

**BUILDING ENERGY EFFICIENCY MEASURE
PROPOSAL TO THE
CALIFORNIA ENERGY COMMISSION**

**FOR THE 2022 UPDATE TO THE
TITLE 24 PART 6 BUILDING ENERGY EFFICIENCY
STANDARDS**

EXPANDED EXCEPTIONAL DESIGNS

Administrative Update and Compliance Alternative

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EXECUTIVE SUMMARY

Introduction

This proposal presents recommendations to support California Energy Commission’s (Energy Commission) efforts to update the Title 24 Standards to include or upgrade requirements for various technologies in California’s Building Energy Efficiency Standards. The California Energy Alliance sponsored this effort. The goal of this proposal is to create a new administrative allowance that will result in cost-effective enhancements to energy efficiency in buildings. This report and the code change proposal presented herein is a part of the Energy Commission effort to develop technical and cost-effectiveness information for proposed regulations on building energy efficient design practices and technologies.

Scope of Code Change Proposal

Expanded Exceptional Designs will affect the following code documents listed in Table 1. This is an administrative update recommendation.

Table 1: Scope of Code Change Proposal

Standards Requirements (see note below)	Compliance Option	Appendix	Modeling Algorithms	Simulation Engine	Forms
10-104	New (Alternative to Performance or Prescriptive)		N/A	N/A	

Note: An (M) indicates mandatory requirements, (Ps) Prescriptive, (Pm) Performance.

Measure Description

The proposed measure will expand options available for use of the Exceptional Designs compliance mechanism to include novel compliance approaches. The administrative update would create a pathway for the Energy Commission to consider novel projects meeting certain requirements for compliance as an Exceptional Design. This option would be made available to nonresidential new construction only. In summary, should a project wish to construct a building that utilizes energy-saving strategies, technologies or approaches that do not align with the performance or prescriptive approaches, the proposed language modifications to Section 10-104 would allow that applicant to submit an application to the Energy Commission for consideration of its novel compliance approach assuming the project met a minimal set of mandatory and other requirements.

Market Analysis and Regulatory Impact Assessment

This proposal includes a voluntary alternative to existing requirements, and as such, cost-effectiveness considerations are not applicable. Building owners assume the cost of any proposed novel approaches and alternative components or processes to be used as part of project construction. Requirements pertaining to use of certain mandatory equipment and strategies has already been deemed cost effective under previous Energy Standards

development activities. In addition, should a project choose to pursue a novel compliance approach, our proposal would require that the building that use 10 percent less energy than one designed according to the performance compliance approach. Thus, overall, this proposal increases the wealth of the State of California. California consumers and businesses save more money on energy than they do for financing the efficiency measure. As a result this leaves more money available for discretionary and investment purposes.

The CEA estimates that this alternative will be utilized sparingly during the first twelve months of implementation. As such statewide energy impacts during this time period, in the context applied typically as part of code change proposal, is not applicable.

Acceptance Testing

Acceptance test requirements for demand management control systems complying with Section 110.12 will be required. These requirements are unchanged from those contained in the 2019 Energy Standards.

1. INTRODUCTION

The California Energy Alliance sponsored this effort. The goal is to prepare and submit proposals that will result in cost-effective enhancements to energy efficiency in buildings. This report and the code change proposal presented herein is a part of the effort to develop technical and cost-effectiveness information for proposed regulations on building energy efficiency design practices and technologies.

The overall goal of this report is to propose an administrative code change for expansion of the Exceptional Designs alternative to include projects other than those following the performance compliance approach, which is the only purpose of Exceptional Designs as it occurs today in the Energy Standards. This report contains pertinent information that justifies the code change.

Section 2 of this report provides a description of the measure, how the measure came about, and how the measure helps achieve the state's zero net energy (ZNE) goals. This section presents how the proposed code change would be enforced and the expected compliance rates.

The report concludes with specific recommendations for language for the Standards, Appendices, Alternate Calculation Manual (ACM) Reference Manual and Compliance Forms.

