

CalBEM Mid-term Planning Process

Final Report
October 2021

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Prepared for: SCE and the CalBEM Steering Committee

Summary

This draft report describes what we learned during the California Building Energy Modeling (CalBEM) mid-term planning process. During the planning process, we solicited feedback from relevant stakeholders via a Stakeholder Brainstorming Workshop, a CalBEM Steering Committee meeting, and individual interviews. The primary goals included the following:

- Anticipate stakeholder expectations to help the Planning Team prepare support activities in advance.
- Revise CalBEM’s mission statement into a “Purpose Statement” that helps others understand the value that CalBEM adds to the BEM ecosystem.
- Revise CalBEM’s “About Statement” to better communicate to BEM stakeholders.
- Help CalBEM move from a year-to-year planning approach to longer term approach.
- Clarify CalBEM purpose and core areas of work.
- Identify topics for Working Groups to support.

The Mid-term Planning process was not a consensus-finding activity. Thus, information presented in this report aims to reflect the opinions voiced by various stakeholders but does not necessarily represent consensus positions or specific opinions by 2050 Partners, SCE, or the Planning Committee.

Based on the feedback, we present recommended updates to the “Purpose” and “About” statements, suggested working group ideas, and provide a description of “the landscape” for BEM in the next three years. Excerpts from this report can be presented to the Working Groups at the CalBEM 2021 symposium. The Appendix describes the planning process in more detail and expands on the stakeholder feedback.

Revised Purpose and About Statements

Below are draft purpose and about statements to be posted on the [CalBEM public site](#) after review and approval by the group.

Purpose:

CalBEM's purpose is to empower California's building energy modeling (BEM) community to identify, explore, and prioritize the challenges they share, and then support solutions to those challenges to help to promote low-carbon buildings.

About:

CalBEM convenes representative voices in the building energy modeling (BEM) field to identify and collaborate on BEM improvements related to building energy codes and building performance. Participants meet throughout the year via Working Groups and at an annual event. CalBEM is sponsored by Southern California Edison on behalf of California utilities.

Working Group Goals

CalBEM has a lofty purpose, achieved through the on-the-ground efforts of working groups. Working groups are structured to work on the following three goals, which remain appropriate for the mid-term planning period.

1. **Streamline & Simplify Processes:** Provide a statewide framework that allows single energy models to be used for:
 - o informing energy design decisions,
 - o compliance with CA Energy Code and local Reach Codes, and
 - o applying for public customer incentive programs and certifications.
2. **Educate Users:** Support California's long-term climate action goals by encouraging, training, and educating on the use of BEM tools.
3. **Improve Capabilities & Accuracy:** Accelerate the introduction of new simulation capabilities into BEM tools while increasing simulation accuracy.

Landscape

CalBEM is part of an ecosystem of organizations in a rapidly changing field. The planning process gave us an opportunity to look at changes in BEM over the coming three years – related to the field of BEM, to regulatory changes in California, and to organizations working on these issues.

Landscape of What's Changing in the Field and in California

To inform refinements to the CalBEM purpose statement and proposed Working Group activities, we asked participants in the mid-term planning to reflect on "Important changes that will affect CalBEM in the next few years." As described in the Process and Input Detail Appendix, three areas rose to the top:

- BEM increasingly used to forecast energy demands when sizing solar and storage systems.
- Additional software functionality required to keep pace with the changing demands of the public and the evolution of the energy grid and building technologies.
- Private BEM software granted a pathway to implement rulesets for Title 24 whole-building performance compliance.

The Planning Team also received input on CalBEM activities to respond to these three areas. Examples included:

- Communicate with software vendors and the CEC about how these features are designed/specified and implications for modeling.
- Outline quality control steps for modeling newer measures (e.g., battery storage) to avoid modeling accuracy issues.
- Facilitate dialogue between software developers, practitioners, and CEC to identify challenges related to private compliance software.
- Solicit feedback from BEM practitioners on their pain points and support them in the software development and regulatory processes.
- Monitor how IES-VE takes the design-oriented model and turns it into a compliance-oriented model (now that it has been approved for compliance).
- Support CBECC and other BEM software to incorporate and utilize energy rate structures for various calculations (e.g., calculating utility costs with various PV sizes under current utility rate structures and recommending larger PV sizes than code minimum where appropriate).

