

HYBRID SOLAR THERMAL HEAT PUMP/CHILLER DEBUT

Energy Concepts – Annapolis, Maryland

A 25 ton hybrid solar thermal heat pump/chiller (HS25) has been providing gas and electric savings at a hotel in Palm Desert, California since summer of 2016.

Thermal heat pumps deliver good energy and cost savings when powered by natural gas. With renewable heat input, and co-produced (free) chilling, the savings increase dramatically.

On a sunny day this hybrid heat pump is powered by 500,000 BTU/hour of 250°F heat from a solar thermal collector. A backup natural gas heater enables 24/7 operation. The domestic hot water heat output is 800,000 BTU/hour at 130°F. The chilling co-product is 25 tons at 44°F.

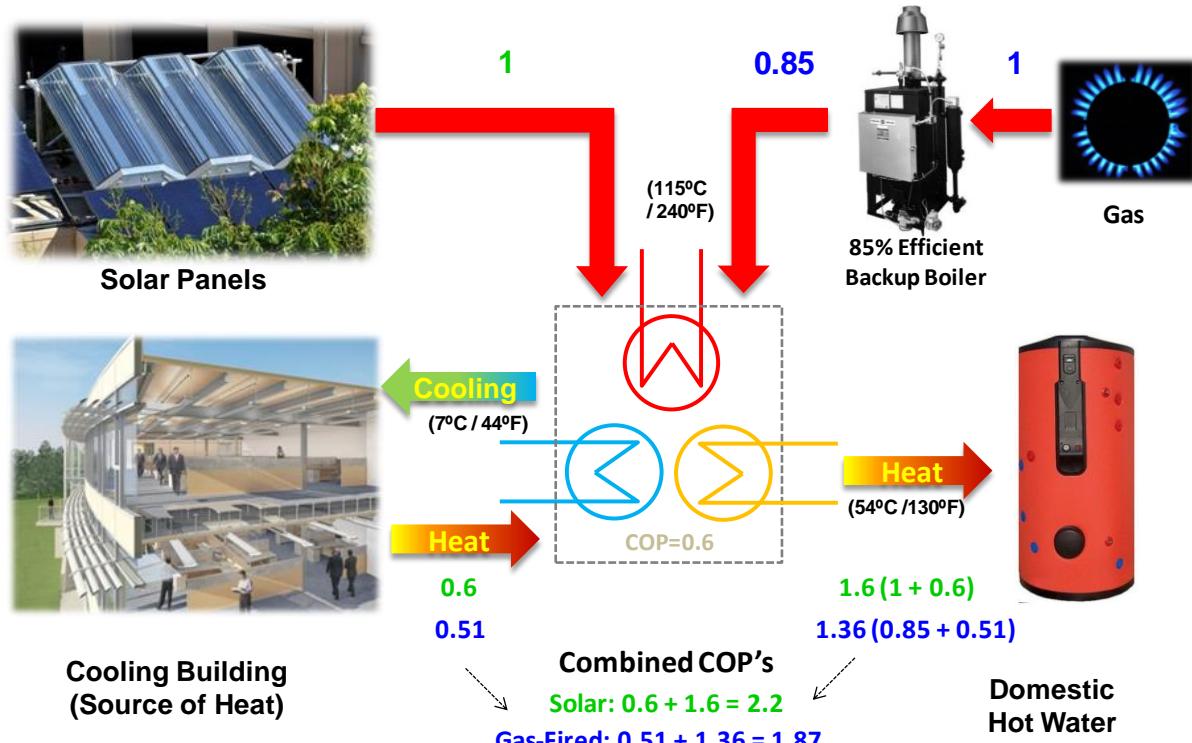
All of the output heat of the hybrid heat pump goes to heating domestic hot water, so no cooling tower is required. The only electric demand is four small pumps. The chilling provides substantial electric savings, and the heat pumping and solar heat provides gas savings. The heat pump consists of a highly efficient and low charge ammonia absorption cycle. With the ability to be powered by a variety of heat sources, it is a very resilient and sustainable heating and chilling solution.

This is the sixth thermal heat pump/chiller fielded by Energy Concepts. Previous units were in poultry processing (100 tons), meat packing (250 tons), and paper mill (150 tons).

Cost share support was provided by the California Energy Commission and by Sempra Utilities. The installation was done by Adroit Energy and Retrofit Technology. The solar thermal panels were supplied by Chromasun.



Efficiency Comparison



Equipment	Overall Efficiency
Boiler	0.9
Electric Heat Pump	1.2 (COP=3.6)
Thermal Heat Pump	1.44 (COP _{heating} =1.6)
Hybrid Heat Pump / Chiller	1.94 (COP _{combined} =2.16)

Markets

Applications that need hot water and chilled water such as

- Hospitals, hotels, campus, large buildings
- Meat/Dairy/Poultry/ Breweries and other Food processing
- Swimming pools, Laundries

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