Solar Water Heaters Development In MENA Region

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Solar Thermal Application in Egypt, Palestine, Lebanon, Syriaq and Jordan: Technical Aspects, Framework conditions, and private Sector Needs
Cairo March 23-25, 2009

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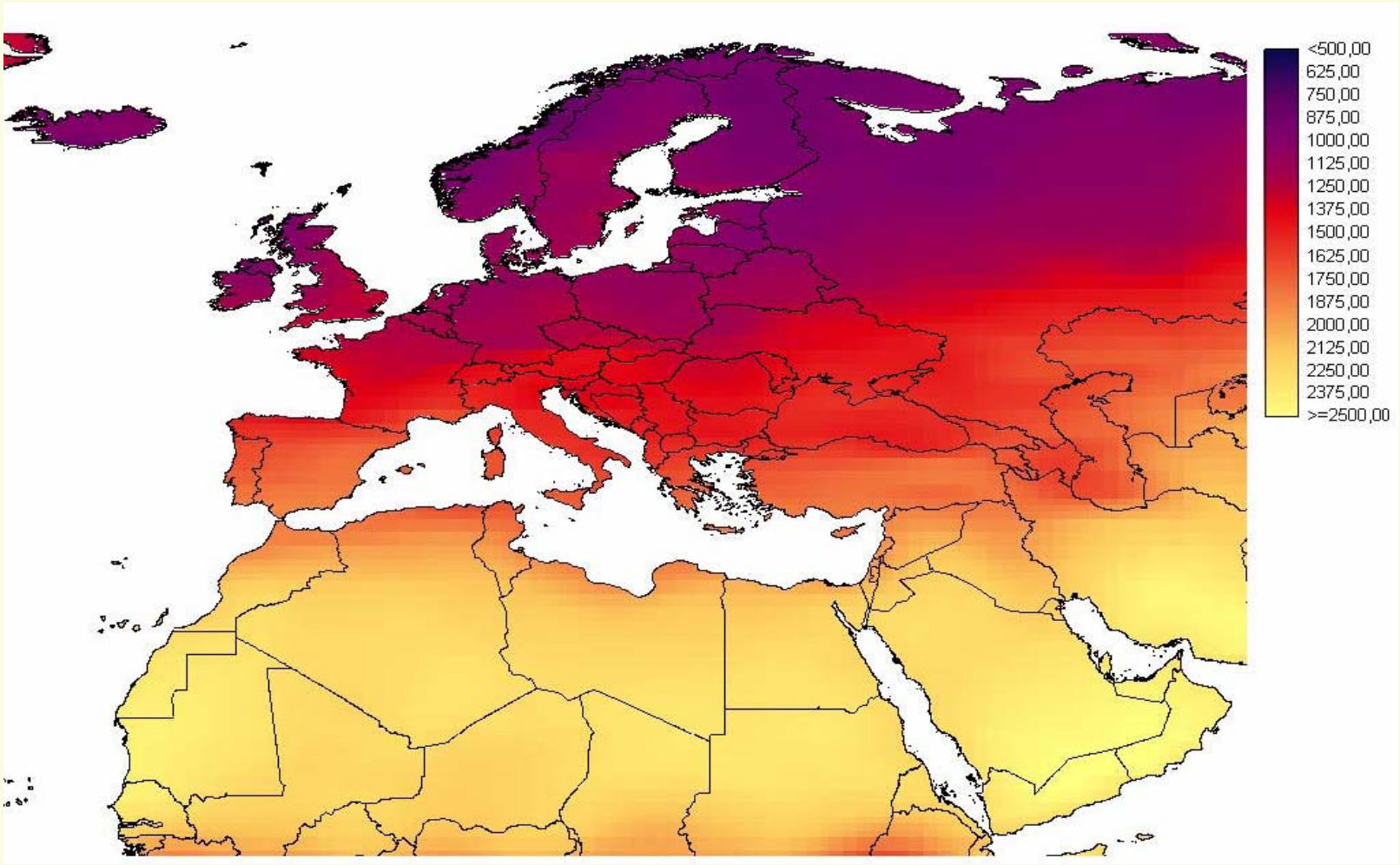
SOLAR ENERGY POTENTIAL IN THE MENA REGION

- The potential of solar energy resources is excellent in all MENA countries with an annual global solar radiation varying between 4 to 8 kWh/m^2
- The region also enjoys high direct normal radiation and low average cloud cover.
- The solar energy irradiated on the ground is equal to 1-2 barrels of fuel oil per square meter per year

Annual Global Solar Irradiation on surfaces tilted south with latitude angle kWh/m²/year.



