Technical Specification Development for CBECC Enhancement

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Energy Solutions Presenters: Bryan Boyce, Shaojie Wang, Alamelu Brooks, Sean Steffensen, Alonzo Ovalle, Rezvan Mohammadiziazi

CALIFORNIA ENERGY CODES & STANDARDS

A STATEWIDE UTILITY PROGRAM

Agenda

1. Introduction
2. CBECC Software enhancement workflow (5 min)
3. Gather feedback via survey on new and in progress topics (30 min)
4. Submit CBECC enhancement ideas using the idea intake form (5 min)

2. Workflow Website

4. Idea Intake Form



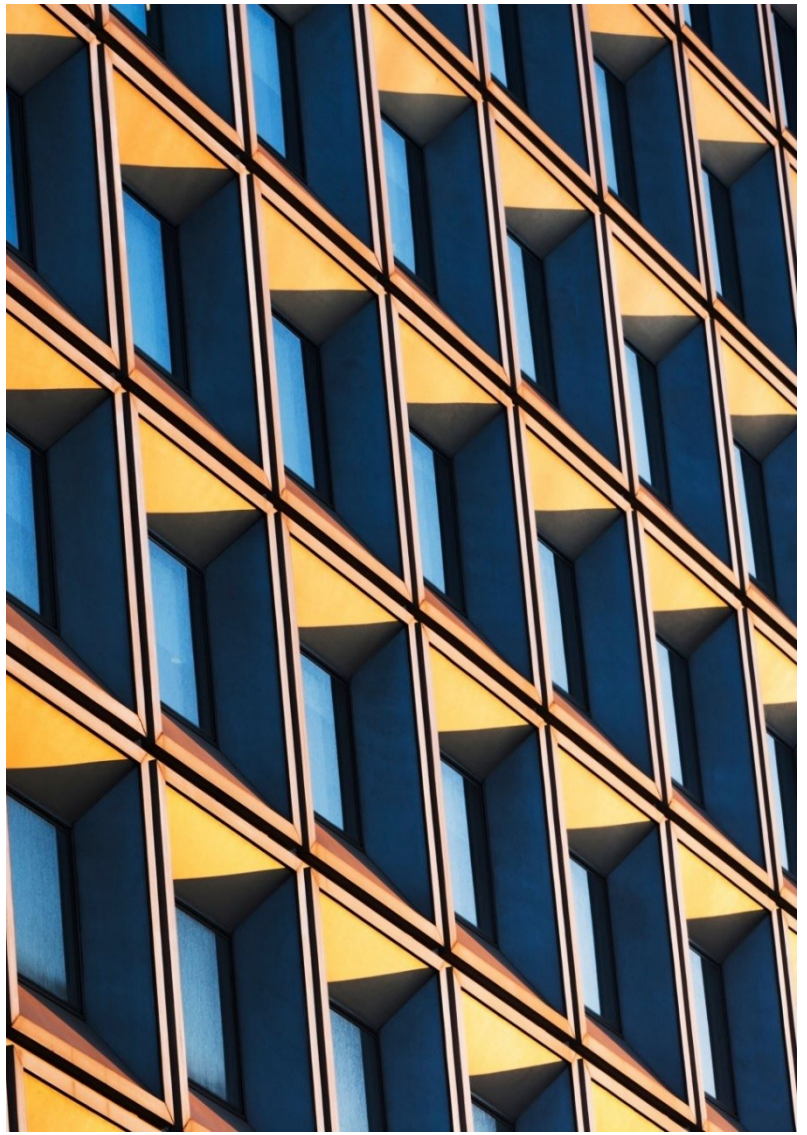
CBECC Software Enhancement Mission

Our goal is to increase the usability, accuracy, and capabilities of CBECC and California building-energy-modeling tool

