

# MISSION HEIGHTS CONDOMINIUMS SOLAR THERMAL HOT WATER HEATING SYSTEM



## PROJECT OVERVIEW:

The Board of Directors of the Mission Heights Condominium Home Owners Association researched the most cost effective ways to reduce their operating expenses and emissions of greenhouse gases. Due to the attractive energy savings and the California Solar Initiative – Thermal rebate program, they collectively agreed a solar hot water heating system was the most beneficial technology they could implement to accomplish these goals. Aaron Sathrum, President of the Mission Heights HOA, had the foresight to contact the California Center for Sustainable Energy (CCSE) and asked them for names of contractors experienced installing solar hot water heating systems. He was provided with a list of contractors specializing in these systems utilizing the CSI-Thermal Program. Adroit Solar has processed more solar hot water heating projects through the CSI-Thermal Commercial Program than any other contractor, and the Mission Heights HOA chose them to do their installation.



## SOLAR THERMAL HOT WATER HEATING SYSTEM AT A GLANCE:

After conducting a thorough analysis of Mission Height’s resident’s natural gas usage, Adroit Solar designed a system that would offset natural gas consumption for Domestic Hot Water heating, and pay back in the shortest time frame reasonably possible. The type of system Adroit specified is an “active flat plate, glazed collector, closed loop pressurized system” which is the best type of solar water heating system for the particulars of their property and their resident’s usage. The project consists of three separate solar water heating systems, to serve the 116 residential units within the 3 building development. A total of 72 Vaillant solar thermal collectors, 3 Haase Energy Tanks, UV protected and fully insulated pipes were installed, producing approximately 3,800 gallons of hot water per day.

The closed loop system utilizes a propylene glycol and water solar fluid mixture to protect against freezing and eliminate the introduction of hard water into the solar collectors. The sun heats the solar fluid in the collectors on the roofs which is then pumped down to the solar storage tank where the heat exchanger transfers the energy to the water in the tank. As hot water is used by the occupants, solar heated water in the storage tank is delivered to the natural gas powered water heating system, significantly reducing natural gas consumption and emissions. The system electronically monitors the temperature in the solar storage tank and continues the heat transfer process as long as the solar energy is available. Adroit Solar’s state of the art system design also provides for the mitigation of a large portion of the recirculation losses inherent in typical commercial solar hot water system designs.

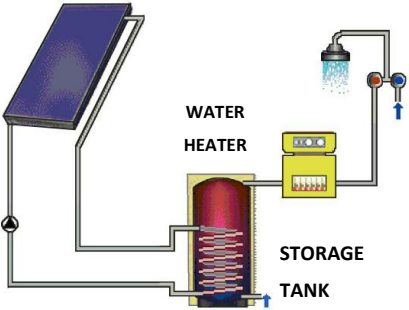




**SYSTEM OVERVIEW**

- **Separate Systems**
  - 72 Solar thermal collectors total
  - 2,275 gallons of storage
- **Capacity Total**
  - Estimated hot water consumption: 8,800 Gal/Day

**SOLAR THERMAL COLLECTOR**



**SYSTEM PERFORMANCE**

- Annual natural gas savings: 8,517 therms
- First year natural gas cost reduction: \$9,000
- Annual natural gas cost reduction: \$15,160
- Averaged over estimated 20 yr system lifetime, with 5.5% estimated annual increases in natural gas costs
- Total savings over 20 years: \$316,662
- Solar fraction of total required therms: 65%

**ENVIRONMENTAL BENEFITS**

- Reduction in natural gas consumption: 8,517 therms/yr
- Reduction in CO2 emissions: 20,000 lbs/yr or 2,401,600 lbs/20 yrs

**PROJECT COST BREAKDOWN**

- Gross project cost: \$207,976
  - CSI Thermal Rebate: \$72,523
  - Net project cost (with 30% tax credit & bonus depreciation) = \$135,453 = 1.5 yr Payback
  - Net project cost (if 2 of residents claim 30% tax credit) = \$115,135 = 1.0 yr Payback
  - Net project cost (if all residents claim 30% tax credit) = \$94,817 = 0.9 yr Payback
  - Net project cost (with 30% tax credit and 1st yr 100% bonus depreciation if entity were in the 38% tax bracket) = \$883.96 = 2 month Payback!!
- \* There are nuances to final determination of tax liability; consult your tax advisor regarding your specific situation

