

Harnessing the Power of the Sun for Clean, Free, Renewable Energy

Solar Thermal Presentation

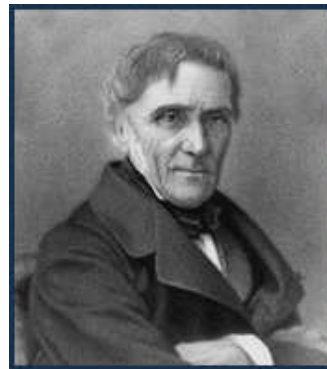


Overview

- Solar – What is available? How does it Work?
- What are the advantages? Is it worth the investment?

Solar – A Brief History

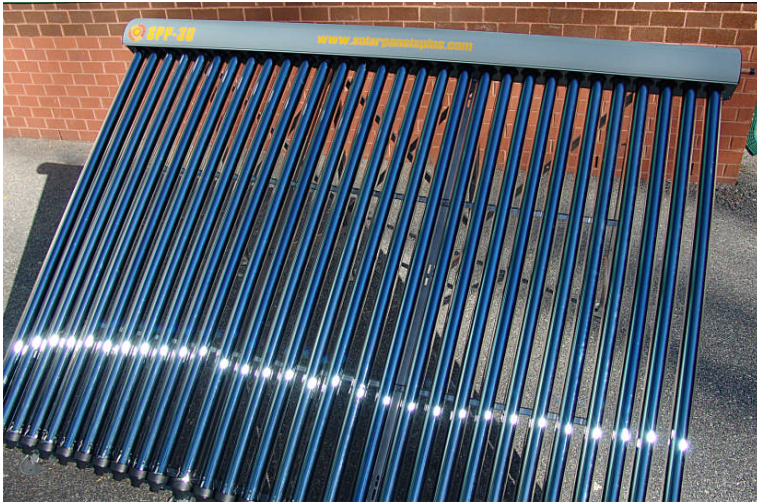
- 700 B.C.E. - A Parabolic Mirror was used to light the Olympic torch
- Greeks & Romans used passive solar building design to warm their home
- 1861 – Auguste Mouchout invents a steam engine powered 100% by the sun
- 1921 – Albert Einstein receives the Nobel Prize for his research into the photoelectric effect
- 1973 – The Arab Oil Embargo creates new interest and research in solar thermal & pv systems to help consumers combat the rising cost of fuel.
- Present Day – the increasing costs of oil, natural gas, and concern for the environment have steadily increased the funding & interest in the solar market.



Solar – How does it Work? What is available?

Introduction to Solar

There are two distinct Solar technologies available:



Solar Thermal Collectors

- Converts sunlight into heat, transferring the heat into hot water.
- High efficiency – over 75% of sunlight is converted into usable energy
- Lower up-front cost & fast payback – average of 4-7 year return on investment



Solar Photovoltaic (PV) Collectors

- Converts sunlight into electricity – can provide power for many different items
- Easier to store excess energy
- Produces usable energy year-round for a variety of applications

Solar Thermal: Concentrating Collectors



Concentrating Collectors or Parabolic Troughs

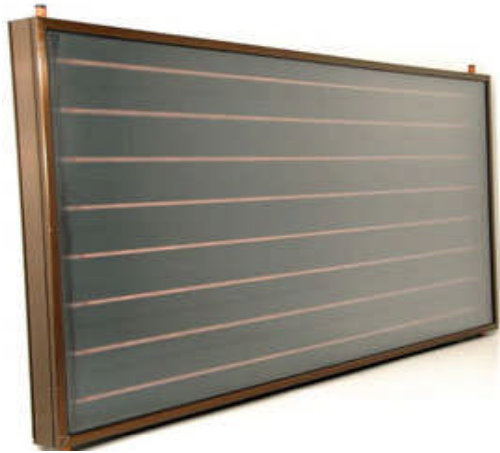
- Used for extremely large scale production – such as the 50MW powerplant in Nevada
- Requires direct, constant sunlight
- Generates temperatures between 750F and 1000+F
- Only used for very large industrial applications

