**GRANT FUNDING OPPORTUNITY**

**Advancing Window Retrofits and Reducing Fireplace Air Leaks to Improve Energy Efficiency in Existing Buildings**

**Gas R&D Program**



**GFO-22-501**

http://www.energy.ca.gov/contracts/index.html

**State of California**

**California Energy Commission**

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**(revised)**

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**Attachments**

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| 2 | Executive Summary |
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# I. Introduction

## Purpose of Solicitation

The purpose of this solicitation is to fund energy efficiency research to advance high-performance windows in existing commercial buildings and reduce air and energy leakage in existing residential wood-burning and gas fireplaces. California’s existing building stock includes almost 14 million single family and multi-family units and nearly 7.5 billion square feet of commercial building space.[[1]](#footnote-2) The U.S. Department of Energy estimates that 40 percent of current commercial buildings and over 60 percent of current residential buildings will still exist in 2050.[[2]](#footnote-3) Although California’s Energy Code (Title 24, Part 6) requirements increase efficiency over time, existing building stock can be very leaky and inefficient, especially older buildings built prior to the energy code. Addressing envelope retrofits in existing buildings to improve energy efficiency results in greenhouse gas (GHG) reductions and is necessary to help California meet its decarbonization goals. The goal of this solicitation is to reduce GHG emissions by reducing energy use for heating, ventilation, and air conditioning (HVAC).

This solicitation has two funding groups:

* Group 1: High-Performance Window Retrofits for Commercial Buildings. This group focuses on advancing and demonstrating high-performance window retrofit technologies in existing commercial buildings to reduce costs, increase energy performance, increase ease of installation, and maximize commercialization and deployment. Tighter and more energy efficient building envelopes reduce heating and cooling loads, improve occupant comfort, and reduce infiltration of outside air. Windows account for about 10% of building energy losses and affect HVAC use and lighting.[[3]](#footnote-4) Space conditioning accounts for about 37% of total gas consumption in California commercial buildings.[[4]](#footnote-5) High-performance windows, such as triple pane and vacuum insulated glass windows (VIG), are on the market for commercial buildings. However, retrofits have been minimal due to technical and cost challenges, such as cost of replacement, size and weight incompatibilities with existing windows, and durability. For instance, highly insulated windows such as triple-pane windows represent less than 2% of the U.S. window market.[[5]](#footnote-6) The objectives of the research include:

1. Advance high-performance window technologies by addressing the retrofit technical and cost challenges, such as replacement cost, existing window size and weight incompatibilities, and durability;
2. Demonstrate increased energy performance (e.g., higher energy efficiency) **according to the research goals listed in Table 1 and decreased HVAC energy consumption** by at least 1**5**~~[0]~~% **when** compared to current **HVAC energy use with existing single pane windows**[~~code standards~~];
3. Reduce installation costs compared to code compliant windows; and
4. Accelerate high-performance window uptake in the retrofit market through direct partnerships with manufacturers, suppliers, and others.

* Group 2: Strategies to Reduce Fireplace Air Leaks in Residential Buildings. Energy efficiency typically focuses on air leaks associated with the building envelope and façade components, which include windows, walls, and roofs. However, current and California-specific energy efficiency research on other aspects such as fireplaces is lacking. Air leakages from fireplaces affect both energy use and indoor air quality, which depends on outdoor air quality including smoke from wildfires.

California’s Energy Code (Title 24, Part 6) does not have a specific fireplace air leakage standard. There are some requirements in the code for fireplace dampers and closable metal or glass doors that cover the entire firebox opening. However, these apply only to new construction, and older buildings that predate the Energy Code could have large energy losses and air leakages from fireplaces. An early 1980’s Lawrence Berkeley National Laboratory study attributes fireplace air leakage in homes with dampers and without dampers to 9% and 24%, respectively.[[6]](#footnote-7) Another study estimated a 30% increase in heating energy use for an unlit fireplace with an open damper compared to a home with no fireplace chimney.[[7]](#footnote-8) Additionally, outdoor pollutant infiltration through these air leaks affects the indoor air quality, especially during air events such as wildfires. Thus, the objectives of this research are to:

1. Understand the magnitude of the air leakage problem and implications to energy and health;
2. Identify actions that residents can take to mitigate the problem(s); and
3. Recommend possible updates to building energy efficiency codes and standards and future energy efficiency programs to address the problem(s).

This research will contribute to implementing the Gas Research & Development (R&D) Program 2019-2020 Funding and Supplemental Budget Plan. Projects must fall within the following project groups:

* **Group 1**: High-Performance Window Retrofits for Commercial Buildings; and
* **Group 2**: Strategies to Reduce Fireplace Air Leaks in Residential Buildings.

See Part II of this solicitation for project eligibility requirements. Applications will be evaluated as follows: Stage One proposal screening and Stage Two proposal scoring. Applicants may submit multiple applications, though each application must address only one of the project groups identified above. If an applicant submits multiple applications that address the same project group, each application must be for a distinct project (i.e., no overlap with respect to the tasks described in the Scope of Work).

Prospective applicants looking for partnering opportunities for this funding opportunity should register on the California Energy Commission’s Empower Innovation website at [www.empowerinnovation.net](http://www.empowerinnovation.net).

## Key Words/Terms

|  |  |
| --- | --- |
| Word/Term | Definition |
| Applicant | The entity that submits an application to this solicitation. |
| Application | An applicant’s written response to this solicitation. |
| Authorized Representative | *Authorized Representative*, the person signing the application form who has authority to enter into an agreement with the CEC. |
| **California Tribal Organization** | **A corporation, association, or group controlled, sanctioned, or chartered by a California Native American tribe that is subject to its laws, the laws of the State of California, or the laws of the United States.** |
| California Native American Tribe**/Tribe** [~~or Tribal Communities~~ ~~(Tribe)~~] | 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. |
| CAM | *Commission Agreement Manager,* the person designated by the CEC to oversee the performance of an agreement resulting from this solicitation and to serve as the main point of contact for the Recipient. |
| CAO | Commission Agreement Officer |
| CBE | California Based Entity |
| CBO | Community Based Organization. A public or private nonprofit organization of demonstrated effectiveness that:   1. Has an office in the region (e.g., air basin or county) and meets the demographic profile of the communities they serve. 2. Has deployed projects and/or outreach efforts within the region (e.g., air basin or county) of the proposed disadvantaged or low-income community. 3. Has an official mission and vision statements that expressly identifies serving disadvantaged and/or low-income communities. 4. Currently employs staff member(s) who specialized in and are dedicated to – diversity, or equity, or inclusion, or is a 501(c)(3) non-profit. |
| CEC | State Energy Resources Conservation and Development Commission or, the California Energy Commission. |
| CEQA | California Environmental Quality Act, California Public Resources Code Section 21000 et seq. |
| Commercial Buildings | **As defined in this GFO**,[~~C~~]**c**ommercial buildings with at least 50,000 square feet and [~~at least 30%~~]**have a** window to wall ratio **between 25% and 30% inclusive**. |
| Fireplaces | Fireplaces that use wood or fossil gas as fuel. |
| Days | *Days refers to calendar days.* |
| Disadvantaged Community | These are communities **that represent the 25% highest scoring census tracts in CalEnviroScreen 4.0[[8]](#footnote-9), 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**. [~~in the top 25% scoring areas from CalEnviroScreen along with other areas with high amounts of pollution and low populations.~~  ~~(https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40)~~] **(**[**https://oehha.ca.gov/calenviroscreen/sb535**](https://oehha.ca.gov/calenviroscreen/sb535)**)** |
| Gas IOU | Gas Investor-Owned Utility, including Pacific Gas and Electric Co., San Diego Gas and Electric Co., and Southern California Gas Co. |
| Low**-**Income Community | *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]~~**at or below the threshold designated as low-income** by the **California** Department of Housing and Community Development.  ([**https://www.hcd.ca.gov/grants-and-funding/income-limits/state-and-federal-income-rent-and-loan-value-limits**](https://www.hcd.ca.gov/grants-and-funding/income-limits/state-and-federal-income-rent-and-loan-value-limits)**)** [~~https://www.hcd.ca.gov/grants-funding/income-limits/state-and-federal-income-limits.shtml)~~] |
| NOPA | *Notice of Proposed Award,* a public notice by the CEC that identifies award recipients. |
| Pre-Commercial Technology | *Pre-commercial Technology* means a technology that has not reached commercial maturity or been deployed at scales sufficiently large and in conditions sufficiently reflective of anticipated actual operating environments to enable the appraisal of operational and performance characteristics, or of financial risks. |
| Pilot Test | *Pilot test* means small scale testing in the laboratory or testing on a small portion of the production line of the affected industry. Pilot tests help to verify the design and validity of an approach, and adjustments can be made at this stage before full-scale demonstrations |
| Principal Investigator | The technical lead for the applicant’s project, who is responsible for overseeing the project; in some instances, the Principal Investigator and Project Manager may be the same person. |
| Project Manager | The person designated by the applicant to oversee the project and to serve as the main point of contact for the CEC. |
| Project Partner | An entity or individual that contributes financially or otherwise to the project (e.g., match funding, provision of a test, demonstration or deployment site), and does not receive CEC funds. |
| Recipient | An entity receiving an award under this solicitation. |
| Residential Buildings | Residential buildings, which include single family and multi-family units. |
| R-value | A unit of thermal resistance used for comparing insulating values of different material. It is a measure of the effectiveness of insulation in stopping heat flow. The higher the R-value number for a material, the greater its insulating properties and the slower the heat flow through it. The specific value needed to insulate a home depends on climate, type of heating system, and other factors. |
| **Secondary Windows** | **Retrofit products that are installed over existing windows and add layers of glazing or insulation without the need for full window replacement.** |
| Solicitation | This entire document, including all attachments, exhibits, any addendum and written notices, and questions and answers (“solicitation” may be used interchangeably with “Grant Funding Opportunity”). |
| State | State of California |
| SHGC | Solar Heat Gain Coefficient is the amount of heat gained or lost through windows due to solar radiation into the building. The higher the number, the more heat gained through the window. |
| **Total Installed** **Price** **Premium** | **The additional amount for purchasing and installing high- performance windows compared to standard double pane windows.** |
| TRL | Technology readiness levels, are a method for estimating the maturity of technologies during the acquisition phase of a program.  Source: U.S. Department of Energy, “Technology Readiness Assessment Guide”. <https://www2.lbl.gov/dir/assets/docs/TRL%20guide.pdf> |
| U-Factor | A measure of how well heat is transferred by the entire window - the frame, sash, and glass - either into or out of the building. U-value is the opposite of R-value. The lower the U-factor number, the better the window will keep heat inside a home on a cold day. |
| [~~Under-resourced community~~] | [~~A broader term that includes disadvantaged, low-income, and tribal communities in California.~~] |
| Visible Light Transmittance or VT | A measure of the amount of visible light that is transmitted through a window. Higher values indicate that more light is transmitted through the window. |

## Project Focus

1. **Group 1: High-Performance Window Retrofits for Commercial Buildings**

This research focuses on advancing building window efficiency and strives to achieve a performance approaching that of a wall. Projects under this research category must be ready to demonstrate and deploy in commercial buildings and be at a technology readiness level[[9]](#footnote-10) (TRL) of 7 or 8 at the start of the research. The objective of this group is to raise the TRL by at least one level and develop window technologies that have potential for widespread adoption. The objectives are to: a) advance high-performance window technologies by addressing retrofit technical and cost challenges; b) demonstrate increased energy performance **according to the research goals listed in Table 1 and decreased HVAC energy consumption** by at least 1**5%**[~~0%~~] **when** compared to current **HVAC** **energy use with existing single pane windows** [~~code standards~~]; c) reduce installation costs compared to code compliant windows; and d) accelerate high-performance window uptake in the retrofit market through direct partnerships with manufacturers, suppliers, and others.

Projects in this group must meet **all** of the following requirements during the research agreement period, and these must be included in the Scope of Work (Attachment 5):

i. Performance and Metrics

* Have the **potential to meet the performance goals** listed in Table 1**.** [~~or provide justification for an alternate goal that will exceed baseline requirements as described later in this section under the Project Narrative, Technical Approach.~~]
* Independently field test and demonstrate lower heating and cooling building energy consumption compared to Title 24 compliant windows for a period of 12 months that includes the summer and winter seasons.
* Independently field test and demonstrate lower cost of implementation compared to current practices.
* Be easily deployable, with comparable thickness and weight to the currently installed window base and an installation time that is similar to or less than current practices.
* Lab test to compare the performance of Title 24 compliant windows and the proposed window technology prior to field installation to verify that the energy performance goals listed in Section I.A. and Table 1 can be met.
* Model performance of standard Title 24 compliant and the advanced windows in all climate zones using CBECC 2022 modeling software **for the same demonstration site building**.

