

Case Study: Free Hot Water's Solar Thermal Design is Cost Competitive with Natural Gas Systems for Apartment Buildings

San Jose, California -- Free Hot Water, a solar thermal engineering, manufacturing, and procurement company, is a finalist in the 2013 Intersolar North America Project Award for a San Francisco solar thermal and solar PV apartment project. Gal Moyal, Free Hot Water's Chief Engineer will make a presentation on the project details before the Intersolar Award's Ceremony

Free Hot Water engineer challenge:

The Building:

- Retrofit of an old 3 story building (formerly a warehouse, and a Tibetan Monastery)
- 50 single bedroom apartments
- 6 Washers
- Common kitchens

Requirements:

- 800 GPD of DHW
- Deliver Radiant heat to 60 different zones
- Radiant heat system to be assisted by solar thermal system
- Reduce operating cost of the system by 30% minimum
- 4.5kWh PV system to cover common areas electrical use
- Controls to allow building owner to monitor and operate the system remotely
- Keep the system cost competitive with conventional gas systems

Solar Thermal System:

- 18 Solene SLAR-40 (4X10) annual output of 2,792 Therms
- 3 X 265 gal Free Hot Water dual coil tanks
- 1 ¼" Free Hot Water pump station with Grundfos VFS digital flow meter and UPS 26-150 circulation pump
- Sorel XTDC Controller
- 2 X 199,000 BTU/Hr A.O. Smith State tankless water heaters
- Free Hot Water Omni Rack (accommodates 2 or 3 - 4 X 8 or 4 X 10 collectors)

Radiator System:

- 60 radiators with integrated thermostats
- Free Hot Water radiant heat pump skid
- Grundfos Magna pump
- 3 Grundfos Alpha pumps
- 60 zone manifold
- Water Softener

Photovoltaic System:

- PV Collectors – 18X TALESUN 255W
- Inverter – Enphase Energy
- Monitoring – Envoy Communications Gateway
- Racking – Ecofoot2 Ballasted flat roof system

Barak Jolish, a San Francisco building developer, took five bids for a hydronic heating and hot water system for a 3-story, 19,260-sq.-ft. student housing complex renovation. Jolish compared bids from conventional natural-gas systems against solar hot water. While the lowest bidder for each technology came to about \$200,000, rebates and tax incentive meant that the net installed cost of solar hot water was under \$114,000.

To tie together the various solar heating and energy systems, a cutting-edge control panel enables the building manager to monitor the solar PV, solar radiant heat, and the solar hot water system from a single web-based dashboard, allowing managers to view all solar operations on-the-go and quickly address any problems.

Free Hot Water used Grundfos Magna and Alpha eco-friendly pump technology. The Autoadapt intelligent feature delivers the highest possible comfort with the lowest possible energy usage. The unique technology implemented by Free Hot Water is a proportional pressure control system with added intelligence.

The system is set-up to allow the differential pressure across the building's pump array to automatically adjust and match the flow requirements. That means that the pump is always operating on the most efficient performance curve.

The developer estimates the building will cut its operating energy costs by 66% compared to a similar sized apartment building with a natural gas system, conventional lighting, and without solar PV.

With innovative design, solar thermal is now cost competitive with natural gas systems for new and renovated apartment buildings.

With incentives, especially in California, the final cost of a commercial solar thermal system is even lower. Yet, the U.S. market has been slow to recognize solar thermal cost advantages.

The Free Hot Water Designed System included:

- Complete mechanical room design and installation using 98% efficient boilers
- Complete solar thermal system tied to the domestic hot water and building heat
- Complete hydronic radiant heating system to all 50 1-bedroom apt units, plus the common areas
- All piping, materials, and installation labor
- A complete 4.5Kw solar electric system using micro-inverters for potential future expansion.
- A central controller that ties all the solar and natural gas components with one dashboard that can be viewed and manipulated from any internet-connected device, including smart phones.

The Developer received the following rebates and tax incentives:

- California's Solar Initiative (CSI) Thermal Rebate (~\$25K)
- CSI PV rebate (~\$750)
- 30% Federal Tax Credit (~\$60K)
- Value of Modified Accelerated Cost-Recovery System (MACRS) + Bonus Depreciation tax incentive.
- Estimated net cost to developer with applicable solar incentives = less than \$114,000.

About Free Hot Water

Free Hot Water, based in San Jose, California, offers affordable, high-quality hot water systems for commercial applications. Our in-house engineering department specializes in designing solar thermal systems for a variety of large-scale commercial applications.

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Free Hot Water Intersolar Booth #7821

Free Hot Water Case Study Presentation:

Tuesday, July 9, 2013, 12:00pm
Innovation & Application Stage
Moscone Center, West Hall, Level 3, Exhibition Floor

Intersolar Awards Winner Announced:

Tuesday, July 9, 2013, 3:00pm
same location as above