Additional suggested activities that fall outside of the top three changes identified by the brainstorming group include:

- Clarify CalBEM's position on inclusive attendance and better define the stakeholder groups who are to be represented.
- Provide technical support and infrastructure to assist the CEC with reviewing Compliance Options (Comp Op) requests.
- Provide help with updating the ACM, developing CASE Report sections for ACM updates, and/or provide training materials.
- Work to facilitate connections and coordination between Title24Stakeholders, CalBEM, and EnergyCodeAce to some degree.
- Consider areas to support the CEC in the period before new software is developed, including existing efforts to improve workflows and consolidate technical documents, and processes.

Landscape with Many Active Organizations

Multiple organizations (many of which are listed on the [CalBEM Resource Hub](#)) work on building energy modeling. CalBEM should complement (rather than duplicate) the effort of

similar organizations and support the work of regulatory groups such as the California Energy Commission and the California Public Utilities Commission. Table 1 shows some organizations that work on BEM in California and the efforts they work on. The table reflects input from stakeholder interviews, as described in the Stakeholder Interviews section of the appendix.

Table 1. Illustrative table to show that CalBEM is one of many organizations working on BEM.

Organization	Primary Functional Goals						Primary Functional Areas		
	Education / Networking	Project Funding	Membership Organization	CA Code Devel. / Advocacy	BEM R&D	Software Development	California	Building Code Compliance	Building Design
CA Energy Commission	X	X		X		X	X		
CA Public Utilities Commission*	X*	X*		X*			X	X*	
CA Utilities: Energy Code Ace	X						X	X	
CA Utilities: Title 24 Stakeholders	X	X		X			X	X	
CA Utilities: CalBEM	X	X					X	X	
CABEC	X		X	X			X	X	
IBPSA-USA	X		X	X			**	X	
ASHRAE	X	X	X		X			X	
DOE Building Tech Office		X			X			X	
National Labs					X	X		X	
Private Software Companies					X	X		X	

*Includes work conducted by IOUs with CPUC oversight

**CA-focused subcommittee

Note: assignments are not exact in all scenarios and are meant to reflect major roles.

Acronyms: CA = California; CABEC = California Association of Building Energy Consultants; CalBEM = California Building Energy Modeling; DOE = U.S. Department of Energy; IBPSA-USA = International Building Performance Simulation Association, USA regional affiliate; ASHRAE = American Society of Heating, Refrigerating and Air-Conditioning Engineers

CalBEM members should keep this landscape in mind when developing Working Group activities. CalBEM’s leadership (e.g., Steering Committee, Planning Committee, Working Group Co-chairs) is designed with the goal to support these synergies. For example, Steering Committee members and Working Group leads are active with many of the organizations active in building energy modeling and can provide input links to the above organizations.

CalBEM Functions in this Landscape

To help CalBEM compliment the other organizations in the existing landscape, we asked participants in this planning process to reflect on what CalBEM should and should not do. The results of this discussion are summarized in three topic sections below.

CalBEM can (and should) be nimble

- Provides a neutral forum for groups relevant to California BEM to stay interconnected and moving in the same direction.
- Gets the right people in the room to understand the problems and find solutions.
- Leads with the idea and the “why,” then tries to find the right people to act.
- Is NOT overly prescriptive or an advocate for ways things should be done.

CalBEM is an important forum for collaboration

- Brings regulators, developers, researchers, and modelers together to foster a common understanding of not only what others are working on, but also of the concerns and priorities of other BEM groups.
- Provides a centralized feedback hub where regulators and others have an opportunity to get input on modeling-specific questions.
- Strengthens ties between institutions that wouldn’t otherwise cross paths often to help reduce duplicative efforts.
- Provides a framework for the community to coordinate and pool resources (e.g., funding, connections, special expertise, tools, participation in regulatory proceedings) towards common goals.

CalBEM helps existing organizations play to their strengths

- Rather than jumping in to fill gaps in BEM, the CalBEM working groups and funding structure facilitates work to understand what gaps exist and why, with the goal of helping existing organizations refine and/or magnify BEM efforts.
- CalBEM does not pursue:
 - Endorsement of any commercial products or entity.
 - Development of original training or education.
 - Lobbying for legislative changes to code mandates (e.g., Warren-Alquist Act).

