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DO NOT DESIGN OR SUBMIT APPLICATIONS ACCORDING TO THIS DRAFT
Comments are due on March 6, 2024, at 5:00 p.m.

DRAFT SOLICITATION CONCEPT

Proposed Electric Program Investment Charge Concept

Subject Area: Retrofitting with Innovative Building Envelope Solutions

No applications are being accepted at this time. This is a draft compilation of solicitation concepts. Do not design or submit applications according to this DRAFT. The actual solicitation is subject to change.

The purpose of this draft solicitation concept is to solicit public feedback on eligibility requirements, goals and vision, and solicitation format (See Section 8 for specific questions). Staff will accept comments submitted to the California Energy Commission (CEC) Dockets Unit or by email until March 6, 2024, at 5:00 p.m. (See Section 9 for additional details on how to comment.)

http://www.energy.ca.gov/contracts/index.html
State of California
California Energy Commission
February 2024

Table of Contents

I. INTRODUCTION

This "draft solicitation concept" document details the concept under consideration for a competitive grant solicitation on innovative retrofit solutions for existing buildings to be issued through the CEC's Electric Program Investment Charge (EPIC) 2021-2025 Investment Plan.[1] The purpose of this solicitation is to improve the value proposition of existing building envelope retrofits while also increasing building energy efficiency. These projects aim to help California achieve the greenhouse gas (GHG) emissions reduction goal of limiting GHG emissions statewide and will target building stock decarbonization through improving the existing building envelope.

For the purposes of this solicitation, the building envelope includes the interior and exterior components of the building, such as the ceiling, walls, windows and roofs. Projects in this "draft solicitation concept" focus on technologies and strategies that improve energy efficiency, improve the value proposition for implementing retrofits, significantly reduce GHG emissions in existing buildings, and have the potential to drive increased adoption of building retrofits. These projects will contribute to improving building energy efficiency and reducing peak demand, overall energy use, and GHG emissions.

II. FUNDING

A. Available Funding

There is $9,850,000 available for the grants resulting from this competitive solicitation. The funding breakdown for each group is listed in the table below.

Table 1: Project Funding

Project Group	Available Funding	Minimum Award Amount	Maximum Award Amount
Group 1: Value Proposition Improvement-Residential Envelope Technology Retrofit Opportunity for Opaque Envelopes (VPI-RETRO- Opaque Envelopes)	$3,000,000	$1,000,000	$2,000,000
Group 2: Value Proposition Improvement-Residential Envelope Technology Retrofit Opportunity for Vacuum Insulated Glass (VPI-RETRO- Vacuum Insulated Glass)	$2,450,000	$950,000	$1,500,000

[1] Lew, Virginia, Anthony Ng, Mike Petouhoff, Jonah Steinbuck, Erik Stokes, and Misa Werner. 2023. *The Electric Program Investment Charge 2021–2025 Investment Plan: EPIC 4 Investment Plan.* California Energy Commission. Publication Number: CEC-500-2021-048-CMF-REV.

Group 3: Value Proposition Improvement-Residential Envelope Technology Retrofit Opportunity with Multiple Measures (VPI-RETRO-MM)	$ 3,400,000	$950,000	$2,000,000
Group 4: Value Proposition Improvement-Improving the Thermal and Air Infiltration in Window Retrofits with Existing Frames	$1,000,000	$500,000	$1,000,000

The CEC reserves the right to modify funding amounts.

B. **Match Funding**
Match funding is required in the amount of at least 20% of the requested project funds. Reduced match funding levels will be considered for projects sited in and benefiting a Disadvantaged Community (DAC), Low-Income Community (LICs), or Tribe.

III. ELIGIBILITY REQUIREMENTS

This is an open solicitation for public and private entities.

Each grant agreement resulting from this solicitation will include terms and conditions that set forth the recipient's rights and responsibilities. By submitting an application, each applicant agrees to enter into an agreement with the CEC to conduct the proposed project according to the terms and conditions that correspond to its organization, without negotiation: (1) University of California and California State University terms and conditions; (2) U.S. Department of Energy terms and conditions; or (3) standard terms and conditions.

