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**ASSESSMENT OF THERMAL
SOLAR MARKET
IN LEBANON:**

**Market Analysis &
Perspectives**

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APPROVISIONNEMENT TOTAL EN ENERGIE PRIMAIRE ATEP (KTEP) - 2005

				KTEP	%
1- PRODUCTION					
1-1	HYDROENERGIE		1046 GWH	92	2.2
1-2	ENERGIE TRADITIONNELLE			122	0.6
TOTAL 1				138	2.8
2- IMPORTATIONS				KTEP	%
2-1	GPL	KTONNES	166	166	4.4
2-2	ESSENCE	"	1373	1361	25.5
2-3	GASOIL	"	1483	1714	37.4
2-4	KEROSENE	"	1	1	-
2-5	FIUL OIL	"	1360	1306	23.4
2-6	CARBUREACTEUR	"	146	155	2.5
2-7	ELECTRICITE	GWH	155	10	0.2
2-8	CHARBON	KTONNES	200	132	2.5
2-9	A.P.P.	"	50	57	1.5
TOTAL 2				4964	97.2
3- EXPORTATION				-	-
4- VARIATION DE STOCK				-	-
5- TOTAL 1+2- 3+4				5092	100

In 2005

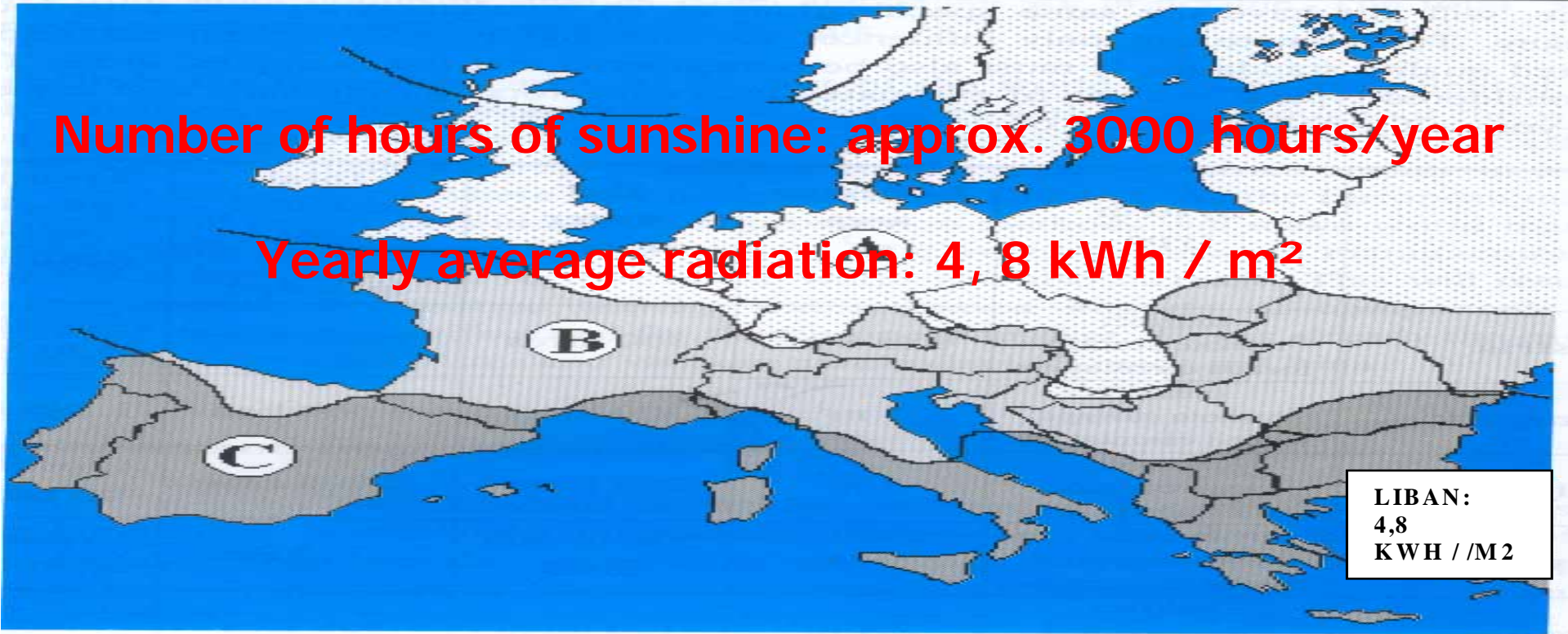
98 % of the primary energy was imported (Petroleum products, No N.G.)