Direct normal and global horizontal solar irradiance of MENA Countries

Country	Direct normal Solar irradiance kWh/m²/y (for CSP)	Global horizontal Solar irradiance kWh/m²/y (for PV)
Bahrain	2,050	2,160
Iraq	2,000	2,050
Jordan	2,700	2,310
Kuwait	2,100	1,900
Lebanon	2,000	1,920
Oman	2,200	2,050
Qatar	2,000	2,140
S. Arabia	2,500	2,130
Syria	2,200	2,360
UAE	2,200	2,120
Yemen	2,200	2,250

Direct normal and global horizontal solar irradiace of MENA Countries

Country	Direct normal Solar irradiance kWh/m²/y (for CSP)	Global horizontal Solar irradiance kWh/m²/y (for PV)
Algeria	2,700	1,970
Egypt	2,800	2,450
Libya	2,700	1,940
Morocco	2,600	2,000
Tunisia	2,400	1,980

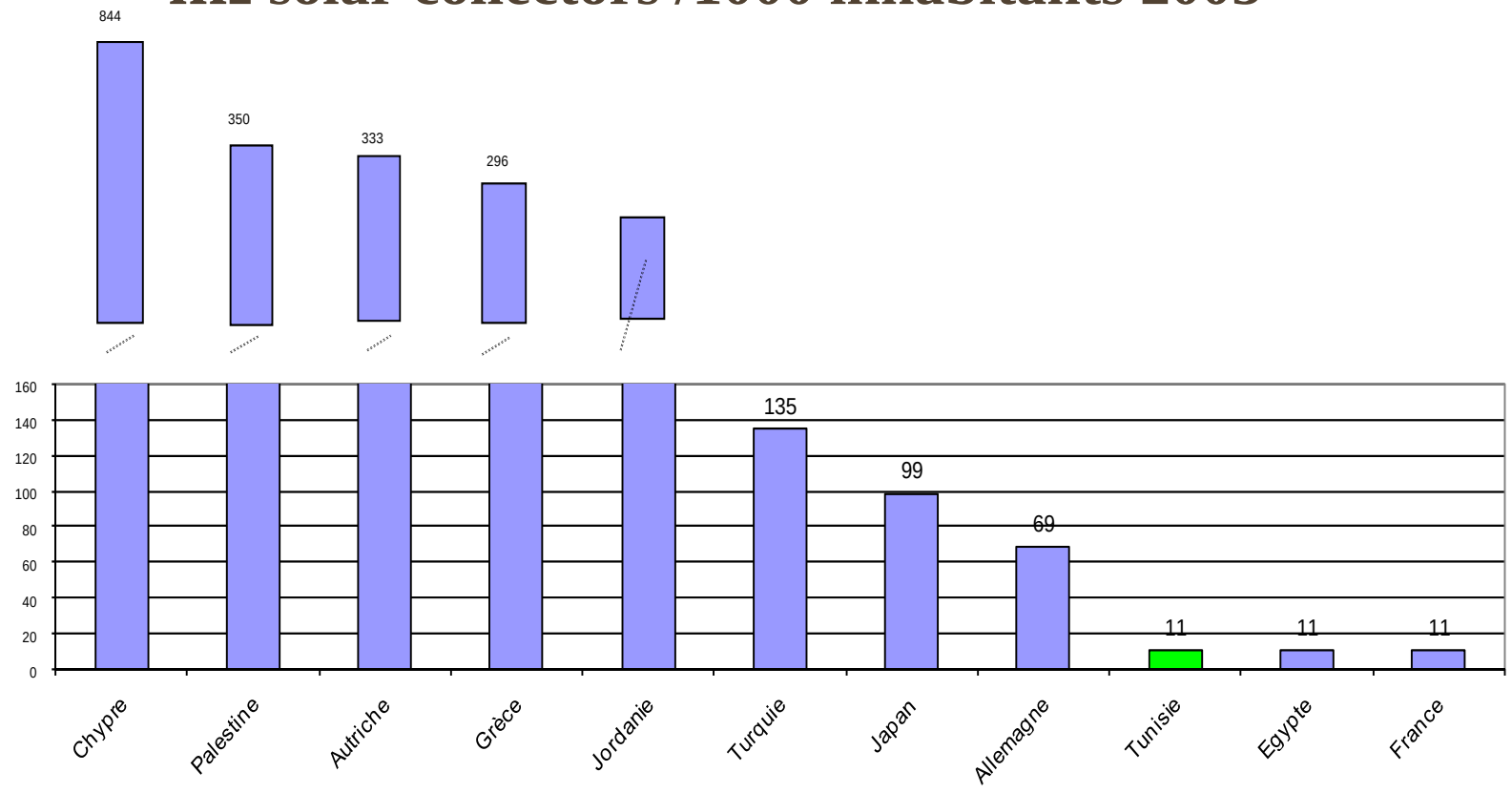
THERMAL APPLICATIONS OF SOLAR ENERGY

Solar Energy Application	Services	Solar Energy Technologies
Solar water heating Systems for	Households	Flat plate solar collectors Vacuum tube collectors
	Commercia Buildings	Liquid-based collectors
	Agriculture	Glazed &/or Unglazed flat plate solar collectors
Swimming Pools Heating Systems for	Outdoor pools	Unglazed flat plate collectors
	Indoor pools	Glazed flat plate collectors

