Regional Workshop
Cairo, 24th – 25th March, 2009

Solar Thermal Applications in Palestine

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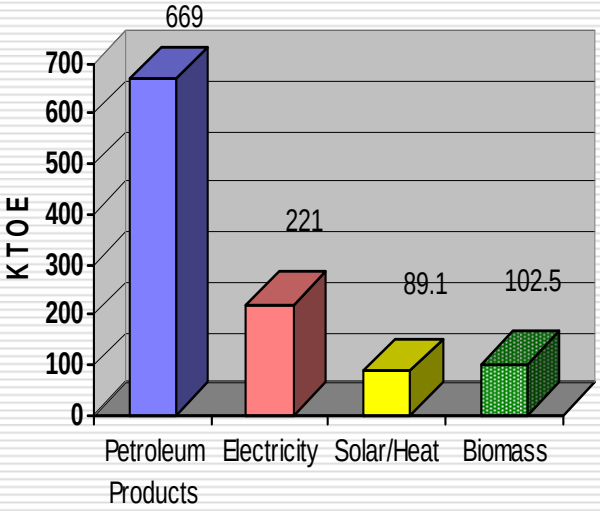
Problems in Energy Sector

- Energy resources either dwindling or non existing
- High energy prices
- Renewable energy not reached a satisfactory level of utilization
- Environmental pollution potentially threatening
- Supply of conventional energy monopolised by Israel

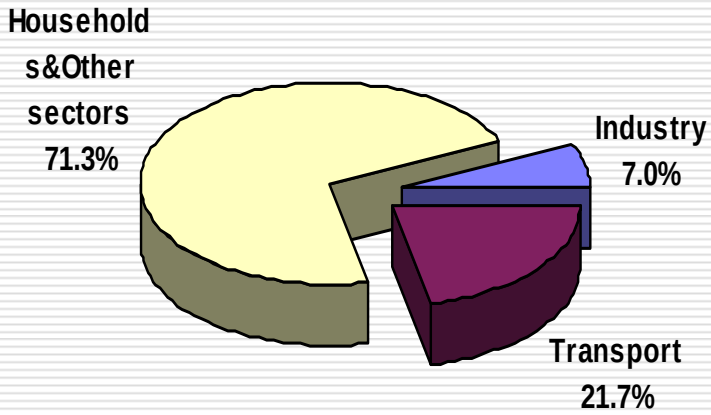
Energy and electricity consumption

- energy consumption Per capita =292 kg.oe
- Per capita electricity consumption= 280 KWh