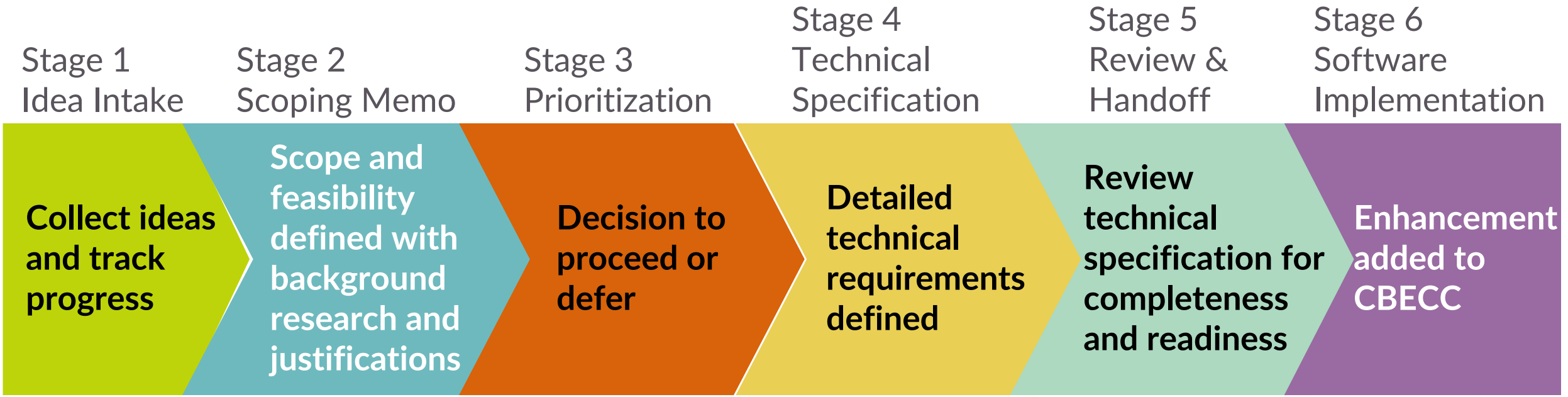
Led by Energy Solutions, California Investor-Owned Utilities and CALBEM Working Group 3

Why enhance CBECC?

- Improve Usability & Workflow
- Expand Modeling Capabilities
- Improve Modeling Accuracy
- Align with Industry Practice
- Expand Evaluation Metrics