Appendix: Process and Input Detail

This appendix provides a summary of the mid-term planning process, including:

- The project overview
- Feedback from the Brainstorming Workshop and Steering Committee discussions
- Background on stakeholder interviews and common themes
- Input used for BEM landscape institutional mapping

Project Overview

CalBEM's 2021 Mid-term Planning project was requested by SCE and conducted from March through November 2021. The project was led by a Planning Team including 2050 Partners (Elise Wall, Jenn Fox, and Alex Chase), with the following goals:

- Anticipate stakeholder expectations to help the Planning Team prepare support activities in advance.
- Revise CalBEM's mission statement into a "Purpose Statement" that helps others understand the value that CalBEM adds to the BEM ecosystem.
- Revise CalBEM's "About Statement" to better communicate to BEM stakeholders.
- Help CalBEM move from a year-to-year planning approach to longer term approach.
- Clarify CalBEM purpose and core areas of work.
- Identify topics for Working Groups to support.

The Planning Team received input via Stakeholder Interviews, a CalBEM Brainstorming Workshop, and in a Steering Committee meeting. The entire CalBEM stakeholder group was invited to participate in the CalBEM Brainstorming Workshop, and all Steering Committee members were invited to participate in individual interviews. Project outcomes included:

1. Identify and prioritize stakeholder expectations on a 3-year time horizon.
2. Consider support activities with CalBEM core areas to support mid-term opportunities.
3. Revise purpose and about statements to address common stakeholder questions about CalBEM.

One project tenet was that the discussion is as important as a final piece of paper. In that spirit, we summarize information from the brainstorming sessions and interviews below.

Summary Input from the Brainstorming Workshop

Below are questions that we discussed during the planning process related to building energy modeling changes in the next 3 years. What important change will affect BEM in California in the next three years?

1. What changes in the field of BEM will be most influential in the coming 3-years?

In the Brainstorming Workshop, we asked participants to share what they viewed as the most important changes. Participants submitted responses via the chat. The changes were discussed, and a few ideas were combined (as shown below in Table 2). The ideas were then “upvoted” to result in a prioritized ranking. The following presents priority-ranked results for each change in the landscape.

Table 2. Important changes in the BEM landscape as reported by the Midterm Planning brainstorming group.

Important changes that will affect CalBEM in the coming three years	Priority Votes
Private engine and ruleset implementations for Title 24 compliance.	10
BEM being used more and more to informing actual energy use and needs for sizing PV, battery, storage etc.	8
Decarbonization, renewable energy and battery storage systems for Non-Residential. Demand Flexibility: sub-hourly simulation need.	5
Improved demand modeling will become important as EV's, batteries, and load controls proliferate. Next 3 years: on-site and off-site renewable energy requirements, and how that integrates with the energy model and 24/7 zero carbon requirements	2
Industry starting to care about carbon emissions.	1
2022 Code is shaking things up.	1
CEC is focusing on GHG friendly measures, such as HPWH, Central HPWH, etc.	1
CEC's focus has been changed from Residential to Non-Residential.	1
More accurately capture monetary benefit to homeowner and building owner (or energy bill payer).	1
Shift from individual savings (kWh, kW, therms) to Total System Benefits for CPUC portfolio assessment	1

The top three ideas were discussed and refined by the Planning Team and Steering Committee.

Participants in the planning process were also asked to identify CalBEM core activities to help the group maintain focus on core work areas. Table 3 below shows results from the discussion of “What CalBEM should and shouldn’t do” from the Brainstorming meeting.

Table 3. Ideas from the brainstorming session on what CalBEM should and should not do.