IV. PROJECT FOCUS

The goal of this solicitation is to improve the energy performance of California's existing building stock while improving the value proposition for building retrofits. Accordingly, this goal will advance California's decarbonization goals. California's first policy for statewide GHG emissions reductions was passed in 2006 when Assembly Bill 32 (AB 32) began requiring California to reduce GHG emissions to 1990 levels by 2020. In 2016, Senate Bill 32 (SB 32) established a goal to limit GHG emissions statewide to at least 40 percent below 1990 levels by 2030.[2] In 2022, AB 1279's California Crisis Act extended this limit to at least 85 percent below 1990 levels by 2045.[3] The reduction of GHG emissions from buildings is essential to help the state meet its ambitious climate goals.

[2] California Global Warming Solutions Act of 2006: emissions limit. Chapter 249 of 2016 (Senate Bill 32, Pavley) http://www.leginfo.ca.gov/pub/15-16/bill/sen/sb_0001-0050/sb_32_bill_20160908_chaptered.html

[3] The California Crisis Act. Chapter 337 of 2022 (Assembly Bill 1279, Muratsuchi) https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220AB1279

Building decarbonization includes a variety of strategies through which to reduce residential and commercial building emissions. These strategies include electrification, electricity generation decarbonization, energy efficiency, refrigerant leakage and global warming potential reduction, use of distributed energy resources, decommissioning and decarbonizing the gas system, and demand flexibility. This solicitation concept focuses on energy efficiency by targeting the envelope of residential buildings. Energy efficiency reduces costs, decreases energy use and GHG emissions, increases reliability and availability of electricity, improves building occupant comfort, and reduces impacts to the environment through HVAC load reduction. In turn, load reduction can enable a virtuous cycle whereby right-sizing HVAC systems for smaller loads equates to smaller HVAC systems with smaller climate, environmental, and economic footprints. Improvements to the building envelope can also reduce demand on the grid during peak periods, resulting in enhanced grid reliability during critical times.

Projects funded under this solicitation will develop and demonstrate new envelope technologies and/or techniques and manufacturing processes to validate technology in real-life situations, reduce cost, reduce occupant intrusion, and increase market adoption of envelope retrofits to improve the value proposition of existing building envelope retrofits.

A. Project Elements

CEC staff plans to release this solicitation with three groups focusing on existing residential building retrofits. Group 1 focuses on opaque[4] envelope retrofit technologies. Group 2 focuses on fenestration retrofit technologies. Group 3 focuses on envelope retrofits using multiple efficiency measures. Group 4 focuses on the thermal performance and air infiltration of existing window frame retrofits.

Group 1: Value Proposition Improvement- Residential Envelope Technology Retrofit Opportunity for Opaque Envelopes (VPI-RETRO- Opaque Envelopes)

This group will target the development and demonstration of high-performance opaque envelope technologies and strategies for existing buildings that may include walls, attics, ceilings, and roofs. Projects should demonstrate technologies that focus on single-family (SF) and multi-family (MF) residential units and manufactured homes with a technology readiness level[5] (TRL) of 7 and raise to at least a TRL of 9.

Projects in this group must be **less costly, easier, quicker to install, and less invasive** than traditional retrofit methods are. Projects in this group must be located in a

[4] In this concept, the opaque envelope includes the walls, attics, ceilings, and roofs.
[5] U.S. Department of Energy, "Technology Readiness Assessment Guide". https://www2.lbl.gov/dir/assets/docs/TRL%20guide.pdf

disadvantaged[6] or low-income community [7] and/or Tribes[8] and requires CBO involvement.

Technologies and strategies must have the following capabilities:

a. Insulation products in this group must meet minimum high-performance requirements, such as aerogel (R-8) and Vacuum Insulated Panels (R-14). Minimum requirements are dependent on the technologies selected and are not limited to these technologies. However, other novel insulation products selected in this group must meet the minimum performance requirement of R-8/inch or higher, depending on the current equivalent state-of-the-art capabilities for that novel insulation product. Please note that considerations previously described must also be fully considered. The product performance must be available in at least 0.25-inch increments.

b. Suitable with stucco, wood, and vinyl siding construction practices at a minimum.