3% was locally produced (mainly hydro energy)

Solar Energy less than 1%

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ENSOLEILLEMENT GLOBAL JOURNALIER
ORIENTATION SUD, INCLINAISON: LATITUDE DU LIEU
LIBAN : 33 degre NORD



A 2,4 to 3,4 kWh/m² **B** 3,4 to 4,4 kWh/m² **C** > 4,4 kWh/m²

Daily global irradiation in kWh/m². Inclined at site Latitude, facing South

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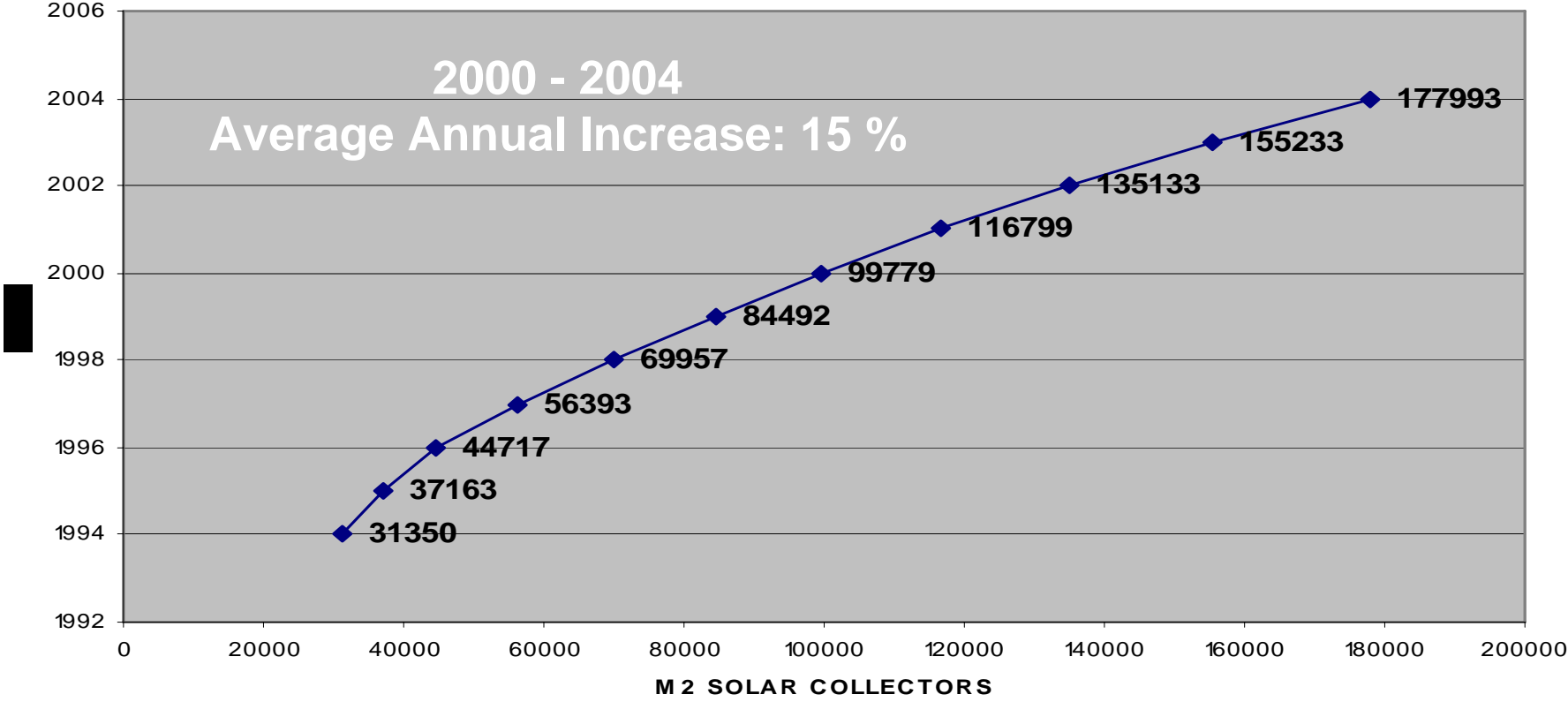
Solar Thermal Systems in Lebanon

- **Low temperature level $T < 60^{\circ}\text{C}$:**
mainly for sanitary water heating (Domestic Hot Water), swimming pools heating in hotels and leisure resorts as well as for floor heating (very few applications) & in some industrial processes where heat at low temperatures is needed .
- **Medium temperature level $60 < T < 250$: N.A.**
- **High temperature level $250 < T$: N.A.**

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Low temperature level T<60°C

