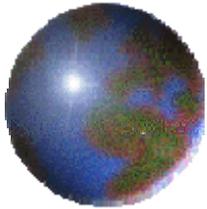


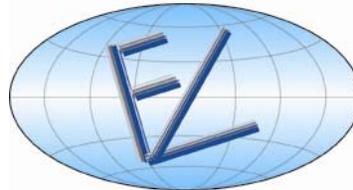
Israel Energy Forum on Solar Thermal Energy
24 January 2007, Samuel Neaman Institute, Haifa, Israel



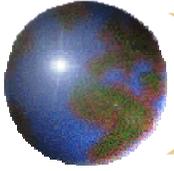
Trends in the Solar Thermal Energy Markets in the U.S.A and the EU

Dr. Perry P. Lev-On

The LEVON Group, LLC



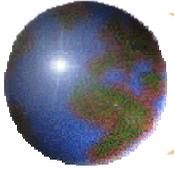
Environmental Consultancy and Facilitation



Introduction

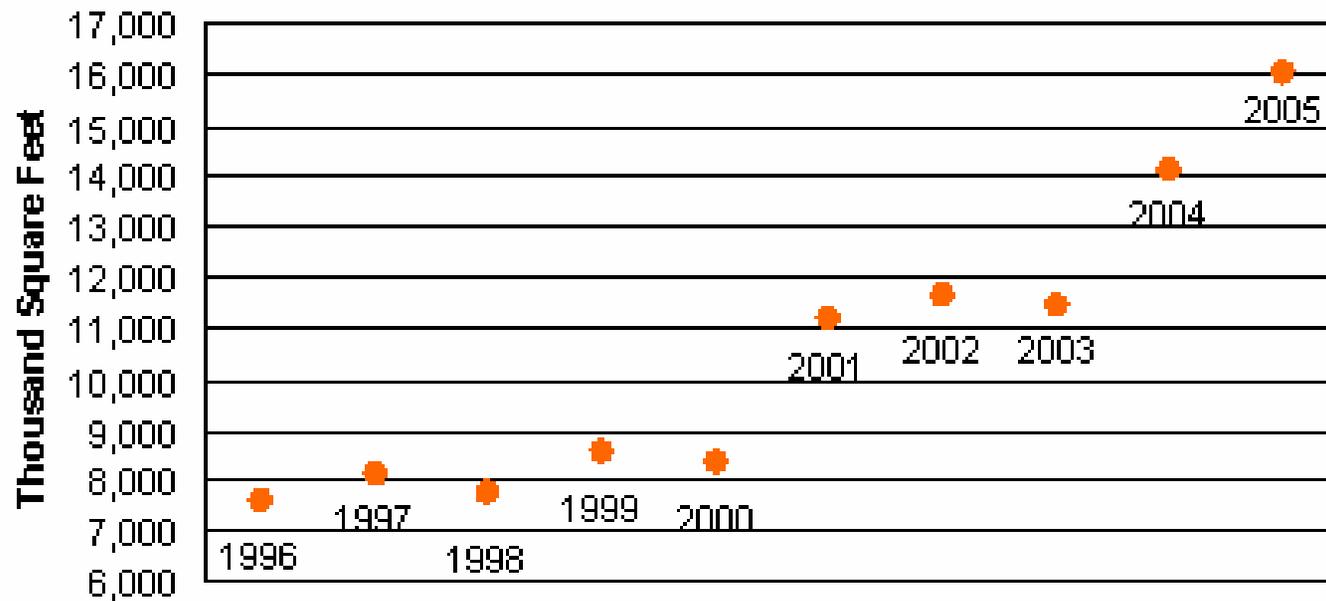
- A Green paper submitted in September 2006 to the European Parliament by the ‘Committee on Industry, Research and Energy’ on a Strategy for Sustainable Competitive and Secure Energy, that also holds true for the U.S. and the world-over, states:
 - “We are in a radically new context in relation to energy, which demands the development of a vision for an energy policy securing affordable energy as far as possible from indigenous resources whilst protecting the environment and combating climate change.
 - This should be delivered via open and fair markets whilst balancing the need to retain competitiveness in a global context.”
- One such resource is Solar Thermal energy