2. MEASURE DESCRIPTION

2.1 Measure Overview

The proposed change, Expanded Exceptional Designs, allows the Energy Commission to consider new construction projects proposing novel design and operational strategies as *novel compliance approaches* under Section 10-104 Exceptional Designs. Expanded Exceptional Designs amends Section 10-104 Exceptional Designs to add an alternative compliance pathway that provides significantly greater design flexibility in exchange for achieving at least a 10 percent lower energy budget as compared to the building designed according to the performance compliance approach. In addition, the energy budget must be verified by meter-based monitoring. Metering will provide the actual energy consumption of the building, both prior to occupancy, and over its first two years of operation. An initial pre-occupancy energy check and two annual post-occupancy energy checks will replace typical verification of individual installed efficiency measures and equipment to determine compliance with the Energy Standards.

Mandatory requirements are limited to the demand management requirements set forth in Section 110.12 and electrical infrastructure requirements in Section 130.5. Projects must also provide disaggregated energy metering and reporting of all electric load types set forth in Table 130.5-B. Because building compliance is verified with actual energy data obtained after occupancy, a project must be backed by a financial guarantee covering the two-year monitoring period, which ensures money is available for retrofits should the project fail to achieve its energy performance goals. By requiring actual building energy performance to meet design performance, this proposal will foster innovation, incentivize builders to invest in quality construction and encourage practices that result in sustained, demonstrative energy savings.

2.2 Measure History

Currently, the Energy Standard's prescriptive and performance compliance approaches are entirely design-based, and provide no assurance that building systems actually perform as efficiently as they are designed. There is a persistent gap between the estimated energy use of a building design and the actual energy use of the constructed building. This is due to multiple factors, including the Energy Standard's focus on individual building components, rather than overall building operational performance. In addition, design savings are often overestimated because they are based on installation under ideal, static conditions. In reality, occupancy, maintenance, and energy use of loads not included in the standard calculations impact actual building energy performance. Finally, there is little incentive for builders to ensure that designed savings are actually met because of the lack of actual energy performance verification requirements. The current prescriptive and performance compliance approaches provide no incentive for ensuring long-term energy performance.

In addition, decades of compounding, incremental, component-based energy code requirements have created a code that is complex and difficult to understand and apply. Many existing

prescriptive requirements are supported only by outdated analyses that no longer reflect the costs or energy savings achievable in today's buildings. While the performance approach reduces the amount of prescriptive requirements, it still is considered by many stakeholders to be too prescriptive and a barrier to engineering more holistic and innovative solutions to obtaining energy savings.

Allowance for novel compliance approaches has been developed by industry stakeholders with the goal of removing unnecessary prescriptive/mandatory requirements and encouraging design innovation. This approach will allow building owners to construct the building that's right for their business and needs, while ensuring that new buildings shall continue to support grid management by retaining demand management capabilities and ensuring that innovative designs lead to actual savings by using metered data to demonstrate compliance.

The proposed administrative change thus increases the flexibility of the exceptional design allowance while ensuring actual savings in a manner that no current approach provides. Like historical use of exceptional designs, any novel compliance approach would require Commission approval on a case-by-case basis. This allows for a controlled trial for the Commission to consider alternative approaches that might otherwise not be eligible for approval, while at the same time providing greater certainty of energy savings than the current compliance pathways.

The proposal requires initial energy performance to be better than current code requirements in recognition that the energy efficiency of buildings often degrades over time and as an additional offset to the elimination of certain prescriptive requirements that currently still apply even under the performance compliance approach. The proposed Novel Compliance Approach requires meter-based verification of the energy budget prior to issuance of the occupancy permit and two years of operational meter-based verification to demonstrate the design results in persistent savings.

Novel compliance approaches, when accepted as an Exceptional Design, also require a performance guarantee backed by a financial instrument that ensures financing is available for and will be used to complete building retrofits necessary to achieve the approved baseline energy budget should the novel approach fail to achieve its stated energy budget within its first two years of operation. Retrofits shall be required if the baseline energy budget is not verified. Through this approach, the Energy Commission will ensure real, measured energy efficiency outcomes.

2.3 Summary of Proposed Changes to Code Documents

The sections below provide a summary of how each Title 24 document will be modified by the proposed change. See *Section 3 Error! Reference source not found.* of this report for detailed proposed revisions to code language.

2.3.1 Standards Change Summary

This proposal would modify the following sections of the Building Energy Efficiency standards as shown below. See *Section 3.1 Standards* of this report for the detailed proposed revisions to the standards language.