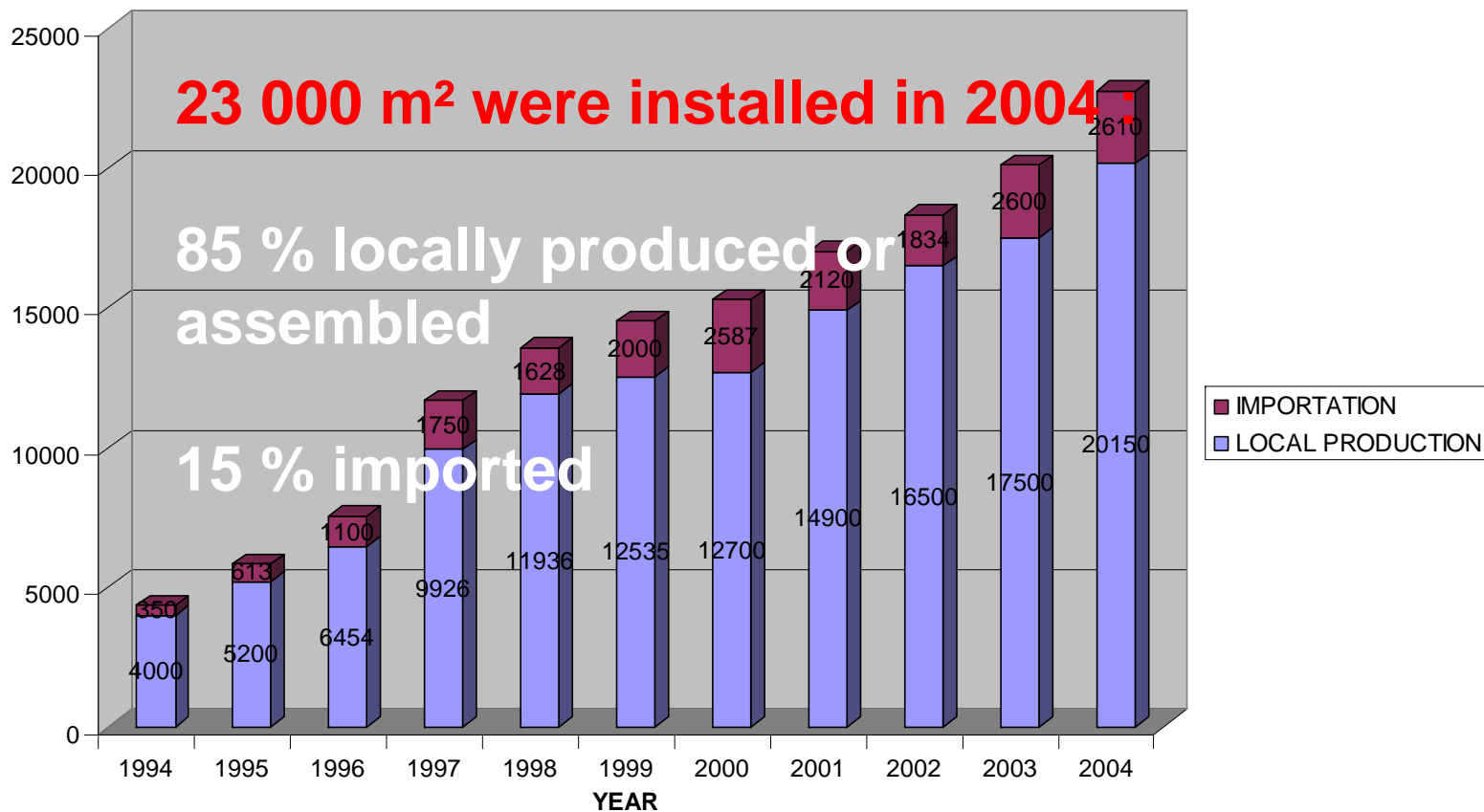
TOTAL INCREMENTAL M² SOLAR COLLECTORS INSTALLED



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YEARLY LOCAL PRODUCTION & IMPORTATION

M2 SOLAR COLLECTORS



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A collage of images related to solar energy. It includes several panels of solar panels, some of which are tilted and connected to a solar water heater system. The background is a light blue and white grid pattern.

There are around twenty full time fitters operating currently in the local market of which:

50% are manufacturers

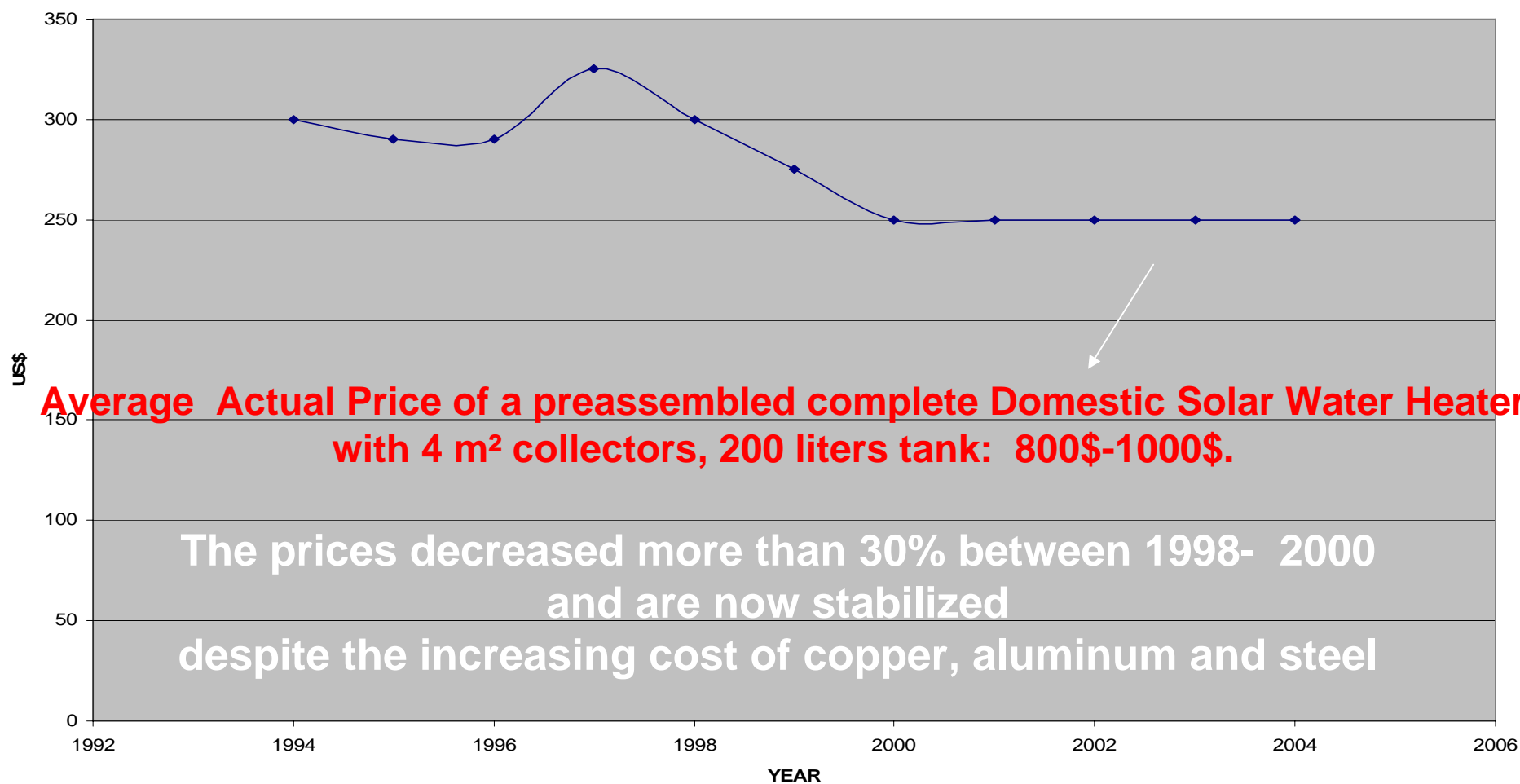
30% are importers

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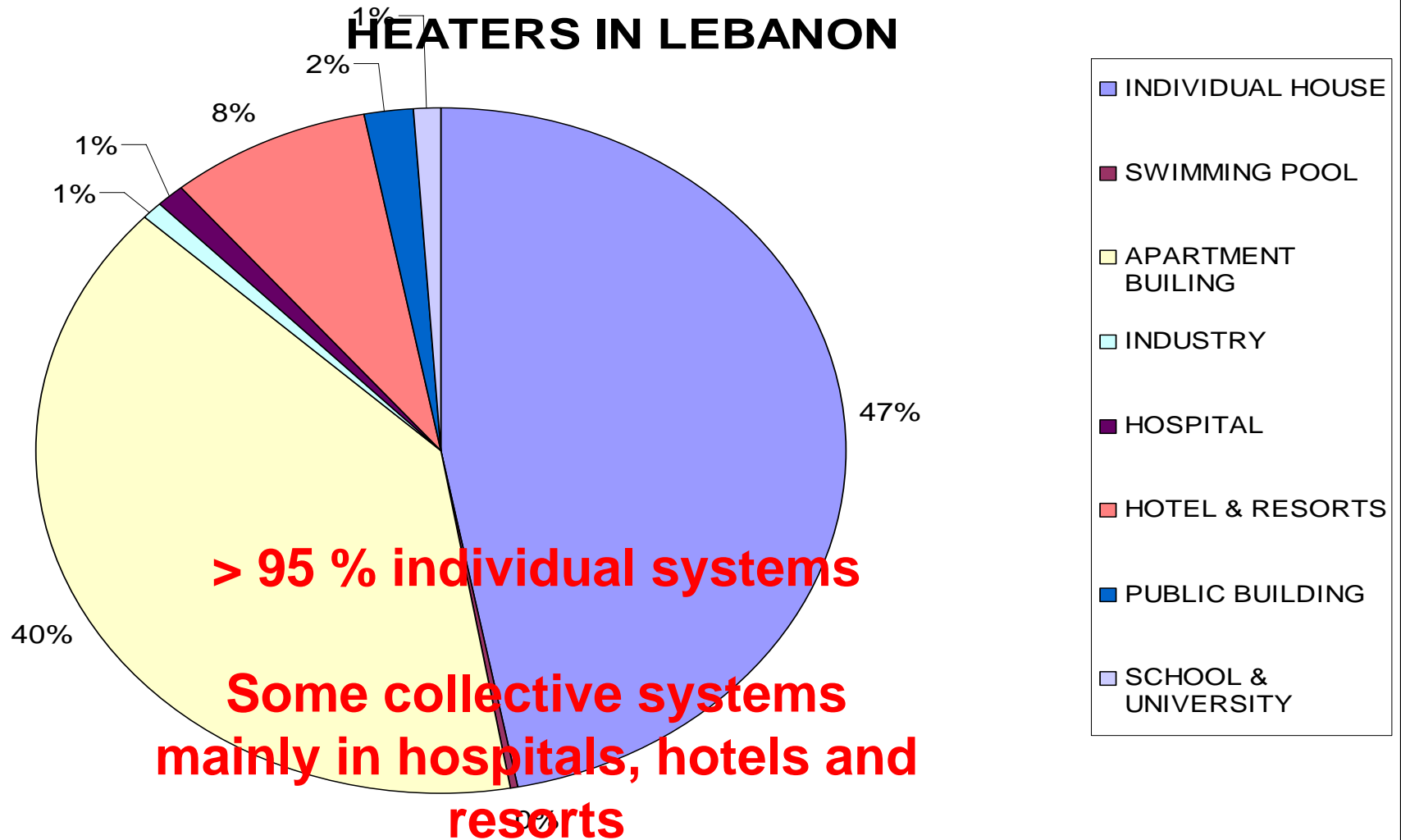
Technical and material skills available locally