The window research must include at least one of the following:

* + Novel or upgraded materials to improve window performance, such as:
    - low cost highly insulating inter-pane cavity filling material alternatives for the insulated glass units (IGU);
    - window frame materials, geometries, and assemblies that reduce thermal conductivity and maintain long-term air filtration, air quality and structural integrity;
    - window components such as spacer systems and seals;
    - ways to reduce large thermal stresses on the seal to improve edge seal reliability and durability for VIGs; and
    - pillars that separate panes of glass as in VIGs to minimize thermal bridging and stress concentration.
  + Novel IGU and frame component production approaches that have a pathway to compatibility with current manufacturing processes (e.g., automated IGU assembly).
  + Novel fabrication processes to reduce complexity and allow for greater production capabilities for high-performance windows.

ii. Location and sample size

* The retrofit must occur in a **single commercial building or group of commercial buildings** totaling at least 50,000 square feet **with a window to wall ratio** **between 25% and 30%, inclusive. The ratio must remain the same before and after the retrofit.** Targeted buildings could include school campuses, retail centers, and office buildings[~~with at least~~ ~~30% window to wall ratio~~]. Verification documentation of window to wall ratio**,** [~~and~~] total building construction floor area**,** **and potential for** **decreased HVAC energy consumption by at least 15% when compared to current HVAC energy use with existing single pane windows** must be included in the proposal.
* The demonstration must retrofit at a minimum 5,000 square feet of single pane windows with high-performing windows.
* All demonstration sites must be located in a Gas IOU service territory (Pacific Gas and Electric Co., San Diego Gas and Electric Co., and/or Southern California Gas Co.).
* Demonstration projects must occur in buildings and climate zones with the highest potential for adoption of the high-performance windows if the performance criteria in Section I.A. and Table 1 are met. This can include cost effectiveness based on high heat and/or extreme cold days such as in climate zones 1, 11, 12, 13,14, 15, and 16; long operating hours; or other circumstances that make them prime retrofit candidates.

iii. Cost reduction

* Evaluate and estimate the system cost (materials and installation per **square foot of** window).
* Take actions to reduce the window costs and increase efficiency, such as keeping assembly thickness comparable to existing windows for retrofit applications. improved spacers that have positive impact on U-factor; and improved frame assemblies that maintain long-term air filtration and structural requirements.
* Provide the cost effectiveness of each action by building type (e.g., schools, offices, retail, etc.).

iv. Market Deployment

* Provide a market deployment plan that will increase installation and market share of high-performance windows if the requirements in Table 1 are met, including, but not limited to:
  + Strategies for obtaining a manufacturing partner(s);
  + Strategies for scaling up manufacturing and scaling up deployment of the window technology;
  + Compare current Title 24 compliant window cost to the high-performance new window costs, to include materials and installation per window cost and strategies for cost reductions;
  + Overall analysis of cost effectiveness including payback by building type (e.g., school, office, retail, etc.);
  + Analysis to estimate market size and identify most promising market, including all assumptions; and
  + Strategies for increasing installation and market shares of the window technology in commercial buildings with the most potential for retrofit.
* **Energy Efficient Statewide measure development component**
  + **This effort is intended to streamline potential energy efficiency measure development for inclusion into California’s energy efficiency portfolios.**
  + **CAM will direct when to commence the process.**
  + **This includes but is not limited to:**
    - **consultation with** [**California Technical Forum (Cal TF)**](http://www.caltf.org/)**[[10]](#footnote-11);**
    - **data collection consistent with the needs of measure development; and**
    - **completing Cal TF’s** [**Measure Proposal Form**](http://www.caltf.org/s/CalTF-Measure-Proposal-Form-v10.xlsm)**[[11]](#footnote-12) when directed by the CAM.**
    - **Submission of a completed measure application packet is not required.**

The Project Narrative (Attachment 3) must discuss the following in the sections identified under Technical Approach:

* Discuss how the project will meet or exceed the requirements identified in Section I.C.1. of the solicitation manual, including sections i through iv (i.e., performance, location and sample size, cost reduction, and market deployment in the Scope of Work). Each sub-section of the narrative **must clearly describe and label** which of the areas identified in I.C.1 and Scope of Work they are meant to address.
  + Provide analysis on how the selected technology may meet or exceed the criteria listed in Table 1 and summarize the information in Table 2. [~~If the target performance for the selected technology is different than those listed in Table 1, provide: a) reason for the difference in performance, b) explain how it will still exceed current building energy efficiency standards, c) how it will increase deployments in the retrofit market, d) how it will benefit California Gas IOU ratepayers, such as GHG reductions and energy and cost savings, and e) provide all assumptions used to justify the high-performance window.~~]
* Estimate and discuss how window system costs (capital and/or installation) will be reduced compared to current Title 24 compliant technology. Identify specific measures that facilitate system cost reduction, such as framing thickness, improved spacers, and more durable frame assemblies. If proposed window technology will concurrently test with Title 24 compliant windows in a side-by-side approach, use Title 24 technology installation values.
* **This item only pertains to applicants with demonstration sites who already have plans and budget to install Title 24 compliant windows and are willing to do side-by-side field testing to compare with the new high-performance window technology.** Side-by-side means that windows must be evaluated under the same environmental conditions, such as same building orientation and location, and be installed in buildings of similar vintage with respect to energy using systems, envelope and occupant usage patterns. Examples of side-by-side installations include, windows that are all south facing, windows on one floor will be the Title 24 compliant windows and another floor will have the high-performance windows. Side-by-side approaches will be considered an enhancing feature during the scoring of the technical approach. If proposing to do the side-by-side comparison, applicants must:
  + install at least 2,500 square feet of Title 24 compliant windows.
  + collect M&V data for both windows under the same environmental conditions for the purpose of identifying differences in window performance, installation practices, and cost and energy savings.
  + Include the following in the project narrative:
    - * 1. Description of demonstration site and the building where the Title 24 compliant and high-performance windows will be installed. Include the building orientation, building vintage, major energy using systems and occupancy patterns,
        2. Source of funding for the purchase and installation of the 2,500 square foot of Title 24 compliant windows since the purchase and installation cost cannot be paid for with Gas R&D funds,
        3. Source of contingency funding in the event of cost overruns and supply chain issues associated with the purchase and installation of the Title 24 compliant windows, and
        4. Copies of construction, design drawings or other documentation to provide evidence or commitment that the applicant has already planned to retrofit at least 2,500 square feet of replacement windows with Title 24 compliant windows.

Title 24 compliant window square footage does not count towards the 5,000 square feet requirement of proposed window technology. Costs for the Title 24 compliant windows and installation will count as match if it meets the requirements in Section I.J. This item **does not apply** to demonstration sites that **have not planned nor budgeted** for a retrofit of their existing windows with Title 24 compliant windows **prior to submitting the application**. **However, prior completed window retrofits that meet 2022 Title 24 compliant standards can be considered to have an enhanced feature but cannot be counted as match.**

* Provide analysis on the strengths and weaknesses of the window system chosen for the project. Include analysis and discussion on potential or known market barriers for the proposed technology, including appropriate references.
* Identify demonstration site(s) and address(es) and why these were selected, such as having the highest retrofit potential.
* Identify at least one building owner who may be interested in deployment of the technology if the targeted metrics are achieved and provide a commitment letter.
* Identify a project partner/manufacturer on the team who will produce the new window product at the end of the project and who may be committed to deploy the technology if the targeted metrics are achieved and provide a commitment letter.

Table 1: Summary of Metrics for Group 1[[12]](#footnote-13)

|  |  |  |  |
| --- | --- | --- | --- |
| **Technology** | **Baseline** | **Research Goal** | **Research Goal**  **Secondary window technology only** |
| **Commercial Windows Performance** | **[~~\*~~]**Performance:  U-Factor **≤ 0.34**  **(R-2.9)** [~~0.2 to 0.14~~  ~~(R-5 to R-7)~~] | U-Factor ≤ 0.13 (R ~7.7)  [~~V~~~~T~~ ~~>0.42~~]  [~~SHGC ≤ 0.20~~] | **U-Factor ≤ 0.22**  **(R ~4.5)** |
| **Installation [~~Ease~~] and Cost of Implementation** | **Price of**  [~~S~~]**s**tandard double- pane window **and** install**ation** [~~time and cost~~] | [~~The installation time and cost of new technology are the same or less than those for double-pane windows.~~]  [~~Cost premium ≤~~ ~~$5~~]  \***Total installed** **price**  **≤ $6**/sq. ft. | \***Total installed** **price** **premium   ≤ $5/sq. ft.** |

[~~\*Baseline performance metrics based on Gupta, Smita, Jeremy Smith. Itron, Inc. 2019.~~ *~~Research Gap Analysis for Zero-net Energy Buildings.~~* ~~California Energy Commission. Publication Number: CEC-500-2019-031-AP.~~ ]

**\*Total Installed Price Premium is the increased cost of the advanced window product purchase and product installation compared to the cost for purchasing and installing standard double pane windows.**

Table 2 Metrics for Group 1 Applicant Technology

| Performance  Metric | Baseline Performance (1) | Target Performance | Evaluation  Method | Metric  Significance |
| --- | --- | --- | --- | --- |
| Cost per square foot of windows to be retrofitted |  |  |  |  |
| R-Value |  |  |  |  |
| U-Factor |  |  |  |  |
| Solar Heat Gain Coefficient (SHGC) |  |  |  |  |
| Visible Light Transmittance (VT) |  |  |  |  |
| Other, specify |  |  |  |  |

* + - 1. Baseline performance should be Title 24 compliant windows and not what is currently installed in the buildings. Indicate if metric is from field performance (e.g., side by side approach) or modeled.

Measurement and Verification Plan

The Project Narrative (Attachment) must include a Measurement and Verification Plan, completed by an independent contractor and not the applicant, that describes how actual project benefits will be measured and quantified, such as by pre- and post-project fossil gas use (therms, BTU/hr), electricity use (kilowatt-hours, kilowatts), and cost savings for electricity, fossil gas, and other benefits. The activities proposed in the Measurement and Verification Plan must be included in the “Technical Tasks” section of the Scope of Work Template (Attachment 5)

1. **Group 2: Strategies to Reduce Fireplace Air Leaks in Residential Buildings**

Research focuses on characterizing energy and air leakage in residential California buildings with fireplaces. The objectives are to: a) understand the magnitude of the air leakage problem and implications to energy and health; b) identify actions that residents can take to mitigate the problem; and c) recommend possible updates to building energy efficiency codes and standards and future energy efficiency programs to address the problem(s).

This research will provide: a) an inventory of California residential buildings with gas or wood burning fireplaces; b) information and data on their air leakage rates by building vintage; c) fireplace air leakage solutions and their effectiveness; and d) information on energy use and indoor air quality implications caused by leakages.

The Project Narrative (Attachment 3), must discuss the following in the sections identified under Technical Approach:

1. Each sub-section of the narrative **must clearly describe and label** which of the areas identified in Section I.C.2. are being addressed. Explain how the residential California building stock with fireplaces will be characterized such as fireplace fuel type, building vintage and type (single family or multi-family), climate zones, and how the fireplace is used (primary heating, secondary heating, decorative, or unused).
2. Describe how the project team plans to select and test the homes for fireplace air leaks including monitoring indoor and outdoor pollutants such as particulate matter (PM), nitrogen oxides (NOx), carbon monoxide, carbon dioxide, and hydrocarbons.
3. Describe each air leakage test scenario to be evaluated for the selected homes, such as fireplace non-operational, fireplace operational with damper open, fireplace operational, and gas heating system operational, and identify how air leakage measurements will be made, including timing and duration of test, and what protocols or standards will be used to verify accuracy of measurements. Identify instrumentation to be used for testing and measurements.
4. Describe how solutions and strategies for air leakage reduction will be identified and tested for effectiveness and technical and economic feasibility and acceptance potential.
5. Describe how the project team will determine and measure outdoor and indoor air transfer through fireplace air leaks during air quality events (e.g., wildfire events) and non-air quality events. Applicants must explain methods used to perform indoor and outdoor air quality monitoring (e.g., active pollutant monitoring, passive pollutant monitoring, or both) to measure changes in pollutant concentrations through the fireplace and describe whether and how time-resolved monitoring will be used.
6. Discuss how energy use will be measured or determined and how GHG emissions will be calculated for the baseline case and potential retrofit leakage reduction strategy case. Include all assumptions.
7. Describe the plan and approach for information dissemination and discuss previous community engagement activities performed on similar projects. Indicate past information dissemination to stakeholders, such as utilities, building occupants, and regulatory agencies, and the results.