10-104 EXCEPTIONAL DESIGNS

The proposed administrative regulations expand the use of Exceptional Designs to allow for consideration of novel compliance approaches that do not align with either the Performance or Prescriptive compliance approaches. Note, referenced sections 10-110 remains unchanged.

Subsection 10-104(a): The proposed regulations remove the term "performance" from the requirements to allow consideration of different types of compliance approaches as an Exceptional Design, not just those that cannot be adequately modeled under the performance compliance approach.

Subsection 10-104(b): The proposed regulations add mandatory requirements for novel approaches including documentation requirements for demonstrating compliance.

2.4 Regulatory Context

The proposed regulations are a clear divergence from established compliance approaches. However, nothing in the Warren-Alquist Act prohibits the Commission from adopting a voluntary building energy efficiency standard compliance path for new construction that requires post-construction meter-based verification. The duties of the Commission are liberally construed to carry out the Act's objectives.¹ The Warren-Alquist Act grants the Commission broad authority to achieve its energy efficiency goals, including the authority to regulate the energy use of new buildings through performance standard and the authority to evaluate the actual energy savings generated as a result of its programs. The Novel Compliance Approach requirements fall squarely within this authority.

The Commission's existing duties include collecting and analyzing forecasts of energy consumption from utilities and other sources,² as well as serving as a "central repository with the state government for the collection, storage, retrieval, and dissemination of data and information on all forms of energy supply, demand, conservation, public safety, research, and related subjects."³ The Act, along with several other state laws, directs the Commission to fulfill its tasks through programs, sources, and activities "that the commission determines is necessary" to achieve these objectives.⁴

The Commission thus has broad authority to require new buildings to verify that they meet the Commission's Building Energy Efficiency Standards, including by requiring meter-based

¹ *Id.* at § 25218.5.

² Pub. Resources Code § 25216(b).

³ *Id.* at § 25216.5(d).

⁴ *See, e.g., id.*; §§ 25303, 25402(a)(1).

verification. This authority stems both from the Commission’s express building standards adoption authority as well as the Commission’s broader and more general authority to collect data to develop energy policies and to confirm the actual energy savings achieved from its policies.

2.4.1 Existing Standards

Requirements pertaining to post-occupancy energy performance and metering as a compliance verification tool are currently used by multiple jurisdictions. In addition, existing standards such as ASHRAE 100 – Energy Efficiency in Existing Buildings and the 2018 International Green Construction Code (IgCC) require post-occupancy energy monitoring and verification to demonstrate compliance, and are being adopted across the country at both the state and local level.

In 2019, Washington State passed a law that requires by November 1, 2020 that the state set energy performance standards for covered commercial buildings. In developing energy performance standards, the state must seek to maximize reductions of greenhouse gas emissions from the building sector. The standard must include energy use intensity targets by building type and methods of conditional compliance that include an energy management plan, operations and maintenance program, energy efficiency audits, and investment in energy efficiency measures designed to meet the targets. The state is directed to use ANSI/ASHRAE/IES Standard 100-2018 as an initial model for standard development, which includes a collection of post-occupancy monitoring and verification requirements⁵.

At the local level in Washington, the Seattle Energy Code (SEC) includes a Target Performance Path (TPP) that requires verification that the actual, measured building energy consumption meets established targets. Under the TPP, projects must provide utility bills to prove that the building’s actual energy use meets a specific Energy Use Intensity target. The TPP gives increased design freedom, in exchange for a commitment to demonstrate actual energy efficiency. In addition, projects must pay a financial penalty if they do not meet their target.

The IgCC uses the Zero Energy Performance Index (zEPI), which provides a scale for measuring commercial building energy performance. zEPI represents a fundamental shift in measurement of building efficiency as it sets energy targets for actual energy consumption rather than using a predictive energy model of building energy performance to calculate a “percent better than code” metric. zEPI sets an energy use intensity (EUI) target for building type and is adjusted for climate. It is also the measure by which a building’s energy efficiency is calculated once operational and occupied based on measured energy use data⁶. Dozens of cities across the country have adopted municipal energy codes with zEPI requirements for commercial and residential buildings⁷.