c. Ability to be installed as continuous insulation on exterior walls, and as interior insulation behind the drywall, or as cavity insulation between studs, or other suitable practices that do not significantly change the current insulation installation practices. Researchers must ensure that insulation that is installed on the interior side of the walls does not cause moisture issues in the wall cavity.

d. Ability to be manufactured with minimal modifications to existing manufacturing processes at similar or lower costs than current processes.

e. Ability to be used as roofdeck insulation both under the deck between roof rafters and as continuous above-deck insulation.

f. Ability to be cut and fit into wall, roofdeck, and ceiling cavities in the field without degrading the performance of the insulation product.

g. Must have a longevity of at least 40 years from the date of installation, with no more than 35 percent degradation in the R-value performance at the end of the 40-year period. Describe how component failures can be detected by the building occupants in a timely manner, for example, the loss of vacuum in insulated panels. Describe what practical and cost-effective remedies may be available to replace the failed

[6] Disadvantaged communities are communities designated that represent the 25% highest scoring census tracts in CalEnviroScreen 4.0, census tracts previously identified in the top 25% in CalEnviroScreen 3.0, census tracts with high amounts of pollution and low populations, and federally recognized tribal areas as identified by the Census in the 2021 American Indian Areas Related National Geodatabase. (https://oehha.ca.gov/calenviroscreen/sb535)

[7] Low-income Communities are defined as communities within census tracts with median household incomes at or below 80 percent of the statewide median income or the applicable low-income threshold listed in the state income limits updated by the Department of Housing and Community Development. (https://www.hcd.ca.gov/grants-funding/income-limits/state-and-federal-income-limits.shtml)

[8] A Native American Tribe located in California that is on the contact list maintained by the Native American Heritage Commission for the purposes of Chapter 905 of the Statutes of 2004. https://nahc.ca.gov/

components, for example swapping out the failed panels with minimal disturbance of the other wall or roof components. Describe what would be the cost of these remedies in a mature market.

Additional desirable features include:

- Novel opaque envelope product that is fault-tolerant or self-correcting (or self-healing) to minimize the potential for or impact of installation errors and penetrations;
- Insulation products with simple installation and finishing techniques that require no on-site modifications, minimize demolition and reconstruction, or avoid teardowns;
- Strategies or technologies that improve installation time and precision of opaque envelope product installation to ensure high product performance and lower cost;
- Manufacturing processes that can be adapted to increase production and availability of novel technology using existing methods and machinery;
- Technologies that have lower embodied carbon and lifecycle carbon emissions than do technologies currently on the market; and
- Technologies that are or include recycled materials, sourced from sustainable materials, and have end-of-life recycling or reuse options.

Demonstration and Proof of Concept Plans

The novel insulation technology must be demonstrated in a combination of SF, MF, and manufactured homes.

Site and building requirements:

- SF homes must have a conditioned floor area (CFA) of at least 1,200 square feet each.
- At least one demonstration building must be located in a California cooling climate zone (CZs 4, and 8-15) demonstrating the benefits of roofdeck insulation using novel insulation technologies and novel wall insulation technologies.
- One of the demonstration buildings may not include roofdeck insulation if the building is located in climate zones 1,2, 3, and 16. However, it must have novel wall insulation.
- Demonstration buildings may not be located in mild south coast climate zones 5, 6, and 7.

Buildings must utilize roofdeck and wall insulation installations. The energy efficiency of these novel insulation technologies must be measured and documented using established monitoring equipment and techniques for a 12-month period. Measured savings must be compared against simulated savings results from 2022 CBECC-Res or another CEC approved Title 24 compliance software tool. The proposed wall and roofdeck insulation efficiency upgrade and monitoring plans must be approved by the Commission Agreement Manager ahead of time, prior to commencement of improvements.

Group 2: Value Proposition Improvement - Residential Envelope Technology Retrofit Opportunity for Vacuum Insulated Glass (VPI-RETRO- Vacuum Insulated Glass)

This group will target the development and demonstration of cost-effective novel vacuum insulated glass (VIG) windows for existing building retrofits. The research will address high

costs, durability concerns, and standardized testing procedures and demonstrate performance and benefits of high-performing VIGs to improve their value proposition and increase market adoption and scale-up.

Projects in this group must be less costly, less invasive, and/or easier to install than traditional retrofit methods. Projects must develop a standard testing process to evaluate the durability, stability, longevity, and mechanical strength of the VIG window.

