



GFO-22-308 Pre-Application Workshop

Decarbonizing HVAC Systems in Large Buildings

Energy Research and Development Division, California Energy Commission

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July 14, 2023



Agenda

Time	Item
1:00 pm	Welcome and Introduction
1:05 pm	Solicitation Background <ul style="list-style-type: none">• EPIC Research Program• Purpose of Solicitation• Available Funding
1:25 pm	Application Requirements <ul style="list-style-type: none">• Project Group Requirements• Attachments• Submission Process• Evaluation Process
2:00 pm	Q&As
3:00 pm	Adjourn



Housekeeping

- This workshop will be recorded.
- Participants will be muted during the presentation. Please chat your question in the Q&A window.
- Updates on solicitation documents including this presentation will be posted at the Grant Funding Opportunity's webpage:

<https://www.energy.ca.gov/solicitations/2023-06/gfo-22-308-decarbonizing-heating-ventilation-and-air-conditioning-systems>



Commitment to Diversity

The Energy Commission adopted a resolution strengthening its commitment to diversity in our funding programs. The Energy Commission continues to encourage disadvantaged and underrepresented businesses and communities to engage in and benefit from our many programs.

To meet this commitment, Energy Commission staff conducts outreach efforts and activities to:

- Engage with disadvantaged and underrepresented groups throughout the state.
- Notify potential new applicants about the Energy Commission's funding opportunities.
- Assist applicants in understanding how to apply for funding from the Energy Commission's programs.
- Survey participants to measure progress in diversity outreach efforts.



We Want to Hear From You!

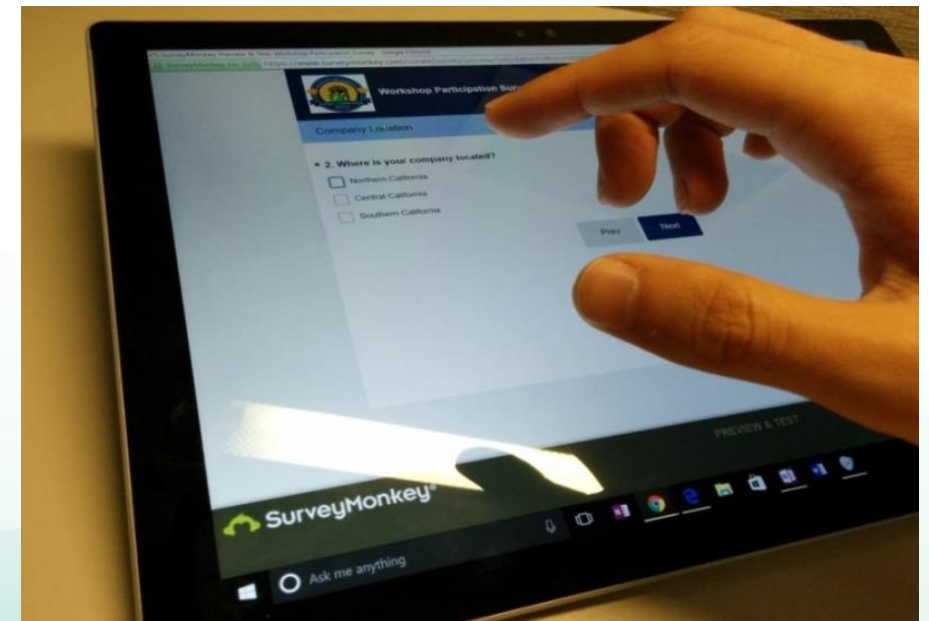
Participation Survey

Survey responses will be summarized anonymously to track attendance of underrepresented groups in our workshops for public reporting purposes.

- Online participants, please use link:

<https://forms.office.com/g/Ju8UyZNiBB>

Thanks!





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Find a Partner on EmpowerInnovation.net

Empower Innovation strives to accelerate your clean tech journey with easy access to funding opportunities from the Energy Commission and other funding providers, curated resources and events, and connections to people and organizations.