**The research project must include the following at a minimum in the Scope of Work:**

* + Characterization of the number of residential California buildings with gas or wood-burning fireplaces, and for those buildings, characterization of the building type, building vintage, climate zones, and how the fireplace is used.
  + Test fireplace air leakage rates in at least 20 homes when space conditioning is in operation and not in operation.
  + Home selection criteria include, but are not limited to:
    - Homes must be located in one of the following gas investor-owned utility service areas: Pacific Gas and Electric Co., Southern California Gas Co., and San Diego Gas and Electric Co.;
    - Space conditioning: homes with gas heating, either central or unitary;
    - Climate zones: multiple climate zones, including those in wildfire prone areas;
    - Fireplace fuel type: at least 70% of the selected homes must have wood-burning fireplaces, the remaining 30% can use fossil gas (no propane);
    - Fireplace venting: exhaust gases must be vented through a chimney;
    - Building vintage: at least 50% of the selected homes must be older homes built before the Title 24 Energy Code (e.g., pre-1978) with wood-burning fireplaces; and
    - Building occupants: willingness to participate in the research and complete a survey of basic fireplace knowledge (e.g., fireplace fuel source, damper accessibility, energy impact, air infiltration, comfort, behavior).
  + Measure and evaluate the transport of emissions between the indoor and outdoor via fireplace leakages. At a minimum, NOx and PM emissions must be measured for two weeks during both the winter and summer seasons.
  + Identify and test or evaluate solutions to measure effectiveness of reducing fireplace air leaks. Solutions should be cost-effective when possible.
  + Measure or evaluate energy use, GHG emission impact, and indoor air quality impact for the test scenarios. Identify any other related benefits.
  + Prepare an educational guide that includes:
    - A summary of methods to reduce fireplace air and energy leakages along with resulting implementation cost, energy and cost savings, and effectiveness;
    - Best practices for operating space conditioning in homes with fireplaces;
    - Cost effectiveness of the retrofit solutions (i.e., simple payback, retrofit cost - both do-it-yourself and professional install - on multiple building vintages and by climate zone); and
    - Health and energy benefits of fireplace air leakage retrofitting.
  + Provide recommendations on information dissemination to increase uptake.

## Funding

1. **Amount Available and Minimum/ Maximum Funding Amounts**

There is **up to $2,638,222** available for grants awarded under this solicitation. The total, minimum, and maximum funding amounts for each project group are listed below.

| Project Group | Available funding | Minimum award amount | Maximum award amount | Minimum match funding  (% of Gas R&D Funds Requested) |
| --- | --- | --- | --- | --- |
| Group 1: High-Performance Window Retrofits for Commercial Buildings | $2,400,000 | $1,200,000 | $2,400,000 | 20% match required but match requirement is waived for demonstrations in and benefiting **disadvantaged/low-income** **communities** **and/or Tribes**. [~~under-resourced communities~~]. |
| Group 2: Strategies to Reduce Fireplace Air Leaks in Residential Buildings | $238,222 | $200,000 | $238,222 | No match required, but those with match will receive preference points. |

1. **Match Funding Requirement**

Match funding for **Group 1** is required in the amount of at least **20%** of the requested project funds. If the demonstration is in a[~~n under-resourced community~~] **disadvantaged/low-income** **community** **and/or Tribe** and demonstrates how the project will benefit the community, the match requirement is waived.

Match funding is not required for **Group 2** of this solicitation. However,applications that include match funding will receive additional points during the scoring phase (see Scoring Criteria in Section IV. F).

For the definition of match funding see Section I.J.

1. **Change in Funding Amount**

Along with any other rights and remedies available to it, the California Energy Commission (CEC) reserves the right to:

* Increase or decrease the available funding and the minimum/maximum award amounts described in this section.
* Allocate any additional or unawarded funds to passing applications, in rank order.
* Reallocate funding between any of the groups*.*
* Reduce funding to an amount deemed appropriate if the budgeted funds do not provide full funding for agreements. In this event, the Recipient and Commission Agreement Manager will reach agreement on a reduced Scope of Work commensurate with available funding.

## Key Activities Schedule

Key activities, dates, and times for this solicitation and for agreements resulting from this solicitation are presented below. An addendum will be released if the dates change for activities that appear in **bold.**

| ACTIVITY | DATE | TIME[[13]](#footnote-14) |
| --- | --- | --- |
| **Solicitation Release** | **September 20, 2022** |  |
| **Pre-Application Workshop** | **October 11, 2022** | **10:00 a.m.** |
| **Deadline for Written Questions[[14]](#footnote-15)** | **October 21, 2022** | **5:00 p.m.** |
| Anticipated Distribution of Questions and Answers | Week of [~~November 4~~] **November 7**, **2022** |  |
| **Deadline for Second Round of Written Questions** | **November 14, 2022** | **5:00 p.m.** |
| **Anticipated Distribution of Second Round Questions and Answers** | **Week of November 28, 2022** |  |
| **Deadline to Submit Applications** | **[~~November 29~~] December 9, 2022** | **11:59 p.m.** |
| Anticipated Notice of Proposed Award Posting Date | February 3, 2023 |  |
| Anticipated Energy Commission Business Meeting Date | May 10, 2023 |  |
| Anticipated Agreement Start Date | May 29, 2023 |  |
| Anticipated Agreement End Date | March 31, 2027 |  |

## Notice of Pre-Application Workshop

CEC staff will hold one Pre-Application Workshop to discuss the solicitation with potential applicants. Participation is optional but encouraged. The Pre-Application Workshop will be held remotely. Applicants may attend the workshop via the internet (Zoom, see instructions below), or via conference call on the date and at the time and location listed below. Please call (916) 654-4381 or refer to the CEC's website at www.energy.ca.gov/contracts/index.html to confirm the date and time.

**Date and time:**  October 11, 2022 at 10:00 a.m.

**Zoom Instructions:**

To join the Zoom meeting, go to https://zoom.us/join and enter the Meeting ID below and select “join from your browser”. Participants will then enter the meeting password listed below and their name. Participants will select the “Join” button.

**Meeting ID:** 983 8243 0283

**Meeting Password:** meeting@10

**Topic:** Pre- Application Workshop: GFO-22-501- Advancing Window Retrofits and Reducing Fireplace Air Leaks to Improve Existing Building Energy Efficiency

**Telephone Access Only:**

Call **1-888 475 4499** (Toll Free) or **1-877 853 5257** (Toll Free). When prompted, enter the meeting number above. International callers may select a number from the Zoom International Dial-in Number List at: https://energy.zoom.us/u/adjzKUXvoy. To comment, dial \*9 to “raise your hand” and \*6 to mute/unmute your phone line.

**Access by Mobile Device:**

Download the application from the Zoom Download Center, https://energy.zoom.us/download.

**Technical Support:**

* For assistance with problems or questions about joining or attending the meeting,

please call Zoom Technical Support at **1-888-799-9666 ext. 2.** You may also contact the Public Advisor’s Office at [publicadvisor@energy.ca.gov](mailto:publicadvisor@energy.ca.gov), or 800-822-6228.

* System Requirements: To determine whether your computer is compatible, visit:

http://support.-zoom.us/hc/en-us/articles/201362023-System-requirements-for-Windows

* If you have a disability and require assistance to participate, please Erica Rodriguez by e-mail at Erica.Rodriguez@energy.ca.gov or (916) 654-4314 at least five days in advance.

## Questions

During the solicitation process, direct questions to the Commission Agreement Officer listed below:

Angela Hockaday, Commission Agreement Officer

California Energy Commission

715 P, MS-1

Sacramento, California, 95814

E-mail: [Angela.Hockaday@energy.ca.gov](mailto:Angela.Hockaday@energy.ca.gov)

Applicants may ask questions at the Pre-Application Workshop and may submit written questions via email. However, all **technical** questions must be received by the deadline listed in the “Key Activities Schedule” above. Questions received after the deadline may be answered at the CEC's discretion. **Non-technical** questions (e.g., questions concerning application format requirements or attachment instructions) may be submitted to the Commission Agreement Officer (CAO) at any time prior to 5:00 p.m. of the application deadline date.

The questions and answers will also be posted on the Commission’s website at: https://www.energy.ca.gov/funding-opportunities/solicitations

If an applicant discovers a **conflict, discrepancy, omission, or other error** in the solicitation at any time prior 5:00 p.m. of the application deadline date, the applicant may notify the CEC in writing and request modification or clarification of the solicitation. The CEC, at its discretion will provide modifications or clarifications by either an addendum to the solicitation or by written notice to all entities that requested the solicitation. At its discretion, the CEC may, in addition to any other actions it may choose, re-open the question/answer period to provide all applicants the opportunity to seek any further clarification required.

**Any verbal communication with a Commission employee concerning this solicitation is not binding on the State and will in no way alter a specification, term, or condition of the solicitation. Therefore, all communication should be directed in writing to the assigned CAO.**

## Applicants’ Admonishment

This solicitation contains application requirements and instructions. Applicants are responsible for **carefully reading** the solicitation, asking appropriate questions in a timely manner, ensuring that all solicitation requirements are met, submitting all required responses in a complete manner by the required date and time, and **carefully rereading** the solicitation before submitting an application. In particular, please carefully read the **Screening/Scoring Criteria and** **Grounds for Rejection** in Part IV, and the relevant PIER Grant terms and conditions located at: http://www.energy.ca.gov/research/contractors.html.

Applicants are solely responsible for the cost of developing applications. This cost cannot be charged to the State. All submitted documents will become publicly available records upon the posting of the Notice of Proposed Award.

In addition to any other right reserved to it under this solicitation or that it otherwise has, if the CEC determines, in its sole and absolute discretion, that if an agreement is not being successfully executed with an applicant in a timely manner, the CEC may cancel a proposed award and award funds to the next highest scoring applicant.

## Background

1. **Gas R&D Program[[15]](#footnote-16)**

This solicitation will award projects under the Gas R&D program, which is funded by a ratepayer surcharge on gas consumed by ratepayers of Gas IOUs in California (see California Public Utilities Code section 890 and 895). The California Public Utilities Commission (CPUC) designated the California Energy Commission as administrator of the program in August 2004.[[16]](#footnote-17) The purpose of the program is to benefit California gas ratepayers by funding public interest research and development activities, which the CPUC has defined as “developing science or technology, the benefits of which accrues to California citizens and are not adequately addressed by competitive or regulated entities.”[[17]](#footnote-18)

1. **Program Areas, Strategic Objectives, and Funding Initiatives**

Gas R&D projects must fall within one or more specific focus areas (**“research initiatives”**) identified in the Gas R&D Budget Plan. This solicitation targets the following research initiative(s) from the Gas R&D Budget Plan for Fiscal Year 2019/2020[[18]](#footnote-19):

**Gas Research and Development Program, Proposed Program Plan and Funding Request for Fiscal Year 2019-20**

* **Research Area**: Energy Efficiency
  + **Research Initiative:**  Innovative Solutions for Facades and Envelopes

**Gas Research and Development Program Supplemental Budget Plan for Fiscal Year 2019-20**

* **Research Area**: Energy Efficiency
  + **Research Initiative:**  Innovative Solutions for Facades and Envelopes
* **Applicable Laws, Policies, and Background Documents**

This solicitation addresses the energy goals described in the following laws, policies, and background documents.

Laws/Regulations

* **Assembly Bill (AB) 32[[19]](#footnote-20) - Global Warming Solutions Act of 2006**

AB 32created a comprehensive program to reduce greenhouse gas (GHG) emissions in California. GHG reduction strategies include a reduction mandate of 1990 levels by 2020 and a cap-and-trade program. AB 32 also required the California Air Resources Board (ARB) to develop a Scoping Plan that describes the approach California will take to reduce GHGs. ARB must update the plan every five years.

Additional information: http://www.leginfo.ca.gov/pub/15-16/bill/sen/sb\_0001-0050/sb\_32\_bill\_20160908\_chaptered.htm

Applicable Law: California Health and Safety Code §§ 38500 et. seq.