Total Final Consumption by Fuel Type, 2004



Total Final Consumption by Sector, 2004

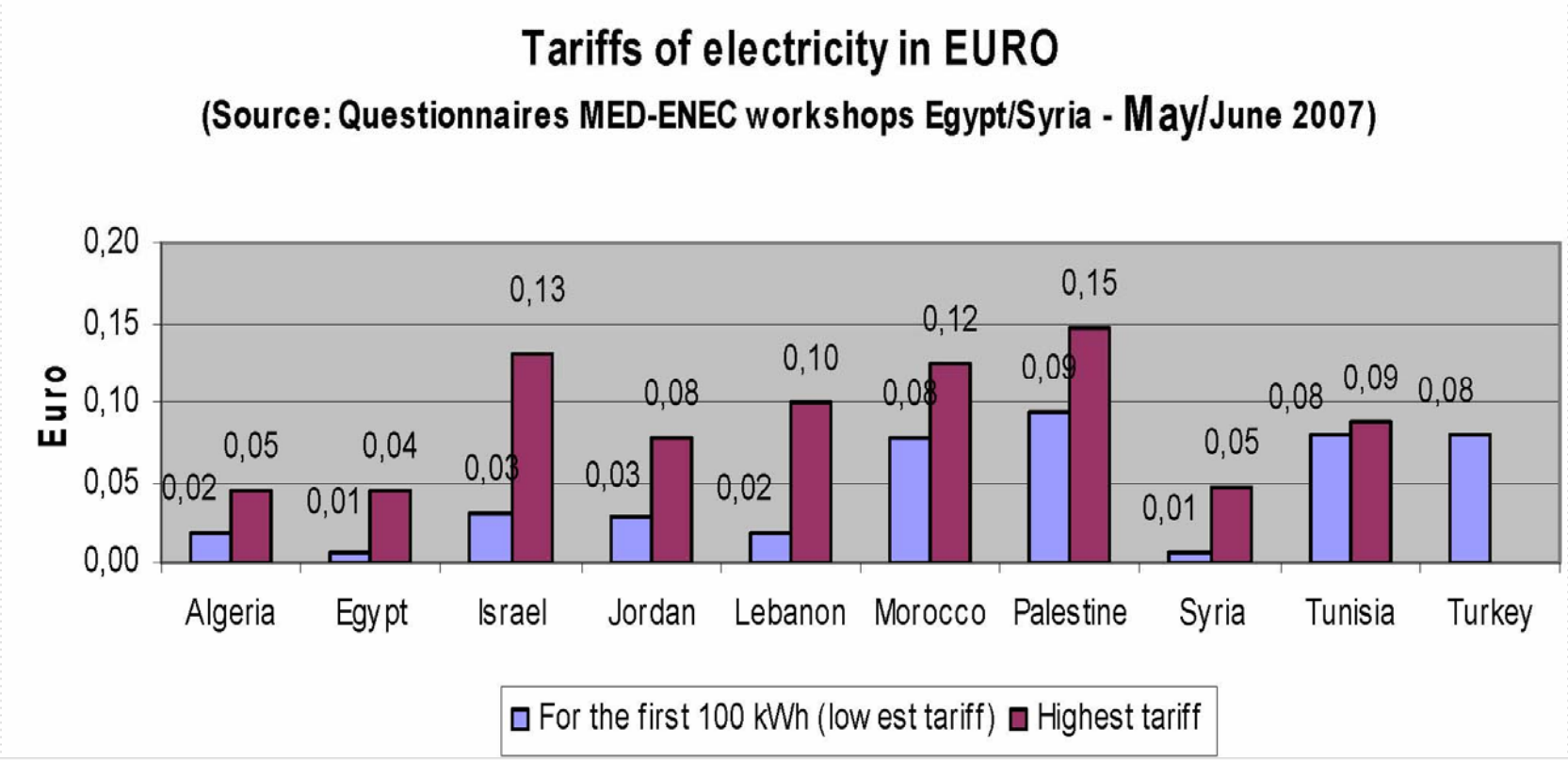


Share of renewable in total energy

- Renewable energy (solar & biomass) contributes 19% of Total Primary Energy Supply (TPES)
- Electricity supply contributes also 19%
- Solar thermal energy has the share of 8.5% of the total energy supply (103 Ktoe)

Energy Prices

- The cost and consumer prices of electricity in Palestine are the most expensive if compared to other countries in the region
- All energy consumed is imported from Israel and it is heavily taxed.



Consumer Energy Prices in Palestine (2008)

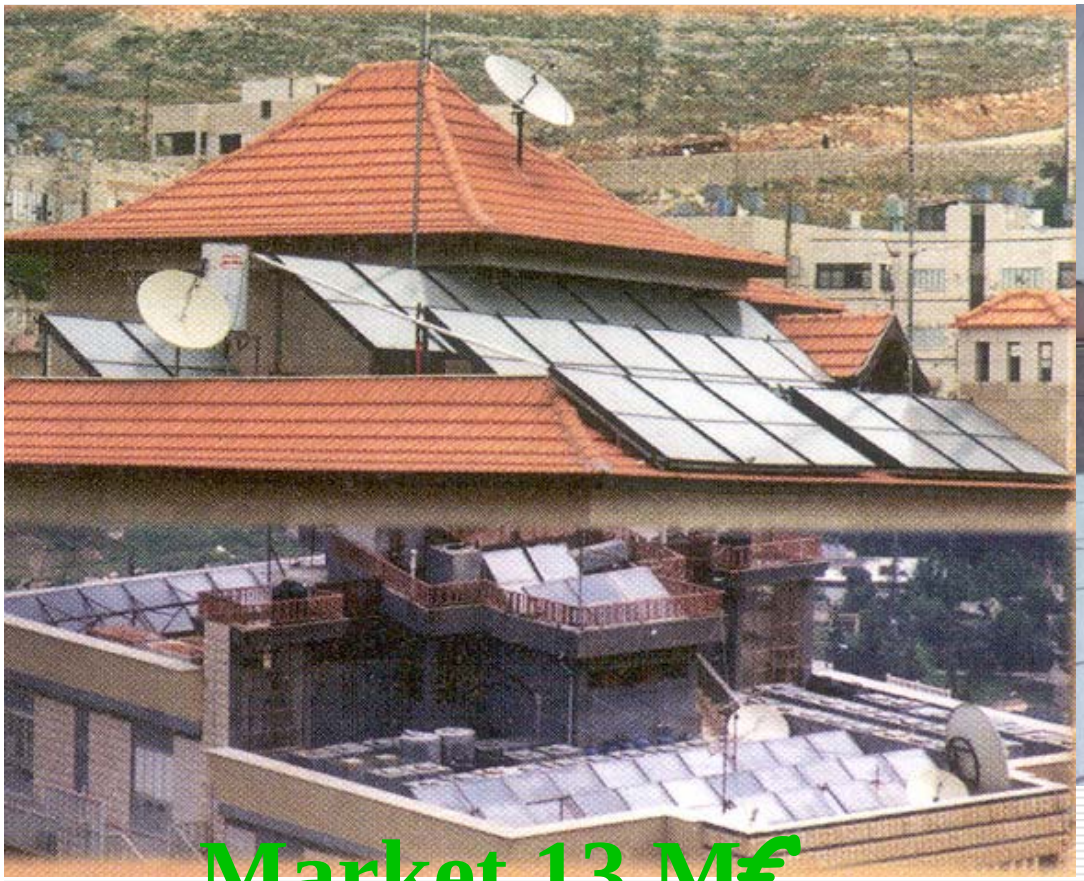
Price of Electricity	0.09 – 0.13 €/KWh
Price of Gasoline	0.92 €/liter
Price of Diesel	0.72 €/liter
Price of Liquid Fuel	0.3 €/Kg
Price of Kerosene	0.72 €/liter
Price of firewood	95 €/ton

