

DOCKETED

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Increasing Resilience in Homes

Additional submitted attachment is included below.



Electric Program Investment Charge 2026–2030 (EPIC 5) Research Concept Proposal Form

The California Energy Commission (CEC) is currently soliciting research concept ideas and other input for the Electric Program Investment Charge 2026–2030 (EPIC 5) Investment Plan. For those who would like to submit an idea for consideration, please complete this form and submit it to the CEC by **August 8, 2025**. More information about EPIC 5 is available below.

To submit the form, please visit the e-commenting link:

<https://efiling.energy.ca.gov/EComment/ECommentSelectProceeding.aspx> and select the Docket **25-EPIC-01**. Enter your contact information and then use the “choose file” button at the bottom of the page to upload and submit the completed form. Thank you in advance for your input.

1. Please provide the name, email, and phone number of the best person to contact should the CEC have additional questions regarding the research concept:

Vamsi Kumar Kotla, CEO, ykk@remo.homes, (323) 708-4094

2. Please provide the name of the contact person’s organization or affiliation:

ReMo Homes

3. Please provide a brief description of the proposed concept that you would like the CEC to consider as part of the EPIC 5 Investment Plan. What is the purpose of the concept, and what would it seek to do? Why are EPIC funds needed to support the concept?

Climate adaptation of homes for resilience is critical in light of increasingly frequent and severe wildfires (some caused by utilities’ transmission lines). Greater resilience for homes has the potential to avoid substantial quantities of embodied carbon by protecting against fire damage and destruction, thereby reducing future rebuilding and the embodied carbon footprint this typically entails. Some fire resilience measures can also bring operational efficiency benefits (e.g., metal roofs with high solar reflectance and passive daytime radiative cooling, metal shutters that can also provide shading, better windows and doors), which may additionally provide resilience to extreme heat. However, climate adaptation measures

represent a high up-front expense in new construction that puts them out of reach for some buyers and developers, though they offer long-term resilience and economic benefits.

We propose the study of advanced fire protection measures implemented in a modular manufacturing setting. These may include elements such as intumescent coatings, standing-seam metal roofs with above-code solar reflectance index (SRI) and passive daytime radiative cooling, metal window shutters (designed to also be used for controllable shading), improved windows and doors, possibly novel technologies borrowed from other industries, and others—even exceeding the IBHS Wildfire Prepared Home standards—.

Incorporating these measures into prefabrication of homes as part of a rational, systematic “industrialized construction” process can allow for cost reduction from labor savings and volume as well as improved consistency and quality control. This approach can therefore make these measures more affordable and attainable, bringing greater resilience to more homes—along with its future embodied carbon and potential immediate operational energy savings.

4. In accordance with Senate Bill 96¹, please describe how the proposed concept will “lead to technological advancement and breakthroughs to overcome barriers that prevent the achievement of the state's statutory energy goals.” For example, what technical and/or market barriers or customer pain points would the proposed concept address that would lead to increased adoption of clean energy technology or innovation? Where possible, please provide specific cost and performance targets that need to be met for increased industry and consumer acceptance. For scientific analysis and tools, provide more information on what data and information gaps the proposed concept would help fill, and which specific parties or end users would benefit from the results, and for what purpose(s)?

Summary

The proposed concept to implement resilience measures in a modular manufacturing settings would provide key benefits including:

¹ See section (a) (1) of Public Resources Code 25711.5 at: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=PRC§ionNum=25711.5.

- Quality installation of climate adaptation and resilience measures at reduced cost, making resilient homes more widespread, reducing the risk of future destruction and the consequent embodied carbon footprint from rebuilding.
- Operational energy savings co-benefits from these measures, which can reduce peak grid demand, and maintenance savings co-benefits.
- Testing of new technologies adopted from other industries (such as aerospace and high-rise commercial construction) with potential advantages in resilience and embodied and operational carbon.

Avoided Embodied Carbon

New home construction represents a substantial source of embodied carbon emissions. Thus, protecting against the destruction of homes that would then have to be rebuilt is an important part of a carbon neutrality strategy.

To give an illustrative example, a reasonable estimate of the embodied carbon footprint of rebuilding the homes destroyed by the Palisades and Eaton fires could be around 370,000 tCO₂e. This assumes 180 kg CO₂e/m² of floor area (the midpoint of the range noted in this report:

<https://rmi.org/insight/hidden-climate-impact-of-residential-construction/>; note that this is a conservative range as it reflects “cradle-to-gate” embodied carbon only, not transportation and installation); a home size of about 1,700 sq. ft. (per Federal Reserve data from LA County:

<https://fred.stlouisfed.org/series/MEDSQUFEE6037>) or around 160 m²; and 12,941 homes (the number destroyed within the perimeters of the Palisades and Eaton fires, per Redfin:

<https://www.redfin.com/news/los-angeles-wildfires-housing-statistics/>).

Operational Energy Savings

Resilience measures can also provide operation energy savings, either inherently or through simple design choices. Below are two examples, which are not exhaustive.