- The local industry is centered mainly on the individual solar water heater (with open circuit or closed double circuit, with a thermo siphon or a circulation pump) installed on a roof sloping at 45° toward the South, using a paint or galvanized black steel chassis. The local industry suffers from the lack of standards (**existing but not largely disseminated**), a test and labeling center, reliable measurements of profitability, of endurance, of sustainability as well as a credible guarantee of results.
- The solar water heater is made of:
 - 1 – Flat collector (an average 1 m² for 50 liters at 55-60° C) with an aluminum external shell, a 5cm thickness polystyrene insulation, an absorbing surface in black colored copper or aluminum and a coolant, if existing, based on water and glycol. The glazing is of ordinary type with an average thickness of 4mm.
 - 2 – Sanitary hot water tank (150 to 300 l for individual water heater according to needs), cylindrical in form generally, made from black steel insulated with glass wool (2.5cm).
 - 3 – Additional power: generally an electrical resistance $P = 700W - 1.5kW$ with a thermostat.

EVOLUTION OF PRICES IN \$ OF SOLAR WATER HEATERS BY M2 OF COLLECTORS



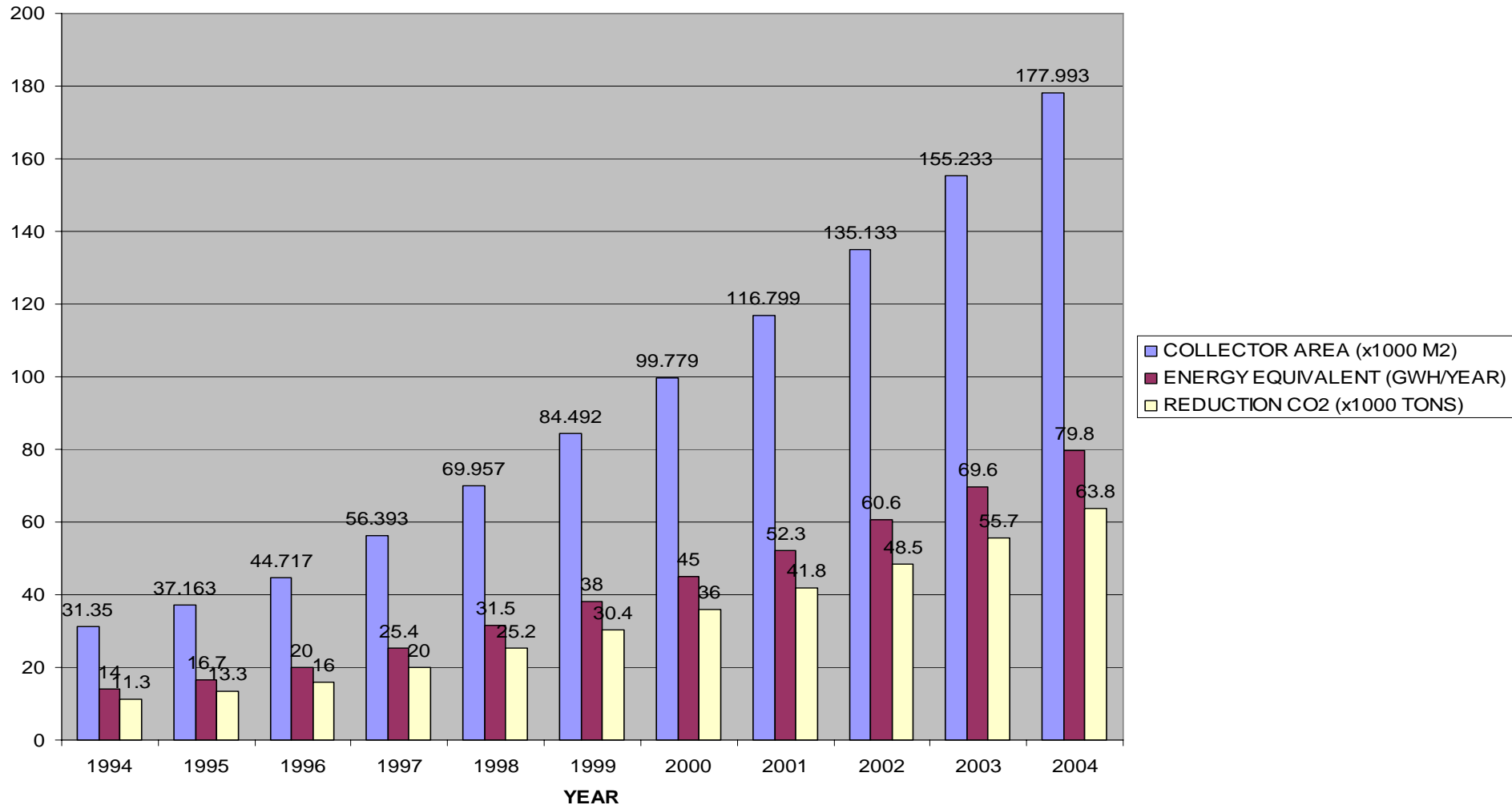
TYPE OF INSTALLATIONS OF SOLAR WATER HEATERS IN LEBANON