Solar Thermal: Solar Pool Panels



- Solar Pool Panels are the most installed solar system in the USA
- They have the lowest up-front cost, are the simplest to install, and can have a very quick payback – even as little as 2 years

Solar Thermal: Hot Water Generation



Flat Plate Collector

- Good for lower temperatures, or warmer/southern climates
- Good efficiency requires a high outside (ambient) temperature
- Good output during summer months, low output in winter months



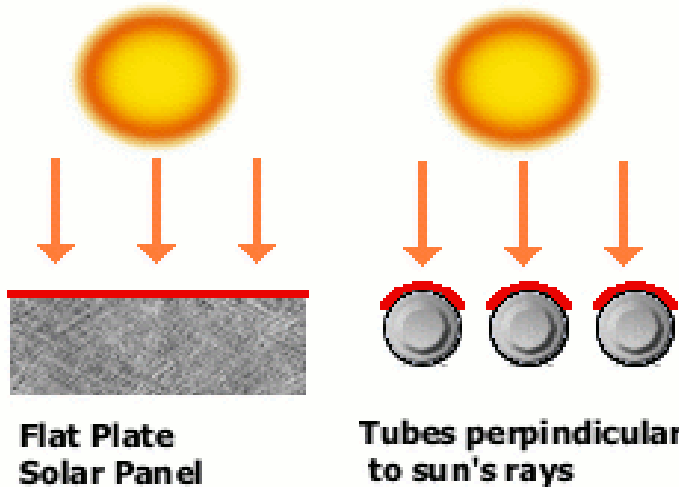
Evacuated Tube Collector

- Good for mid-high temperatures, and all climates, even cold areas, such as Canada
- Efficiency does not significantly decrease when ambient temperature falls
- Consistent output all year long, even in winter months