CalBEM should:	CalBEM should not:
Convenes BEM relevant groups and stakeholders to coordinate ideas	Endorse any commercial products or entity.
Harmonize and enhance BEM, and freely share our BEM tools and knowledge	Develop code change proposals, software tools or modeling methodologies.
Organizes annual CalBEM Symposium	Provide training or education (done by utilities, CABEC, IBPSA, secondary education)
CalBEM provides a forum for modelers and SMEs to hear where problems or issues are and provide a mechanism for sharing their knowledge and experience on a particular subject.	Direct training related to code compliance (Energy Code Ace, CEC)
Convene public, private, and governmental groups working on energy modeling resources to align, advance, and prioritize their efforts.	Lobby for legislative changes to code mandates (e.g., Warren-Alquist Act)
Facilitates three Working Groups	Does not fill the gaps but helps facilitate those who do that work to understand what the gap is and why it must be filled.
Reduces duplicative inputs across modeling applications (such as code compliance, value engineering, and incentive programs) to simplify the modeling workflow.	
Work on identifying the gaps of the modeling industry as it applies to CA, but to do that, it needs to identify who does what and why.	
Bring different organizations and professionals together to understand different points of view, needs and priorities.	
Facilitate projects to enhance new simulation rulesets and technology specifications for consideration of use by IOUs, CASE teams, Programs, and CEC/CPUC.	
Provides a place for practitioners, who don't have time or resources to participate in regulatory proceedings, to have their concerns heard.	
Connect the CEC to the outside (national/international) world, to encourage collaboration in national standards and to aim to make life easier for practitioners and software developers who work both in California and other states.	
Recognize outstanding contributors in the field.	

Stakeholder Interviews

We conducted 12 interviews with 15 professionals working in the field. These individual interviews allowed for unbiased and critical feedback. We shared background on the mid-term planning project (e.g., that we're looking at the coming 3 years). We asked several open-ended questions, including:

1. What changes do you see important in BEM in the coming three years?
2. Is your organization planning any actions related to these or other changes affecting BEM in the next 3 years?
3. How is CalBEM defined in the eyes of stakeholders, in terms of what sorts of activities that CalBEM does and doesn't do?
4. Additionally, what can you share with our team about what your organization does and doesn't do?
5. Are there any other thoughts you'd like to share about CalBEM?
6. What can CalBEM improve or do better?
7. What organizations are working in this space and what activities are you/they planning in the next 3 years (which we should consider, complement and/or not duplicate)?
8. Are there any other thoughts you'd like to share about CalBEM?

We found that people value the group of people who participate in CalBEM. Interviewees noted that CalBEM participants are:

- Highly capable technical experts.
- Each representative of a larger group of BEM stakeholders in California.
- From a broad slice of the BEM community.

We also learned that different people have different ideas about what CalBEM does. When we asked about activities, some interviewees turned the question back to us, and shared their questions about the group, for example:

- *Who is the audience for CalBEM? For each working group?*
- *What's the scope of CalBEM? Is it an organization? A framework? A dream?*
- *What is the exclusivity of CalBEM participation? Would like more specifics on how the group is kept small and who is welcome to join. Does the answer conflict with the public mission of many members of the Steering Committee?*
- *Is CalBEM compliance-focused? It seems that way.*
- *Is CalBEM trying to uproot or change things?*

Common Themes

Below we share some themes and ideas that emerged across multiple interviews.

Focus is good

- Focuses on CA-specific BEM issues.
- Is a place to identify problems in CA building energy market and identify what that means to BEM stakeholders.
- Strives to keep CA BEM interconnected and moving in the same direction.
- Leads with the idea, then tries to find the right people.
- Gets the right people in the room to find solutions.

CalBEM can (and should) be nimble

- Keeps processes understandable and knowledge widespread.
- Humanizes the problem-solving process.
- Creates a neutral forum to discuss change.
- Is NOT overly prescriptive or an advocate for ways things should be done.

CalBEM is an important forum for collaboration

- Equips participants with the connections and tools to effect change at high levels.
- Fosters a common understanding of not only what others are working on, but also of the concerns and priorities of other BEM groups. Brings regulators, developers, researchers, and modelers together to escape the echo chamber of any one profession.
- Provides a centralized feedback hub where regulators and others have an opportunity to get input on modeling-specific questions.
- Strengthens ties between institutions that wouldn't otherwise cross paths often.
- Provides a framework for the community to coordinate and pool resources (e.g., funding, special expertise) towards common goals.

Building Energy Modeling Organizational Landscape

Stakeholder input on interview questions 2 and 4 helped us to develop a picture of the landscape of organizations working on building energy modeling and their functional goals and areas of expertise. Table 4, shown below, lists organizations active in Building Energy Modeling in the US. In the mid-term planning interviews, we also asked staff to share more the relationship of their work and CalBEM and have compiled the below list based on stakeholder interviews. In the future, this table could be used to track other institutional activities including institutional focuses on carbon emissions, industry standards, Residential vs Non-Residential, or New Construction vs Retrofit.