Examples of projects include, but are not limited to:

- Thermal performance improvements (e.g., spacers, seals, innovative pillar designs, frames).
- Improved materials or processes for glass or edge sealing and other durability improvements.
- Advanced manufacturing to lower production costs.
- Software modeling of high-performance windows (i.e., durability, stability).

This research project must evaluate both of the following VIG installation methods for SF and MF residential buildings:

- Method 1 - VIG windows retrofitted into the frame of existing windows. This method greatly reduces the labor and installation costs by preserving the frames of existing windows. There are two options under this method.

    - Option 1: The existing sashes, spacer, and all other existing components are removed with the exception of the existing frame. The new VIG window and the frame are fitted inside the existing frame and fastened into the wall studs.

    - Option 2: A variation is to remove the existing window sashes and replace them with VIG sashes. The researchers must also evaluate whether they can cost-effectively improve the thermal performance of the existing frame.

    Under this method, the new VIG window combined with the existing frame must achieve a U-factor of no greater than 0.18. Describe how to improve the thermal performance of the existing frame that is left in place to improve the overall U-factor of the entire fenestration, which includes the existing frame, including but not limited to thermal break, cladding, or other techniques.

- Method 2 - Clean changeout of the existing windows. Under this method, the entire existing window and frame are removed and replaced with new VIG units with new frames. This option would achieve very low U-factors but might also have a long payback period because of the labor-intensive nature of removing the existing frames. The researchers will evaluate cost effectiveness of this option, considering both higher window efficiencies and installation costs.

For both installation methods, proper installation guidelines must be developed to ensure defect-free installations to the greatest extent possible while ensuring that energy savings and longevity goals are realized.

This research project must address the following barriers for VIG window installations:

1. How durable are vacuum seals VIG insulated glazing units (IGUs) for all installation methods mentioned above? Ideally, the seals must last at least for 40 years. Describe how component failures can be detected by the building occupants in a timely manner, for example, the loss of vacuum in IGUs, which can greatly reduce the thermal performance of the VIG units. Describe what practical and cost-effective remedies may be available to replace the failed components, for example swapping out the failed IGUs without disturbing the other fenestration components. Describe what would be the cost of these remedies in a mature market.
2. Can VIGs work for windows larger than eight feet and would vacuum seals hold for at least 40 years in these larger windows?
3. Can stress on seals due to extreme temperature differences cause vacuum seals to fail? If yes, any solutions to avoid seal failures?
4. Can the project team develop accelerated testing of VIG components to ensure that VIG windows will last at least 40 years?
5. What is the optimum pillar spacing that maximizes energy performance while maintaining durability of the glass panes?
6. What are the project team's plans for addressing lack of consumer awareness regarding product availability and energy performance?
7. What are the project team's plan for addressing the lack of certification procedures, such as NFRC rating, for VIG windows? Without an NFRC rating, VIG windows cannot get full performance compliance credit.
8. What are the project team's plans for addressing builders' product availability and performance concerns, particularly related to products that lack large-scale demonstrated proof of performance?

Table 2: Performance and Cost metrics Summary

	Method 1- Reuse of frame	**Method 2-Complete changeout**
Whole Window (U-factor) (R-value)	≤ 0.18 ≥ 5.6	≤ 0.08 ≥ 12.5
Cost ($)	$8/ft^2 premium cost (2025 target) *	$8/ft^2 premium cost (2025 target) *

* CEC-500-2021-018 compared to double pane windows

Group 3: Value Proposition Improvement - Residential Envelope Technology Retrofit Opportunity for with Multiple Measures (VPI-RETRO- MM)

This group will target high-performance envelope solutions using advanced building construction methods[9] **for existing residential buildings** to improve the value proposition of building retrofits and drive uptake of retrofits. (*Applicants in this group must have received* prior *DOE funding (i.e., E-ROBOT, ABC FOA, BENEFIT FOA, etc.*) *for similar envelope type projects.)* This group is targeting technologies and approaches that are currently at TRL 4-6 to advance the technology by at least two levels. Technologies should improve building envelope performance while **improving affordability, increasing the speed of renovations, with less disruption to the building occupant** compared to the current technology solutions which are suitable for the California climate zones and building stock. Projects should demonstrate technologies that focus on single and multi-family residential units with the potential to be scaled up and must meet or exceed the metrics in Table 3 below. Projects in this group must be located in a disadvantaged[10] or low-income community [11] and/or Tribes[12] and requires CBO involvement.