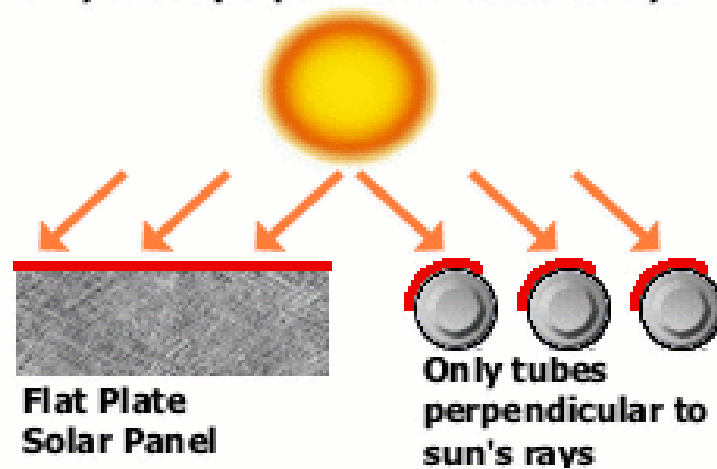
Evacuated Tubes vs. Flat Plates

Passive Tracking Technology

Both collectors perpendicular to sun's rays

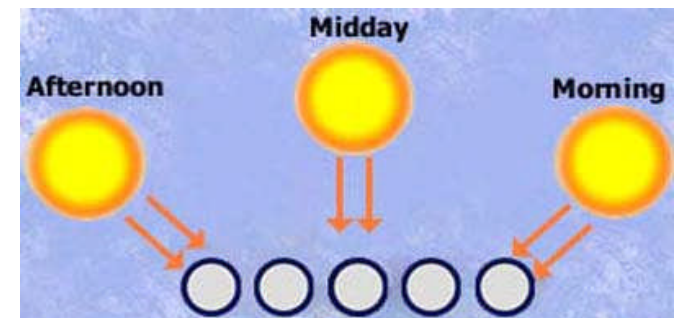
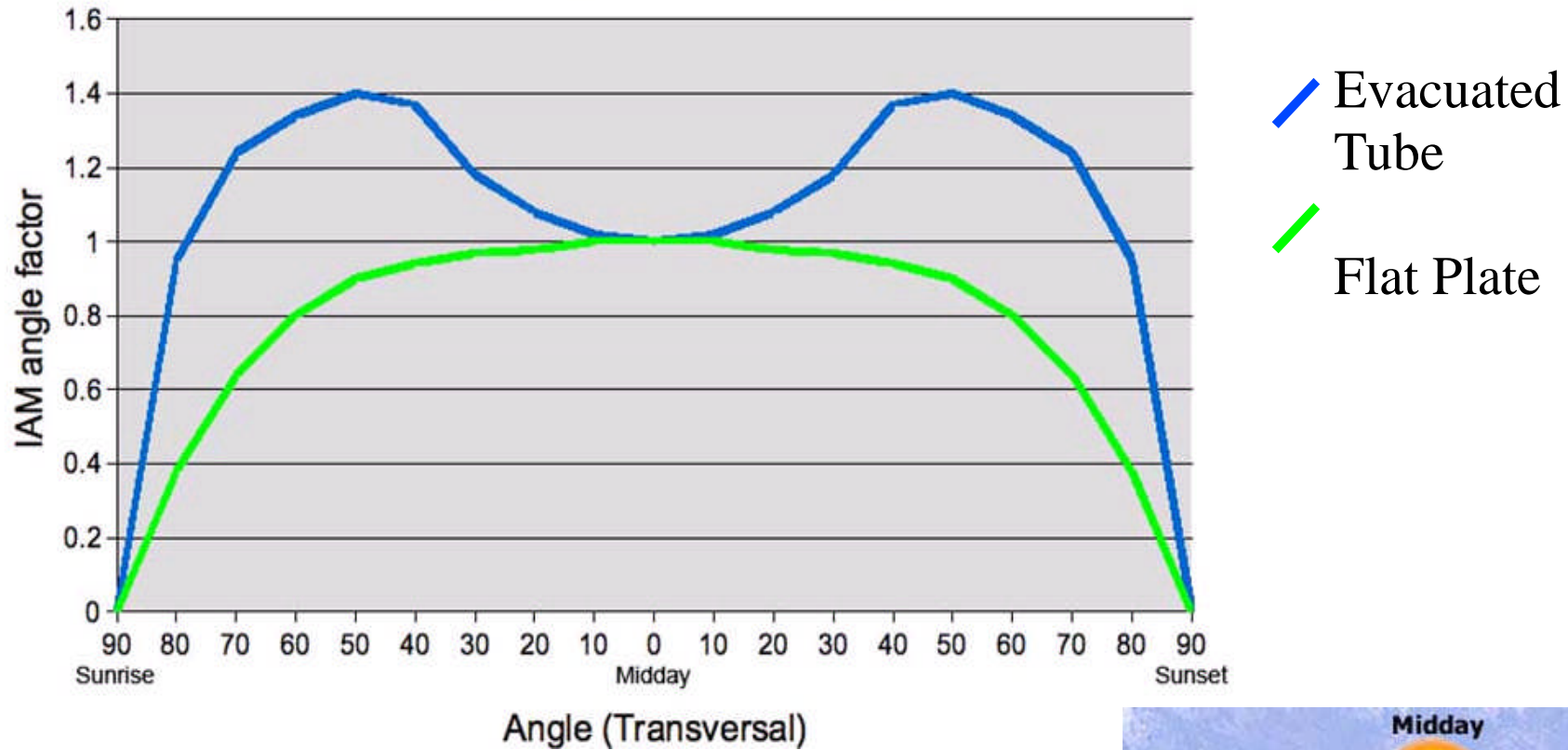