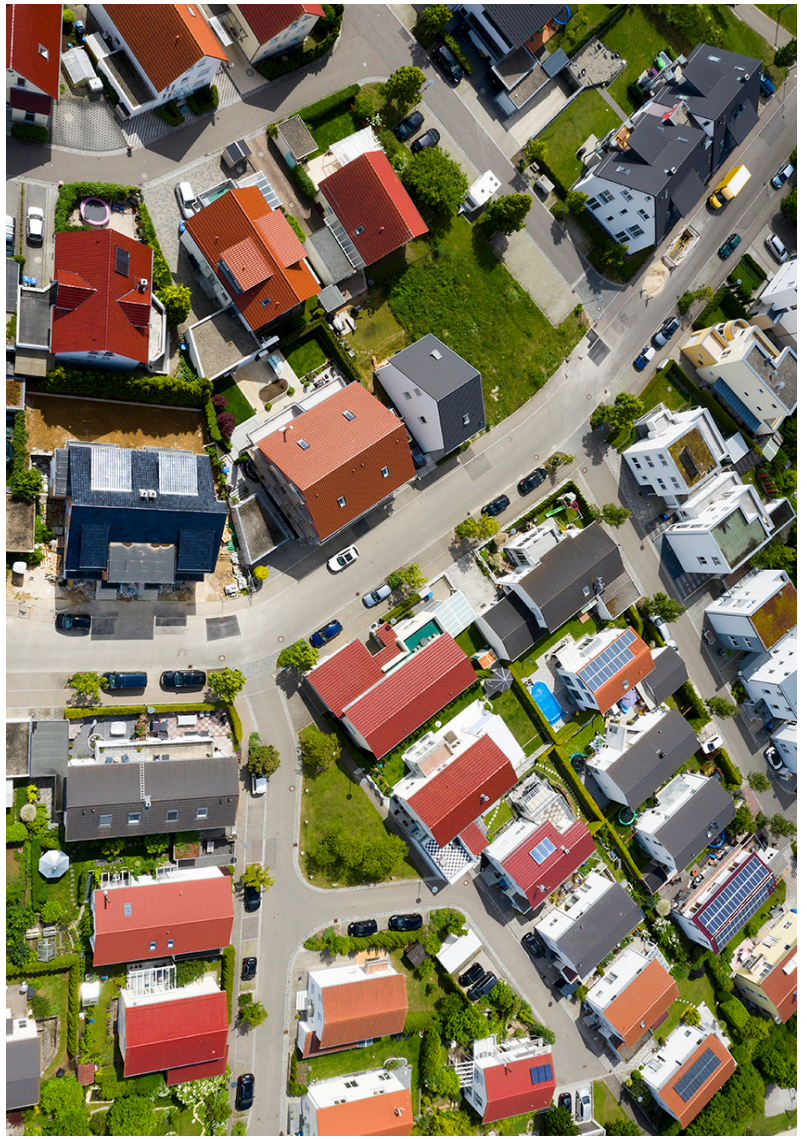


CBECC Software Enhancement Workflow



Review of Recent Initiatives

- We want your input.
- Measures presented in these categories
  - Improve Usability and Workflow
  - Expand Modeling Capabilities
  - Improve Modeling Accuracy
  - Align with Industry Practice
  - Expand Evaluation Metrics
- *How important is this proposal for you?*
- *What would you suggest so each measure leads to software, technology or documentation that is more usable, accurate, or capable?*
- *Provide inputs to us via comments at the meeting and in the paper forms we are distributing*



Improve Usability and Workflow (5 min)

Make CBECC easier and more useful to practitioners

Proposals

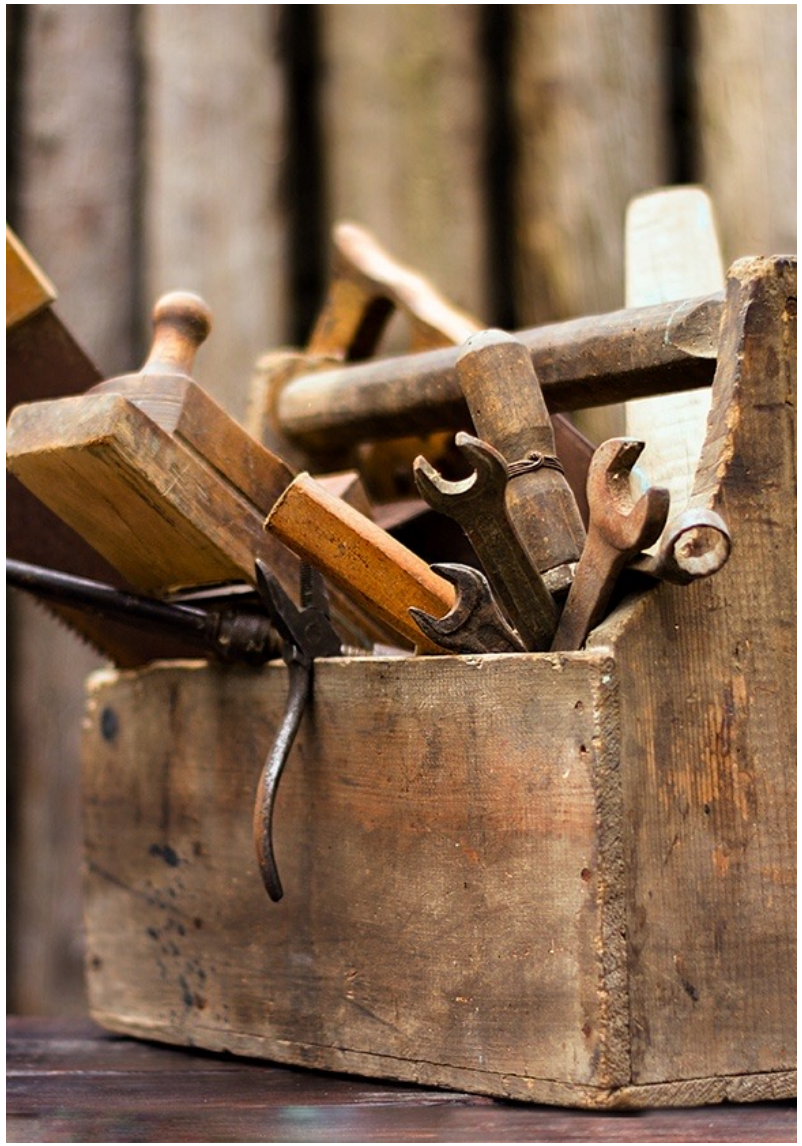
1. Suites of Measures
2. Manage Alternatives Using epmacro or openstudio
3. Error Explanations
4. Insulated Headers and Quality Insulation Installation



Expand Modeling Capabilities (8 min)

Identify and add building system, technology, or strategy so that it can be modeled in CBECC and/or the underlying EnergyPlus implementation.