* **Senate Bill (SB) 32 - California Global Warming Solutions Act of 2006: emissions limit**

AB 32 designates the State Air Resources Board as the state agency charged with monitoring and regulating sources of greenhouse gas (GHG) emissions. The state board is required to approve a statewide GHG emissions limit equivalent to the statewide GHG emissions level in 1990 to be achieved by 2020 and to adopt rules and regulations in an open public process to achieve the maximum, technologically feasible, and cost-effective GHG emissions reductions. This requires the state board to ensure that statewide GHG emissions are reduced to 40% below the 1990 level by 2030.

Additional information: https://ww3.arb.ca.gov/cc/scopingplan/scopingplan.htm

* **AB 758, Building Efficiency[[20]](#footnote-21)**

AB 758 requires the Energy Commission to collaborate with the California Public Utilities Commission and stakeholders to develop a comprehensive program to achieve greater energy and water savings in existing residential and nonresidential buildings. The Energy Commission developed the *Existing Buildings Energy Action Plan* in August 2015.

Additional information: https://ww2.energy.ca.gov/efficiency/existing\_buildings/documents/ab\_758\_bill\_20091011\_chaptered.pdf

Applicable Law: California Public Resources Code § 25943, California Public Utilities Code §§ 381.2 and 385.2

* **SB 350[[21]](#footnote-22) Clean Energy and Pollution Reduction Act of 2015,**

SB 350 does the following: 1) expands California’s RPS goals and requires retail sellers of electricity and local publicly owned electricity to increase their procurement of eligible renewable energy resources; 2) requires the Energy Commission to establish annual targets for statewide energy efficiency savings in electricity and gas final end uses of retail customers by January 1, 2030; and 3) provide for transformation of the Independent System Operator into a regional organization.

Additional information: <http://www.leginfo.ca.gov/pub/15-16/bill/sen/sb_0301-0350/sb_350_bill_20151007_chaptered.htm>

* **California Energy Code**

The Energy Code is a component of the California Building Standards Code and is published every three years through the collaborative efforts of state agencies including the California Building Standards Commission and the Energy Commission. The Code ensures that new and existing buildings achieve energy efficiency and preserve outdoor and indoor environmental quality through use of the most energy efficient technologies and construction.

Additional information: <http://www.energy.ca.gov/title24/>

Applicable Law: California Code of Regulations, Title 24, Part 6 and associated administrative regulations in Part 1

Policies/Plans

* **Integrated Energy Policy Report (Biennial)**

California Public Resources Code Section 25302 requires the Energy Commission to release a biennial report that provides an overview of major energy trends and issues facing the state. The IEPR assesses and forecasts all aspects of energy industry supply, production, transportation, delivery, distribution, demand, and pricing. The Energy Commission uses these assessments and forecasts to develop energy policies and provide recommendations for future research and analysis areas.

Additional information: http://www.energy.ca.gov/energypolicy

Applicable Law: California Public Resources Code § 25300 et seq.

* **California’s Existing Buildings Energy Efficiency Action Plan**

The Existing Buildings Energy Efficiency Action Plan provides a 10-year roadmap to activate market forces and transform California’s existing residential, commercial, and public building stock into high performing and energy efficient buildings. The Plan provides a comprehensive framework centered on five goals, each with an objective and a series of strategies to achieve it. Each strategy includes industry and/or government implementation partners. Water related items are addressed in several of the strategies from the Existing Buildings Energy Efficiency Action Plan including but not limited to strategies 1.5, 2.2, 4.1, and 5.7 from the plan.

Additional Information:

https://www.energy.ca.gov/programs-and-topics/programs/energy-efficiency-existing-buildings

* **2019 California Energy Efficiency Action Plan**

The Energy Efficiency Action Plan expands on the Existing Buildings Energy Action Plan and includes topics related to existing buildings’ energy efficiency, low-income barriers to energy efficiency, and doubling energy efficiency by 2030. The SB 350 Doubling of Energy Efficiency by 2030 report expands beyond existing buildings to include agriculture, industry, newly constructed buildings, conservation voltage reduction, and electrification. This report combines these topics with the Existing Buildings Energy Efficiency Action Plan to create a comprehensive statewide energy efficiency action plan.

Additional information: https://ww2.energy.ca.gov/efficiency/existing\_buildings/

* **Executive Order B-55-18**

Governor Brown’s Executive Order B-55-18 established a new statewide goal to achieve carbon neutrality as soon as possible, and no later than 2045, and achieve and maintain a negative emissions thereafter. This goal is in addition to the existing statewide targets of reducing greenhouse gas emissions.

Additional Information: <https://www.ca.gov/archive/gov39/wp-content/uploads/2018/09/9.10.18-Executive-Order.pdf>

Reference Documents

Refer to the link below for information about past CEC research projects and activities:

* <http://www.energy.ca.gov/research/>

The following documents were consulted in the preparation of this solicitation:

* Dalicieux, P & Nicolas, C. (1990). Ventilation perturbations due to an open fireplace in a house, *Energy and Buildings*. 14(3), 211-214. <https://doi.org/10.1016/0378-7788(90)90045-k>
* Dickerhoff, D., Grimsrud, D., & Lipschutz, R. (1982). Component Leakage Testing in Residential Buildings. Lawrence Berkeley National Laboratory. Retrieved from <https://escholarship.org/uc/item/03q2t8d3>

Emerging Technologies Research and Development DRAFT Research and Development Opportunities Report for Windows. (2020). <https://www.energy.gov/sites/default/files/2020/05/f74/bto-20200504_Draft_Windows_RDO.pdf>

* Gupta, Smita, Jeremy Smith. Itron, Inc. 2019. Research Gap Analysis for Zero-net Energy Buildings. California Energy Commission. Publication Number: CEC-500-2019-031. <https://ww2.energy.ca.gov/2019publications/CEC-500-2019-031/CEC-500-2019-031.pdf>
* Kenney, Michael, Jacob Wahlgren, Kristina Duloglo, Tiffany Mateo, Danuta Drozdowicz, and Stephanie Bailey. 2022. Final 2021 Integrated Energy Policy Report, Volume I: Building Decarbonization. California Energy Commission. Publication Number: CEC-100-2021-001-V1.
* Kenney, Michael, Nicholas Janusch, Ingrid Neumann, and Mike Jaske. 2021. California Building Decarbonization Assessment. California Energy Commission. Publication Number: CEC-400-2021-006-CMF.
* Stephen Selkowitz, Robert Hart, and Charlie Curcija. “Breaking the 20 Year Logjam to Better Insulating Windows”. In: *ACEEE 2018 Summer Study on Energy Efficiency in Buildings*. 2018, pp.1–16. DOI:10.20357/B76K5K.
* 2019. *The Natural Gas Research Development and Demonstration Program: Proposed Program Plan and Funding Request for Fiscal Year 2019-20*. California Energy Commission. <https://ww2.energy.ca.gov/2019publications/CEC-500-2019-035/CEC-500-2019-035.pdf>

## Match Funding

* **“Match funds”** includes cash or in-kind (non-cash) contributions provided by the applicant, subcontractors, or other parties including pilot testing, demonstration, and/or deployment sites (e.g., test site staff services) that will be used in performance of the proposed project.

“Match funds” do not include: CEC awards, future/contingent awards from other entities (public or private), the cost or value of the project work site, or the cost or value of structures or other improvements affixed to the project work site permanently or for an indefinite period of time (e.g., photovoltaic systems).

Definitions of “match funding” categories are listed below:

* + - **“Cash”** **match** means funds that are in the recipient’s possession or proposed by match partner and clearly identified in a support letter, and are reserved for the proposed project, meaning that they have not been committed for use or pledged as match for any other project. Cash match can include funding awards earned or received from other agencies for the proposed technologies or study (but not for the identical work). Proof that the funds exist as cash is required. Cash match will be considered more favorably than in-kind contributions during the scoring phase.
    - **“In-Kind”** **match** is typically in the form of the value of personnel, goods, and services, including direct and indirect costs. This can include equipment, facilities, and other property as long as the value of the contribution is based on documented market values or book values, prorated for its use in the project, and depreciated or amortized over the term of the project using generally accepted accounting principles (GAAP).
* **Match** funds must be spent only during the agreement term, either before or concurrently with CEC funds. Match funds also must be reported in invoices submitted to the CEC.
* All applicants providing match funds must submit commitment letters, **including prime and subcontractors**, that: (1) identify the source(s) of the funds; (2) justify the dollar value claimed; (3) provide an unqualified (i.e., without reservation or limitation) commitment that guarantees the availability of the funds for the project; and (4) provide a strategy for replacing the funds if they are significantly reduced or lost. Please see Attachment 11, Commitment and Support Letter Form. Commitment and support letters must be submitted with the application to be considered.
* Any match pledged in Attachment 1 must be consistent with the amount or dollar value described in the commitment letter(s) (e.g., if $5,000 “cash in hand” funds are pledged in a commitment letter, Attachment 1 must match this amount). Only the total amount pledged in the commitment letter(s) will be considered for match funding points.
* Examples of preferred match share:
  + - **“Travel”** refers to all travel required to complete the tasks identified in the Scope of Work. Travel includes in-state and out-of-state, and travel to conferences. CEC funds are limited to lodging and any form of transportation (e.g., airfare, rental car, public transit, parking, mileage). Use of match funds for out-of-state travel is encouraged, as the CEC discourages and may not approve the use of its funds for such travel. If an applicant plans to travel to conferences, including registration fees, they must use match funds. Applicants shall adhere to travel restrictions of using state funds to travel to certain other states pursuant to AB 1887 (2016) and codified at California Government Code Section 11139.8. All applicants are encouraged to consider the Attorney General’s website https://oag.ca.gov/ab1887 for a current list of states subject to travel restrictions. Awarded Grants under this solicitation shall not contain travel paid for with Commission funds (applicants can instead use match funds) to the listed states unless the Commission approves in writing that the trip falls within one of the exceptions under the law.
    - **“Equipment” is** an item with a unit cost of at least $5,000 and a useful life of at least one year. **Purchasing equipment with match funding is encouraged** as there are no disposition requirements at the end of the agreement for such equipment. Typically, grant recipients may continue to use equipment purchased with CEC funds if the use is consistent with the intent of the original agreement.
    - **“Materials”** under Materials and Miscellaneous are items under the agreement that do not meet the definition of Equipment (unit cost of at least $5,000 and a useful life of at least one year). **Using match funds for purchasing items such as laptops, notebooks and/or personal tablets is encouraged, as Energy Commission funds for these purchases is not allowed.**

## Funds Spent in California and California-Based Entities

* Only CEC reimbursable funds counts towards funds spent in California and funds spent on California-Based Entities totals.
* "Spent in California" means that:
  + (1) Funds in the "Direct Labor category and all categories calculated based on direct labor (e.g., fringe benefits, indirect costs and profit) are paid to individuals that pay California state income taxes on wages received for work performed under the agreement. Payments made to out-of-state workers do not count as “funds spent in California.” However, funds spent by out-of-state workers in California (e.g., hotel and food) can count as “funds spent in California.”; AND
  + (2) Business transactions (e.g., material and equipment purchases, leases, and rentals) are entered into with a business located in California.
  + (3) Total should include any applicable subcontractors.
* Airline ticket purchases for out-of-state travel and payments made to out-of-state workers are not considered funds “spent in California.” However, funds spent by out-of-state workers in California (e.g. lodging) and airline travel originating and ending in California are considered funds “spent in California.” A business located in California means: 1) businesses registered with Secretary of State AND 2) transaction is with a location in California that is directly related to the grant project (e.g., direct purchase of material and equipment to be used in the grant) and results in the support of California business and jobs.
  + Example 1: Grant funds will be spent on temperature sensors.  The temperature sensors are manufactured in Texas. The recipient orders the temperature sensors directly from a CA based supply house.  The invoice shows that the transaction occurred with the CA based supply house. This transaction is eligible and can be counted as funds spent in CA.
  + Example 2: Grant funds will be spent on temperature sensors. The temperature sensors are manufactured in Texas. The recipient orders the temperature sensors directly from Texas.  The manufacturer has training centers in CA that instructs purchasers on how to use the sensors. The invoice shows that the transaction occurred in Texas. This transaction is not eligible and cannot be counted as funds spent in CA.
* Pursuant to California Public Resources Code Section 25620.5(h), the California Energy Commission’s Gas R&D Program must give priority to “California-Based Entities” (CBEs) when making awards. California Public Resources Code Section 25620.5(i) defines “CBE” as a corporation or other business entity organized for the transaction of business that either:
  + Has its headquarters in California AND manufactures in California the product that is the subject of the award; or
  + Has an office for the transaction of business in California and substantially manufactures the product or substantially performs the research within California that is the subject of the award.
* Applications must meet the following requirements in order to receive CBE preference points:
  + The proposal must include a CBE as either the recipient or a subcontractor.
  + The budget must show that the CBE(s) will receive more than 60.00% of the funds awarded.