Only tubes perpendicular to sun's rays

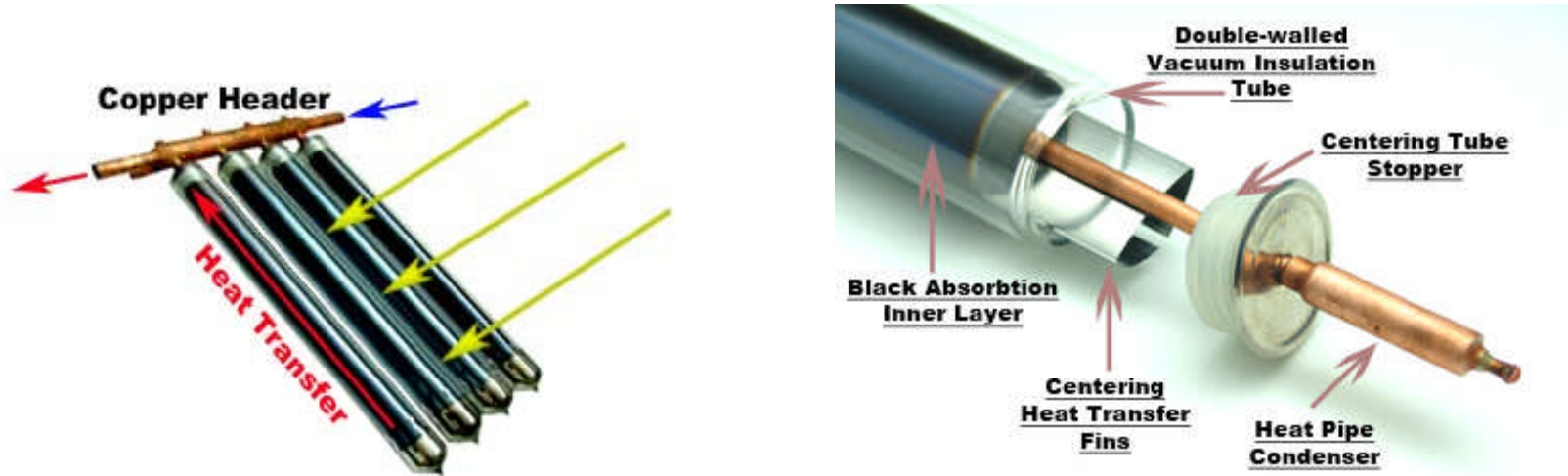


Evacuated Tubes: Passive Tracking Design

Solar Collector IAM Curves



How an Evacuated Tube Collector Works



Sunlight hits the tubes, creating heat inside the chamber.

Each tube is sealed and under a vacuum (evacuated). Removing all air means nearly all heat collected is retained in the tube.

Heat Transfer fins help push the heat collected into heat pipe.