FIND A PARTNER

Announce your interest in this funding opportunity and message other interested parties to find potential partners.

RESOURCES & TOOLS

Browse the collection of resources for clean tech innovators including Resource Libraries, Funding Sources, Tools, and Databases.

<https://www.empowerinnovation.net/en/custom/funding/view/39374>



EmpowerInnovation.net





Research Program Background

- Guided by the EPIC Investment Plan (2021-2025)
- Develop pre-commercial HVAC decarbonization solutions for large buildings with emphasis on electrifying space heating systems and other non-gas alternatives
- Demonstrate affordable low or ultra-low GWP HVAC options for large buildings that can also be a showcase for others



Policy Drivers

- Senate Bill 32 - California Global Warming Solutions Act of 2006
- SB 350 Clean Energy and Pollution Reduction Act of 2015
- Assembly Bill 3232 – 40 percent reduction in GHG emissions from buildings by 2030
- Additional Information available in the Solicitation Manual



Purpose of Solicitation

Develop, test and demonstrate pre-commercial HVAC decarbonization solutions for large commercial buildings with an emphasis on technology advancements, efficiency and replicability.

Group 1: Large Hybrid or Stand-Alone Low GWP Electric Heat Pump Systems (GWP of 10 or less)

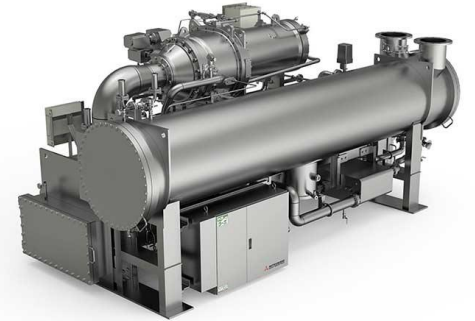
Group 2: Ultra-Low-GWP HVAC Heat Pump Advancements (GWP of 4 or less)

Group 3: Other Advanced HVAC Technologies (GWP of 0)



Background and Motivation

- Decarbonization of the large building HVAC sector is difficult technically and economically
- Heat pumps and heat recovery chillers offer a viable option for traditional airside HVAC applications but there are challenges:
 - Heat pumps for large commercial buildings have high first costs, low operating efficiency at higher temperatures, and operating limitations
 - May require electrical infrastructure upgrades
 - Have a larger footprint and can be very heavy
 - Using new low and ultra-low refrigerants may require a low-probability¹ installation at the site such that a refrigerant leak is not capable of entering the occupied space



¹ California Mechanical Code 1103.2 (1103.2.1 and 1103.2.2)



New State Refrigerant Regulations

California Air Resources Board regulates global warming potential of refrigerants ²

Chillers (new)

Refrigerants with a GWP of 750 or greater
Prohibited as of January 1, 2024

Space Conditioning Heat Pumps (all types and charge sizes) for buildings

Refrigerants with a GWP of 750 or greater
Prohibited as of January 1, 2025

² Section 95374 (c), Table 3 of the HFC Regulation



Low-GWP Refrigerant Options

(Source: HVAC - Proposer Defined Study: A Roadmap for Accelerating the Adoption of Low-Global Warming Potential HVAC Refrigerants. March 30, 2023, California Public Utilities Commission)

GWP Category	Refrigerant Name	Refrigerant Type	100-year GWP	Flammability/ Toxicity
High-GWP	R-410A	HFC	2088	Non-Flammable/Lower Toxicity
High-GWP	R-134a	HFC	1430	Non-Flammable/ Lower Toxicity
Low-GWP	R-32	HFC	675	Lower-Flammability/ Lower Toxicity
Low-GWP	R-452B	HFC	698	Lower-Flammability/ Lower Toxicity
Low-GWP	R-454B	HFC	466	Lower-Flammability/ Lower Toxicity
Ultra-low GWP	R-290 (propane)	Hydrocarbon/Natural	4	Highly Flammable/ Lower Toxicity
Ultra-low GWP	R-744 (CO2)	Natural Refrigerant	1	Low Toxicity
Ultra-low GWP	R-717 (Ammonia)	Natural Refrigerant	0	High Toxicity
Ultra-low GWP	HFO-1234ze(E)	Hydrofluoroolefin (HFO)	1	Lower-Flammability/ Lower Toxicity
Ultra-low GWP	HFO-1234yf	Hydrofluoroolefin (HFO)	1	Mildly Flammable/ Lower Toxicity
Ultra-low GWP	HFO-1233zd	Hydrofluoroolefin (HFO)	1	Non-Flammable/ Lower Toxicity