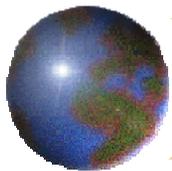
Overview of U.S. Trends

Total Solar Thermal Collector Shipments, 1996-2005



Source: Energy Information Administration, "Annual Solar Thermal Collector Manufacturers Survey"





Annual Shipments of Solar Thermal Collectors, 1996-2005

Year	Number of Companies	Collector Shipments ^a (Thousand Square Feet)		
		Total ^b	Imports	Export
1996	28	7,616	1,930	454
1997	29	8,138	2,102	379
1998	28	7,756	2,206	360
1999	29	8,583	2,352	537
2000	26	8,354	2,201	496
2001	26	11,189	3,502	840
2002	27	11,663	3,068	659
2003	26	11,444	2,986	518
2004	24	14,114	3,723	813
2005 ^P	25	16,041	4,546	1,361

^a Includes imputation of shipment data to account for nonrespondents.

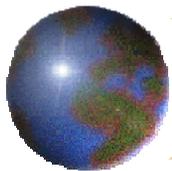
^b Includes shipments of solar thermal collectors to the government, including some military, but excluding space applications.

^P = Preliminary.

Note: Total shipments as reported by respondents include all domestic and export shipments and may include imported collectors that subsequently were shipped to domestic or foreign customers.

Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."





Annual Shipments of Solar Thermal Collectors by Type, 1996-2005 (Thousand Square Feet)

Year	Low-Temperature		Medium Temperature		High Temperature Total Shipments _{a,c}
	Total Shipments _{a, b}	Average per Manufacturer	Total Shipments _a	Average per Manufacturer	
1996	6,821	487	785	41	10
1997	7,524	579	606	29	7
1998	7,292	607	443	23	21
1999	8,152	627	427	21	4
2000	7,948	723	400	25	5
2001	10,919	1,092	268	16	2
2002	11,126	856	535	31	2
2003	10,877	906	560	33	7
2004	13,608	1,512	506	30	0
2005 ^P	15,224	1,522	702	41	115

^a Includes imputation of shipment data to account for nonrespondents.

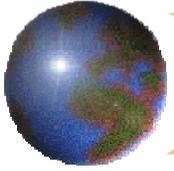
^b Includes shipments of solar thermal collectors to the government, including some military, but excluding space applications.

^c For high-temperature collectors, average annual shipments per manufacturer are not disclosed.

^P = Preliminary.

Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."



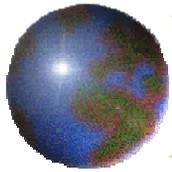


Arizona Public Services (APS) Saguaro Trough Power Plant

- The first Concentrating Solar Power Plant built in the U.S.A since 1988.
- Features over 100,000 ft² of parabolic trough shaped mirrors, 15 feet tall.
- Has the capability of generating one megawatt of clean electrical power, enough electricity to meet the demands of about 200 homes.

Saguaro Solar Trough Power Plant





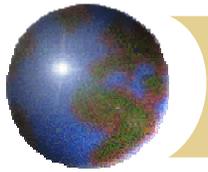
Shipments of Solar Thermal Collectors Ranked by Origin, 2005

	Thousand Square Feet	Percent of U.S. Total
Origin		
Top Five States	11,328	71
New Jersey	5,130	32
California	4,961	31
Florida	933	6
Tennessee	190	1
Arizona	114	1
Other Domestic	166	1
Imported	4,546	28
U.S. Total	16,041	100

- Of all the Solar Thermal Collectors manufactured in the U.S.A, 71% were from New-Jersey, California, Florida, Tennessee and Arizona.
- 28% of all the shipments were imported, with the majority of the import coming from Israel!!!