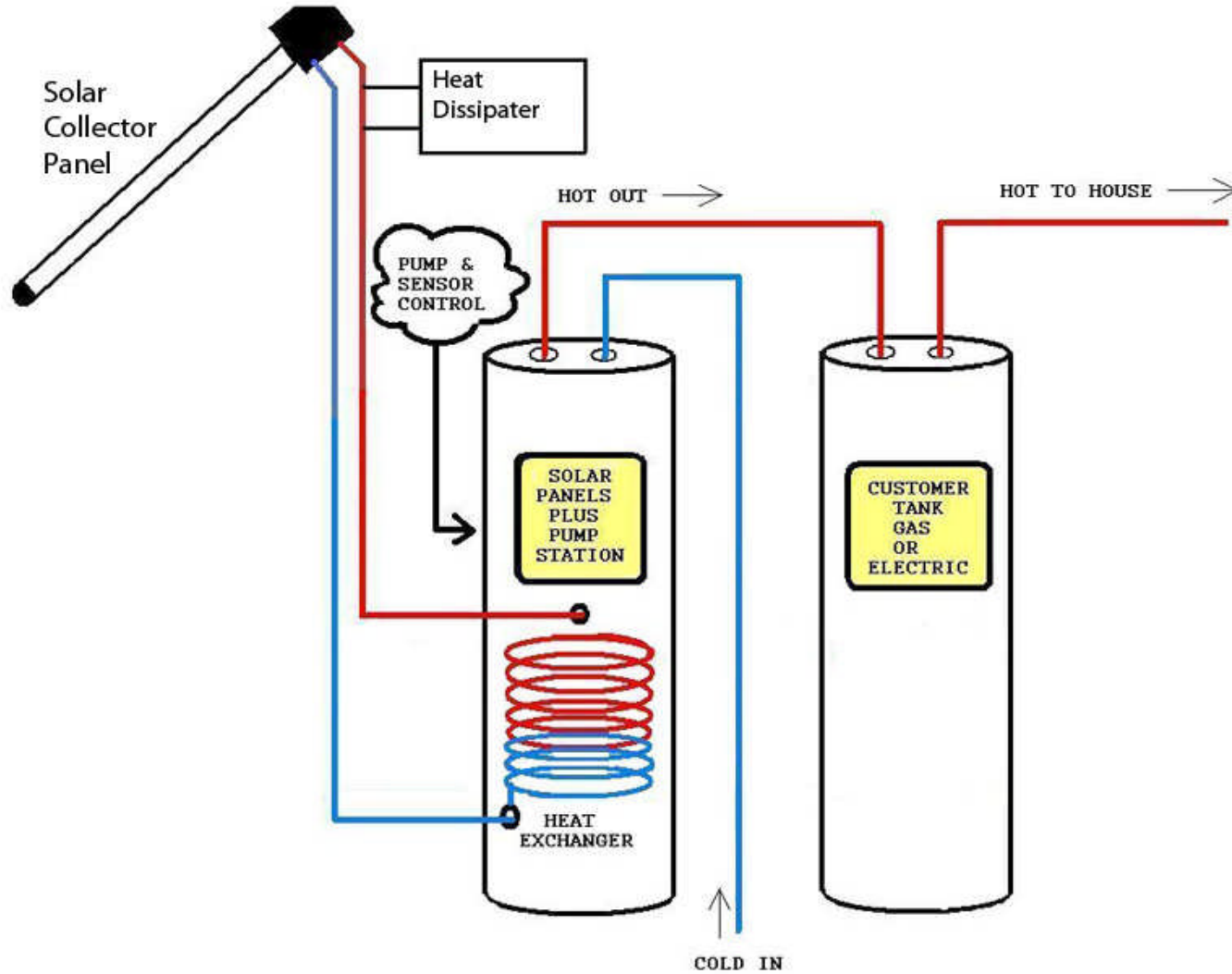
Heat Pipe transfers collected heat into Water/Corn Glycol mixture in the manifold.

HOW IT MAY LOOK



Flush Mount

Typical Solar Hot Water Layout



Evacuated Tubes: Applications

Residential Applications:

- Domestic Hot Water
- Space Heating
- Pool Heating (For Year-Around Heat, or High Temps)