HVAC Today

Near-term Options

Long-term Options/Goals



Available Funding

Project Group	Available funding	Minimum award amount	Maximum award amount	Minimum match funding (% of EPIC Funds Requested)
Group 1: Large Hybrid or Stand-Alone Electric Heat Pump System	\$12M	\$2M	\$6M	20%
Group 2: Ultra-Low GWP HVAC Heat Pump Advancements	\$4M	\$1M	\$2M	20%
Group 3: Other Advanced HVAC Technologies	\$4M	\$1M	\$2M	20%



Match Funding

- Match funding is required (20% minimum).
- Match funding contributors must submit match funding commitment letters that meet the requirements. Failure to do so will disqualify the match funding commitment from consideration.
- Refer to the Solicitation Manual for more details on match funding.



Group 1: Large Hybrid or Stand-Alone Electric Heat Pump System

Funding Amount: \$12,000,000 (GWP of 10 or less)

Develop and demonstrate emerging electric HVAC solutions to replace gas use. Project could be one technology or a system solution, involving multiple technologies.

- Stand-alone new low GWP electric heat pump
- Stand-alone water-cooled heat recovery chiller operating in heating-only mode to provide a portion of the building's heating hot water needs.
- Hybrid electric solution that provides operational flexibility to building operators (heat pump working in conjunctions with a boiler/chiller).
- Alternative electric hybrid heating loop with thermal storage with or without a back-up boiler
- Primary/Secondary System (example Propane + Propylene Glycol)
- Cascade system (examples NH₃ + CO₂, Propane + CO₂)



Group 2: Ultra-Low GWP HVAC Heat Pump Advancements

Funding Amount: \$4,000,000 (GWP of 4 or less)

- Develop and demonstrate emerging HVAC solutions to replace gas use
 - Air-source (less than 50 tons and greater than 20 tons) that use an ultra-low GWP refrigerant, with an acceptable coefficient of performance (such as greater than 3 in heating and cooling mode)
 - Water-source (less than 100 tons) heat pumps that use an ultra-low-GWP refrigerant, with an acceptable coefficient of performance (such as greater than 3) in heating and cooling mode



Group 3: Other Advanced HVAC Technologies

Funding Amount: \$4,000,000 (GWP of 0)

Develop and demonstrate emerging HVAC solutions:

- Solid-state cooling/heating
- Thermo-elastic cooling/heating
- Personal comfort devices that heat and cool
- Cost-effective ground-source heat pump borings
- Use of eutectics/phase change material to store energy from compressor for use in heating water
- Other technologies including desiccant and innovative heat storage
- Other efficient electric non-vapor compression technology
- Non-vapor compression cooling (high efficiency indirect evaporative)



Minimum Requirements (All Groups)

Proposals submitted to the three funding groups, as described in Section I.A. and I.C. of this solicitation, must meet all the following minimum requirements:

- All electric
- State funds are to pay for only electric and other non-gas HVAC technologies
- Provide at least 20% match funds for electric and other non-gas HVAC technologies
- Match funds in excess of the 20% may be used to fund other technologies
- All projects resulting from this solicitation must be located in electric IOU territory



Eligible Applicants

- This is an open solicitation for public and private entities.
- Applicants must accept the EPIC terms and conditions.
 - Standard, UC, and DOE T&Cs available online:
<https://www.energy.ca.gov/funding-opportunities/funding-resources>
- Applicants are encouraged to register with the California Secretary of State, as all recipients must be registered and in good standing to enter into an agreement with the Energy Commission: <http://www.sos.ca.gov>