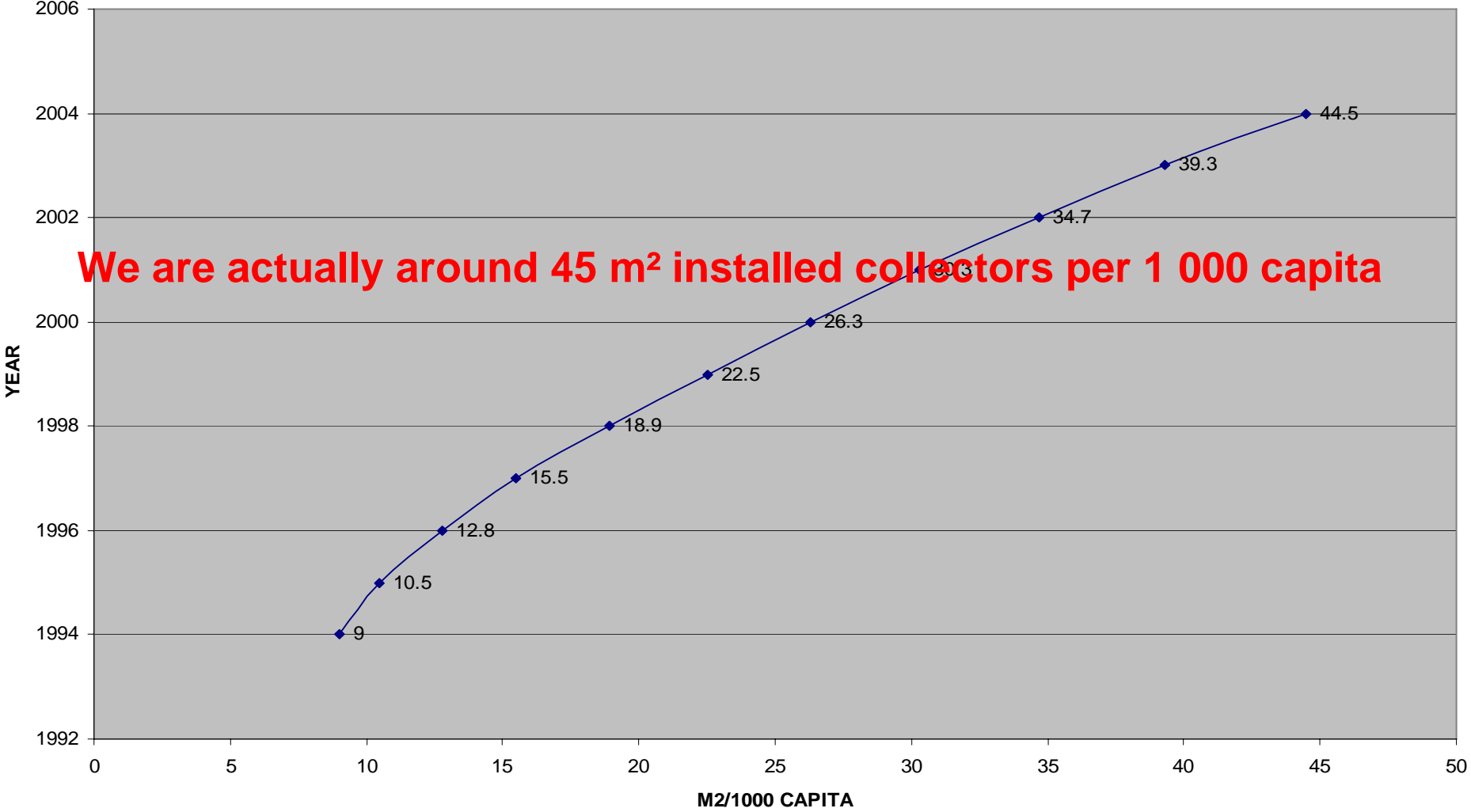
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ENERGY EQUIVALENT & CO2 REDUCTION