Projects in this group must advance envelope energy-saving components or system packages that include two or more energy efficiency measures. At least one measure must be a **novel envelope measure**. This can include, but is not limited to, combination measures such as:

- Panelized envelope systems and air sealing;
- Wall insulation and window upgrades;
- Attic insulation and air sealing;
- Attic and wall insulation and air sealing; and
- Envelope and electric equipment upgrades (e.g., heat pumps, HVAC systems, water heaters).

[9] In this Solicitation Concept, Advanced Building Construction methods are methods that offer high-performing envelopes, faster renovation, and construction with less disruption to building occupants and are lower costs for developers and consumers which can increase scalability and repeatability in order to drive technology adoption. This includes the use of new building materials, robotics, offsite manufacturing, 3-D printing, and digitization.

[10] Disadvantaged communities are communities designated that represent the 25% highest scoring census tracts in CalEnviroScreen 4.0, census tracts previously identified in the top 25% in CalEnviroScreen 3.0, census tracts with high amounts of pollution and low populations, and federally recognized tribal areas as identified by the Census in the 2021 American Indian Areas Related National Geodatabase. (https://oehha.ca.gov/calenviroscreen/sb535)

[11] Low-income Communities are defined as communities within census tracts with median household incomes at or below 80 percent of the statewide median income or the applicable low-income threshold listed in the state income limits updated by the Department of Housing and Community Development. (https://www.hcd.ca.gov/grants-funding/income-limits/state-and-federal-income-limits.shtml)

[12] A Native American Tribe located in California that is on the contact list maintained by the Native American Heritage Commission for the purposes of Chapter 905 of the Statutes of 2004. https://nahc.ca.gov/

Table 3: Performance and Cost metrics Summary

Measures	Current performance	Current cost	Target Performance	Target Cost
Insulation	R<6/in *	$14-17.25/sf *	R8-R14/inch	$0.75-$1.87/sf * (2040 installed price premium)
Whole Window	U-0.22 (Energy Star V7.0)	$48.40/sf **	U- 0.17–0.077 **	$2.10-$6.60/sf ** (2040 installed price premium)
Air Sealing	3-5 ACH50 *	$1.50-$2.50/sf*	1 ACH50 *	$0.16-$1.22/sf * (2040 target)
Heat Pump	SEER≥22; HSPF≥10 (ducted home) *** SEER≥29; HSPF≥10 (mini-split) ***		SEER ≥22; HSPF≥10 (ducted home) SEER ≥33; HSPF≥13 (mini-split) ****	****

* Opaque Envelopes: Pathway to Building Energy Efficiency and Demand Flexibility, DOE 2021
** Pathway to Zero Energy Windows: Advancing Technologies and Market Adoption, DOE 2022
*** Accelerating Residential Building Decarbonization, ABC 2024
****Heat pump and eat pump water heater must be meet CARB GWP guidelines with similar or better performance and cost.

Features of projects may include, but are not limited to:

- Innovative advanced strategies that promote affordability and scalability, such as rapid prototyping for customization of energy-saving retrofits or installation-ready systems created offsite (e.g., prefabrication, 3D printing)
- Automation technology or processes/strategies to make retrofit processes smoother, quicker, lower cost, easier to implement, and more productive. This may include a combination of the use of robotic or digital tools to assist with:
  - Identifying problem areas for retrofits;
  - Creating simpler non-invasive solutions;
  - Completing retrofits more safely and quickly;
  - Ensuring better quality installations; and
  - Gaining access to challenging/difficult-to-access locations.
- Novel technology or processes that promote easy installations without complicated teardown or reconstruction and are fault-tolerant or self-correcting to minimize potential for reducing technology performance.
- Installation process improvement strategies or techniques to lower installation cost.
- Novel non-destructive testing or sensing technologies that can diagnose the building envelope and offer cost-effective retrofit solutions.