Application Requirements

1. Application Form (.pdf)	8. CEQA Compliance Form (.docx)
2. Executive Summary (.docx)	9. References and Work Product Form (.docx, .pdf)
3. Project Narrative (.docx)	10. Commitment and Support Letters (.pdf)
4. Project Team (.docx, .pdf)	11. Project Performance Metrics
5. Scope of Work (.docx)	12. Applicant Declaration (.docx)
6. Project Schedule (.xlsx)	13. Energy Efficiency Data (.xlsx)
7. Budget (.xlsx)	

Note: Attachment 13 is used for any estimates of energy savings or GHG impacts to the extent they apply to project. There is an Attachment 14 to be completed by California Native American Tribes and Tribal Organizations with Sovereign Immunity.



Project Narrative (Attachment 3)

- This is your opportunity to explain the entirety of the project. The narrative should explain:
 - Why is your project necessary and important to California?
 - What is your project approach and how will each major task be implemented?
 - How will the project be completed in the term proposed?
 - How will the project outcomes benefit electric IOU ratepayers?
 - Address the requirements for your group as described in Section I.C.

Respond to the scoring criteria described in Section IV.F.



Scope of Work (Attachment 5)

- Tell us exactly what you are proposing to do in your project.
- Identify what will be delivered to the Energy Commission.
- Be sure to include in the technical tasks:
 - At least one product deliverable per task.
 - Address requirements in Section I.C. under Project Focus.
- Be sure to include in the Project Schedule (Attachment 6):
 - Product deliverables that correspond with the Scope of Work.
 - Realistic dates on when product deliverables can be completed.



Budget (Attachment 7)

- Identify how the Energy Commission funds and match funds will be spent to complete the project
- Subcontractors receiving \$100,000 or more Energy Commission funds must complete a separate budget workbook.
- Ensure that all rates provided are **maximum** rates for the entire project term.
- Travel Restrictions:
 - CEC funds should be limited to lodging and any form of transportation (e.g., airfare, rental car, public transit, parking, mileage).
 - If an applicant plans to travel to conferences, including registration fees, they **must** use match funds.



Commitment and Support Letter Forms (Attachment 10)

- Follow guidelines provided for commitment and support letters.
 - Commitment letters are required for entities or individuals that are committing match funding, testing/demonstration sites, including the **Prime**.
 - Support letters describe a project stakeholder's interest or involvement in the project.
- All applicants must submit **at least one** support letter.
- Match funding must be supported by a match fund commitment letter.
- Any project partners that will make contributions to the project (other than match and sites) must submit a commitment letter.
- Limit to two pages per letter, excluding the cover page.



GFO Submission Requirements

- Method of Delivery is the Energy Commission Grant Solicitation System, available at: <https://gss.energy.ca.gov/>
- Electronic files must be in Microsoft Office Word (.doc, .docx) and Excel (.xls, .xlsx) formats, unless originally provided in solicitation in another format.
- Application documents should meet formatting requirements, and page recommendations.
- Attachments requiring signatures (Application Form and Support/Commitment Letters) may be scanned and submitted in PDF format.
- First-time users must register as a new user to access system.
- Grant Solicitation System (GSS) How to Apply presentation: <https://www.energy.ca.gov/media/1654>



GSS WARNING

START THE PROCESS EARLY!

- Applications must be fully submitted BEFORE the deadline listed in the solicitation manual
- **The GSS system will shut off at the deadline**
- Applications in the process of being submitted prior to the deadline will NOT be accepted after the deadline
- Applications will NOT be accepted after the deadline



GSS Structure

- Register as a New User
- Log In
- 3 Step Application Process:
 1. Select Solicitation
 2. Upload Files
 - Select documents for upload
 - Tag files with document type
 - Designate confidential documents (if applicable)
 3. Review and Submit

All three steps must be complete BEFORE the deadline



How will my Application be Evaluated?