5. Air to Water Heat Pump for Both Heating and Cooling
6. Wind Responsive Controls for Laboratories
7. Ground Heat Exchanger
8. Phase Change Materials
9. Laundry Facilities
10. DHW Distribution and Plant Modelling for Multifamily Buildings



Improve Modeling Accuracy (10 min)

Improve assumptions, controls, or algorithms to better represent real equipment or operation

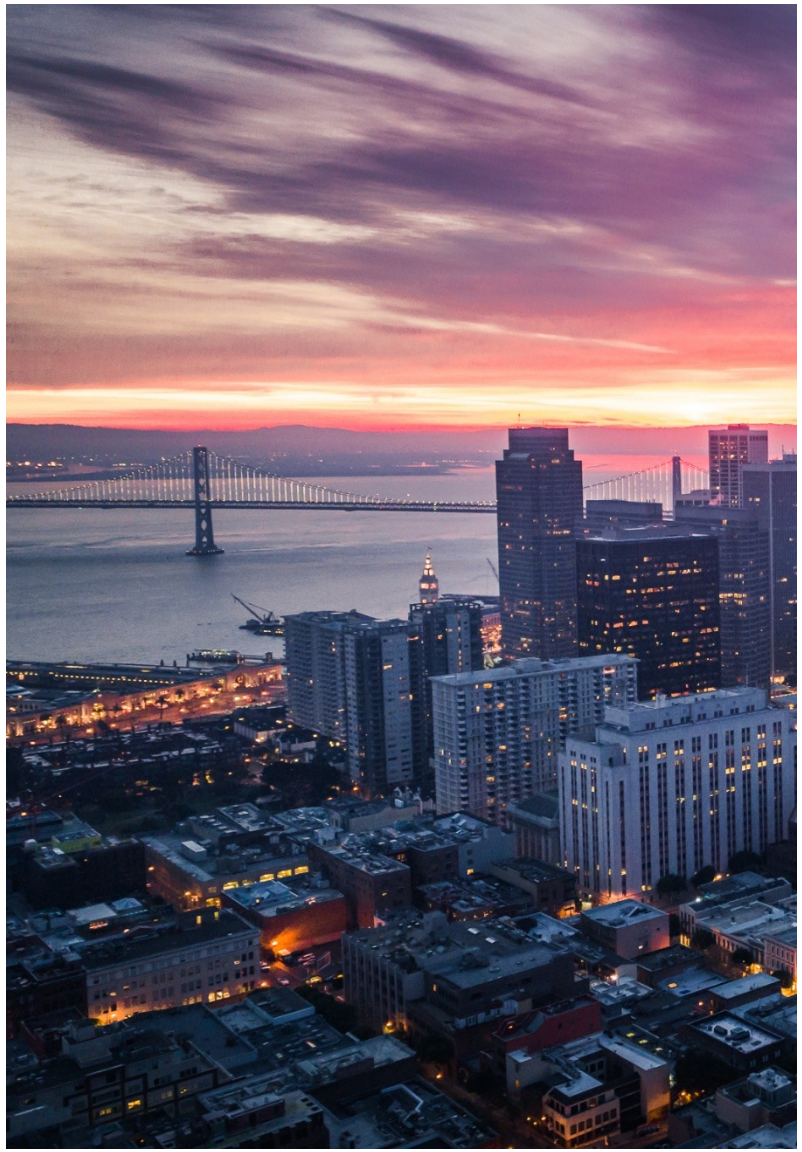
11. Tiered performance curves for NEEP and NEEA
12. Air-Cooled Chiller Performance Curves
13. Air-to-Water Heat Pumps and Glycol Modeling
14. Precooling and preheating hotel thermostat setting
15. Expanding JA13 to Central Heat Pump Water Heaters in MF Buildings
16. Cooling-Mode Bypass for Heat Recovery Ventilator Systems
17. Updated Equivalent R-Values for Buried Ducts
18. Improvement of HPWH Ventilation Modelling in CBECC



Align with Current and Emerging Industry Practice (2 min)

Align with trends occurring in National Model Codes

19. ASHRAE G36 Controls



Expand Evaluation Metrics (3 min)