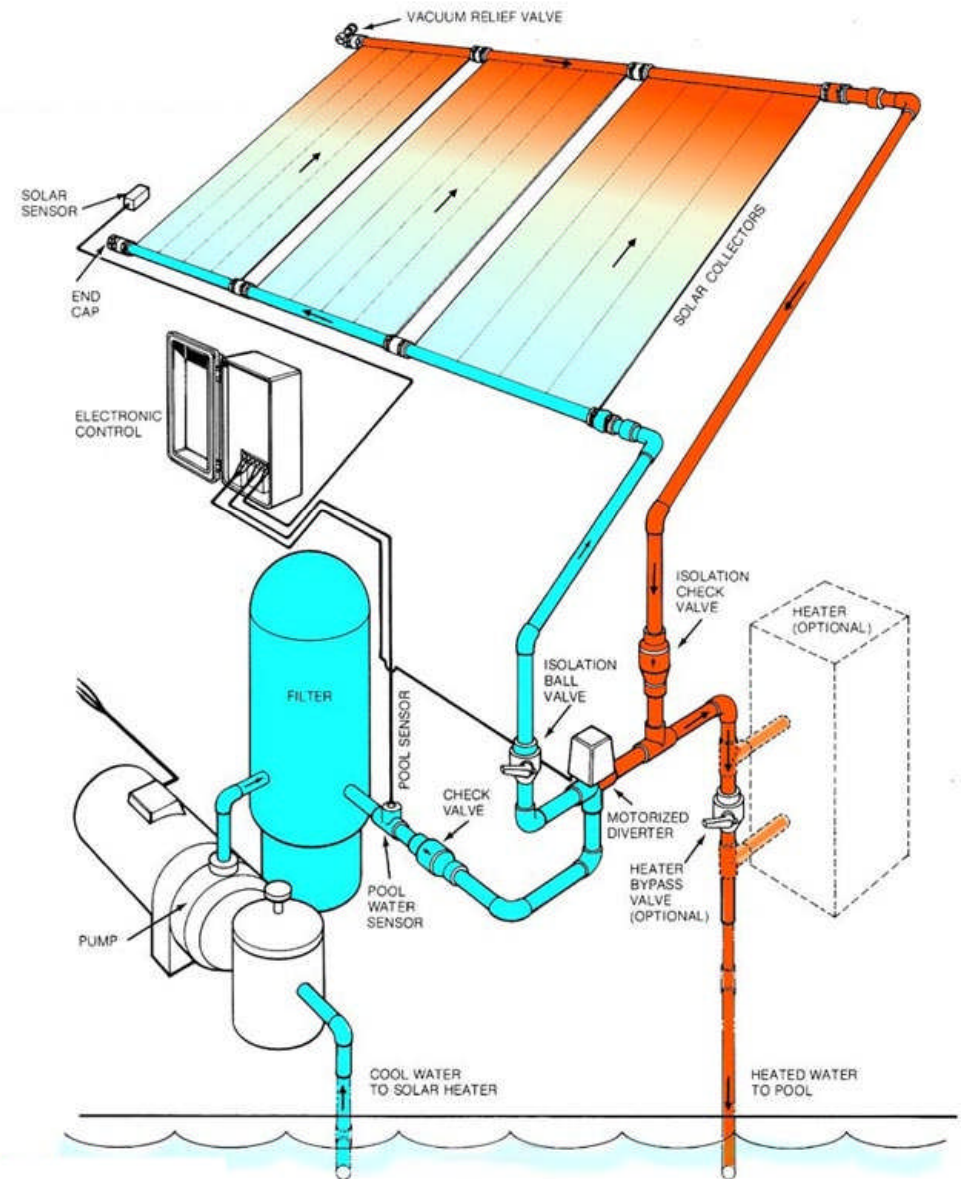
Commercial Applications:

- Domestic Hot Water
- Space Heating
- Cooling – Using a Yazaki Absorption Chiller
- Pool Heating (For Year-Around Heat, such as Hotels)

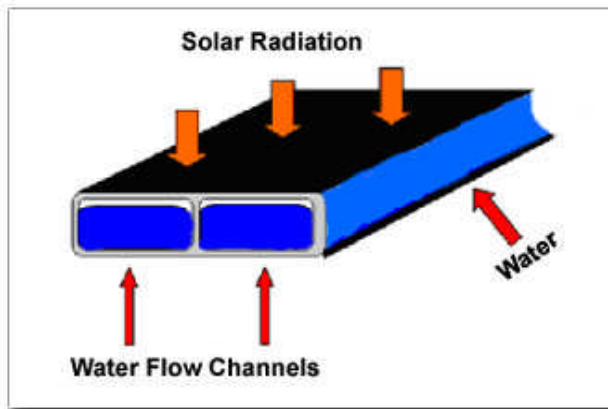
Solar Pool Heating

Solar Pool Heating: How it Works

- 1) Water is pumped from the pool to the bottom of the panels.
- 2) Water travels up the panels through square “flow-through” channels, being heated by the sun.
- 3) Heated water is returned to the pool.



ASE Pool Panels: Design Differences



#1 – We use Square flow channels – this minimizes heat loss you would have with round channels.

The heated water being next to each other insulates themselves.

#2 – We use the highest quality materials – Polypropylene, Carbon Black, and non-depleting UV Stabilizers.