Application Screening

Admin Screening Process

- Energy Commission staff screens applications per criteria in Section IV.E.
- Criteria are evaluated on a pass/fail basis.
- Applicants must pass all screening criteria or the application will be disqualified.

Some Reasons for Disqualification

- Application is not submitted by the specified due date and time.
- Application does not include one or more support letters.
- Application contains confidential material.



How will my Application be Evaluated?

Application Scoring

- **Evaluation Committee applies the scoring scale to the scoring criteria.**
- **Applications must obtain a minimum passing score of 52.5 points for Criteria 1-4 in order to continue evaluation.**
- **Applications must obtain a minimum passing score of 70 points for Criteria 1-7 in order to be considered for funding.**
- **Review Section IV of the manual and ensure the application provides a clear and complete response to each scoring criteria.**

Scoring Criteria	Maximum Points
1. Technical Merit	15
2. Technical Approach	25
3. Impacts and Benefits for CA IOU Ratepayers	20
4. Team Qualifications, Capabilities, and Resources	15
5. Budget and Cost-Effectiveness	10
6. CEC Funds Spent in California	10
7. Ratio of Direct Labor Costs to Indirect Costs	5



How will my Application be Evaluated?

Application Scoring – Preference Points

- **Passing applications (score of 70 or more from Criteria 1-7) will be considered for bonus points. Criteria for bonus points include:**
 - **Match Funding**
 - **Disadvantaged or Low-income Communities**

Scoring Criteria	Maximum Bonus Points (Group 1 Demonstration)	Maximum Bonus Points (Groups 2 and 3)
8. Match	10	10
9. Disadvantaged or Low-income Communities	5	NA
Total Bonus Points	15	10



Identifying Disadvantaged Communities

These areas represent the **25% highest scoring census tracts in CalEnviroScreen**, along with other areas with high amounts of pollution and low populations.

