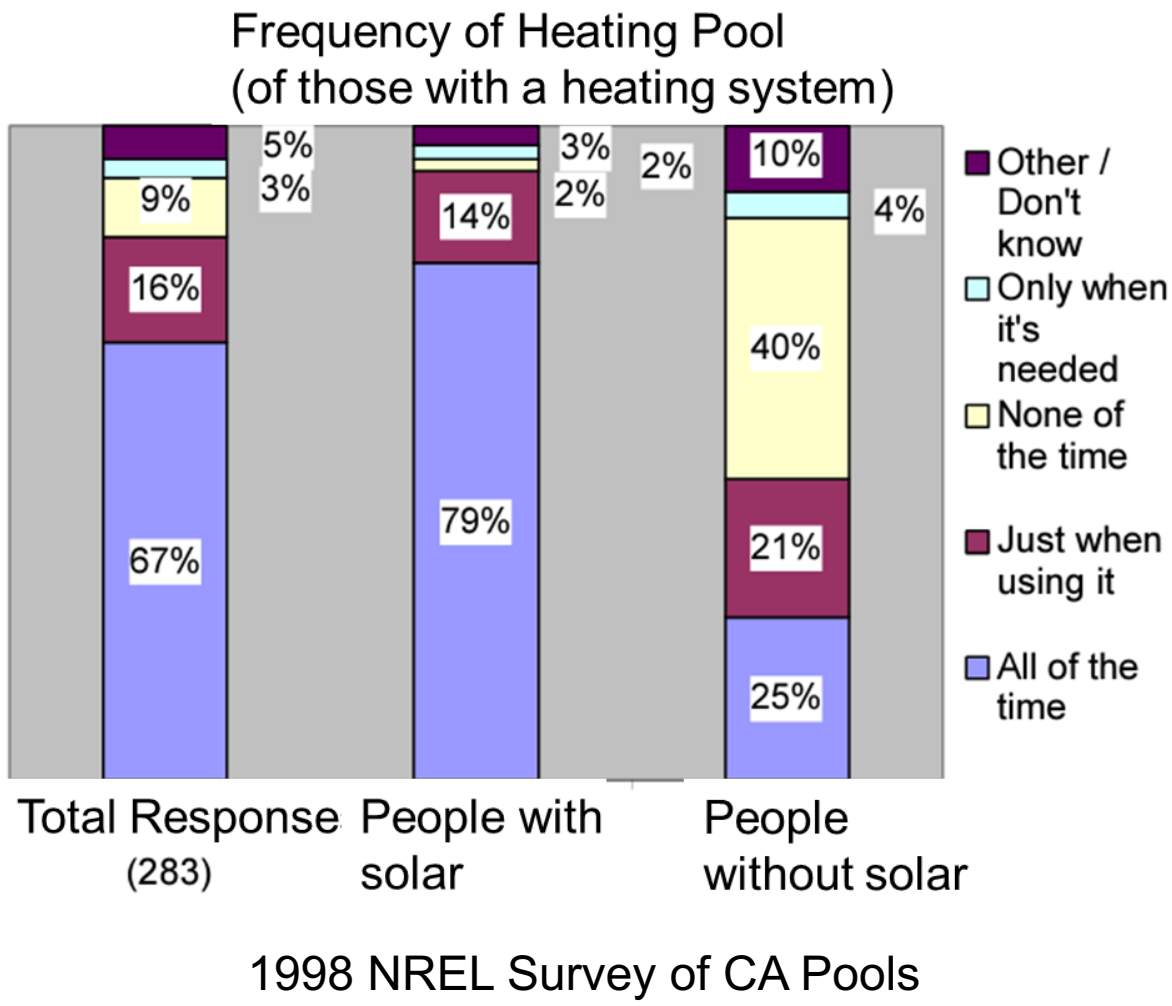
# SF Cost Effectiveness

| Climate Zone | Residential | | |
|---|---|---|---|
| | Benefits<br>Life Cycle Energy Cost Savings + Other PV Savings (2026 Present Value$) | Costs<br>Total Incremental PV Costs (2026 Present Value$) | Benefit-to-Cost Ratio |
| 1 | $ 4,692 | $ 8,713 | 0.5 |
| 2 | $ 22,036 | $ 8,713 | 2.5 |
| 3 | $ 10,707 | $ 8,713 | 1.2 |
| 4 | $ 25,525 | $ 8,713 | 2.9 |
| 5 | $ 10,306 | $ 8,713 | 1.2 |
| 6 | $ 12,547 | $ 8,713 | 1.4 |
| 7 | $ 11,665 | $ 8,713 | 1.3 |
| 8 | $ 22,011 | $ 8,713 | 2.5 |
| 9 | $ 22,093 | $ 8,713 | 2.5 |
| 10 | $ 28,555 | $ 8,713 | 3.3 |
| 11 | $ 29,028 | $ 8,713 | 3.3 |
| 12 | $ 26,181 | $ 8,713 | 3.0 |
| 13 | $ 32,254 | $ 8,713 | 3.7 |
| 14 | $ 29,703 | $ 8,713 | 3.4 |
| 15 | $ 31,713 | $ 8,713 | 3.6 |
| 16 | $ 12,179 | $ 8,713 | 1.4 |

- Low baseline duty cycle due to sporadic seasonal heating leads to lower BCR values.

