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Passive House standard reach-code in Title 24

California's building code, while steadily improving, is not moving fast enough in adapting to future climate change and electric-grid demand. To accommodate this need, CEC should, as a first step, implement an alternate compliance pathway to an acknowledged high-performance standard, such as Passive House. See the attached document describing a legislative proposal for an alternate compliance pathway for Passive House. This can be used as an exemplar for CEC's rule-making.

Additional submitted attachment is included below.

Implementing Passive House in Title 24

2024 Bill Proposal

This document describes a two-step legislative agenda for accelerating establishment of a low-energy-demand, high-performance green building standard in California. Building types will include all of the following: single family residential buildings, multi-family residential buildings, and commercial buildings.

The two steps are: 1) define an alternate compliance pathway to high-performance buildings and 2) offer incentives for developers and builders to follow the pathway.

The new standard can be introduced legislatively during Title 24's upcoming 2024 code revision window. This is preferable to going through the agencies (CEC, CPUC) since their mandates are guided by existing legislation.

Outline

1. Define an alternate code-compliance pathway for achieving higher performance buildings, other than the pathway outlined in Title 24, Part 6[1] *i.e.* provide an optional, approved route to exceed the current energy-model requirements using Passive House energy models. The Passive House (PH) standard is recommended because it's performance-based and affordable. https://passivehousenetwork.org/what-is-passive-house/
    A. **Motivation - *why* is a PH alternate pathway needed?**
        1. Passive House Certification tools (PHPP, WufiPassive) are not among the CEC's list of approved modeling tools for demonstrating compliance with 2022's Building Energy Efficiency Standards (Title 24, Part 1, Article 1, Section 10-109). https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2022-building-energy-efficiency-1

[1] California's Title 24, Part 6 regulations for single-family homes (2022): https://www.energy.ca.gov/publications/2022/2022-single-family-residential-compliance-manual-2022-building-energy-efficiency

2. Independently-developed Passive House standards *require* their own approved energy models for certification (*i.e.* PHPP or WufiPassive).
    a. that means there's a need for project teams to run two energy models – this is time-consuming and adds additional cost
3. In the past decade, attempts were made to add Passive House elements to existing energy code, but many energy-saving features could not be adequately credited within Title 24's framework. (This book-keeping challenge prevents Passive House elements from being included and frustrates baseline code from valuing other key PH measures.)

B. Emissions reduction - is PH *effective*?

Passive House certification supports and goes beyond the emission targets and building performance levels already mandated in California.

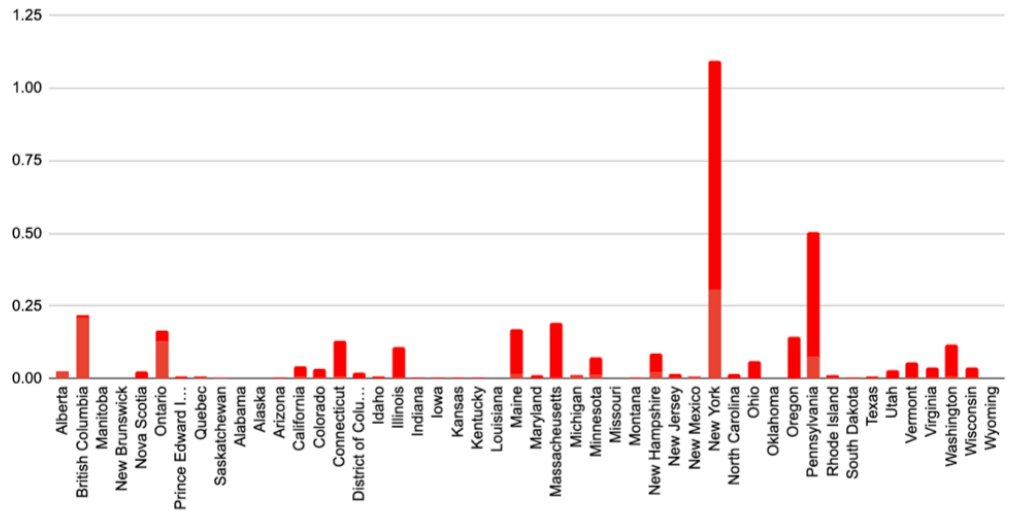
1. A National Renewable Energy Laboratory (NREL) study of Deep Energy Retrofits shows PHPP to be more accurate compared to standard software predictions: https://www.nrel.gov/docs/fy15osti/63085.pdf
2. Results from 2000 Passive House projects show that pre-construction model *predictions* compare favorably with post-construction measured *performance*. https://passivehousecal.org/are-the-energy-savings-of-the-passive-house-standard-reliable-a-review-of-the-as-built-thermal-and-space-heating-performance-of-passive-house-dwellings-from-1990-to-2018/
3. A 2023 report by *Emu* compares Passive House energy modeling for sites in California with their Title 24, Part 6 equivalent. In every case the Passive House projects demonstrated higher indoor air quality, superior energy performance, and (by inference) lower utility bills. https://passivehousenetwork.org/emu-report-energy-standards-california-results/ (especially Appendix B.)
4. Passive House software programs (PHPP and WufiPassive) have been ASHRAE 140 validated. PHPP has been confirmed to be