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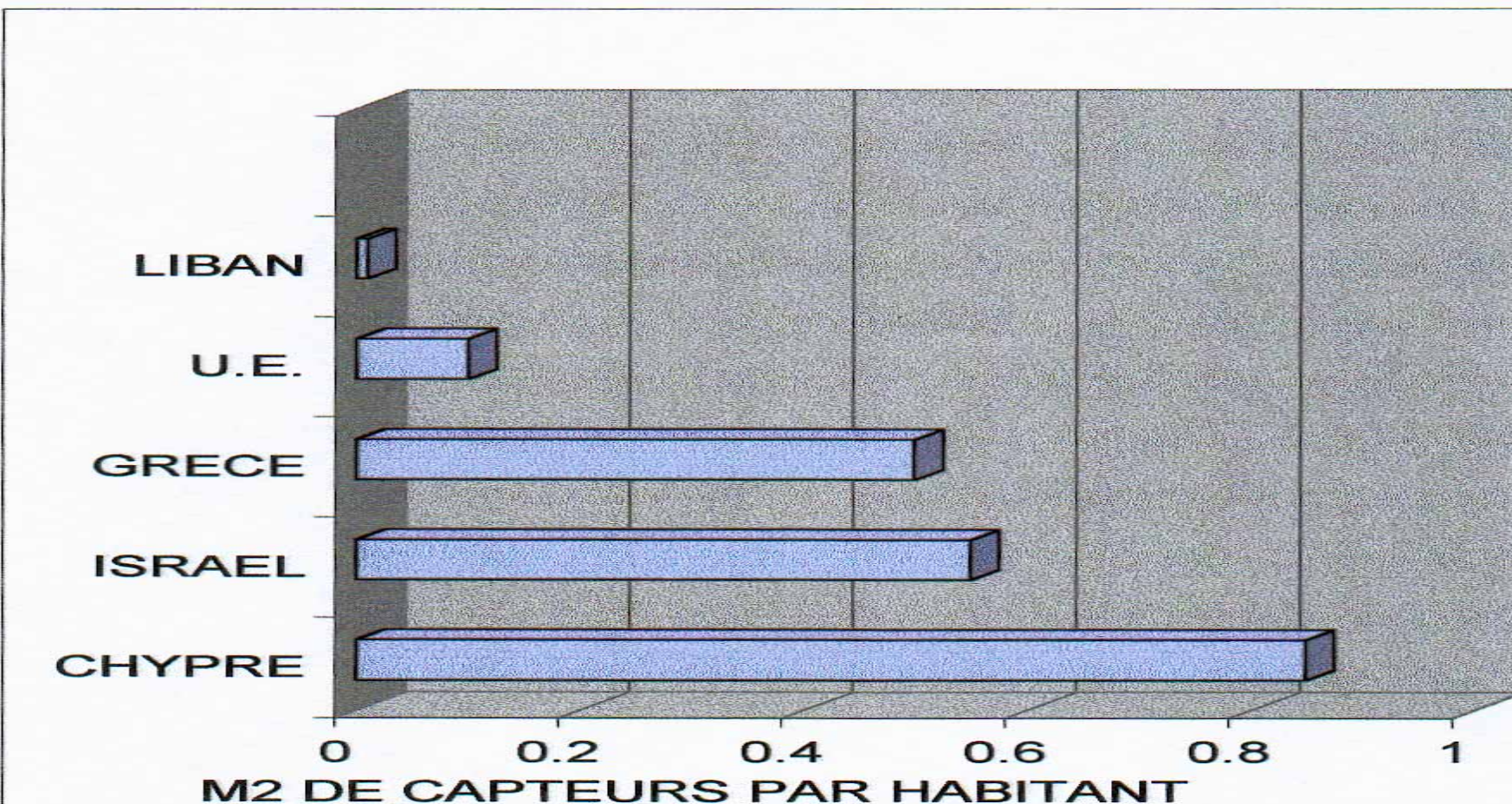
TOTAL INSTALLED M2 OF WATER HEATER SOLAR COLLECTORS PER 1000 CAPITA



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PARC DE CAPTEURS SOLAIRES EN M2 PAR HABITANT AUX HORIZONS DES ANNEES 2005

PAYS	M2/H
CHYPRE	0.85
ISRAEL	0.55
GRECE	0.5
U.E.	0.1
LIBAN	0.01



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Main Barriers to be removed

- 1. The structure of the electricity prices that do not reflect the real cost.
- 2. The absence of a political will and specific policies in favor of the solar energy that can focus on the national and macro-economic interests toward those of the consumer and the end user.
- 3. An insufficient taking into account of the environmental impact and of the public health due the atmospheric pollution.
- 4. The relatively high price of the DSWH (about 1 200 \$ for a complete installed DSWH of 4 m² - 200 liters versus 800 \$ in Cyprus).
- 5. Lack in certification , labeling and guaranty of result.
- 6. The quality of water is generally hard and calcareous which leads to a fast deterioration of the DSWH (water tank collectors, heat exchangers,) dragging an appreciable reduction of the output and the life of the DSWH system.
- 7.The individual DSWH isn't adapted to urban zones.
- 8. A flagrant lack of sensitization, public awareness and information.

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**THERMAL SOLAR MARKET POTENTIAL
and PERSPECTIVE**

Potential for the Solar Water Heater

Hotel trade sector

Hotels: 218

Number of beds: 19,329

Average consumption: 40 l/day.bed at 45 oC

Total consumption : 773 m³/day

Furnished apartment buildings: 94

Number of beds: 6,121

Average consumption: 60 l/day. bed at 45 oC

Total consumption: 367 m³/day

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Education sector

Universities: 100 buildings

Number of beds: 2,000

Average consumption: 40 l/day. bed at 45 oC

Total consumption: 80 m³/day

Schools: 1,200 buildings

Number of beds: 3,500

Average consumption: 40 l/day. bed at 45 oC

Total consumption: 140 m³/day

Health sector

Hospitals: 145

Number of beds: 9,500 Average

Consumption: 50 l/day. bed at 45°C

Total consumption: 475 m³/day

Free health center: 55

Number of beds: 100 Average

Consumption: 25 l/day. bed at 45 °C

Total consumption: 3 m³/day

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Residential sector

Housings: 900,000Av.