<https://oehha.ca.gov/calenviroscreen/sb535>

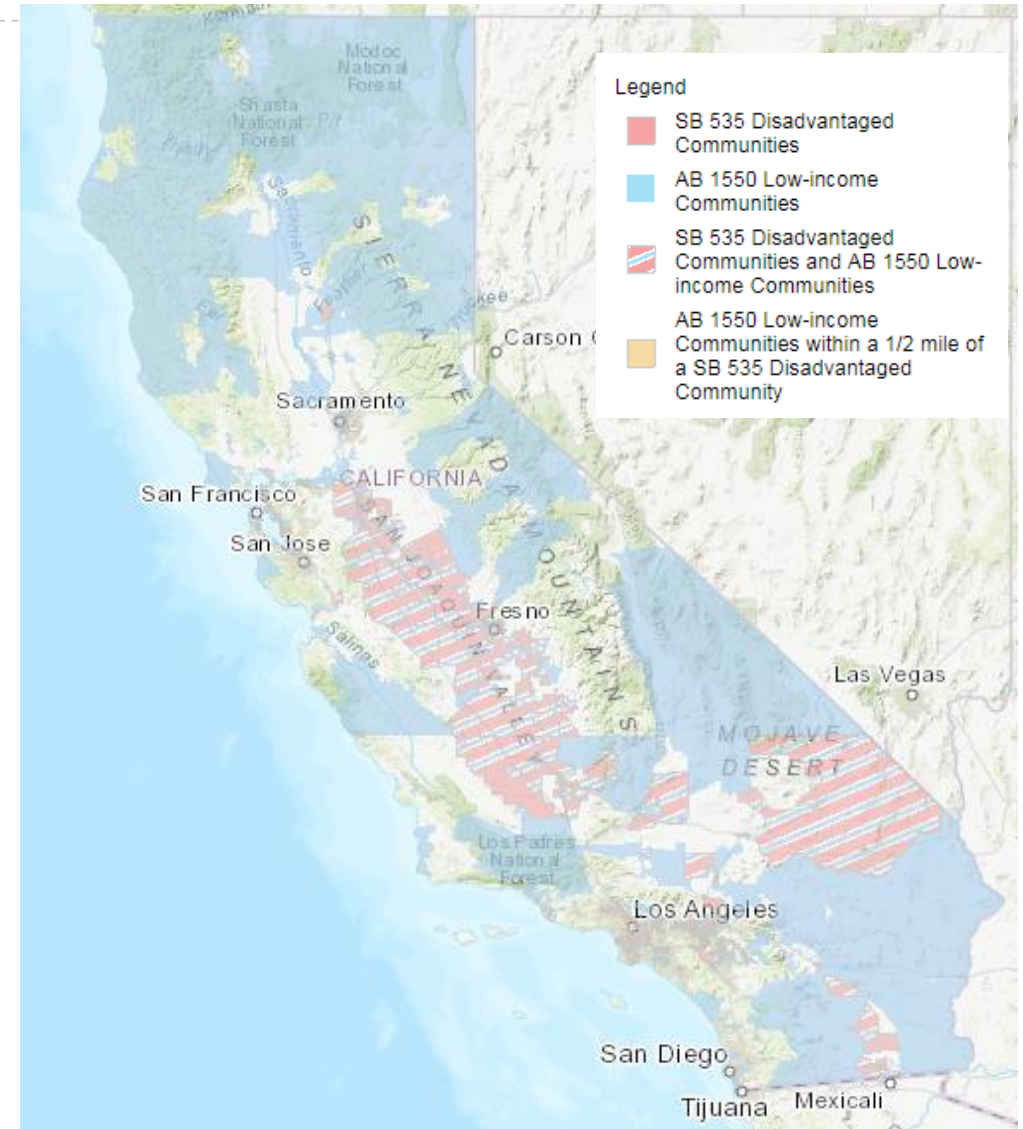




Identifying Low-Income Communities

Energy Commission staff proposes to use the existing low-income mapping tool developed by ARB to determine AB 523 low-income communities

<https://www.arb.ca.gov/cc/capa/ndtrade/auctionproceeds/communityinvestments.htm>





Match Funding Points

- Applicants may receive up to 10 additional preference points based on the criteria below:
 - Up to 5 points will be awarded based on the percentage of proposed cash relative to the total match contributions using the Match Scoring Table in the Scoring Criteria.
 - The remaining 5 points may be awarded to applications that exceed the minimum match requirements up to 100 percent of requested CEC funds using the Exceeds Minimum Match Scoring table.



Next Steps After Grant Award

- **Notice of Proposed Award:** Shows total proposed funding amounts, rank order of applicants by project group, and the amount of each proposed award.
- **Agreement Development:** Proposal documents will be processed into a legal agreement.
- **Failure to Execute:** The Energy Commission reserves the right to cancel the pending award if an agreement cannot be successfully executed with an applicant.
- **Project Start:** Recipients may begin work on the project **only** after the agreement is fully executed (approved at an Energy Commission business meeting and signed by the Recipient and the Energy Commission).



Key Dates

Activity	Date
Solicitation Release	06/16/2023
Pre-Application Workshop	07/14/2023
Deadline for Written Questions	07/19/2023 at 5:00 pm
Anticipated Distribution of Questions and Answers	Week of 08/1/2023
Deadline to Submit Applications	09/15/2023 at 11:59 pm
Anticipated Notice of Proposed Award Posting	11/15/2023
Anticipated Energy Commission Business Meeting	11/29/2023
Anticipated Agreement Start Date	01/20/2024
Anticipated Agreement End Date	03/29/2029



Questions and Answers

- Please chat your question in the Question and Answers window or raise your hand and you will be called on to unmute yourself. Please remember to introduce yourself by stating your name and affiliation. (Feature found under the Participants panel)
- Keep questions under 2 minutes to allow time for others.
- Note that our official response will be given in writing and posted on the GFO webpage.



Additional Questions

Please send all questions related to GFO-22-308 to:

Eilene Cary

Commission Agreement Officer

715 P Street, MS-18

Sacramento, CA 95814

(916) 776-0739

eilene.cary@energy.ca.gov

Deadline to submit questions:

Wednesday, July 19, 2023, 5:00 PM



Thank You!