# SF Pool Heating with Gas Heaters

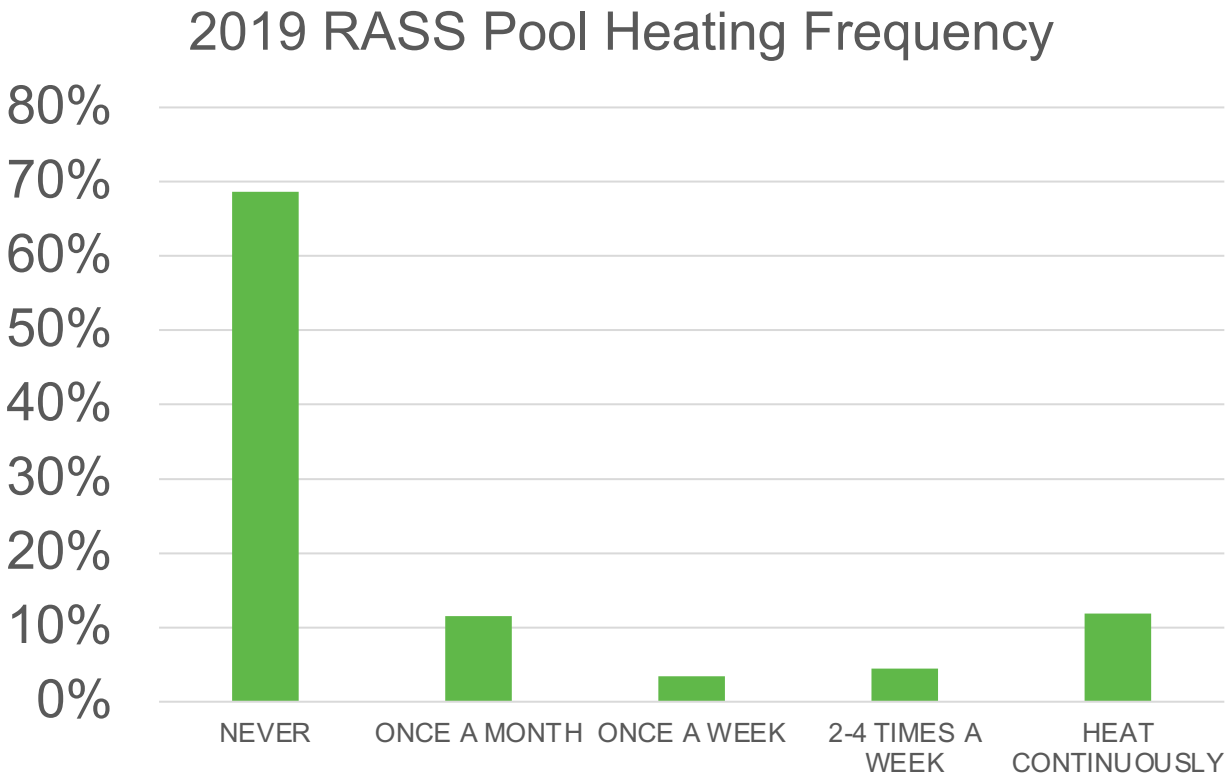


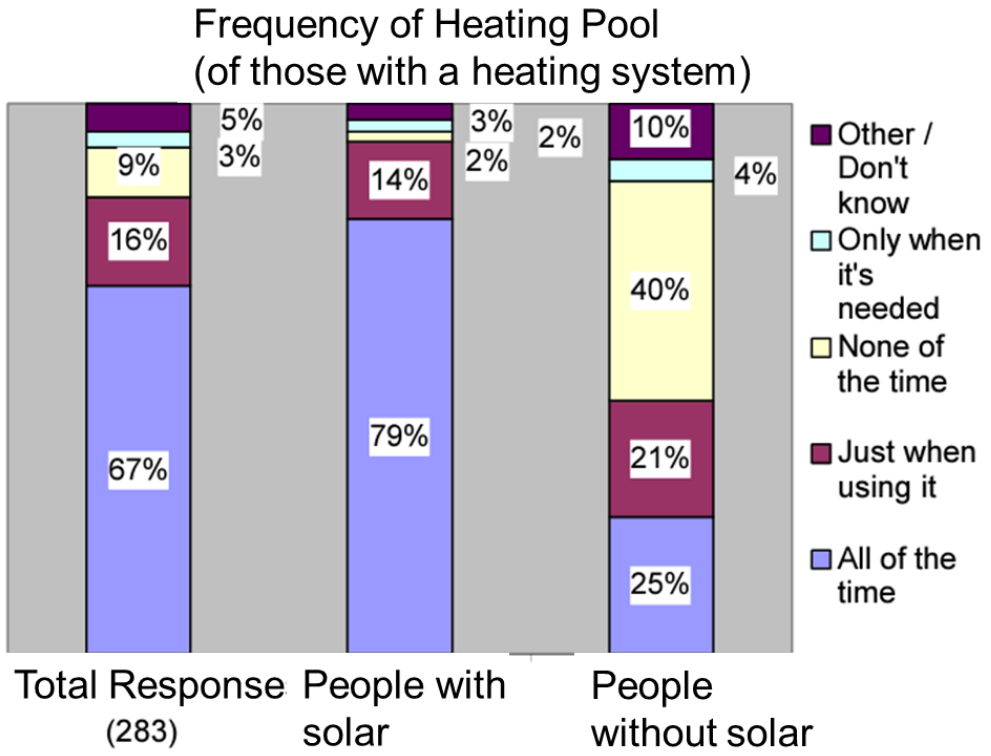




1998 NREL Survey of CA Pools

Most single-family pool owners with gas heaters do not to heat pools due to fuel cost

# Poll




Open ended answers: Tell us if your experience agrees or disagrees with how people heat their pools? Do people with gas heaters use them a lot, somewhat or not really?

# Statewide Impacts

***Methodology and Assumptions***

- Statewide Energy Impacts Methodology and Results

# Statewide Energy Impacts Methodology

The Statewide CASE Team estimates annual statewide impacts by multiplying **A x B x C**:

A. per-pool energy impacts (discussed in previous section)
B. number of pool of new construction/additions/alterations of each applicable pool prototype
C. number of heated pool in each climate zone

**Example:**

Per Pool Impacts

| Savings type | Savings per pool |
|---|---|
| Electricity | [X] kWh |
| Peak demand | [X] Watts |
| Natural gas | [X] Therms |
| GHG emissions | [X] Tons $CO_2e$ |

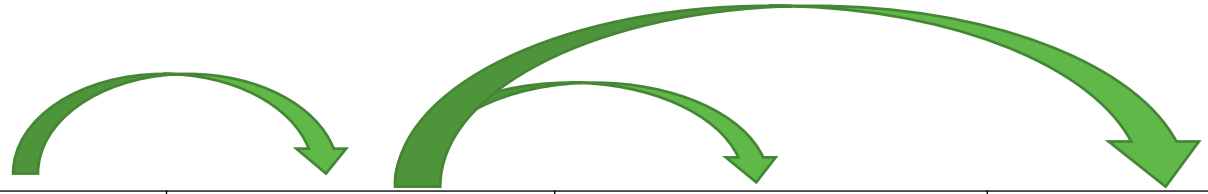
Affected New Construction

| Climate Zone | NR Outdoor | NR Indoor |
|---|---|---|
| 1 | 100 | 20 |
| 2 | 1,000 | 1,500 |
| … | | |
| 16 | 5,000 | 3,000 |

Statewide Energy Impacts

| Climate Zone | Gas Savings (Therms) | … | GHG savings (MT $CO_2e$) |
|---|---|---|---|
| 1 | 20 | | 1,500 |
| 2 | 50 | | 3,000 |
| … | | | |
| 16 | 100 | | 2,000 |