# II. Applicant Eligibility Requirements

## Eligibility

This solicitation is open to all public and private entities. Demonstration projects in this solicitation must be located in the service territory of a California gas Investor-Owned Utility (Gas IOU), which includes Pacific Gas and Electric Company, San Diego Gas & Electric Company, and Southern California Gas Company. All projects in this solicitation must benefit Gas IOU ratepayers.

## Terms and Conditions

Each grant agreement resulting from this solicitation will include terms and conditions that set forth the recipient’s rights and responsibilities. By signing the Application Form (Attachment 1), 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) **special terms and conditions for Tribes and tribal corporations; and (4)** standard terms and conditions. All terms and conditions are located at http://www.energy.ca.gov/research/contractors.html**, with the exception of special terms and conditions for California Native American Tribe (Tribe) or a California Tribal Organization (Tribal Organization), which will be posted on this GFO website**. Please refer to the applicable Gas R&D Program Grant terms and conditions. Failure to agree to the terms and conditions by taking actions such as failing to sign the Application Form or indicating that acceptance is based on modification of the terms will result in **rejection** of the application. Applicants **must** **read** the terms and conditions carefully.The CEC reserves the right to modify the terms and conditionsprior to executing grant agreements.

**If a Tribe or Tribal Organization with sovereign immunity is listed as a proposed awardee in the Notice of Proposed Awards (NOPA), CEC staff must receive the following before bringing the proposed award to Business Meeting:**

**1.** **A resolution or other authorizing document by the governing body of the Tribe or Tribal Organization authorizing the Tribe or Tribal Organization to enter into the proposed agreement, including accepting the Special Terms and Conditions for California Native American Tribes and California Tribal Organizations with Sovereign Immunity (see Attachment 16).**

**2.** **A limited waiver of sovereign immunity in the form and manner required by tribal law.**

**3.** **A resolution or other authorizing document delegating authority to execute the agreement to an appropriate individual.**

**The above requirements may be provided in one or more documents. The document(s) will be included as an exhibit to the resulting grant agreement.**

**Delay in award. Any delay in the Tribe or Tribal Organization’s ability to provide such documentation may result in delayed award of the grant agreement.**

**Reservation of right to cancel proposed award. Funds available under this solicitation have encumbrance deadlines which the CEC must meet in order to avoid expiration of the funds. In addition to any other rights reserved to it under this solicitation or that it otherwise has, the CEC reserves the right to cancel a proposed award if it determines, in its sole and absolute discretion, that the documentation described above would likely not be provided prior to an encumbrance deadline, and that the CEC’s ability to meet its encumbrance deadline may thereby be jeopardized. In this instance, the CEC may cancel the proposed award and award funds to the next highest scoring applicant.**

## California Secretary of State Registration

All corporations, limited liability companies (LLCs), limited partnerships (LPs) and limited liability partnerships (LLPs) that conduct intrastate business in California are required to be registered and in good standing with the California Secretary of State prior to its project being recommended for approval at an CEC Business Meeting.  If not currently registered with the California Secretary of State, applicants are encouraged to contact the Secretary of State’s Office as soon as possible to avoid potential delays in beginning the proposed project(s) (should the application be successful).  For more information, contact the Secretary of State’s Office via its website at www.sos.ca.gov.  Sole proprietors using a fictitious business name must be registered with the appropriate county and provide evidence of registration to the CEC prior to their project being recommended for approval at an CEC Business Meeting.

## Disadvantaged/ [~~&~~] Low-income Communities and/or Tribe(s)

In January of 2019, the California Public Utilities Commission (CPUC) Resolution G-3546 stated, “the Commission directs the CEC to enhance its engagement with disadvantaged communities.” In addition, the CPUC directed the Energy Commission to Incorporate an explicit long-term strategy for the role of the Gas R&D Program in the more aggressive statewide decarbonization goals set by Senate Bill 100 (De León, 2018) and Executive Order B-55-18.

The California Energy Commission is committed to ensuring all Californians have an opportunity to participate in and benefit from programs and services. While it is not required to complete the project within a disadvantaged community, demonstration projects located and benefiting disadvantaged and/or low-income communities **and/or Tribe(s)** will be [~~considered~~] **eligible for preference points** under the scoring criteria for this GFO.

Low-income communities and households are defined as the census tracts and households, respectively, that are either at or below 80 percent of the statewide median income, or at or below the threshold designated as low-income by the California Department of Housing and Community Development (HCD). Visit the California Department of Housing & Community Development site for the current HCD State Income Limits: [**https://www.hcd.ca.gov/grants-and-funding/income-limits/state-and-federal-income-rent-and-loan-value-limits**](https://www.hcd.ca.gov/grants-and-funding/income-limits/state-and-federal-income-rent-and-loan-value-limits) [~~http://www.hcd.ca.gov/grants-funding/income-limits/index.shtml~~]. Disadvantaged communities are defined as areas representing census tracts scoring in the top 25% in CalEnviroScreen. For more information on disadvantaged communities and to determine if your project is in a disadvantaged community, use the California Communities Environmental Health Screening tool (CalEnviroScreen): <https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40>.

# III. Application Organization and Submission Instructions

## Application Format, Page Limits, and Number of Copies

The following table summarizes the application formatting and page limit recommendations:

The CEC may have waived the requirement for a signature on application materials for this solicitation. If a notice regarding CEC’s waiver of the signature requirement appears here: https://www.energy.ca.gov/funding-opportunities/solicitations, the waiver applies to this solicitation. In the event of a conflict between the notice and any language in this solicitation regarding signatures, the notice will govern.

|  |  |
| --- | --- |
| **Format** | * **Font:** 11-point, Arial (excluding Excel spreadsheets, original template headers and footers, and commitment or support letters) * **Margins:** No less than one inch on all sides (excluding headers and footers) * **Spacing:** Single spaced, with a blank line between each paragraph * **Signatures**: Wet signatures only (i.e., not electronic) * **File Format:** MS Word version 2007 or later (.doc or .docx format), excluding Excel spreadsheets and commitment or support letters (PDF files are acceptable for the letters) * **File Storage:** Electronic files of the application must be submitted on a USB memory stick when submitting via **hard copy.** |
| **Maximum Page Limit Recommendations** | * **Executive Summary** (Attachment): **two** pages * **Project Narrative Form** (Attachment): **twenty** pages excluding documentation for CEQA * **Project Team Form** (Attachment): **two** pages for each resume * **Reference and Work Product Form** (Attachment): **one** page for each reference, **two** pages for each project description * **Commitment and Support Letter Form** (Attachment): **two** pages, excluding the cover page * **Scope of Work** (Attachment): **thirty** pages * **Project Schedule** (Attachment): **four** pages * There are no page limits for the following:   + **Application Form** (Attachment)   + **Budget Forms** (Attachment)   + **CEQA Compliance Form** (Attachment)   + **Project Performance Metrics** (Attachment) |

## Method For Delivery

The only method of submitting applications to this solicitation is the CEC Grant Solicitation System (GSS), available at: https://gss.energy.ca.gov/. This online tool allows applicants to submit their electronic documents to the CEC prior to the date and time specified in this solicitation. Electronic files must be in Microsoft Word XP (.doc format) or newer and Excel Office Suite formats unless originally provided in the solicitation in another format.  Attachments requiring signatures may be scanned and submitted in PDF format.  Completed Budget Forms, (Attachment), must be in Excel format.

The deadline to submit grant applications through the CEC’s GSS is 11:59 p.m. The GSS system automatically closes at 11:59 pm. If the full submittal process has not been completed before 11:59 p.m., your application will not be considered. NO EXCEPTIONS will be entertained.

The CEC strongly encourages Applicants to upload and submit all applications by 5:00 p.m. because CEC staff will not be available after 5:00 p.m. or on weekends to assist with the upload process. And please note that while we endeavor to assist all would-be applicants, we can’t guarantee staff will be available for in-person consultation on the due date, so please plan accordingly.

Please give yourself ample time to complete all steps of the submission process: do not wait until right before the deadline to begin the process. Due to factors outside the CEC’s control and unrelated to the GSS system, upload times may be much longer than expected. For example, some past applicants experienced unexpected issues on their end, causing long delays that prevented timely submission. They spent significant time and resources on applications the CEC will not consider. Please plan accordingly. For instructions on how to apply using the GSS system, please see the How to Apply document available on the CEC website at: https://www.energy.ca.gov/media/1654.

First time users must register as a new user to access the system. Applicants will receive a confirmation email after all required documents have been successfully uploaded. A tutorial of the system will be provided at the pre-application workshop, and you may contact the Commission Agreement Officer identified in the Questions section of the solicitation for more assistance.

## Application Content

Below is a general description of each required section of the application. Completeness in submitting all the information requested in each attachment will be factored into application scoring.

1. Application Form (Attachment 1)

This form requests basic information about the applicant and the project. Please reference each individual attachment for a detailed description of the information requested by that attachment. The application must include an original Application Form that includes all requested information. The Application Form must be signed by an authorized representative of the applicant’s organization or will be failed as indicated in Section IV.E.

The CEC may have waived the requirement for a signature on application materials for this solicitation. If a notice regarding CEC’s waiver of the signature requirement appears here: https://www.energy.ca.gov/funding-opportunities/solicitations, the waiver applies to this solicitation. In the event of a conflict between the notice and any language in this solicitation regarding signatures, the notice will govern.

1. Executive Summary Form (Attachment 2)

The Executive Summary includes: a project description; the project goals and objectives to be achieved; an explanation of how the goals and objectives will be achieved, quantified, and measured; and a description of the project tasks and overall management of the agreement.

1. Project Narrative Form (Attachment 3)

This form will include the majority of the applicant’s responses to the Scoring Criteria in Section IV, including the following which must be addressed for both Applied Research & Technology Demonstration projects:

* 1. **Group Specific Questions** 
     + Include required group specific information (see Section I.C.) in the specified sections.
  2. **Project Readiness**
     + Include information about the permitting required for the project and whether or not the permitting has been completed. If complete, provide appropriate documentation. If local jurisdiction CEQA review and project approval is not complete, applications must include information documenting progress towards and a schedule for achieving compliance under CEQA. All supporting documentation must be included in Attachment 8.

1. Project Team Form (Attachment 4)

Identify by name all key personnel[[22]](#footnote-23) assigned to the project, including the project manager and principal investigator (if applicable), and individuals employed by any major subcontractor (a major subcontractor is a subcontractor receiving at least 25% of Commission funds or $100,000, whichever is less). Clearly describe their individual areas of responsibility. Include the information required for each individual, including a resume (maximum two pages, printed double-sided).

1. Scope of Work Template (Attachments 5)

Applicants must include a completed Scope of Work for each project, as instructed in the template. The Scope of Work identifies the tasks required to complete the project. See requirements in section I.C.

Electronicfiles for the Scope of Work must be in **MS Word** file format**.**

1. Project Schedule (Attachment 6)

The Project Schedule includes a list of all product, meetings, and due dates. All work must be scheduled for completion by the “Key Dates” section of this solicitation manual.

Electronic files for the Project schedule must be in MS Excel file format.

1. Budget Forms (Attachment 7)

The budget forms are in MS Excel format. Detailed instructions for completing them are included at the beginning of Attachment 7.  **Read the instructions before completing the worksheets**. Complete and submit information on **all** budget worksheets. The salaries, rates, and other costs entered on the worksheets will become a part of the final agreement.

