California Solar Initiative - Thermal Program

SOLAR WATER HEATING TOOL KIT
For Commercial/Industrial Customers

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What is Solar Water Heating?
What is Solar Water Heating (SWH)?

A solar water heating system preheats your water with the warmth of the sun to help your existing system use less energy.

The technology is called “solar thermal.”
Solar Power vs. Solar Water Heating

- Solar power panels (photovoltaic) convert light energy into electricity
- Connects to the building’s electrical system
- Common PV types have an efficiency of less than 30 percent**

- Solar thermal collectors gather heat energy from the sun
- Connects to the building’s plumbing system
- Solar collectors can be as high as 87 percent efficient*

**National Renewable Energy Laboratory

* Environment California Research & Policy Center
How Does it Work?
How Solar Water Heating Works

Sun Heats Collector
Collector Heats Transfer Liquid
Transfer Liquid Heats Coil
Coil Heats Water
System Works More Efficiently
Types of Solar Water Heating Systems

- Closed-loop
  - Active
  - Passive
- Integral Collector Storage
- Open-loop System
Glad to be of service.
Types of Solar Water Heating Systems:

Closed-loop Passive – Dual Tank System

- Sun Heats Collector
- Collector Heats Transfer Liquid
- Transfer Liquid Heats Coil
- Coil Heats Water
- System Works More Efficiently
Integral Collector Storage System

Types of Solar Water Heating Systems:

- Solar Batch Collector (on roof)
- Conventional Tank
- Sun Heats Collector
- Collector Heats Stored Water
- System Works More Efficiently
Open Loop System
(only eligible for solar pool heating uses)
What is the CSI-Thermal Program

- What is it?
- Program Eligibility
- Rebate
A statewide incentive program which offers cash rebates to customers of the four investor-owned utilities who install qualifying solar water heating (SWH) systems on their properties.

The program is administered under the auspices of the California Public Utilities Commission.
Benefits of Solar Water Heating

- **Reduces the amount of energy** used to heat your business’s or your property’s water
- **Lowers the cost** of heating your water or swimming pool
- **Lowers the cost** of space heating/cooling and process heating
- Reduces harmful **greenhouse gas emissions**
- Helps your business or property become **more sustainable**
Eligible End Uses:

- Drinking, food preparation, washing, laundry, sanitation and personal hygiene
- Solar-heated water used as a medium to carry heat for space heating/cooling or process heating*
- Solar pool heaters in commercial and multi-family applications such as apartments, HOAs, hotels, schools/colleges or fitness centers

*Incentives for expanded applications such as space heating/cooling and industrial process heating will be paid under the Performance Based Incentives (PBI) program. See program website for details.
Commercial Uses:

- Apartment Buildings / HOAs
- Schools / Colleges / Universities
- Commercial Office Space
- Hotels and Resorts
- Manufacturers / Industrial Processors
- Agricultural / Food Processors
- Fitness Centers / Gyms / Spas
- Government Agencies / Non-Profits
- And many more…
• A maximum of one commercial incentive will be allowed per SWH system, not to exceed $500,000 for natural gas-displacing systems

• The total incentives for multiple systems on one site cannot exceed the $500,000 incentive maximum
Eligibility

Site Eligibility 1

The premises may contain multiple buildings on one site.

Bldg. 1
XYZ Inc.

Bldg. 2
XYZ Inc.

Bldg. 3
XYZ Inc.
Eligibility

Site Eligibility 2

Businesses divided by a dedicated street, highway or other public thoroughfare or railway are considered to be one site.
Eligibility

Site Eligibility 3

Separate businesses on a single parcel of land undivided by a highway, public road and thoroughfare or railroad are considered separate sites.
Eligible Systems

Closed-loop Active
- Indirect Forced-circulation

Closed-loop Passive
- Thermosiphon

Integral Collector Storage System
- Passive System
- Eligible only in certain climate zones

Open Loop System
- Eligible only for use with solar pool heaters
Eligibility

System Requirements

- Commercial solar collectors must have a Standard 100 Collector Certification from either:
  - Solar Rating and Certification Corporation (SRCC) or
  - International Association of Plumbing and Mechanical Officials (IAPMO)

- Systems in compliance with Standard 300 standards will also be eligible to receive commercial incentives.

- All components must be new and unused with a few exceptions

- System installations must conform to manufacturer's specifications and all applicable codes and standards

- All systems must have freeze and stagnation or overheat protection
• It varies. Rebates are based on how much energy the solar water heating system is expected to displace annually.
How is the Rebate Calculated?