⁵ <http://lawfilesexternal.wa.gov/biennium/2019-20/Pdf/Bills/Session%20Laws/House/1257-S3.SL.pdf#page=1>

⁶ https://newbuildings.org/code_policy/zepi/

⁷ <https://database.aceee.org/city/energy-code-stringency>

Similarly, in New York City, local Law 87 (LL87) mandates that buildings over 50,000 gross square feet undergo periodic energy audit and retro-commissioning measures, as part of the Greener, Greater Buildings Plan (GGBP). The intent of this law is to inform building owners of their energy consumption through energy audits, which are surveys and analyses of energy use, and retro-commissioning, the process of ensuring correct equipment installation and performance.

2.4.2 Relationship to Other Title 24 Requirements

The proposed regulations do not impact other parts of Title 24. A project must comply with all other rules and regulations to be considered for compliance using a novel compliance approach as defined under the proposed expansion of Section 10-104, Exceptional Designs.

With respect to Title 24, Part 6, the meter verification requirement prior to issuance of the occupancy permit is not fundamentally any different than any of the current commissioning or acceptance test requirements, which also occur prior to issuance of an occupancy permit. The difference is that the commissioning and acceptance test requirements are component-based, complex and limited in scope – while the metering requirement verifies that the overall building energy budget assumptions are actually met using simple checks of whole-building energy consumption.

2.4.3 Relationship to State Laws and Other Programs

The metering requirement after occupancy to ensure persistent savings is not a new concept. Post-installation, meter-based verification is already required by many state and utility energy efficiency and solar energy incentive programs. This approach is also consistent with the Commission’s 2019 Energy Efficiency Action Plan Update. In that update, the Commission laid out several recommendations for improving energy efficiency in new and existing buildings, including the use of meter-based energy efficiency programs to measure and verify actual energy savings.⁸ It acknowledged that more energy usage information is necessary to achieve the state’s efficiency goals.⁹ This approach also begins to align the Commission’s existing building benchmarking requirements (AB 802) with the Energy Standards.

2.5 Compliance and Enforcement

Compliance and enforcement is a challenge regardless of the compliance option utilized by a particular project, and we expect no increase in compliance or enforcement burdens from the proposed regulations. Enforcement activities related to verification of specific measures and equipment will be eliminated and replaced by a periodic check of whole building energy use and comparison to claimed energy budgets. In addition, for projects using an approved, novel

⁸ Kenney, Michael, Heather Bird, and Heriberto Rosales. 2019. 2019 California Energy Efficiency Action Plan, at 8. California Energy Commission. Publication Number: CEC400-2019-010-CMF, [https://ww2.energy.ca.gov/business_meetings/2019_packets/2019-12-11/Item_06_2019%20California%20Energy%20Efficiency%20Action%20Plan%20\(19-IEPR-06\).pdf](https://ww2.energy.ca.gov/business_meetings/2019_packets/2019-12-11/Item_06_2019%20California%20Energy%20Efficiency%20Action%20Plan%20(19-IEPR-06).pdf).

⁹ *Id.* at 94.

compliance approach, compliance is expected to improve because building performance verification is a required component of the compliance process. However, coordination between the Energy Commission and Authority Having Jurisdiction (AHJ) will be required to verify a project achieves its energy budget within two years of occupancy. Because the proposed regulations represent a trial program and participation is expected to be low, we anticipate that additional compliance and enforcement issues will be identified and solutions developed on a case-by-case basis.

With respect to compliance forms, we believe projects should provide a completed PRF-01 for the project's baseline design along with a calculation of the annual energy consumption of the newly constructed building prior to occupancy and disaggregated by electric load types as set forth Table 130.5-B. Compliance documentation should include a statement describing the novel compliance approach; a description of how the novel approach varies from the performance or prescriptive compliance approaches; and a description of how the approach will achieve an energy budget at least ten (10) percent more efficient than that obtained using the performance compliance approach and approved calculation methods. Documentation should also include detailed evaluation of the energy consumption of the proposed building including all novel strategies and the building's materials, components, and manufactured devices proposed to be installed to ensure the building's energy budget does not exceed 90 percent of that allowed under the performance compliance approach; and copies of all information required to validate the novel design and calculate its energy budget.

3. PROPOSED REVISIONS TO CODE LANGUAGE

The proposed changes to the Standards, Reference Appendices, and the ACM Reference Manuals are provided below. Changes to the 2019 documents are marked with underlining (new language) and ~~strikethroughs~~ (deletions).