1. All project expenditures (match share and reimbursable) must be made within the approved agreement term. Match share requirements are discussed in Part I of this solicitation. The entire term of the agreement and projected rate increases must be considered when preparing the budget.
2. The budget must reflect estimates for **actual** costs to be incurred during the agreement term. The CEC may only approve and reimburse for actual costs that are properly documented in accordance with the grant terms and conditions. Rates and personnel shown must reflect the rates and personnel the applicant would include if selected as a Recipient.
3. The proposed rates are considered capped and may not change during the agreement term. The Recipient will only be reimbursed for **actual** rates up to the rate caps.
4. The budget must NOT include any Recipient profit from the proposed project, either as a reimbursed item, match share, or as part of overhead or general and administrative expenses (subcontractor profit is allowable, though the maximum percentage allowed is 10% of the total subcontractor rates for labor, and other direct and indirect costs as indicated in the Category Budget form). Please review the terms and conditions and budget forms for additional restrictions and requirements.
5. The budget must allow for the expenses of all meetings and products described in the Scope of Work. Meetings may be conducted at the CEC or by conference call, as determined by the Commission Agreement Manager.
6. Applicants must budget for permits and insurance. Permitting costs may be accounted for in match share. Permit costs and the expenses associated with obtaining permits are not reimbursable under this Agreement with CEC funds, with the exception of costs incurred by University of California recipients.
7. The budget must NOT identify that CEC funds will be spent outside of the United States or for out-of-country travel.  However, match funds may cover these costs if there are no legal restrictions.
8. All applicants should go to the Attorney General’s website https://oag.ca.gov/ab1887 for a current list of states subject to travel restrictions. Grants awarded under this solicitation shall not contain travel paid for with Commission funds (applicants can instead use match funds) to the listed states unless the Commission approves in writing that the trip falls within one of the exceptions under the law.
9. **Prevailing wage requirement:** Projects that receive an award of public funds from the CEC often involve construction, alteration, demolition, installation, repair or maintenance work over $1,000. For this reason, projects that receive an award of public funds from the CEC are likely to be considered public works under the California Labor Code. See Chapter 1 of Part 7 of Division 2 of the California Labor Code, commencing with Section 1720 and Title 8, California Code of Regulations, Chapter 8, Subchapter 3, commencing with Section 16000.

Projects deemed to be public works require among other things the payment of prevailing wages, which can be significantly higher than non-prevailing wages.

By accepting this grant, Recipient as a material term of this agreement shall be fully responsible for complying with all California public works requirements including but not limited to payment of prevailing wage. Therefore, as a material term of this grant, Recipient must either:

(a) Proceed on the assumption that the project is a public work and ensure that:

1. prevailing wages are paid; and
2. the project budget for labor reflects these prevailing wage requirements; and
3. the project complies with all other requirements of prevailing wage law including but not limited to keeping accurate payroll records, and complying with all working hour requirements and apprenticeship obligations;

or,

(b) Timely obtain a legally binding determination from the Department of Industrial Relations or a court of competent jurisdiction before work begins on the project that the proposed project is not a public work.

1. California Environmental Quality Act (CEQA) Compliance Form (Attachment 8)

The CEC requires the information on this form to facilitate its evaluation of proposed activities under CEQA (California Public Resources Code Section 21000 et. seq.), a law that requires state and local agencies in California to assess the potential environmental impacts of their proposed actions. The form will also help applicants to determine CEQA compliance obligations by identifying which proposed activities may be exempt from CEQA and which activities may require additional environmental review. If proposed activities are exempt from CEQA (such as paper studies), the worksheet will help to identify and document this. This form must be completed regardless of whether the proposed activities are considered a “project” under CEQA.

Failure to complete the CEQA process in a timely manner after the CEC’s Notice of Proposed Award may result in the cancellation of a proposed award and allocation of funding elsewhere, such as to the next highest-scoring project.

1. Reference and Work Product Form (Attachment 9)
   * 1. Section 1: Provide applicant and subcontractor references as instructed.
     2. Section 2: Provide a list of past projects detailing technical and business experience

of the applicant (or any member of the project team) that is related to the proposed work. Identify past projects that resulted in market-ready technology, advancement of codes and standards, and/or advancement of state energy policy. Include copies of up to three of the applicant or team member’s recent publications in scientific or technical journals related to the proposed project, as applicable.

1. Commitment and Support Letter Form (Attachment 10)

A commitment letter commits an entity or individual to providing the service or funding described in the letter. A support letter details an entity or individual’s support for the project. Commitment and Support Letters must be submitted with the application. Letters that are not submitted by the application deadline will not be reviewed and counted towards meeting the requirement specified in the solicitation.

1. Commitment Letters

Applicants must submit a **match funding** commitment letter signedby eachrepresentative of the entity or individual that is committing to providing match funding. The letter should: (1) identify the source(s) of the funds; and (2) guarantee the availability of the funds for the project.

* If the project involves **demonstration** activities, the applicant must include a site commitment letter signed by an authorized representative of the proposed demonstration site. The letter must: (1) identify the location of the site (street address, parcel number, tract map, plot map, etc.), which must be consistent with Attachments 1 and 8. and (2) commit to providing the site for the proposed activities.
* **Project partners** that are making contributions other than match funding or a demonstration site, and are not receiving CEC funds, must submit a commitment letter signed by an authorized representative that: (1) identifies how the partner will contribute to the project; and (2) commits to making the contribution.

1. Support Letters

All applicants must include at least one support letter from a project stakeholder (i.e., an entity or individual that will benefit from or be involved in the project) that: (1) describes the stakeholder’s interest or involvement in the project; (2) indicates the extent to which the project has the support of the relevant industry and/or organizations; and (3) describes any support it intends (but does not necessarily commit) to provide for the project, such as funding or the provision of a demonstration site.

The CEC may have waived the requirement for a signature on application materials for this solicitation. If a notice regarding CEC’s waiver of the signature requirement appears here: https://www.energy.ca.gov/funding-opportunities/solicitations, the waiver applies to this solicitation. In the event of a conflict between the notice and any language in this solicitation regarding signatures, the notice will govern.

1. Project Performance Metrics (Attachment 11)

The purpose of this questionnaire is to identify and document 5-7 performance targets for the project. The performance targets should be a combination of scientific, engineering and techno-economic metrics that provide the most significant indicator of the research or technology’s potential success.

1. Applicant Declaration (Attachment 12)

This form requests the applicant declare that they: are not delinquent on taxes nor suspended by the California Franchise Tax Board; are not being sued by any public agency or entity; are in compliance with the terms of all settlement agreements, if any, entered into with the Energy Commission or another public agency or entity; are in compliance with all judgments, if any, issued against the Applicant in any matter to which the Energy Commission or another public agency or entity is a party; are complying with any demand letter made on the Applicant by the Energy Commission or another public agency or entity; and are not in active litigation with the Energy Commission regarding the Applicant’s actions under a current or past contract, grant, or loan with the Energy Commission. The declaration must be signed under penalty of perjury by an authorized representative of the applicant’s organization.

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1. California Based Entity (CBE) Form (Attachment 13)

Identify any California-based entities as instructed in the form. California-based entities are entitled to a scoring preference as described in Part IV of this solicitation.

1. References for Calculating Energy End-Use and GHG Emissions (Attachment 14)

Any estimates of energy savings or GHG impacts described in the application should be calculated as specified on this form, to the extent that the references apply to the proposed project.

# IV. Evaluation and Award Process

## Application Evaluation

Applications will be evaluated and scored based on responses to the information requested in this solicitation and on any other information available, such as on past performance of CEC agreements. To evaluate applications, the CEC will organize an Evaluation Committee that consists primarily of CEC staff. The Evaluation Committee may use technical expert reviewers to provide an analysis of applications. Applications will be evaluated in two stages:

1. **Stage One: Application Screening**

The Contracts, Grants, and Loans Office and/or the Evaluation Committee will screen applications for compliance with the Screening Criteria in **Section E** of this Part. **Applications that fail any of the screening criteria will be rejected.**The Evaluation Committee may conduct optional telephone **Clarification Interviews** with applicants during the screening process to clarify and/or verify information submitted in the application. However, these interviews may not be used to change or add to the content of the original application. Applicants will not be reimbursed for time spent answering clarifying questions.

1. **Stage Two: Application Scoring**

Applications that pass Stage One will be submitted to the Evaluation Committee for review and scoring based on the Scoring Criteria in **Section F** of this Part.

* The scores for each application will be the average of the combined scores of all Evaluation Committee members.
* Clarification Interviews: The Evaluation Committee may conduct optional telephone interviews with applicants during the evaluation process to clarify and/or verify information submitted in the application. However, these interviews may not be used to change or add to the content of the original application. Applicants will not be reimbursed for time spent answering clarifying questions.
* **A minimum score of 70.0 points** is required for criteria 1-7- to be eligible for funding. In addition, the application must receive a minimum score of **52.50 points for criteria 1−4** to be eligible for funding.

## Ranking, Notice of Proposed Award, and Agreement Development

1. **Ranking and Notice of Proposed Award**

Applications that receive at least the minimum required score for all criteria will be ranked according to their score.

* CEC staff will post a **Notice of Proposed Award (NOPA)** that includes: (1) the total proposed funding amount; (2) the rank order of applicants; and (3) the amount of each proposed award. The CEC will post the NOPA at its headquarters in Sacramento and on its website and will mail it to all entities that submitted an application. Proposed awards must be approved by the CEC at a business meeting.
* **Debriefings:** Unsuccessful applicants may request a debriefing after the release of the

NOPA by contacting the Commission Agreement Officer listed in Part I. A request for debriefing must be received **no later than 30 calendar days** after the NOPA is released.

* In addition to any of its other rights, the CEC reserves the right to:
  + Allocate any additional funds to passing applications, in rank order; and
  + Negotiate with successful applicantstomodify the project scope, schedule, project team entity that will receive the award, location and/or level of funding.

1. **Agreements**

Applications recommended for funding will be developed into a proposed grant agreement to be considered at a CEC Business Meeting. Recipients may begin the project only after full execution of the grant agreement (i.e., approval at a CEC business meeting and signature by the Recipient and the CEC).

* **Agreement Development:** The Contracts, Grants, and Loans Office will send the Recipient a grant agreement for approval and signature. The agreement will include the applicable terms and conditions and will incorporate this solicitation and the application by reference. The CEC reserves the right to modify the award documents (including the terms and conditions) prior to executing any agreement.
* **Failure to Execute an Agreement:** If the CEC is unable to successfully execute an agreement with an applicant in a timely manner, it reserves the right to cancel the pending award and use the funds elsewhere, such as to fund the next highest-ranked, eligible application.

## Grounds to Reject an Application or Cancel an Award

Applications that do not pass the screening stage will be rejected. In addition, the CEC reserves the right to reject an application and/or to cancel an award for any reason, including any of the following:

* The application contains false or intentionally misleading statements or references that do not support an attribute or condition contended by the applicant.
* The application is intended to erroneously and fallaciously mislead the State in any way.
* The application does not comply or contains caveats that conflict with the solicitation, and the variation or deviation is material.
* The applicant has previously received funding through an EPIC or Public Interest Energy Research (PIER) agreement, has received the royalty review letter (which the CEC annually sends out to remind past recipients of their obligations to pay royalties), and has not responded to the letter or is otherwise not in compliance with repaying royalties.
* The applicant has received unsatisfactory agreement evaluations from the CEC or another California state agency.
* The applicant is a business entity required to be registered with the California Secretary of State and is not in good standing.
* The applicant has not demonstrated that it has the financial capability to complete the project.
* The applicant fails to meet CEQA compliance within sufficient time for the CEC to meet its encumbrance deadline or any other deadlines, as the CEC in its sole and absolute discretion may determine.
* The applicant has included a statement or otherwise indicated that it will not accept the terms and conditions, or that acceptance is based on modifications to the terms and conditions.
* The application contains confidential information or identifies any portion of the application as confidential.

## Miscellaneous

1. **Solicitation Cancellation and Amendment**

It is the policy of the CEC not to solicit applications unless there is a bona fide intention to award an agreement. However, if it is in the State’s best interest, the CEC reserves the right, in addition to any other rights it has, to do any of the following:

* Cancel this solicitation;
* Revise the amount of funds available under this solicitation;
* Amend this solicitation as needed; and/or
* Reject any or all applications received in response to this solicitation.

If the solicitation is amended, the CEC will send an addendum to all entities that requested the solicitation, and will also post it on the CEC’s website at: www.energy.ca.gov/contracts. The CEC will not reimburse applicants for application development expenses under any circumstances, including cancellation of the solicitation.

1. **Modification or Withdrawal of Application**

Applicants may withdraw or modify a submitted application before the deadline to submit applications by sending a letter to the Commission Agreement Officer listed in Part I. Applications cannot be changed after that date and time. An Application cannot be “timed” to expire on a specific date. For example, a statement such as the following is non-responsive to the solicitation: “This application and the cost estimate are valid for 60 days.”

1. **Confidentiality**

Though the entire evaluation process from receipt of applications up to the posting of the NOPA is confidential, **all submitted documents will become publicly available records** after the CEC posts the NOPA or the solicitation is cancelled. **The CEC will not accept or retain applications that identify any portion as confidential.**

1. **Solicitation Errors**

If an applicant discovers any ambiguity, conflict, discrepancy, omission, or other error in the solicitation, the applicant should immediately notify the CEC of the error in writing and request modification or clarification of the solicitation. The CEC will provide modifications or clarifications by written notice to all entities that requested the solicitation. The CEC will not be responsible for failure to correct errors.