The benefits of “cool roofs” with higher solar reflectance and thermal emittance are well known, and Title 24 includes cool roof requirements for many buildings. Resilient metal roofs can easily be designed with colors and coatings that return very high performance in these areas, exceeding code requirements and providing peak demand reduction and annual energy savings compared to code-minimum cool roofs. Additionally, emerging passive daytime radiative cooling techniques (see for example:

<https://rmi.org/clean-energy-101-passive-daytime-radiative-cooling-really-cool-ro>

[ofs/](#)) can provide even greater cooling benefits and could be incorporated into resilient roofing measures.

Exterior window shading, which fire-resistant shutters can provide, can yield cooling energy savings on the order of 20% (https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-30536.pdf) and are significantly more effective at blocking heat than interior blinds.

Both of these are also effective strategies for helping to mitigate extreme heat.

5. Please describe the anticipated outcomes if this research concept is successful, either fully or partially. For example, to what extent would the research reduce technology or ratepayer costs and/or increase performance to improve the overall value proposition of the technology? What is the potential of the innovation at scale? How will the innovation lead to ratepayer benefits in alignment with EPIC's guiding principles to improve safety,² reliability,³ affordability,⁴ environmental sustainability,⁵ and equity?⁶

Ratepayer benefits in:

- Improved safety through better protection from wildfires and extreme heat.
- Affordability of resilience measures (up to 40% reduction in installed costs); energy savings
- Environmental sustainability through reduction in future embodied carbon and other pollutants (reduced need to rebuild; less burning

² EPIC innovations should improve the safety of operation of California's electric system in the face of climate change, wildfire, and emerging challenges.

³ EPIC innovations should increase the reliability of California's electric system while continuing to decarbonize California's electric power supply.

⁴ EPIC innovations should fund electric sector technologies and approaches that lower California electric rates and ratepayer costs and help enable the equitable adoption of clean energy technologies.

⁵ EPIC innovations should continue to reduce greenhouse house gas emissions, criteria pollutant emissions, and the overall environmental impacts of California's electric system, including land and water use.

⁶ EPIC innovations should increasingly support, benefit, and engage disadvantaged vulnerable California communities (DVC). (D.20-08-046, Ordering Paragraph 1.) DVCs consist of communities in the 25 percent highest scoring census tracts according to the most recent version of the California Communities Environmental Health Screening Tool (CalEnviroScreen), as well as all California tribal lands, census tracts with median household incomes less than 60 percent of state median income, and census tracts that score in the highest 5 percent of Pollution Burden within CalEnviroScreen, but do not receive an overall CalEnviroScreen score due to unreliable public health and socioeconomic data.

down of homes and releasing noxious gases and other pollutants) as well as energy efficiency

- Equity benefits in the form of greater attainability and economic accessibility of safer, more resilient, more efficient homes

These measures can be implemented at scale in a factory environment, similar to how cars have air bags and rockets have ablative coatings.

6. Describe what quantitative or qualitative metrics or indicators would be used to evaluate the impacts of the proposed research concept.
 - Climate Resilience (duration of fire rating, max temperature that the homes can withstand, max wind gusts speed during wildfires)
 - Insurability and insurance cost savings (% of homes not rejected by private insurers other than CA FAIR plan, % or \$ of annual/lifetime cost savings)
 - Maintenance costs savings (lifetime)
 - Energy savings
 - Peak load reduction
 - Ease of solar panel installation (metal roof can allow for rapid installation without needing to make penetrations)
7. Please provide references to any information provided in the form that supports the research concept's merits. This can include references to cost targets, technical potential, market barriers, equity benefits, etc.



The IBHS Wildfire Prepared standards provide a validated starting point for useful resilience measures that could be systematically incorporated into modular housing.

8. The EPIC 5 Investment Plan must support at least one of five Strategic Goals:⁷
 - a. Transportation Electrification
 - b. Distributed Energy Resource Integration
 - c. Building Decarbonization**
 - d. Achieving 100 Percent Net-Zero Carbon Emissions and the Coordinated Role of Gas**
 - e. Climate Adaptation**

Please describe in as much detail as possible how your proposed concept would support these goals.

As noted above, the concept would support improved operational energy efficiency and reduced peak loads, which are key elements of building decarbonization (c) and achieving net-zero carbon emissions (d).

The concept is fundamentally a response to the need for climate adaptation (e), aiming to bolster resistance to increasing hazards (especially wildfires) exacerbated by climate change. The operational energy co-benefits can also help homes in adapting to extreme heat.

Additionally, the potential future embodied carbon benefits of more resilient homes, outlined above, would support California's goal of carbon neutrality by 2045.

⁷ In 2024 the CPUC adopted five Strategic Goals to guide development of the EPIC 5 Investment Plan. A description of the goals can be seen in Appendix A of CPUC Decision 24-03-007 available at:
<https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M527/K228/527228647.PDF>

About EPIC

The CEC is one of four EPIC administrators, funding research, development, and demonstrations of clean energy technologies and approaches that will benefit electricity ratepayers of California's three largest investor-owned electric utilities.

EPIC is funded by California utility customers under the auspices of the California Public Utilities Commission.

To learn more about EPIC, visit:

<https://www.energy.ca.gov/programs-and-topics/programs/electric-program-investment-charge-epic-program>

EPIC 5 documents and event notices will be posted to:

<https://www.energy.ca.gov/proceeding/electric-program-investment-charge-2026-2030-investment-plan-epic-5>

Subscribe to the EPIC mailing list to stay informed about future opportunities to inform the development of EPIC 5:

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