Expand basis on which design are evaluated

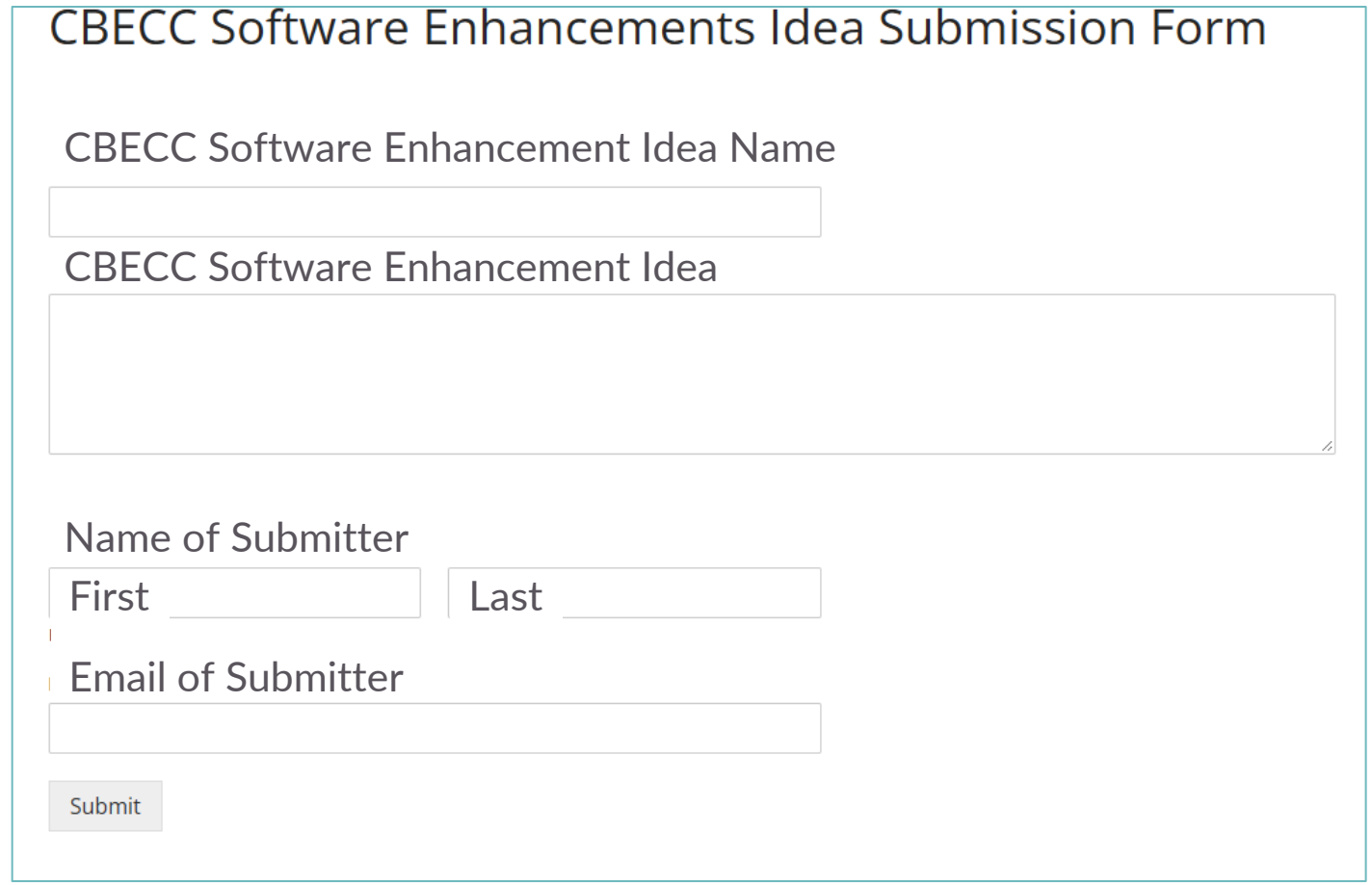
20. Add Water Cost to Long-term Systemwide Cost Analysis
21. Add Water Distribution Energy Consumption Analysis



CBECC Idea Submission Intake Form

- Submit your ideas (proposer can be lead author if they'd like)
- What is difficult to model today?
- Where are results not accurate enough?
- What would make CBECC more useful?

Idea Intake Form



Thank You

Sean Steffensen
ssteffensen@energy-solutions.com
510.482.4420 x448

Workflow Website

Idea Intake Form

Improve Usability and Workflow



1. Suites of Measures

- Summary: Allow packages of efficiency measures to be applied to CBECC model.
- Benefits: Provide designers with tools similar to OpenStudio, ResStock or ComStock.