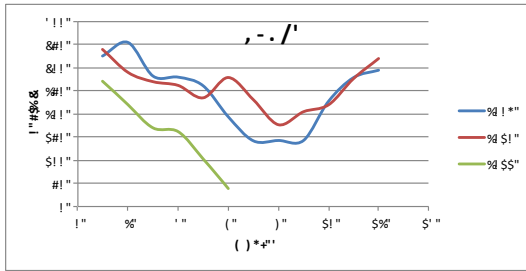


## IMPACT ON INDIVIDUAL OCCUPANTS GAS COSTS

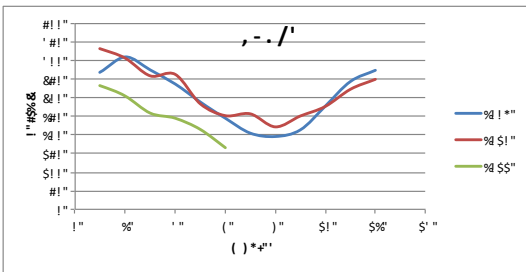
The California Solar Initiative's Thermal Program rebate of "\$12.82 per therm saved" was paramount in making investing in these systems financially viable. The CSI-Thermal rebate alone offset the cost of the project by 4%. Although the Mission Heights Home Owners Association is not a for-profit entity and does not pay taxes, individual members of the HOA can take advantage of their proportionate share of the 30% federal tax credit. There are 16 individual residences within the Mission Heights Condominium development. Each residence owner was able to capture a tax credit of \$350.00. Water heating costs were \$155.00 per unit, per year, prior to the installation. Water heating costs are now \$55.00 per unit, per year.

Businesses, homeowners and HOA's, usually will not make large investment into renewable energy, or energy efficient technologies unless the paybacks are rapid, or at least close to comparable to other traditional investment opportunities that exist. More businesses, homeowners, and HOA's, are becoming aware of the availability of these programs, tax credits, and bonus depreciation programs which should result in more installations of these types of technologies.

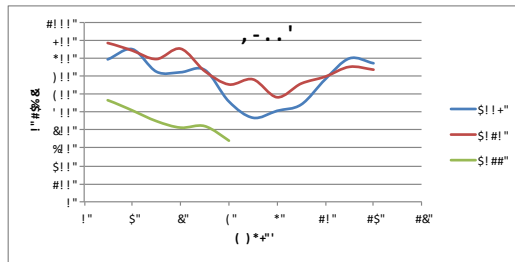
## COMPARISON OF JANUARY THROUGH JUNE 2010 GAS BILLS TO JANUARY THROUGH JUNE 2011 GAS BILLS



The 295 Rancho Mission Rd. building only uses hot water for domestic hot water heating.



The 275 Rancho Mission Rd. building uses hot water for DHW, and water for the spa.



The 255 Rancho Mission Rd. building uses hot water for DHW, and uses additional gas to power the laundry dryers



Ground-Mounted Solar Photovoltaic



Solar Thermal



Geothermal Loop Field Net-Zero Design



Mechanical Piping & Controls for Radiant Floor Heating



Radiant Floor Heating



Commercial Boilers/Hot Water Heaters



Hydrogen Fuel Cells



Cogenerated Concentrated Solar photovoltaic, thermal hybrid



In-deck Tennis Court solar thermal pool heating



Microturbines

## ABOUT ADROIT SOLAR

Adroit Solar is a Division of Mariner Mechanical, Inc., located in Pacific Beach/San Diego. Adroit has 25 years of experience in the hydronics and renewable energy industry. Adroit designs and installs solar thermal, solar photovoltaic, concentrated cogeneration pv/thermal hybrid solar, ground source geothermal heating and cooling systems, radiant heating and cooling systems, hydrogen fuel cells, microturbines and provides design and specification work for development of energy independent "net zero," high-end residential and commercial properties. They are a licensed contractor in California and Hawaii with C46 and C36 licenses, and a member of the U.S. Green Building Council (USGBC). Owner and President James Backman is a LEED Accredited Professional (Leadership in Energy and Environmental Design), as are most of Adroit Solar employees. Adroit recently contributed to two San Diego Excellence in Energy (SANDEE) Award winning projects and has processed more commercial solar thermal installation rebate submittals through the CSI-Thermal rebate program than any other contractor in San Diego. For more information about these technologies, or how to implement them, please contact Jim Backman at [jim@adroitsolar.com](mailto:jim@adroitsolar.com) (858-483-3568) or David Demarest at [demarest@adroitsolar.com](mailto:demarest@adroitsolar.com) (858-229-5575).



1135 Garnet Ave. Suite 13, San Diego, 92109  
[www.adroitsolar.com](http://www.adroitsolar.com) [www.mmcan.com](http://www.mmcan.com)