1. **Immaterial Defect**

The CEC may waive any immaterial defect or deviation contained in an application. The CEC’s waiver will not modify the application or excuse the successful applicant from full compliance with solicitation requirements.

1. **Disposition of Applicant’s Documents**

Upon the posting of the NOPA, all applications and related materials submitted in response to this solicitation will become property of the State and publicly available records. Unsuccessful applicants who seek the return of any materials must make this request to the Agreement Officer listed in Part I, and provide sufficient postage to fund the cost of returning the materials.

## Stage One: Application Screening

|  |  |
| --- | --- |
| Screening Criteria  *The Application must pass ALL criteria to progress to Stage Two.* | Pass/Fail |
| 1. The application is received by the CEC’s Contracts, Grants, and Loans Office by the due date and time specified in the “Key Activities Schedule” in Part I of this solicitation and is received in the required manner (e.g., no emails or faxes). | Pass  Fail |
| 1. The application Form (Attachment 1) is signed where indicated. | Pass  Fail |
| 1. The Applicant Declaration Form (Attachment 12) is signed where indicated. | Pass  Fail |
| 1. The application addresses only one of the eligible project groups, as indicated on the Application Form. | Pass  Fail |
| 1. If the applicant has submitted more than one application for the same project group, each application is for a distinct project (i.e., no overlap with respect to the tasks described in the Scope of Work, Attachment).   *If the projects are not distinct and the applications were submitted at the same time, only the first application screened by the CEC will be eligible for funding. If the applications were submitted separately, only the first application received by the CEC will be eligible for funding.* | Pass  Fail |
| 1. *Group 1 only. If project site is not located in a[~~n under-resourced community~~]* disadvantaged/low-income community and/or Tribe, the Application includes Commitment Letters that total the minimum of 20*%* in match share of the total requested CEC funds. | Pass  Fail |
| 1. *Group 1 only. If the project involves technology demonstration/deployment activities:*  * The Application identifies one or more demonstration/ deployment site locations. * The proposal includes a site commitment letter (Section III.D.11) for each demonstration/ deployment site. | Pass  Fail |

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## Stage Two: Application Scoring

Proposals that pass ALL Stage One Screening Criteria and are not rejected as described in Section IV.C. will be evaluated based on the Scoring Criteria on the next page and the Scoring Scale below (with the exception of criteria 6−9, which will be evaluated as described in each criterion). Each criterion has an assigned number of possible points and is divided into multiple sub-criteria. The sub-criteria are not equally weighted. The Project Narrative (Attachment) must respond to each sub-criterion, unless otherwise indicated.

**Scoring Scale**

|  |  |  |
| --- | --- | --- |
| % of Possible Points | Interpretation | Explanation for Percentage Points |
| 0% | Not Responsive | Response does not include or fails to address the requirements being scored. The omission(s), flaw(s), or defect(s) are significant and unacceptable. |
| 10-30% | Minimally Responsive | Response minimally addresses the requirements being scored. The omission(s), flaw(s), or defect(s) are significant and unacceptable. |
| 40-60% | Inadequate | Response addresses the requirements being scored, but there are one or more omissions, flaws, or defects or the requirements are addressed in such a limited way that it results in a low degree of confidence in the proposed solution. |
| 70% | Adequate | Response adequately addresses the requirements being scored. Any omission(s), flaw(s), or defect(s) are inconsequential and acceptable. |
| 75% | Between Adequate and Good | Response better than adequately addresses the requirements being scored. Any omission(s), flaw(s), or defect(s) are inconsequential and acceptable. |
| 80% | Good | Response fully addresses the requirements being scored with a good degree of confidence in the applicant’s response or proposed solution. No identified omission(s), flaw(s), or defect(s). Any identified weaknesses are minimal, inconsequential, and acceptable. |
| 85% | Between Good and Excellent | Response fully addresses the requirements being scored with a better than good degree of confidence in the applicant’s response or proposed solution. No identified omission(s), flaw(s), or defect(s). Any identified weaknesses are minimal, inconsequential, and acceptable. |
| 90% | Excellent | Response fully addresses the requirements being scored with a high degree of confidence in the applicant’s response or proposed solution. Applicant offers one or more enhancing features, methods or approaches exceeding basic expectations. |
| 95% | Between Excellent and Exceptional | Response fully addresses the requirements being scored with a better than excellent degree of confidence in the applicant’s response or proposed solution. Applicant offers one or more enhancing features, methods or approaches exceeding basic expectations. |
| 100% | Exceptional | All requirements are addressed with the highest degree of confidence in the applicant’s response or proposed solution. The response exceeds the requirements in providing multiple enhancing features, a creative approach, or an exceptional solution. |

**Additional Screening Criteria for Past Performance**

| **Screening Criteria** |  |
| --- | --- |
| **Applicant Past Performance with CEC**  The applicant—defined as at least one of the following: the business, principal investigator, or lead individual acting on behalf of themselves—received funds from the CEC (e.g., contract, grant, or loan) and entered into an agreement(s) with the CEC and demonstrated **severe performance issues** characterized by significant negative outcomes including:   * Significant deviation from agreement requirements; * Termination with cause; * Demonstrated poor communication, project management, and/or inability, due to circumstances within its control, from materially completing the project; * Quality issues with deliverables including poorly written final report that prevents publishing; and * Severe unresolved negative audit findings. |  |
| **Must pass to continue with Scoring Criteria** | **Pass/Fail** |

**Scoring CRITERIA**

**The Project Narrative (Attachment 3)** must respond to each criterion below. The responses must directly relate to the solicitation requirements and focus as stated in the solicitation. Any estimates of energy savings or GHG impacts should be calculated as specified in the References for Calculating Energy End-Use and GHG Emissions (Attachment 14), to the extent that the references apply to the proposed project.

**GROUP 1 Scoring CRITERIA**

**The following scoring criteria is for Group 1 only. Scoring criteria for Group 2 appear after the Scoring Criteria for Group 1.**

|  |  |
| --- | --- |
| Scoring Criteria | Maximum Points |
| 1. **Technical Merit** 2. The proposed project provides a clear and concise description of the technological, scientific knowledge advancement, and/or innovation that will overcome barriers to achieving the State’s statutory energy goals. 3. Describes the competitive advantages of the proposed technology over state-of-the-art (e.g., efficiency, emissions, durability, cost). 4. Provides the proposed technical specifications and describe how the project will meet or exceed the technical specifications by the end of the project. 5. Describes the technology readiness level (TRL) the proposed technology has achieved and the expected TRL by the end of the project. 6. Describes at what scale the technology has been successfully demonstrated, including size or capacity, number of previous installations, location and duration, results, etc. 7. Describes how the proposed demonstration will lead to increased adoption of the technology in California. | **15** |
| 1. **Technical Approach** 2. Proposal describes the technique, approach, and methods to be used in performing the work described in the Scope of Work. 3. The Scope of Work identifies goals, objectives, and deliverables, details the work to be performed, and aligns with the information presented in Project Narrative. 4. Proposal identifies the reliability that the project and site recommendations as described will be carried out if funds are awarded. 5. Identifies and discusses factors critical for success, in addition to risks, barriers, and limitations (e.g. loss of demonstration site, key subcontractor). Provides a plan to address them. 6. Discusses the degree to which the proposed work is technically feasible and achievable within the proposed Project Schedule and the key activities schedule in Section I.E. 7. Describes the technology transfer plan to assess and advance the commercial viability of the technology. 8. Provides a clear and plausible measurement and verification plan that describes how energy savings and other benefits specified in the application will be determined and measured. 9. Provides information documenting progress towards achieving compliance with the California Environmental Quality Act (CEQA) by addressing the areas in Section I.I and Section III.D.3., and Section III.D.8 10. Provides information described in Section I.C.1. | **25** |
| 1. **Impacts and Benefits for California IOU Ratepayers** 2. Explains how the proposed project will benefit California Gas Investor-Owned Utility (IOU) ratepayers and provides clear, plausible, and justifiable (quantitative preferred) potential benefits. Estimates the energy benefits including:    * **Annual thermal savings** (therms and kilowatt-hour), energy cost reductions.   **In addition, estimates the non-energy benefits including:**   * greenhouse gas emission reductions, air emission reductions (e.g. NOx), cost reduction, thermal comfort, and HVAC equipment downsizing potential.  1. States the timeframe, assumptions with sources, and calculations for the estimated benefits, and explains their reasonableness. Include baseline or “business as usual” over timeframe. 2. Explains the path-to-market strategy including near-term (i.e., initial target markets), mid-term, and long-term markets for the technology, size and penetration or deployment rates, and underlying assumptions. 3. Identifies the expected financial performance (e.g., payback period, ROI) of the demonstration at scale. 4. Identifies the specific programs which the technology intends to leverage *(e.g,. feed-in tariffs, IOU rebates) and extent to which technology meets program requirements.* | **20** |
| 1. **Team Qualifications, Capabilities, and Resources**   Evaluations of ongoing or previous projects including project performance by applicant and team members will be used in scoring for this criterion. This can include contacting references.   1. Identifies credentials of prime and any subcontractor key personnel, including the project manager, principal investigator and technology and knowledge transfer lead *(include this information in the Project Team Form).* 2. Demonstrates that the project team has appropriate qualifications, experience, financial stability and capability to complete the project. 3. Explains the team structure and how various tasks will be managed and coordinated. 4. Describes the facilities, infrastructure, and resources available that directly support the project. 5. Describes the team’s history of successfully completing projects in the past 10 years including subsequent deployments and commercialization. | **15** |
| **Total Possible Points for criteria 1− 4**  **(Minimum Passing Score for criteria 1− 4 is 70% or 52.50)** | **75** |
| 1. **Budget and Cost-Effectiveness** 2. Budget forms are complete for the applicant and all subcontractors, as described in the Budget instructions. 3. Justifies the reasonableness of the requested funds relative to the project goals, objectives, and tasks. 4. Justifies the reasonableness of direct costs (e.g., labor, fringe benefits, equipment, materials & misc. travel, and subcontractors). 5. Justifies the reasonableness of indirect costs (e.g., overhead, facility charges (e.g., rent, utilities), burdens, subcontractor profit, and other like costs). | **10** |
| 1. **CEC Funds Spent in California**   Projects that maximize the spending of CEC funds in California will receive points as indicated in the table below (see CEC Funds Spent in California and California-Based Entities section for more details).   |  |  | | --- | --- | | Percentage of CEC funds spent in CA vs Total CEC funds requested  (derived from budget Attachment) | Percentage of Possible Points | | >60% | 20% | | >65% | 30% | | >70% | 40% | | >75% | 50% | | >80% | 60% | | >85% | 70% | | >90% | 80% | | >95% | 90% | | >98% | 100% | | **10** |
| 1. **Ratio of Direct Labor to Indirect Costs**   The score for this criterion will be calculated by the following formula:  This ratio will then be multiplied by the maximum possible points for this criterion and rounded to two decimal places.  NOTE: For the purposes of this criterion, the CEC will include the facility charges (e.g., rent, utilities, etc.), burdens and other like costs that are budgeted as direct costs into the indirect costs in the formula. | **5** |
| **Total Possible Points**  **(Minimum Passing Score for Criteria 1 – 7 is 70% or 70.00)** | **100** |

|  |  |
| --- | --- |
| Scoring Criteria | Maximum Points |
| Preference Points Applications must meet both minimum passing scores (Scoring Criteria 1-4, and 1-7) to be eligible for the additional points. |  |
| 1. California Based Entities (CBE) Preference Points   Projects that maximize the spending of CEC funds on California Based Entities will receive points as indicated in the table below (see Funds Spent in California and California-Based Entities section for more details).  Projects that meet these requirements will receive preference points as indicated below:   |  |  | | --- | --- | | Percentage of Gas R&D Funds Allocated to CBEs  (derived from budget attachment “Category Budget”) | Percentage of Possible Points | | > 60% | 20% | | > 70% | 40% | | > 80% | 60% | | > 90% | 80% | | =100% | 100% | | **5** |
| 1. Match Funds 2. Cash match share is preferred; however, in-kind cost share is permitted and will be considered for solicitation match requirements. Points for this criterion will be evaluated based on the proposed cash match relative to the total match (cash + in-kind) contributions using the Cash Match Scoring Table:   Cash Match Scoring Table   | Percentage of Proposed Cash Match Funds | Score | | --- | --- | | 80 to 100% | 5 | | 60 to <80% | 4 | | 40 to <60% | 3 | | 20 to <40% | 2 | | 10 to <20% | 1 | | **5** |
| 1. Additional points will be awarded to applications that exceed the minimum match requirements based on the percentage amount above minimum using the Exceeds Minimum Match Scoring table:   Exceeds Minimum  Match Scoring Table   | Percentage above Minimum Match (cash and in-kind) | Score | | --- | --- | | 80% | 5 | | 60 to <80% | 4 | | 40 to <60% | 3 | | 20 to <40% | 2 | | 10 to <20 % | 1 | | **5** |
| 1. [~~Under-Resourced Communities~~]Disadvantaged/Low-Income Communities and/or Tribes   In order to receive or qualify for additional points, the proposed project must be located in and demonstrate benefits to the disadvantaged/low-income community(ies) and/or Tribe(s)[~~under-resourced communities~~ ~~in order to receive additional points~~].   1. Proposal identifies how the target market(s) will benefit disadvantaged/low-income community(ies) and/or Tribes[~~under-resourced~~ ~~communities~~]. 2. Identifies economic impact on disadvantaged/low-income community(ies) and/or Tribes[~~under-resourced communities~~] including customer bill savings, job creation, partnering and contracting with micro- and small-businesses, and economic development. 3. Describes how the project will increase access to clean energy or sustainability technologies within disadvantaged/low-income community(ies) and/or Tribes[~~under-resourced communities~~] and how the development will benefit the communities. 4. Applicants have letters of support from technology partners, community-based organizations, environmental justice organizations, or other partners that demonstrate their belief that the proposed project will lead to increased equity, and is both feasible, and commercially viable in the identified disadvantaged/low-income community(ies) and/or Tribes[~~under-resourced~~ ~~communities~~]. | **5** |