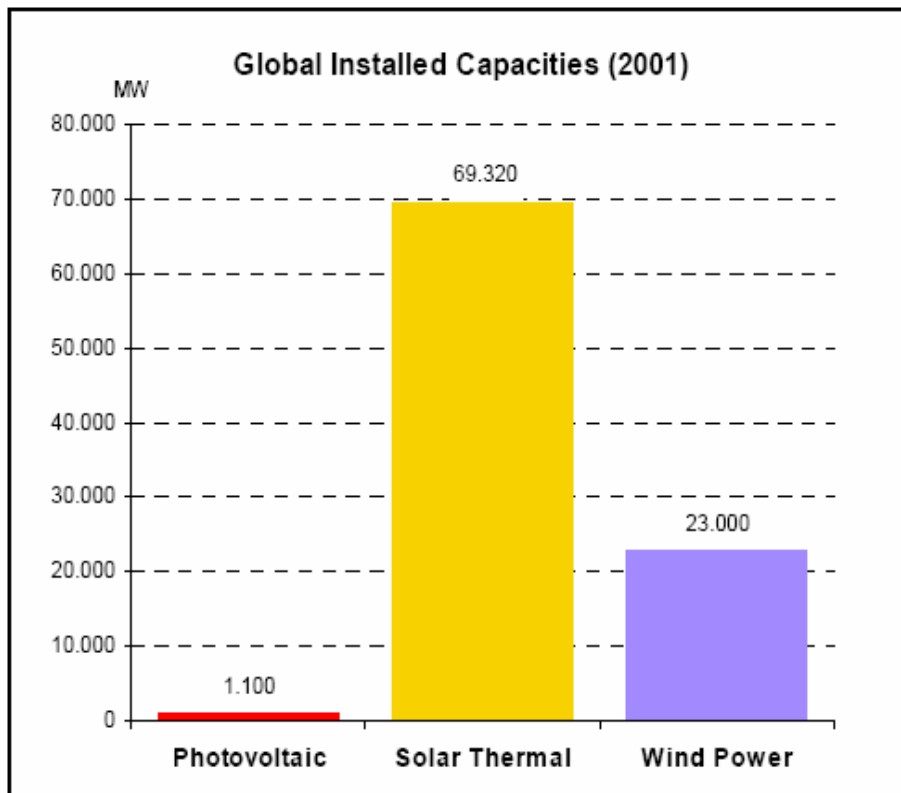
#3 – USA Made – and production & extrusion is done in-house – assuring the highest quality standards are met.

#4 – 10 Year *Replacement* Warranty – not repair warranty.



What are the advantages of using Solar Energy?
Is it worth the investment?

Solar Thermal: Some of the Advantages



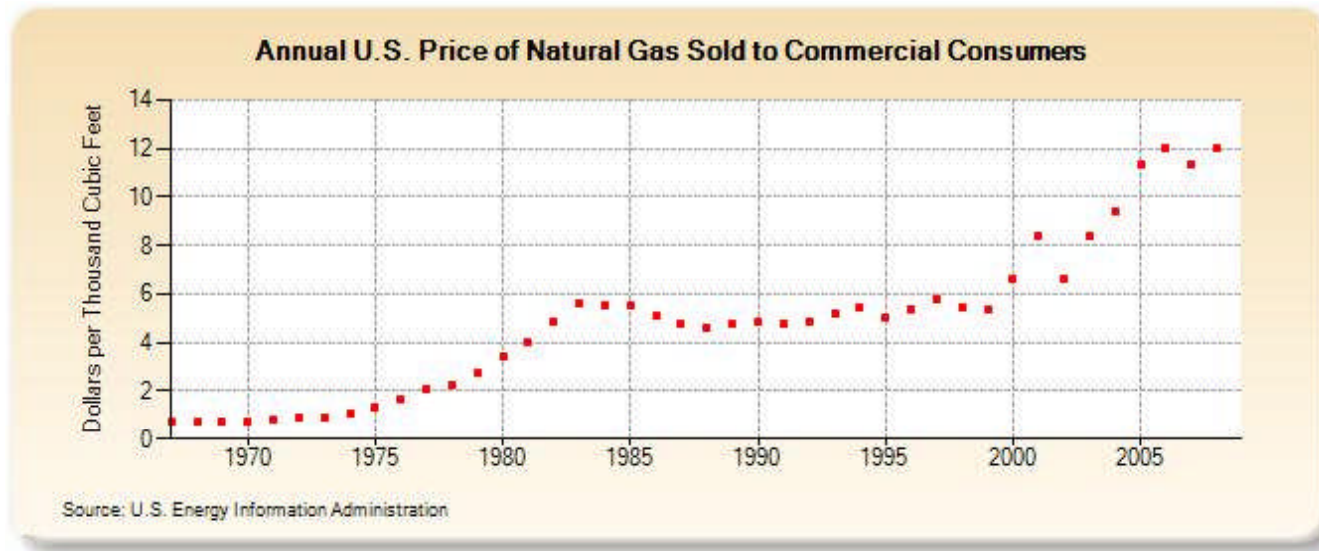
Solar Thermal is one of the most installed alternative energy systems in the world