Solar Energy Application	Services	Solar Energy Technologies
Heating - Ventilation & Air conditioning for	All building types	all Air-based collectors
Passive & Active Solar Heating of Buildings	Household & Commercial Buildings	Advanced windows Transparent insulation
		Trombe wall
		Liquid-based collectors with home heating system
Cooling - Buildings	Commercial	Vacuum tube collectors Glazed flat plate collectors
Crop Drying	Agricultural	all Air-based collectors

Installed SWHs at the international Level

m2 solar collectors /1000 inhabitants 2005



ACTUAL STATUS of SWHs in MENA COUNTRIES

After more than 20 years of technical development, the technology is now mature with a number of different system types, available in the market, and designed to meet the individual requirements

CURENT SWHs STATUS in MENA COUNTRIES

- **Some MENA countries have witnessed a good advancement in the use of solar water heaters.**

- **Jordan, Egypt, Syria, Tunisia and Morocco are good examples of these countries.**

- **The economics of solar water heating systems have witnessed drastic improvements in the past few years**

INSTALLED SWHs in MENA COUNTRIES

Country	installed capacity of solar water heaters
Bahrain	Information N A
Iraq	Information N A
Jordan	More than 200,000 solar water heaters are installed
Kuwait	Information N A
Lebanon	Promotion to use SWHs with cooperation of UNDP
Oman	Information N A
Qatar	Information N A
Palestine,	solar water heaters are used in 70% of houses.
S. Arabia	Many applications of SWHs in the cold and mountains areas of the Kingdom.
Syria	More than 25,000 solar water heaters are installed
UAE	Information N A
Yemen	500 units per month of SWHs are produced

ACTUAL STATUS of SWHs in MENA COUNTRIES

Country	installed capacity of solar water heaters
Algeria	100,000 m^2 of solar collectors have been installed
Egypt	500,000 m^2 of solar collectors have been installed
Libya	around 8000 solar water heaters were installed
Morocco	60000 m^2 of solar collectors have been installed
Tunisia	90000 of solar water heaters are installed

Achievements, Perspectives & Local Manufacturing of SWHs in MENA Countries

Solar Water Heating Systems are well developed and manufactured locally, several manufacturing facilities are established in most of MENA Countries,

However cost still need to be reduced for more wide scale uptake of the technology. Further research is looking at the needs of the solar water heating industry and to ensure high quality products.

Achievements, Perspectives & Local Manufacturing of SWHs in Some of MENA Countries

- It is worthy to mention that, the global solar irradiation is high enough and the duration of daily sunshine is long enough so there is no need to utilize a very sophisticated technology for SWHS,

- That is why around 90% of the installed systems in the region are natural circulation (thermo-siphon systems), open loop type, without pumps and without electronic controls and with separate horizontal or vertical solar storage tank

Achievements, Perspectives & Local Manufacturing of SWHs in Some of MENA Countries

- **Meanwhile, about 10% are centralized-forced circulation closed loop type systems.**

- **Some international agencies and regional cooperation programs gave financial and technical support to some MENA Countries which led to a noticeable increase in the sales of solar water heaters in these countries**

The Tunisian Successful Case

- **Tunisia has undertaken actions to implement a programme on dissemination of SWHs on April 2005 which was supported by the creation of a National Fund of Energy Conservation, which grants subsidies to SWHs;**
- **On March 2006, presidential measures confirm this action in order to improve the contribution of RE in the energy balance and to reduce the subsidy of conventional energy consumption.**

The Tunisian Successful Case

PROSOL MECHANISM IN THE RESIDENTIAL SECTOR

SUBSIDY+ CREDIT

SUBSIDY :

200 TND for 200 L SWH capacity

400 TND for 300 L and more SWH capacity

Financing Source: NFEC +IMET

NFEC National Fund of Energy Conservation

IMET Italian Ministry of Environment and Territory

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The Tunisian Successful Case

PROSOL MECHANISM IN THE RESIDENTIAL SECTOR

CREDIT:

750 TND for 200 L SWH capacity
950 TND for 300 L and more SWH capacity
Refunding Period & modality: on 5 years through Electricity Bill