National targets/ programmers

A national master plan for development of renewable energy and energy efficiency has been set up. The plan aims at:

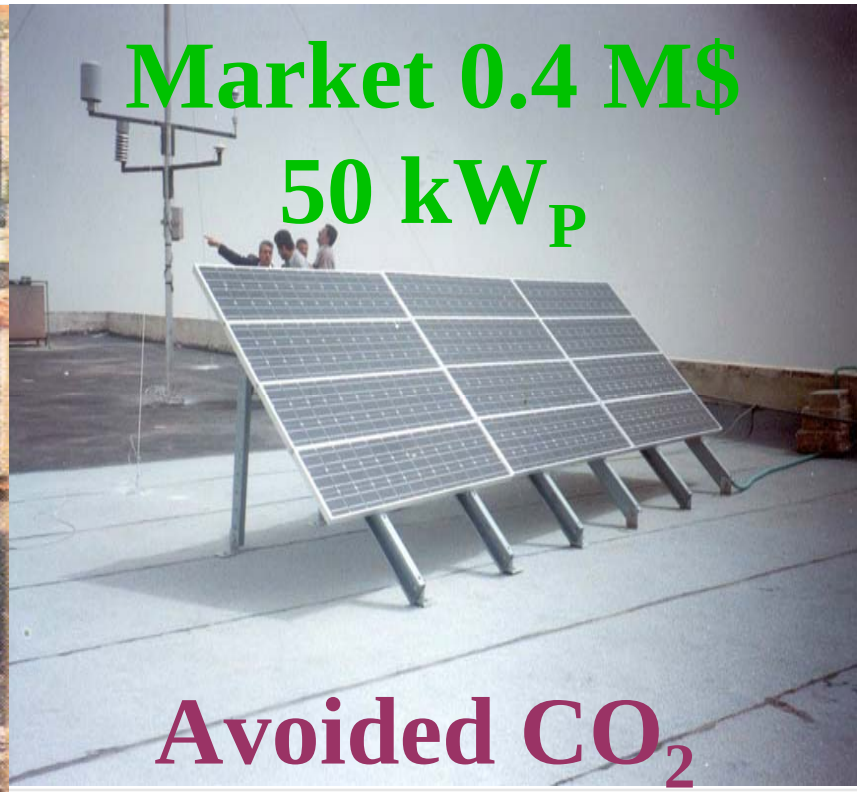
- raising contribution of renewable energy in the energy balance sheet, and
- improving the energy efficiency especially in building and industry sectors.

Solar Energy



Market 13 M€

> 1.5 M m²



Market 0.4 M$

50 kW_P

Avoided CO_2

700 ton

Solar Heaters Market: ***Households***

Success Stories

Jericho Governmental Hospital

- ✓ covers the needs of hot water for cleaning, washing and the patients needs (55 beds).
- ✓ a closed loop type with tilt angle 43˚
- ✓ 69 solar panels
- ✓ total area around 100 m²

Success Stories

- **Birzeit University collective solar water heating**
- ✓ a collector area of 148 m²
- ✓ a 15 m³ storage tanks
- ✓ covers the demand of hot water needed for the cafeteria of the University
- ✓ Palestinian pilot project for studying the tele-monitoring protocol and GSR.