2. Manage Alternatives Using epmacro/ openstudio

- Summary: Allow CBECC to handle design options. Quickly switch between and compare options.
- Benefits: Provide designers with tools to more quickly evaluate alternative designs.

3. Error Explanations

- Summary: Improve the clarity and completeness of error explanations in the CBECC output when the user makes a modeling error and in the case of non-fatal errors to continue to run to completion when possible
- Benefits: Help users identify and correct issues in the compliance model more efficiently rather than as an iterative process

4. Insulated Headers and Quality Insulation Installation (QII)

- Summary: Increase residential adoption of QII through a simplified path without insulated headers. Other QII requirements remain while providing reduced compliance credit.
- Benefits: Improve QII adoption, reduce energy use and strengthen building resiliency.

Expand Modeling Capability



5. Air to Water Heat Pump for Heating and Cooling

- Summary: Add cooling operation to CBECC for AWHP
- Benefits: Improve the accuracy of Title 24 compliance simulations, better represent commercially available AWHP systems, and further support California's building electrification goal

6. Wind Responsive Fan Controls

- Summary: Model the fan control strategies that reflect the energy performance of common laboratory exhaust fan control approaches, including wind responsive control.
- Benefits: Provide designers with options to pursue performance method

7. Ground Heat Exchanger

- Summary: Add ground source heat exchanger to CBECC and ACM Reference Manual to clarify implementation
- Benefits: More uniform modeling without need for workarounds

8. Phase Change Materials

- Summary: Add phase change materials to CBECC and ACM Reference Manual to clarify implementation
- Benefits: More uniform modeling without need for workarounds