Solar Thermal offers one of the fastest payback of any alternative energy system

Closed loop systems are virtually maintenance free

Backed by a 10-year warranty

Solar Thermal: Financial Incentives



Natural Gas, Fuel & Electric Rates consistently going up – A Solar Thermal system is a one time cost, not an ever increasing cost.

Fossil fuels are a finite resource – not a renewable resource. The sun's energy can be harnessed for years – without causing an increasing demand, and thus, an increasing price

Solar Thermal: Government Incentives

Federal Incentives for Renewable Energy

Business Energy Investment Tax Credit (ITC)

Last DSIRE Review: 02/18/2009

Incentive Type: Corporate Tax Credit

Eligible Renewable/Other Technologies: Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Solar Thermal Process Heat, Photovoltaics, Wind, Biomass, Geothermal Electric, Fuel Cells, Geothermal Heat Pumps, CHP/Cogeneration, Solar Hybrid Lighting, Direct Use Geothermal, Microturbines

Applicable Sectors: Commercial, Industrial, Utility

Amount: 30% for solar, fuel cells and small wind;
10% for geothermal, microturbines and CHP

Maximum Incentive: Fuel cells: \$1,500 per 0.5 kW
Microturbines: \$200 per kW
Small wind turbines placed in service 10/4/08 - 12/31/08: \$4,000
Small wind turbines placed in service after 12/31/08: no limit
All other eligible technologies: no limit

Eligible System Size: Small wind turbines: 100 kW or less
Fuel cells: 0.5 kW or greater
Microturbines: 2 MW or less
CHP: 50 MW or less

Equipment/Installation

Requirements: Fuel cells, microturbines and CHP systems must meet specific energy-efficiency criteria

Authority 1: 26 USC § 48

US Government offers a 30% tax credit on the installed amount

Many State Incentives also available: See www.dsireusa.org for complete listings of local, state, and federal incentives

Solar Thermal: Allowing your Company to Advertise being “Green”



- More and more consumers are concerned about:
- Rising Fuel & Living Costs
- Ever Depleting Fossil Fuels
- Our Environment

Studies show that over 50% of Americans have strong attitudes towards being eco-friendly, and by extension, buying from companies who are eco-friendly.

When consumers were asked about what “green” means to them, with regards to washing machines, the top responses were:

- Using less energy
- Using less water
- Using less electricity
- Being more efficient

Consumers are showing a trend: They are becoming increasingly more likely to buy from a green company – even if it means paying a little more – than purchase from a non-green company

Solar Thermal: The Right Choice

Evacuated Tube Technology:

- Well Established Technology
- Consistent, Reliable Output – regardless of temperature
- Year-Round results

Business Incentives:

- Cut Operating Expenses – and Cut Reliance on Cost-Increasing Fossil Fuels
- Better Social & Community Responsibility
- Becoming a “Green” Company – Attracting More Customers
- Initial Cost Offset by various Government Incentives