- **Incentive Rate** $\times$ **Annual Energy Savings** $\times$ **Surface Orientation Factor** $\times$ **Shade Factor**

  $= \textbf{Rebate Amount}$

- Eligible contractor will calculate
  - Visit [socalgas.com/solar](http://socalgas.com/solar) for link to Incentive Calculator
Performance Based Incentives Program (PBI)

Incentive applications received for the following end uses will be paid under the PBI program:

- Space Heating
- Space Cooling
- Process Heating
- Multi-family / Commercial combination systems
- Domestic Hot Water (DHW) systems > 250 kWth

PBI enables the program to calculate incentives based on the amount of energy (therms) actually saved, and payments will be made quarterly over two years (no upfront payments).
• You may also qualify for other incentives outside of the CSI-Thermal Program.

• Visit dsireusa.org to learn about incentives at the local, state and federal levels.
Installing a Solar Water Heating System
Installing a Solar Water Heating System

Contractors

To be eligible, a contractor must be:
Licensed by the State of California Contractors State License Board (CSLB) and have an active:

• A (Engineer)

• B (General)

• C-4 (Boiler, Hot Water Heating and Steam Fitting)

• C-36 (Plumbing) or

• C-46 (Solar) contractors’ license, and be in accordance with rules and regulations adopted by the CSLB
Contractors

• Contractors must also attend a mandatory CSI-Thermal contractor/installer training workshop presented by one of the state’s Program Administrators to be certified in the program.

• Each contractor who meets these requirements is included in the CSI-Thermal Program’s “List of Eligible Contractors”
Case Study:
512 Rose
“The solar hot water system at 512 Rose was a great partnership with the utility, the solar contractor and our overall construction team. Everyone worked together to ensure an optimal, cost-effective design and a timely completion.”

Patrick Wilde
Senior Vice President
Gerdning Edlen (Developer)
Case Study: 512 Rose

Energy-Efficiency Audit

- **Location**: Venice, California
- One Building
- Four Floors
- Five Retail Units
- 70 Residential Units

This case study is for informational purposes only and may not be indicative of your particular situation.
Case Study: 512 Rose

SWH System

- Closed-loop Active
  - Indirect Forced Circulation
- Flat-plate Collectors on roof
- Solar storage tank in parking garage
- Heat Transfer Liquid
  - Non-toxic Propylene Glycol
Solar fraction*: 70 percent average annually

*The average percentage of domestic hot water provided by the SWH system over the course of the year.
Case Study: 512 Rose

SWH System: Collectors

- Flat-plate collectors
- Number of collectors: 32
- Collector dimensions: 4’ x 10’
- Collector arrangement: 4 rows of 8 in parallel
### SWH System: Storage Tanks

**Location:** Lower level of parking garage

**Size of solar storage:** 1,950 gallons

**Size of back-up storage:** 200 gallons

**Size of back-up heater:** 499,000 Btu/hr
“Solar hot water is a very applicable strategy for multi-family buildings from both a cost/benefit and environmental impact perspective. The system will provide an impressive three-quarters of the building’s annual hot water needs. It’s a great complement to the rest of the building’s efficient mechanical systems.”

Renee Loveland
Sustainability Manager
Gerding Edlen (Developer)
Case Study: 512 Rose

CSI-Thermal Incentive

- Estimated* Annual Therm Savings: 4,489 therms

*Estimated therm savings by CSI-Thermal Incentive Calculator. Actual system performance may differ depending on building occupancy and load factors. This case study will be metered and the performance will be evaluated on an annual basis.
Case Study: 512 Rose

CSI-Thermal Incentive

- Estimated* Annual Therm Savings: 4,489 therms
  - Annual Access to Sun between 10 and 3 (Shade Factor): 100%
  - Surface Orientation Factor: .95
- Incentive Rate: $12.82*
- Rebate Amount: $57,549

*Incentive Rate before CPUC Increase
## Project Costs

<table>
<thead>
<tr>
<th>Costs</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collector costs:</td>
<td>$56,883</td>
</tr>
<tr>
<td>Storage tank costs:</td>
<td>30,317</td>
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<tr>
<td>Installation costs:</td>
<td>220,885</td>
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<tr>
<td>Permit costs:</td>
<td>+ 263</td>
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<tr>
<td>Total Costs:</td>
<td>$308,348</td>
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<tr>
<td>CSI-Thermal Rebate:</td>
<td>- 57,594</td>
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<tr>
<td>Net Cost:</td>
<td>-$250,754</td>
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</tbody>
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**Case Study: 512 Rose**
For More Information

CSI-Thermal Program Handbook

- Available at: socalgas.com/solar
- List of Sun Exposure Websites:
  - Los Angeles County: http://solarmap.lacounty.gov/
  - City of Anaheim: http://anaheim.solarmap.org/
- List of eligible contractors
  - Available at: socalgas.com/solar
- Questions?
  - E-mail swh@SoCalGas.com