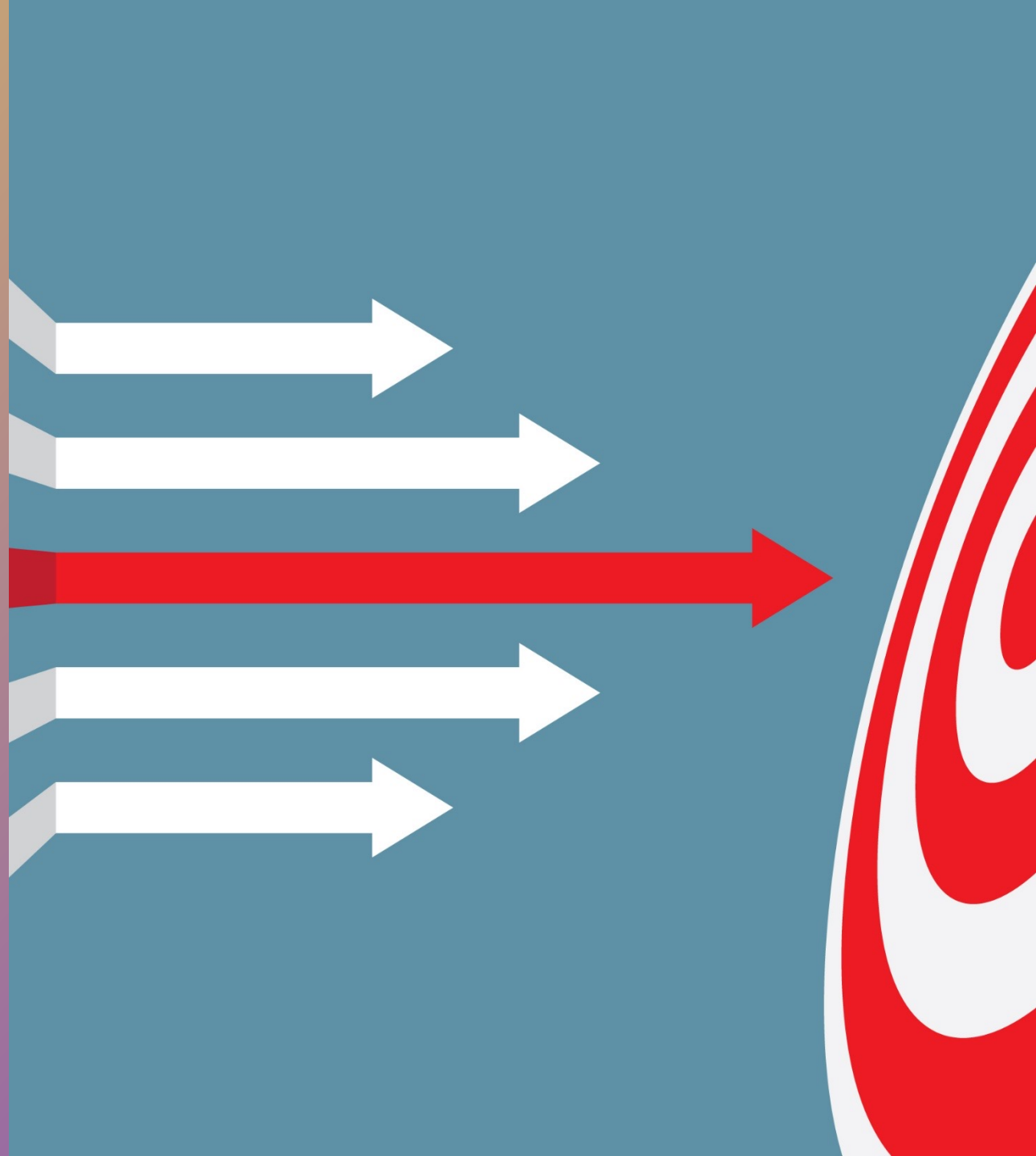
9. Laundry Facilities

- Summary: Enable on-premise laundry facilities at non-residential projects
- Benefits: Adding a significant load would improve modeling of projects

10. Enhance Domestic Hot Water Distribution and Plant Modelling for MF Buildings

- Summary: support single-loop, multi-loop, and riser-based systems, along with user-defined or engineered pipe characteristics, operating controls, and plant interactions
- Benefits: Reduce reliance on adjustment factors while supporting existing and future efficiency measures, including insulation, balancing valves, compact distribution, and recirculation pump control.

Improve Modeling Accuracy



11. Tiered Performance Curves Based on NEEP/NEEA

- Summary: Replace generic assumptions with documented and verifiable performance tiers
- Benefits: Give higher performing heat pumps compliance credit for low load efficiency and cold weather capacity

12. Air-Cooled Chiller Performance Curves

- Summary: Update performance curves to more modern characteristics
- Benefits: Better prediction of part load performance

13. Air-to-Water Heat Pumps and Glycol Modeling

- Summary: Model glycol concentration, evaluate chilled water loop heat pump objects and update interfaces
- Benefits: Expand existing measures to better align modelled performance with real-world systems.

14. Precooling and preheating thermostat settings

- Summary: Adopt DOE hotel prototype thermostat schedules for hotel and motel rooms.
- Benefits: More realistic schedules could improve predictions of energy use, peak demand, and operating costs.

15. Expanding JA13 to Central Heat Pump Water Heaters in Multifamily Buildings

- Summary: The methodology would represent thermal loads, storage availability, temperature setpoints, equipment staging, load-up and load-shed sequences, and heater lockout controls
- Benefits: Enable compliance credits for qualifying projects, support bill savings and grid stability, and encourage adoption of advanced central heat pump water heater controls.

16. Cooling-Mode Bypass for Heat Recovery Ventilator Systems

- Summary: Gain single-family bypass option for HRV and ERV systems equipped with economizers.
- Benefits: More accurate cooling-demand modeling and consistency with MF and NR capabilities.

17. Updated Equivalent R-Values for Buried Ducts

- Summary: Update buried duct R-values from research-based values and temperature-dependent calculations.
- Benefits: Improved compliance modeling accuracy.

18. Improvement of HPWH Ventilation Modelling in CBECC

- Summary: Account for real world installations of HPWH in SF and impacts on equipment ventilation and performance.
- Benefits: Allow compliance credit for projects that perform better than T24 mandatory minimum requirements.

Align with Current and Emerging Industry Practice



19. ASHRAE Guideline 36 Controls

- Summary: Develop improved EMS programs for SAT reset and other control sequences.
- Benefits: Be able to more accurately model advanced control sequences of operation.

Expand Evaluation Metrics



20. Water Cost to Long-term Systemwide Cost Analysis

- Summary: Add HVAC water consumption costs consistent with T24 methodology
- Benefits: Recognize systems with significant water consumption and credit systems that reduce or eliminate HVAC related use.

21. Water Distribution Energy Consumption in CBECC

- Summary: Add water distribution energy consumption consistent
- Benefits: Recognize systems with significant water consumption and credit systems that reduce or eliminate HVAC related use.