# 2026 Pool Forecast



| Statewide Values | 2026 Total Pools | 2026 Heated Pools | 2026 Outdoor Heated Pools | 2026 Indoor Heated Pools |
|---|---|---|---|---|
| Residential Pool Stock 2026 | 1,390,064 | 834,038 | 834,038 | 0 |
| Residential Pool New 2026 | 13,901 | 8,340 | 8,340 | 0 |
| Residential Pool Alteration | 124,113 | 74,468 | 74,468 | 0 |
| Motel Pool Stock 2026 | 43,423 | 43,423 | 26,488 | 16,935 |
| Motel Pool New 2026 | 434 | 434 | 265 | 169 |
| Motel Pool Alteration 2026 | 3,877 | 3,877 | 2,365 | 1,512 |
| Olympic Pool Stock 2026 | 2,061 | 2,061 | 1,257 | 804 |
| Olympic Pool New 2026 | 21 | 21 | 13 | 8 |
| Olympic Pool Alteration 2026 | 184 | 184 | 112 | 72 |

Analysis splits California pools into categories to illustrate impact of various conditions

# Poll

Open ended answers: What changes to the proposal would you suggest to improve cost-effectiveness for pool owners or help solar thermal system installers?

# Discussion and Next Steps

# We want to hear from you!

- Provide **any last comments or feedback** on this presentation now verbally or over the GoTo Webinar Questions Pane
- More information on pre-rulemaking for the 2025 Energy Code at https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2025-building-energy-efficiency

**Comments on this measure are due by June 7, 2023.** Please send comments to info@title24stakeholders.com and copy CASE Authors (see contact info on following slide).

# Thank You

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