Number of inhabitants: 4 inhab./house

Number of inhabitants: 3,600,000

Average consumption: 30 l/day. pers at 45oC

Consumption per housing: 120 l/day at 45 oC

Total consumption: 108,000 m³/day Average

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Summary

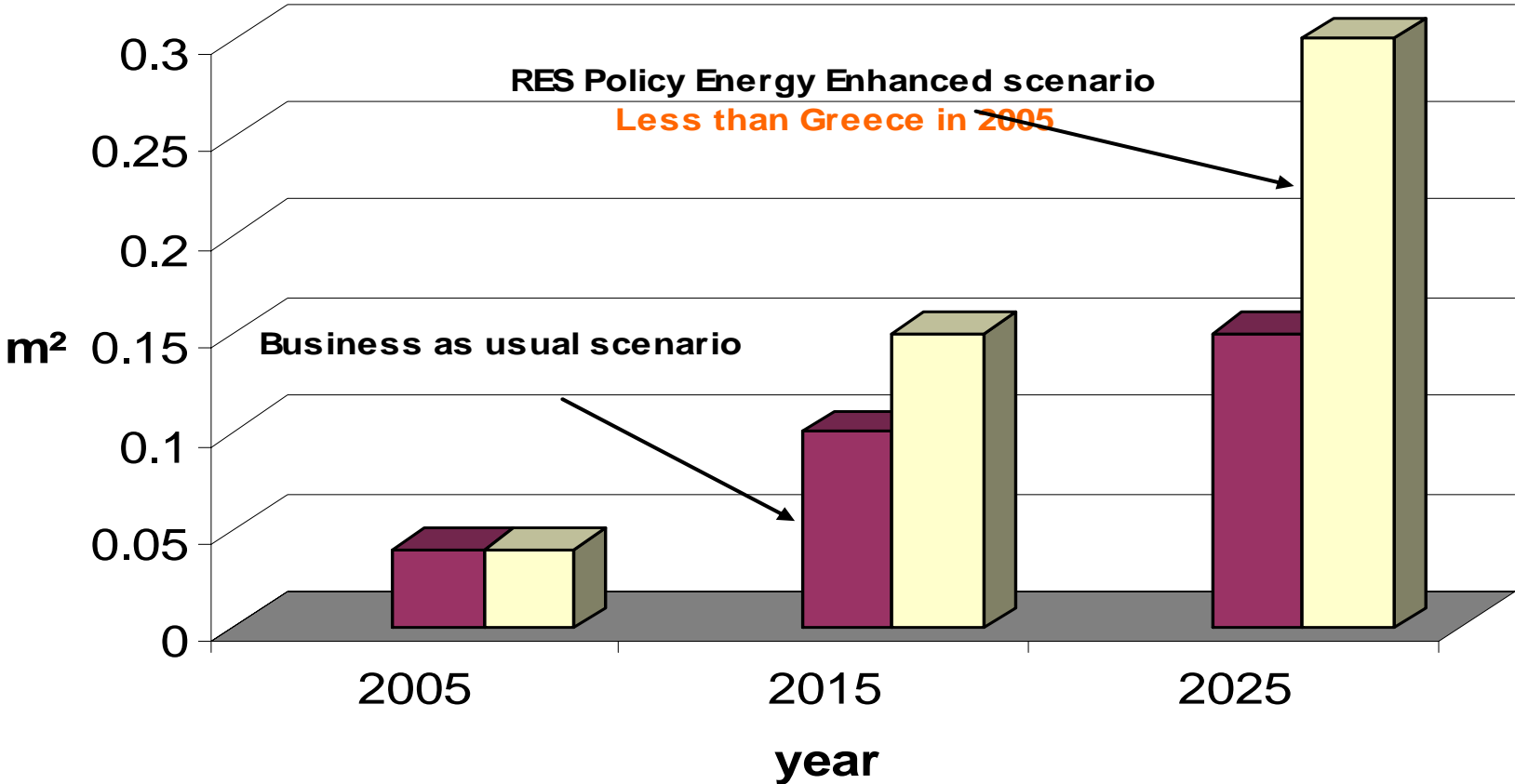
RENEWABLE ENERGY DRAFT LAW (in the parliament)

If adopted, it will help to stimulate the market

- In order to promote the development and utilization of renewable energy, improve the energy structure, diversify energy supplies, safeguard energy security, protect the environment and sustain development of the economy and society
- Renewable energy is referred to non-fossil energy of wind energy, **solar energy**, water energy, biomass, geothermal and ocean energy
- The government encourages and supports various types of grid-connected renewable power generation
- The government supports the construction of independent power systems in areas not covered by the grid
- **The government encourages the use of solar energy utilization systems of solar energy water-heating, heating and cooling** and photovoltaic, etc.

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M² COLLECTORS/CAPITA



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Thank you for your listening

