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## Notice of Funding Opportunity

**Title:** Solar Heating, Cooling, and Power for Industrial and Commercial Applications  
**Website:** <https://www.energy.ca.gov/solicitations/2020-11/gfo-20-502-solar-heating-cooling-and-power-industrial-and-commercial>  
**Funding:** Total: \$3,000,000. Maximum awards: \$1.5M, depending on project.  
**Dates:** Pre-Application Workshop: November 2, 2020  
Questions Deadline: November 06, 2020  
Application Submission Deadline: December 16, 2020

**Summary:** The purpose of this solicitation is to fund research and development projects that will advance the development and technology readiness of concentrating and non-concentrating solar thermal technologies along with solar combined cooling, heating, and power (CCHP) technologies in accord with the California Energy Commission's (CEC) Renewable Energy and Advanced Generation Program research initiative on Solar Heating, Cooling and Power for Industrial Applications in the Fiscal Year 2019-2020 Natural Gas Budget Plan.

The CEC's Renewable Energy and Advanced Generation Program announces the availability of up to \$3 million in grant funds for this solicitation. The intent is to increase the market availability of solar thermal systems and advance the development of emerging pre-commercial solar combined heating, cooling, and power systems by reducing the cost and advancing the technology and market readiness needed to increase adoption.

While this solicitation is open to both commercial and industrial sectors, it is expected that the industrial sector will benefit the most due to its large consumption of energy associated with fossil fuel use. In California, the industrial sector accounts for one-third of the total natural gas (NG) consumption and roughly one-fourth of the state's greenhouse gas emissions (GHG). The vast majority of this consumed natural gas – about eighty-five percent – is used for process heat or indirect boiler applications in the manufacturing industry. Solar thermal technologies have the potential to meet most of these demands for heat and provide means of displacing the on-site burning of natural gas. The sectors that are particularly well-suited for solar thermal systems are industries that produce metals, plastics, rubber products, and chemicals, which together account for roughly one-fifth of the energy used by industry in the state. These sectors have heavy demands for heat and their working temperature requirements are feasible for solar thermal applications.

This grant funding investment will address the need to advance the science and technology of solar heating, cooling and power systems such as solar thermal and solar combined heat and power systems capable of delivering process heat and refrigeration loads or solar electric and hot water. The solicitation will have two groups of research and development projects that are focused on cost effectiveness, efficiency, and flexibility.

### Project Topic Areas:

#### Group 1: Advancing the Development and Market Availability of Solar Thermal Technologies

Projects funded under Group 1 must develop and deploy a solar thermal system that will demonstrate an improving performance over comparable standalone thermal collectors while lowering the overall costs of concentrating and non-concentrating systems at a California's industrial or commercial setting. Project focus for concentrating systems may include development of lightweight and inexpensive materials to increase competitiveness with NG systems. For non-concentrating systems, projects must focus on increasing temperature threshold to meet industrial or commercial temperature requirements and adapt state-of-the-art or innovative engineering to overcome cost and other technical barriers.

#### Group 2: Innovative Demonstration of Solar Combined Heating, Cooling and Power Systems

Projects funded under Group 2 must develop and conduct a pilot-scale demonstration of emerging pre-commercial solar combined heat and power (CHP) or technologies that combine solar thermal systems

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with other enabling technologies. Projects must demonstrate performance and cost improvements to solar CHP and move the technology closer to techno-economic parity with NG equipment that improves adoption in California's industrial and commercial sectors.

Applications anticipated for this group may include distributed generation anchored on a solar thermal system such as solar CHP collectors or a photovoltaic thermal system (PVT) that combines photovoltaic (PV) and thermal technologies into a single system. This generates thermal energy for various temperature applications while simultaneously providing distributed electricity. There are various projects dedicated to developing hybrid PVT that use designs similar to conventional solar thermal systems, including parabolic trough, flat plate collectors, and dish systems with the addition of PV cells before the thermal receivers in either a topping or spectrum splitting configuration.

### **Funding:**

There is up to \$3,000,000 available for grants awarded under this solicitation. The minimum funding amount for each project is \$750,000. The maximum funding amount is \$1,500,000. The top scoring proposal for each project group will have priority to ensure at least one project per group will be funded. Match funding is required in the amount of at least 10% of the requested project funds.

### **Project Requirements:**

Projects in Group 1 must meet all of the following requirements:

- Demonstrate technologies achieving an output fluid temperature of 150 to 300 °C
- Demonstrate the potential for a levelized cost of heat of \$0.03/kWh
- Begin the project with a TRL of 4 or 5 and end the project with a higher TRL than started (5 or higher)
- Demonstrate the technology for no less than 6 months in a relevant field environment. Demonstration and deployment sites must be located in an industrial or commercial setting and in a NG IOU service territory (Pacific Gas and Electric Company, San Diego Gas & Electric Company, and Southern California Gas Company).

Projects in Group 2 must demonstrate the following requirements:

- An output fluid temperature range of 100°C to 200°C.
- Technology readiness level (TRL) from TRL 3 or 4 at the beginning of the project to TRL 5 or greater by the end of the project.
- Demonstrate the ability to meet LCOH of 0.20 – 0.25\$/kWh or better.
- Pilot-demonstrate the technology for no less than 6 months in a relevant field environment. Demonstration and deployment sites must be located at an industrial or commercial setting and in a NG IOU service territory (Pacific Gas and Electric Company, San Diego Gas & Electric Company, and Southern California Gas Company).

### **Eligible Applicants:**

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 natural gas Investor Owned Utility (NG 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 natural gas IOU ratepayers.