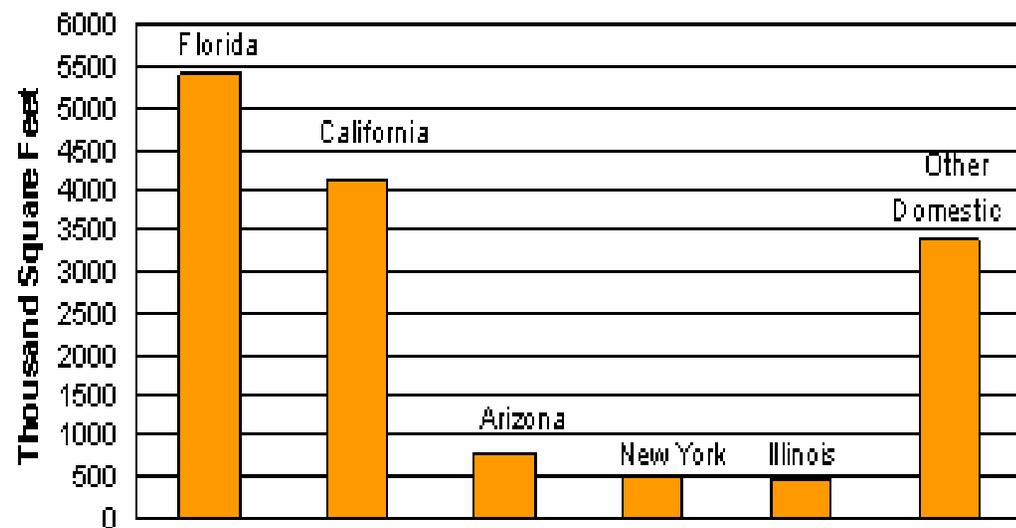
The total value of shipments rose from \$34.3 million in 2004 to \$45.8 million in 2005





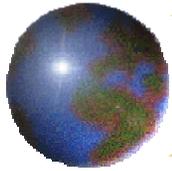
Solar Thermal Collector Shipments Top Domestic Destinations, 2005

- Over 70% of all Solar Thermal Collectors were shipped to 5 states in the U.S.A.
- Of all the receiving states, two, Florida and California received 60% of the shipments.



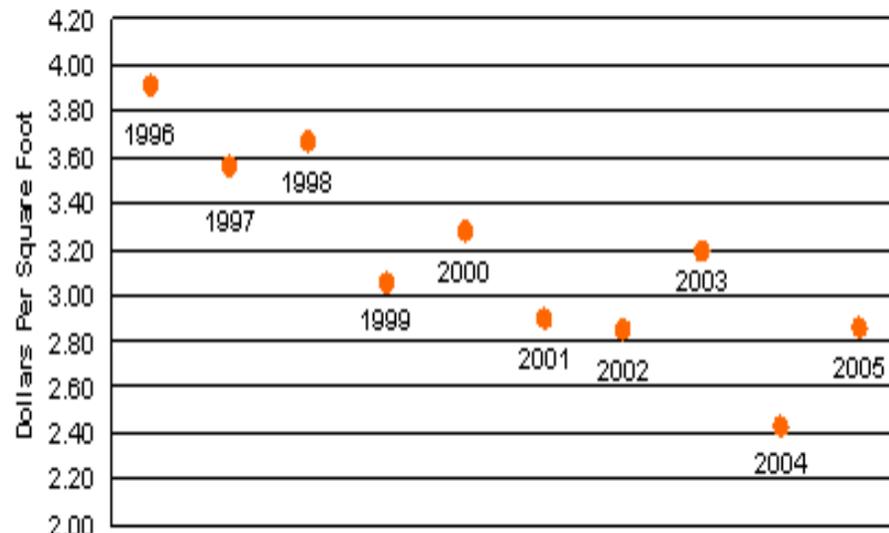
Source: Energy Information Administration, "Annual Solar Thermal Collector Manufacturers Survey."





Main Usage and Prices

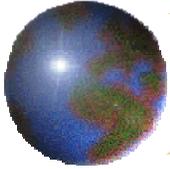
Solar Thermal Collector Average Price 1996-2005



Source: Energy Information Administration, "Annual Solar Thermal Collector Manufacturers Survey."

- The average price of ft² of low temperature Solar Collectors rose from \$1.80 in 2004 to \$2 in 2005.
- Most of the market in 2005 was dominated by low temperature collectors, mainly for heating water in swimming pools.
- The Home Market was the major consumer of collectors in 2005 receiving 15 million ft² or 94% of all Solar Collector shipments.