PROSOL MECHANISM IN THE SERVICES SECTOR

SUBSIDY / CREDIT: 20% from NFEC + Contribution of UNEP /IMET

The Egyptian Case

- Due to its relatively high cost, compared with subsidized electric or gas water heaters, DSWHs are not disseminated on a wide scale range in Egypt ,
- There are more than eight main Egyptian manufacturers producing SWHs for the local market and more than 24 companies are working in this field either suppliers or installers

The Egyptian Case

✓Lately, some local companies integrate some imported components; mainly copper tubes/fins. using laser and ultra sound welding. Some local manufacturers prefer to import absorbers, pumps, control systems and insulation which represent about 30% of the cost;

✓So, the local manufacturing of SWHs in Egypt ranges from 70 to 100%.

The Egyptian Case

✓A new financial support mechanism for disseminating SWHs should be implemented. It is supported by Italy and UNEP, for supporting the local manufacturers of SWHs and providing capacity building and training for local suppliers.

✓A pilot project on solar water heating for medium temperature in cooperation with the African Development Bank was installed . The local manufacturing percentage of this project reached 70%.

The Jordanian Case

- **Solar Water Heating Systems in Jordan are well developed.**
- **It is estimated by NERC of Jordan that 30% of the houses are equipped with solar water heaters,**
- **There are several SWHs manufacturing companies in Jordan, three of them are big companies**
- **There are 11 companies working as dealers and installers of SWHs.**

The Syrian Case

- There are more than 13 manufacturers of SWHs in Syria one of them is a public factory belongs to the Ministry of Industry,
- In addition to many dealers or installers,
- In the year 2006 a pilot project on SWHs was implemented in cooperation between NERC and the Industrial Bank of Syria where around 1000 DSWHs were installed at households of limited income employees

The Syrian Case

- **NERC of Syria started on November 2006 the execution of many pilot projects of Solar Thermal Applications, in cooperation with the Ministry of Electricity and with the Ministry of Health, to install SWHS, in all generation Plants and substations and in 28 Public Hospitals in the country**

BARRIERS of SWHs DISSEMINATION in the MENA REGION

- Although solar water heating has the biggest potential in this region, but some issues such as: l**ow tariff of conventional energy in some MENA countries, manufacture material pricing, legislations, awareness, availability of skilled labor, …..** prevent the wide scale adoption and applications of this technology

Many kind of BARRIERS Prevent DISSEMINATION of SWHs

- Inicial costs
- Technical Barriers
- Lake of Awareness
- Economic/Financial Barriers
- Institutional & Legislative Barriers
- R & Development Problems
- Marketing Considerations & Social Barriers

TECHNOLOGY TRANSFER MECHANISMS

There are many factors could facilitate RE technology transfer to most of MENA Countries such as:

- **The Availability of Strong Scientific Base.**
- **The diversification of international universities; e.g. American Universities, German Universities and French Universities, in addition to the national Universities, gives the region the chance and the ability to adopt the RE technologies.**

TECHNOLOGY TRANSFER MECHANISMS

The following are main issues on Technology Transfer:

- ✓ Capacity-building is required at all stages in the process of technology transfer

We hope that, **this Regional Center of Excellence for RE which established in Cairo/Egypt** will serve the MENA-region facilitate RE technology transfer. This center will act as interconnection point between MENA-region and Europe. The Center of Excellence needs a reasonable budget and a qualified staff for applying the scientific methodologies, exchanging points of view and performing researches and linking between industry needs and research problems.

TECHNOLOGY TRANSFER MECHANISMS

✓**Policies approach includes:**

direct and indirect financial support,
energy tariff policies,
trade and foreign investment policies,
financial sector regulation

are strongly needed for RE Technology Transfer in general & SWHs T. T. in particular

TECHNOLOGY TRANSFER MECHANISMS

- **Government can adopt participatory mechanisms and processes to harness the networks, skills and knowledge of civil society, including community groups and NGOs, to better meet user needs, avoid delays and achieve greater success with technology transfer,**
- **Social movements, community organizations and NGOs contribute to the "social infrastructure" that plays an important role in many forms of technology transfer.**

TECHNOLOGY TRANSFER MECHANISMS

- ✓ **Joint research, cooperative agreements, licensing**, technical meetings, trade shows, and information dissemination, demonstration projects and extension services through linkages between manufacturers, producers and end users;
- ✓ **Local and regional partnerships** between different stakeholders for the transfer, evaluation and adaptation to local conditions of RE
- ✓ **Innovative financial mechanisms** such as public/private sector partnerships and specialized credit facilities
- ✓ **Strengthening scientific and technical educational institutions** in the context of technology needs;

Thank you for your attention