An additional desired feature for projects in this group is for developed technologies to have lower embodied carbon and energy/carbon lifecycle than do technologies that are currently on the market.

Group 4: Value Proposition Improvement- Improving the Thermal and Air Infiltration in Window Retrofits with Existing Frames

This group will study, develop, and demonstrate improvement in overall thermal and air infiltration performance for the retrofit scenarios where the new insulating glass unit (IGU) or the entire fenestration is installed within the existing window frame using one of the options under Method 1, Group 2. The existing window frame retrofit research will address thermal improvements to the insulated glass unit, air infiltration associated with installations, installation accessories and techniques, cost, and ease of installation. The researchers must also develop an air infiltration criterion for use in Title 24's building energy modeling tool. Projects in this group must have a whole window U-factor of no more than 0.18, and be less costly, less invasive, quicker, and easier to install than a full window replacement would be.

The research must include, but is not limited to:

- Documentation of all costs including materials and installation of different IGU replacements (e.g., double-pane, triple-pane, VIG);
- Documentation of installation practices and duration of each installation task used in research;
- Documentation of thermal and air infiltration of windows pre- and post-installation;
- Improvement in the thermal performance of the IGU unit;
- Improvement in the frame's thermal performance using one of the options under Method 1, Group 2;
- Improvement in installation processes and practices that reduce time and increase the likelihood of defect-free installations, potentially via use of artificial intelligence, robotics, or digital tools;
- Best practices installation guidelines to ensure defect-free installations including minimum time assigned to each task;
- Pre- and post-installation measurement and verification of thermal performance, air infiltration, and indoor air pollutants;
- Estimated energy savings associated with thermal performance improvements and air infiltration improvements (separately and combined) compared to baseline T24 code-compliant windows and currently installed windows; and
- Development of a method for capturing energy savings associated with air infiltration from windows in the T24 energy modeling tool.

B. Common Group Requirements

i. Cost Effectiveness (Group 1, 2, and 4 only)

The current high cost of efficient insulation panels and high-performing windows is a barrier to mass deployment of the technology and must be addressed. For cost-effectiveness analysis, researchers must utilize a CEC-approved simulation software tool, such as 2022 CBECC-Res or CBECC-Com, or another software tool, such as EnergyPlus, capable of generating annual 8760 hourly kWh and therms analysis,

utilizing 16 California-specific climate zones (ASHRAE climate zones shall not be used for this analysis). For electricity, the resulting 8760 kWh analysis must be coupled with appropriate Time-of-Use (TOU) rates, using the local utility or the nearest IOU (Southern California Edison, SDG&E, or PG&E) rate schedules (some municipal utilities do not offer TOU rates, so the nearest IOU TOU rates may be used instead). Likewise, for natural gas, the annual 8720 therms usage must be coupled with appropriate natural gas TOU rates. Alternatively, the annual kWh and therms may be grouped in "peak, mid-peak, and off-peak" bins for summer and winter seasons, and then these bins may be coupled with appropriate TOU rates as described above to calculate the annual energy costs and savings.

Utilizing this energy cost-effectiveness approach, applicants should develop a 30-year life cycle net present value analysis, which includes the measures' first costs as well as the annual energy savings, annual maintenance costs (or savings), and other operating and maintenance costs (or savings), using a three-percent real discount rate. Utilizing this approach, develop a benefit/cost ratio for each measure, and the entire building if applicable. Similarly, utilizing the present values of all costs and benefits, develop a simple payback period for each measure, and the entire building if applicable. Ideally, the project will produce a benefit/cost ratio of greater than one, and a simple payback period of less than seven years. Utilizing the lifecycle methodology described above to determine the cost-effectiveness of the technology, assume the following two product cost scenarios:

1. Current high cost of insulation panels (group 1)/VIG windows (group 2), and
2. A mature future market for the insulation panels (group 1)/VIG windows (group 2), assuming product costs based on mass-scale product availability of the novel technologies.

ii. Calculating Direct Building-Based Emissions (All Groups)

Calculating the carbon savings from measures must use a time-varying approach, similar to the approach used by CEC-approved tools such as the 2022 CBECC software. CBECC couples the 8760 annual kWh and natural gas savings with the California-specific "long-term marginal emission rates", also developed for every hour of the year. Researchers may use the CBECC software or other approved CEC building simulation tools to calculate the carbon emission savings for each individual measure or for a multitude of measures impacting the whole building.