highly accurate in predicting heating and cooling energy use in low load buildings.[2]

C. Adoption by other jurisdictions - *where* is PH being used?

1. Passive Houses are widespread across the US and Canada, as shown in the Table below, but the regions that have PH standards embedded within their policy portfolios are implementation leaders: New York, Pennsylvania, Province of British Columbia, Massachusetts, Washington State.

Table: Passive House Projects by Floor Area [millions square feet], c. April 2022
(p.4, https://passivehousenetwork.org/wp-content/uploads/2022/06/PHN_Report_Policy_That_Works_V1.1_June_2022.pdf)



D. *How* to write the PH protocol and standard into legislation?

- Representative language is shown in the Appendix.

[2] https://www.researchgate.net/publication/340014165_Are_the_energy_savings_of_the_passive_house_standard_reliable_A_review_of_the_as-built_thermal_and_space_heating_performance_of_passive_house_dwellings_from_1990_to_2018_full_text_see_comments

2. The second step for accelerating high-performance building construction in California is to encourage industry to become familiar with the PH standard. One way to encourage familiarization is to offer incentives so builders and developers are motivated to follow it. Incentives can include bonus payments for projects achieving PH standard and/or decreasing permit fees for PH projects. A performance-based example is provided at the end of the Appendix.

APPENDIX

Implementing PH Standard
(including example code language)

1. The first half of implementation is establishing a framework for alternative stretch code.

Example

Representative code language from Massachusetts and the City of Denver is given here. Such an update for California could fit into Chapter 2 *Compliance and Enforcement* or Appendix 1A of Title 24, Part 6.

From Massachusetts Stretch Code
Chapter 11, R401.2, Applications
https://www.mass.gov/doc/225-cmr-22-massachusetts-stretch-code-and-specialized-code-for-low-rise-residential-2023-residential-low-rise-amendments-to-iecc2021-and-irc-2021-chapter-11-energy-efficiency/download
(Note: this text is much simpler than the Denver example, shown next.)
OR
From Denver Green Codes
Chapter 1, Table 101.4.2, Compliance Path Option 4
https://codes.iccsafe.org/content/CODGC2022P2/chapter-1-scope-and-administration

2. The second half of implementation is *defining* the Passive House standard.

Example

Representative code language for Passive House definition in Title 24 is shown below. Text like this could go into Chapter 3 *Building Envelope*.

From Washington State Energy Code - Residential, Chapter 4
R407.1 General. Projects shall comply with Section R407.2 or R407.3.

R407.2 Passive House Institute U.S. (PHIUS). Projects shall comply with PHIUS+ 2018 Passive Building Standard, including its USDOE Energy Star and Zero Energy Ready Home co-requisites, and performance calculations by PHIUS-approved software. Projects shall also comply with the provisions of Table R405.2.