Future demand for solar thermal

Distribution of solar installations and the potential in the different sectors, 2004

	Houses	Hospitals	Hotels	Education	Industry
Equipped with SWH %	67 %	50 %	50 %	N.A < 10	N.A
Installed Area (m^2)	1,490,000	4,300	2,600	< 200	N.A
Coverage of Demand %	70 %	40 %	25 %	70 %	-
Potential (m^2)	1,590,000	9,000	10,000	1,000	20,000

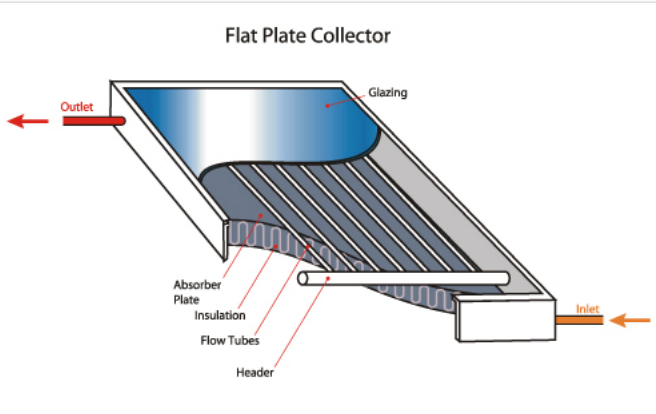
Total Potential = 1,630,000 m^2

Shortage ~ 130,000 m^2 equivalent to 33 M€

Local Manufacturing

- The SWH industry started in West Bank and Gaza in the mid seventies by workers and craftsman who worked in Israel and gained the experience in this field
- Water leakage /pressure testing, but no performance testing
- More than 15 local industrial workshops in the West Bank and Gaza Strip
- annual production rate is more than 26,000 units.
- The numerous workshops are capable to fulfil the local market's needs
- export to external markets if they find the appropriate technical support and advisory
- The market for solar thermal energy technologies is limited to water heating estimated to 13 M€.

Local manufacturing



SWH system cost

- Individual system
  - System price 450 - 550 $ ~ 30% GDP/capita
    100 - 120 $/ m^2
  - Collective system
    price 120 - 150 $/ m^2
  - Pay back periods less than two years

Policy barriers

- Absence of regulations & provisions to control the quality in the market.
- Absence of qualified testing labs & bodies.
- Israeli occupation & obstacles on import/ export trade movements.
- Heavily tax system and high cost of clean/ efficient technologies.
- Lack of incentives & proper financing schemes.

Market barriers

- Absence of independent local distributors and importers of the raw materials required for fabrication
- Disability to export the products.
- Absence of private sector involvement and initiatives for development RE market.
- Unstructured framework of the solar industry
- High initial investment especially for solar collective systems and new applications.
- Lack of awareness programmes at both end users and supplies for the new solar applications and efficient technologies.

Technical barriers

- The technological capability in both human and institutional terms is relatively weak.
- Lack of professional technical handbook for sizing, design, installations.
- Lack of professional training on new applications & designs.
- Lack of regulations and provisions to implement standards or control quality.
- Lack of professional labs, testing & certification facilities
- Lack of pilot projects and expertise especially for the new applications of solar thermal (water distillation, concentrated power, solar cooling).

Social barriers

- Lack of awareness in the selectivity of proper energy system
- Lack of awareness in the benefits of energy conservation and clean technology.
- Low income of the family to cover the investment cost of the solar system, especially for the new and efficient technologies.

Recommendations

- Development of proper financing schemes with involvement of government, private sector
- Creation of a national fund with participation of the government, private sector and external financial aid for supporting development actions of RE and EE.
- Development of governmental policies, regulations, provisions and incentives to encourage use and investment in solar thermal technologies.
- Establishment of national framework for solar technologies manufacturers & suppliers.

Recommendations

- Imposition of standards, regulations and certifications for improvement the level of market quality.
- Establishment of national testing facilities/ research centers and labs.
- Upgrading the local industry of solar thermal technology
- Dissemination of awareness to both demand side and supply side for the new applications and efficient technologies of solar thermal energy
- Mediterranean Solar network
- Solar thermal conferences & exhibitions


THANK YOU