Alternatively, researchers may use third-party building simulation tools, such as EnergyPlus, by incorporating sidebar calculations within the software program or as an external calculation, such as an Excel spreadsheet, which must couple the 8760 annual hourly kWh and therms savings with appropriate California-specific long-term marginal emissions rates for electricity and natural gas, similar to the emissions factors that are incorporated in the 2022 CBECC software. In addition to generating 8760 hourly load profiles for kWh and therms, the third-party software programs must be able to utilize the California-specific 16 climate zones for simulations. Since California's climate and

the grid are very different than the national average, the researchers shall not utilize non-California-specific (national) climate zones and emission rates for this research project.

iii. Approved Simulation Software Programs (All Groups)

Energy savings calculations (kWh, kW, Therms) must be performed using a CEC-approved compliance software program, such as the 2022 CBECC-Res and CBECC-Com, or other CEC-approved programs. Third-party simulation software programs capable of generating annual 8760-hour kWh and therms reports, such as EnergyPlus, may be used if it is capable of utilizing California's 16 climate zones; ASHRAE climate zones shall not be used for this project.

V. QUESTIONS FOR STAKEHOLDERS

Please indicate **which project group(s)** you are addressing. CEC staff are seeking responses and comments to some (or all) of the following questions. Staff will consider responses and comments to shape the direction and scope of this solicitation.

1. Are the requirements for all groups in Section IV.A feasible and reasonable for improving the value proposition of existing building envelope retrofits? If not, what modifications are recommended for CEC staff to consider and why?
2. Are there other envelope retrofit technologies not addressed in this concept that should be considered that could improve the value proposition for building retrofits?
3. The technologies in Groups 1 and 2 have a current payback expectation of less than seven years. Is having a seven-year payback reasonable to increase market adoption of the technology? If not, what would be a necessary payback period to increase adoption of the novel technology?
4. Should the groups include other existing building sectors, such as commercial, in addition to the residential sector, to address challenges and drive market adoption for building retrofits? If so, which sector(s) should be targeted first to lower cost and accelerate market adoption of technologies and why?
5. What are the biggest gaps/barriers/challenges to bringing costs down and improving market adoption of higher-performing products that are not sufficiently addressed in these proposed groups? What is needed to address these barriers and how could those potential solutions be better covered in this draft solicitation concept?
6. Does a sufficient manufacturer ecosystem exist that is willing and/or able to manufacture these high-performing novel technologies following a successful demonstration project? If not, what additional resources are needed or additional concerns need to be addressed in order to increase manufacturing capacity following a successful demonstration?
7. What would be the appropriate level of project funding for the work proposed in this draft concept, and why? Based on the level of funding, what would be the recommended number of demonstration sites for SF, MF, and manufactured homes?
8. Are there building envelope retrofit technologies that do not currently meet the requirements of this solicitation concept that CEC should consider funding and why?
9. Please provide any other relevant comments regarding this solicitation concept draft.

VI. WRITTEN COMMENTS

Comments on this "draft solicitation concept" document are due by **March 6, 2024, at 5:00 p.m.**

Please submit comments to the CEC using the e-commenting feature by accessing the comment page for this docket at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=23-ERDD-01. A full name, e-mail address, comment title, and either a comment or an attached document (.doc, .docx, or .pdf format) is mandatory. Please include "**23-ERDD-01 Retrofitting with Innovative Building Envelope Solutions Concept**" in the comment title. After a challenge-response test is used by the system to ensure that responses are generated by a human user and not a computer, click on the "Agree & Submit Your Comment" button to submit the comment to the CEC's Docket Unit.

Please note that written comments, attachments, and associated contact information included within the documents and attachments (e.g., your address, phone, email, etc.) become part of the viewable public record. This information may become available via Google, Yahoo, and any other search engines.

Interested stakeholders are encouraged to use the electronic filing system described above to submit comments. If you are unable to submit electronically, you may email your comments to: DOCKET@energy.ca.gov and include "**23-ERDD-01 Retrofitting with Innovative Building Envelope Solutions Concept" in the subject line.**