

Solar Water Heating

Types of systems

- Active vs passive
 - Pump vs thermosiphon
- Direct vs indirect
 - Water vs another circulating fluid and a heat exchanger

Types of Systems

- Low-temperature
 - 0 – 10 C above ambient
 - Pools
 - \$10-40/ft²
- Mid-temperature
 - 10 – 50 C above ambient
 - Houses
 - \$90-120/ft²
- High-temperature
 - Evacuated tubes
 - \$40-70/ft² (for large systems)



Options



- 80 gallon tank
- 5-7 people
- Maintenance free 15 years.
- \$1,300
- qddsolar.com

HMC Sustainability Analysis (2008)

- Assumptions
 - Price of natural gas constant.
 - No tax benefits
- Results
 - Payback period 24-27 years



<http://sustainability.claremont.edu/solar/index.html>

Analysis

Calculation of energy savings

$$Savings = \frac{Energy\ of\ Sun}{Area} \times Area\ of\ panels \times Efficiency$$

Economic savings are a function of the price of the fuel saved

Payback period analysis

$$-Cost + \frac{savings}{(1+i)} + \frac{savings}{(1+i)^2} + \dots + \frac{savings}{(1+i)^n} \geq 0$$

Tax credits, rebates, and other incentives become a negative terms in the equation.

California Incentives

- History: 1985 Tax Break
- Tax credit 30%
- Loans 8.5%
- Rebate \$12.85 for therm or \$0.37 kWh displaced
- Source: DSIREUSA.ORG



Future Work

- Do the analysis with the new incentives and adjust gas prices.
- Get more estimated prices for systems for HMC.
- Look into Israel's policy for construction.