R407.2.1 PHIUS documentation. Prior to the issuance of a building permit, the following items must be provided to the code official:

1. A list of compliance features.
2. A PHIUS pre-certification letter.

Prior to the issuance of a certificate of occupancy, the following item must be provided to the code official:

1. A PHIUS+ 2018 (or later) project certificate.

R407.3 Passive House Institute (PHI). Projects shall comply with Low Energy Building Standard, version 9f or later, including performance calculations by PHI-approved software. Projects shall also comply with the provisions of Section R401 through R404.

R407.3.1 PHI documentation. Prior to the issuance of a building permit, the following items must be provided to the code official:

1. A list of compliance features.
2. A statement from a Passive House certifier that the modeled energy performance is congruent with the plans and specifications, and that the modeled performance meets said standard.

Prior to the issuance of a certificate of occupancy, the following item must be provided to the code official:

1. A PHI Low Energy Building project certificate.

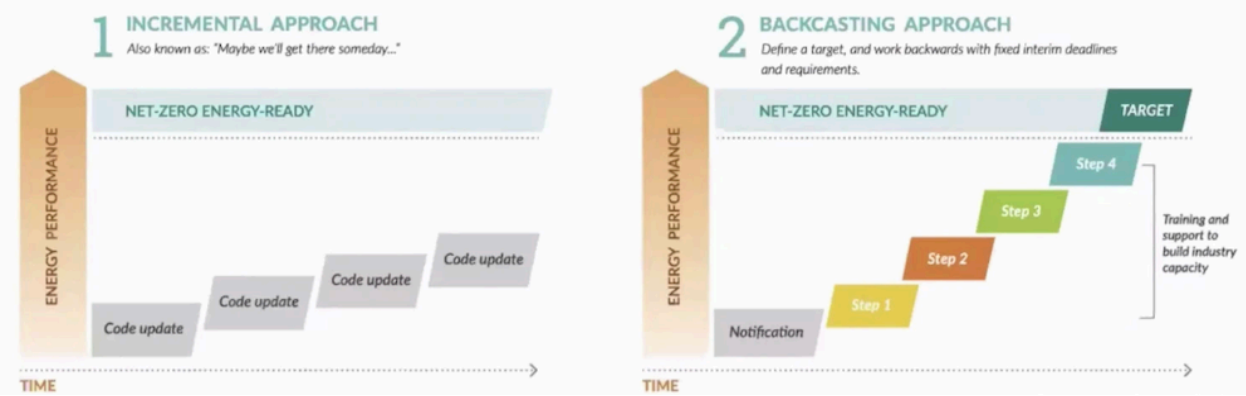
https://sbcc.wa.gov/sites/default/files/2023-04/2021_WSEC_R_1stPrint-1_042623.pdf

3. One successful implementation program is shown in the next example.

Example

The BC Energy Step Code

British Columbia ended incremental improvements to its baseline building code in 2017. The province established an end-goal performance target paired with an end-date. It then 'backcast' five interim steps that municipalities could adopt on their journey to the end-goal. Passive House certification was assigned to the last step — the Code's end-goal. That provides clarity to developers and manufacturers on where building regulations are heading. Many developers have chosen Passive House certification ahead of the 2032 deadline.
https://energystepcode.ca/



Incentivizing PH Standard

Incentivizing Passive House building projects will facilitate industry's familiarity with high-performance standards, and conceivably might speed up its adoption into a Reach Code.

For example

Multi-unit residential building, 30 units, 3 stories - Lowell, MA
https://www.masssave.com/residential/rebates-and-incentives/passive-house-incentives

Design Incentive - $5,000 PH Feasibility Study
Design Incentive - $15,000 PH Energy Modeling
Design Incentive - $15,000 before Pre-Certification ($500/unit x 30 units)
Construction Incentive - $75,000 at Final PH Certification ($2500/unit x 30 units)

Total Incentive - $110,000