Current Manufacturers and Future Plans

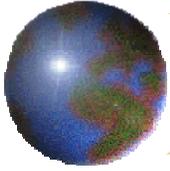
- In 2005, almost 70 percent of the active companies indicated their intention to introduce new solar-related products in the near future.
- As in the previous years, the industry remained highly concentrated, with 92 percent of sales made by the 5 largest companies.
- A total of 22 companies were involved in the design of collectors or systems, 11 were involved in prototype collector development, and 11 were active in prototype system development.

Number of Companies Expecting to Introduce New Solar Thermal Collector Products in 2006

New Product Type	Number of Companies
Low-Temperature Collectors	6
Medium-Temperature Collectors	9
High-Temperature Collectors	2
Noncollector Components	4

Source: Energy Information Administration, "Annual Solar Thermal Collector Manufacturers Survey"





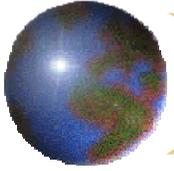
The California Solar Initiative

- Designed to provide incentives to customer-side Photovoltaics (PV) and solar thermal electric projects under 5 MW capacity.
- The California Public Utilities Commission (PUC) has authorized a pilot solar water heater (SWH) incentive program for customers of the San Diego Gas and Electric Company.
- If this pilot is successful, the PUC could start to offer SWH incentives statewide next year.

2007 R&D Strategy

- New R&D program to be directed towards maximizing efficiency and mitigating environmental effects of gas consumption
- One of the strategy element reads: *“Reduce the cost and improve the performance of solar thermal, biogas, and geothermal technologies for natural gas replacement (for example, space heating and industrial applications) as well as hybrid systems (for example, solar/gas hybrids)”*.

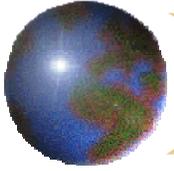




Solar Thermal Markets in the EU

- The market exhibited a solid growth of 26% in 2005, and almost passed the 2 millions m² mark (1,400 MWhr of new capacity);
- The dominance of the German, Austrian and Greek market (representing over 70% of the EU market) is not diminishing, but others are catching up. Some notable national statistics include:
 - *France*: an astonishing growth of 134%;
 - *Germany*: Growth of 27%, and
 - *Austria*: Growth of 28%.
- An important development is the growing share of combined systems that produce domestic hot water and support space heating, leading to higher energy savings.
 - This “system type” is typically used in Northern and Central Europe
 - For example, in Austria, they already have a market share of 35%.

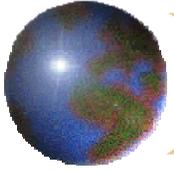




What's New in 2006 in the EU

- The EU has a new National Solar Obligation (revision of the CTE - Technical Building Code):
 - From September 2006 onwards, almost all new buildings are required to cover 30-70% of their domestic hot water demand with Solar Thermal energy.
 - Spain is the first EU country to pass a national Solar Thermal obligation and its market has grown by over 19% over the past year.
- Based on the early estimates of the 2006 market, it is anticipated that the market will grow by another 20+ percent for the whole year.
 - Several large manufacturers have reported a doubling of the production in the first months of 2006 as compared to the previous year.





Summary

- Solar Thermal technologies have been around for a long time, yet have been a “step child” in terms of funding or incentives.
- New environmental and energy security considerations have refocused attention on these technologies as is evident from the trends above.
- The existing sector is divided between small, low power installations for residential use, or large central electricity generating stations.
- Activity in this area, useful for the requirements posed by industrial and institutional heat and steam applications, is, still, very limited.

IEA 2006 Policies Review

The International Energy Agency (IEA) is currently finalizing its 2006 review of Energy Policies of its 26 member countries. A few of its points, germane to our discussion, are summarized below:

- Development and deployment of renewable energy technologies are important components for the future of a balanced global energy economy;
- Renewable heating sources have potential for growth and can replace substantial amounts of fossil fuels and electricity currently used for heating purposes;
- It is necessary to invest more in RD&D; exploit the full potential of renewable heating and cooling; further increase their efficiency; and reduce technology cost.