Table 4. Illustrative table to show that CalBEM is one of many organizations working on BEM.

Organization	Primary Functional Goals						Primary Functional Areas		
	Education / Networking	Project Funding	Membership Organization	CA Code Devel. / Advocacy	BEM R&D	Software Development	California	Building Code Compliance	Building Design
CA Energy Commission	X	X		X		X	X	X	
CA Public Utilities Commission*	X*	X*		X*			X	X*	X*
CA Utilities: Energy Code Ace	X						X	X	
CA Utilities: Title 24 Stakeholders	X	X		X			X	X	
CA Utilities: CalBEM	X	X					X	X	X
CABEC	X		X	X			X	X	
IBPSA-USA	X		X	X			**		X
ASHRAE	X	X	X		X			X	X
DOE Building Tech Office		X			X			X	X
National Labs					X	X		X	X
Private Software Companies					X	X		X	X

*Includes work conducted by IOUs with CPUC oversight

**CA-focused subcommittee

Note: assignments are not exact in all scenarios and are meant to reflect major roles.

Acronyms: CA = California; CABEC = California Association of Building Energy Consultants; CalBEM = California Building Energy Modeling; DOE = U.S. Department of Energy; IBPSA-USA = International Building Performance Simulation Association, USA regional affiliate; ASHRAE = American Society of Heating, Refrigerating and Air-Conditioning Engineers

The following is a *brief*, non-exhaustive, summary of each organization with respect to BEM in California:

- **The California Energy Commission (CEC):** drives work on Codes and Standards (development, compliance, enforcement, software) in California and is the authority for compliance-related software approvals, etc. for BEM in California.
- **The California Public Utilities Commission (CPUC):** confirms that ratepayer money is doing its job effectively; is working closely with the CEC.
- **Energy Code Ace:** strives to give people knowledge and resources to do their job related to code compliance; splits work equally between performance and prescriptive code; is not involved with BEM for incentive programs.
- **California Association of Building Energy Consultants (CABEC):** advocates for the needs of energy consultants in California; educates energy consultants and other key stakeholders; spreads knowledge and helps with networking; offers accreditation for the Certified Energy Analyst certificate, and advocates for it to be included where it makes sense; is most involved in California but open to assisting in other states.
- **International Building Performance Simulation Association, USA regional affiliate (IBPSA-USA):** advocates for the present and future interests of its members (currently majority BEM practitioners and software developers) on national and state levels; is most involved in California, with indirect involvement in other states; growing in education and information dissemination.

- **California Advocacy Committee:** advocates for compliance to add value to the high-performance design process; organizes the voices of selected BEM practitioners in California to find consensus opinions; is looking to establish a communication channel with the CEC.
- **California Utilities:** support funding for building codes advocacy (e.g., Title24stakeholders.com), compliance improvement (e.g., Energy Code Ace), CalBEM, and other research initiatives in the BEM space.
- **The US Department of Energy’s Building Technology Office (DOE BTO), BEM subprogram;** has a national focus, conducting “work in three key areas to continually develop innovative, cost-effective, energy-saving solutions: research and development, market stimulation, and building codes and equipment standards.”¹ California is able to leverage resources developed or funded by the BTO, including but not limited to model code compliance policy language and educational resources like BEMcyclopedia.
- **US National Labs:** coordinates together (PNNL, LBNL, NREL, ORNL, and ANL); are tied to DOE BTO for funding.
 - **LBNL** focuses on metrics, grid flexibility, and other areas.
 - **NREL:** maintains Energy Plus and Open Studio; thinks about grid flexibility and defining metrics.
 - **PNNL:** explores what codes could become and their cost-effectiveness; performs savings determinations for ASHRAE 90.1 (e.g., Standard 140) codes; researches ruleset implementations; contributes to software development (Energy Plus, etc.); evaluates impacts on the grid, building envelope performance, and other analyses for research purposes; contributes design assistance and audits for government buildings.
- **Private Software Companies** are creating quality new BEM tools that advance the status-quo.

¹ [“Key Activities in Energy Efficiency.”](#) 2021, About the Building Technologies Offices, U.S. Department of Energy.