**GROUP 2 Scoring CRITERIA**

**The following scoring criteria will be used to score applications for Group 2.**

|  |  |
| --- | --- |
| Scoring Criteria | Maximum Points |
| 1. Technical Merit 2. The proposed project provides a clear and concise description of the technological, scientific knowledge advancement, and/or innovation that will overcome barriers to achieving the State’s statutory energy goals. 3. Describe how the proposed study will be used by key stakeholders (e.g., policy-makers, project developers, other researchers, etc.). 4. Describes the advantage of the proposed study over that currently being used by key stakeholders. | **15** |
| 1. Technical Approach 2. Proposal describes the technique, approach, and methods to be used in performing the work described in the Scope of Work. 3. The Scope of Work identifies goals, objectives, and deliverables, details the work to be performed, and aligns with the information presented in Project Narrative. 4. Proposal identifies the reliability that the project and site recommendations as described will be carried out if funds are awarded. 5. Identifies and discusses factors critical for success, in addition to risks, barriers, and limitations (e.g., loss of demonstration site, key subcontractor). Provides a plan to address them. 6. Discusses the degree to which the proposed work is technically feasible and achievable within the proposed Project Schedule and the key activities schedule in Section I.E. 7. Describes the knowledge transfer plan, including how key stakeholders and potential users will be engaged, and the plan to disseminate knowledge of the project’s results to those stakeholders and users. 8. Provides information described in Section I.C.2. | **25** |
| 1. Impacts and Benefits for California IOU Ratepayers 2. Explains how the proposed project will benefit California Gas Investor-Owned Utility (IOU) ratepayers and provides clear, plausible, and justifiable (quantitative preferred) potential benefits. Estimates the energy benefits including:    * Annual thermal savings (therms and kilowatt-hours) and energy cost reductions.   In addition, estimates the non-energy benefits including:   * greenhouse gas emission reductions, air emission reductions (e.g., NOx), and cost reduction.  1. States the timeframe, assumptions with sources, and calculations for the estimated benefits, and explains their reasonableness. Include baseline or “business as usual” over timeframe. 2. Identifies how outputs of the study will benefit key stakeholders (e.g., streamline planning, help eliminate barriers, stimulate growth of applicable market sectors). | **20** |
| 1. Team Qualifications, Capabilities, and Resources   Evaluations of ongoing or previous projects including project performance by applicant and team members will be used in scoring for this criterion. This can include contacting references.   1. Identifies credentials of prime and any subcontractor key personnel, including the project manager, principal investigator and technology and knowledge transfer lead *(include this information in the Project Team Form).* 2. Demonstrates that the project team has appropriate qualifications, experience, financial stability and capability to complete the project. 3. Explains the team structure and how various tasks will be managed and coordinated. 4. Describes the facilities, infrastructure, and resources available that directly support the project. 5. Describes the team’s history of successfully completing projects in the past 10 years including subsequent deployments and commercialization. | **15** |
| Total Possible Points for criteria 1− 4  (Minimum Passing Score for criteria 1− 4 is 70% or 52.50) | **75** |
| 1. Budget and Cost-Effectiveness 2. Budget forms are complete for the applicant and all subcontractors, as described in the Budget instructions. 3. Justifies the reasonableness of the requested funds relative to the project goals, objectives, and tasks. 4. Justifies the reasonableness of direct costs (e.g., labor, fringe benefits, equipment, materials & misc. travel, and subcontractors). 5. Justifies the reasonableness of indirect costs (e.g., overhead, facility charges (e.g., rent, utilities), burdens, subcontractor profit, and other like costs). | **10** |
| 1. CEC Funds Spent in California   Projects that maximize the spending of CEC funds in California will receive points as indicated in the table below (see CEC Funds Spent in California and California-Based Entities section for more details).   |  |  | | --- | --- | | Percentage of CEC funds spent in CA vs Total CEC funds requested  (derived from budget Attachment) | Percentage of Possible Points | | >60% | 20% | | >65% | 30% | | >70% | 40% | | >75% | 50% | | >80% | 60% | | >85% | 70% | | >90% | 80% | | >95% | 90% | | >98% | 100% | | **10** |
| 1. Ratio of Direct Labor to Indirect Costs   The score for this criterion will be calculated by the following formula:  This ratio will then be multiplied by the maximum possible points for this criterion and rounded to two decimal places.  NOTE: For the purposes of this criterion, the CEC will include the facility charges (e.g., rent, utilities, etc.), burdens and other like costs that are budgeted as direct costs into the indirect costs in the formula. | **5** |
| Total Possible Points  (Minimum Passing Score for Criteria 1 – 7 is 70% or 70.00) | **100** |

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| --- | --- |
| **Scoring Criteria** | **Maximum Points** |
| **Preference Points** Applications must meet both minimum passing scores (Scoring Criteria 1-4, and 1-7) to be eligible for the additional points. |  |
| 1. **California Based Entities (CBE) Preference Points**   Projects that maximize the spending of CEC funds on California Based Entities will receive points as indicated in the table below (see Funds Spent in California and California-Based Entities section for more details).  Projects that meet these requirements will receive preference points as indicated below:   |  |  | | --- | --- | | Percentage of Gas R&D Funds Allocated to CBEs  (derived from budget attachment “Category Budget”) | Percentage of Possible Points | | > 60% | 20% | | > 70% | 40% | | > 80% | 60% | | > 90% | 80% | | =100% | 100% | | **5** |
| 1. **Match Funds** 2. Cash match share is preferred; however, in-kind cost share is permitted and will be considered for solicitation match requirements. Points for this criterion will be evaluated based on the proposed cash match relative to the total match (cash + in-kind) contributions using the Cash Match Scoring Table:   **Cash Match Scoring Table**   |  |  | | --- | --- | | Percentage of Proposed Cash Match Funds Relative to Total Match | Score | | 80 to 100% | | 5 | | 60 to <80% | | 4 | | 40 to <60% | | 3 | | 20 to <40% | | 2 | | 10 to <20% | | 1 | | **5** |
| 1. Additional points will be awarded to applications that exceed the minimum match requirements based on the percentage amount above minimum using the Exceeds Minimum Match Scoring table:   **Exceeds Minimum  Match Scoring Table**   | Percentage above Minimum Match (cash and in-kind) | Score | | --- | --- | | 80% | 5 | | 60 to <80% | 4 | | 40 to <60% | 3 | | 20 to <40% | 2 | | 10 to <20 % | 1 | | **5** |

1. Kenney, Michael, Nicholas Janusch, Ingrid Neumann, and Mike Jaske. 2021. California Building Decarbonization Assessment. California Energy Commission. Publication Number: CEC-400-2021-006-CMF. [↑](#footnote-ref-2)
2. Emerging Technologies Research and Development DRAFT Research and Development Opportunities Report for Windows. (2020). <https://www.energy.gov/sites/default/files/2020/05/f74/bto-20200504_Draft_Windows_RDO.pdf> [↑](#footnote-ref-3)
3. Emerging Technologies Research and Development DRAFT Research and Development Opportunities Report for Windows. (2020). <https://www.energy.gov/sites/default/files/2020/05/f74/bto-20200504_Draft_Windows_RDO.pdf> [↑](#footnote-ref-4)
4. Kenney, Michael, Nicholas Janusch, Ingrid Neumann, and Mike Jaske. 2021. California Building Decarbonization Assessment. California Energy Commission. Publication Number: CEC-400-2021-006-CMF. [↑](#footnote-ref-5)
5. Emerging Technologies Research and Development DRAFT Research and Development Opportunities Report for Windows. (2020). <https://www.energy.gov/sites/default/files/2020/05/f74/bto-20200504_Draft_Windows_RDO.pdf> [↑](#footnote-ref-6)
6. Dickerhoff, D., Grimsrud, D., & Lipschutz, R. (1982). Component Leakage Testing in Residential Buildings. Lawrence Berkeley National Laboratory. Retrieved from <https://escholarship.org/uc/item/03q2t8d3> [↑](#footnote-ref-7)
7. Dalicieux, P & Nicolas, C. (1990). Ventilation perturbations due to an open fireplace in a house, *Energy and Buildings*. 14(3), 211-214. <https://doi.org/10.1016/0378-7788(90)90045-k> [↑](#footnote-ref-8)
8. **Note that the SB535’s CalEnviroScreen mapping tool undergoes updates, and the latest version can be found on OEHHA’s website: https://oehha.ca.gov/calenviroscreen.** [↑](#footnote-ref-9)
9. U.S. Department of Energy, “Technology Readiness Assessment Guide”. <https://www2.lbl.gov/dir/assets/docs/TRL%20guide.pdf> [↑](#footnote-ref-10)
10. **California Technical Forum website:** [**http://www.caltf.org/**](http://www.caltf.org/) [↑](#footnote-ref-11)
11. **California Technical Form Measure Proposal Form link:** [**http://www.caltf.org/s/CalTF-Measure-Proposal-Form-v10.xlsm**](http://www.caltf.org/s/CalTF-Measure-Proposal-Form-v10.xlsm) [↑](#footnote-ref-12)
12. Performance goals are for the window as a whole. [↑](#footnote-ref-13)
13. Pacific Standard Time or Pacific Daylight Time, whichever is being observed. [↑](#footnote-ref-14)
14. This deadline does not apply to non-technical questions (e.g., questions concerning application format requirements or attachment instructions) or to questions that address an ambiguity, conflict, discrepancy, omission, or other error in the solicitation. Such questions may be submitted to the Commission Agreement Officer listed in Section G at any time prior to the application deadline. Please see Section G for additional information. [↑](#footnote-ref-15)
15. See Public Resources Code section 25620 https://leginfo.legislature.ca.gov/faces/codes\_displayText.xhtml?lawCode=PRC&division=15.&title=&part=&chapter=7.1.&article= [↑](#footnote-ref-16)
16. See CPUC Decision 04-08-010, August 19, 2004, <http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/39314.PDF>. [↑](#footnote-ref-17)
17. *Id.* at pp. 25 and 46. [↑](#footnote-ref-18)
18. 2019. *The Natural Gas Research Development and Demonstration Program: Proposed Program Plan and Funding Request for Fiscal Year 2019-20*. California Energy Commission. <https://ww2.energy.ca.gov/2019publications/CEC-500-2019-035/CEC-500-2019-035.pdf> [↑](#footnote-ref-19)
19. AB 32 (Statutes of 2006, chapter 488) [↑](#footnote-ref-20)
20. AB 758 (Statutes of 2009, chapter 470) [↑](#footnote-ref-21)
21. SB 350 (Statutes of 2015, chapter 547) [↑](#footnote-ref-22)
22. “Key personnel” are individuals that are critical to the project due to their experience, knowledge, and/or capabilities. [↑](#footnote-ref-23)