3.1 Standards

10-104 – EXCEPTIONAL DESIGNS

NOTE: See Section 10-109 for approval of calculation methods and Alternative Component Packages.

(a) **Requirements.** If a building permit applicant proposes to use a ~~performance~~ compliance approach that varies from the performance or prescriptive compliance approach or cannot be adequately modeled by an approved calculation method when using the performance approach, an applicant shall be granted a building permit if the Commission finds:

1. Performance Compliance Approach

- a) The design cannot be adequately modeled with an approved calculation method;
- b) Using an alternative evaluation technique, that the design complies with Part 6; and

c) The enforcement agency has determined that the design complies with all other legal requirements.

2. Novel Compliance Approaches

a) Using alternative compliance strategies and/or evaluation techniques that include meter-based verification, the design's energy budget shall be at least ten (10) percent lower than the energy budget allowed for the same building by Part 6 when designed under the performance compliance approach using components, materials and systems that can be adequately modeled by an approved calculation method;

b) The enforcement agency has determined that the design complies with all other legal requirements.

c) The building shall comply with all mandatory requirements for demand management set forth in Section 110.12.

d) The building shall comply with all mandatory requirements contained in Section 130.5 and shall separately meter the electric load types as set forth in Table 130.5-B.

e) The novel compliance approach may only be applied to newly constructed buildings.

(b) **Applications.** The applicant shall submit four copies of a signed application with the following materials to the Executive Director:

1. A copy of the plans and documentation required by Section 10-103(a)2;

2. If using the performance compliance approach:

a) A statement explaining why meeting the energy budget cannot be demonstrated using an approved calculation method;

b) Documentation from the enforcement agency stating that: A. Meeting the energy budget requirements cannot be demonstrated using an approved calculation method; and B. The design complies with all other legal requirements; and

c) A detailed evaluation of the energy consumption of the proposed building and the building's materials, components, and manufactured devices proposed to be installed to meet the requirements of Part 6 using an alternative evaluation technique. The evaluation shall include a copy of the technique, instructions for its use, a list of all input data, and all other information required to replicate the results.

3. If using a novel compliance approach:

a) A statement describing the novel compliance approach; a description of how the novel approach varies from the performance or prescriptive compliance approaches; and a description of how the approach will achieve an energy budget

at least ten (10) percent more efficient than that obtained using the performance compliance approach and approved calculation methods.

b) A detailed evaluation of the energy consumption of the proposed building including all novel strategies and the building's materials, components, and manufactured devices proposed to be installed to ensure the building's energy budget does not exceed 90 percent of that allowed under the performance compliance approach; and copies of all information required to validate the novel design and calculate its energy budget.

c) A detailed evaluation of the energy consumption of the proposed building designed to comply with the Standards using the Performance approach and with all required materials, components and systems able to be modeled by approved compliance software for use as a baseline when evaluating performance as described in part 3.d; this evaluation shall include a calculation of the annual energy consumption of the newly constructed building prior to occupancy and disaggregated by electric load types as set forth in 2.d and Table 130.5-B.

d) Applicants choosing the novel compliance approach shall demonstrate compliance using meter-based verification techniques and provide the following data reports to the Commission, at a minimum:

i. Before an occupancy permit is issued, at least five days of metered energy data showing the building systems running at normal operating levels.

ii. For the first two years of normal building operation and provided annually, metered monthly energy data for each electric load type as compared to the estimated, monthly energy budget relied upon as part of the novel approach.

e) A performance guarantee backed by a financial instrument that ensures financing is available for and will be used to complete building retrofits necessary to achieve the baseline energy budget provided in subsection (b)3(c) should the novel approach fail to achieve its stated energy budget within its first two years of operation. Retrofits shall be required if the baseline energy budget is not verified according to (b)3(d)(i) or (b)3(d)(ii). The timeframe for completion of retrofits, if required, will be determined by the Commission.

f) The novel compliance approach shall expire on January 1, 2026 unless extended by the Commission after review of compliance reports submitted pursuant to subsection (b)3(d)(ii).

3.2 Reference Appendices

There are no proposed changes to the Reference Appendices.

3.3 ACM Reference Manual

There are no proposed changes to the ACM Reference Manual.

3.4 Compliance Manuals

There are no proposed changes to the Compliance Manuals.