



ADEME-WEC workshop on energy efficiency policies

London, June 25-26 2007

Case Study on Measures to support solar water heating

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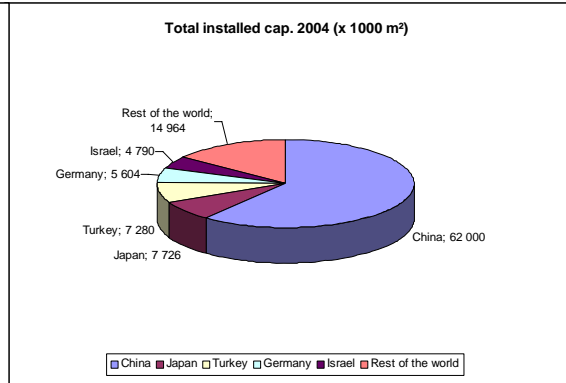
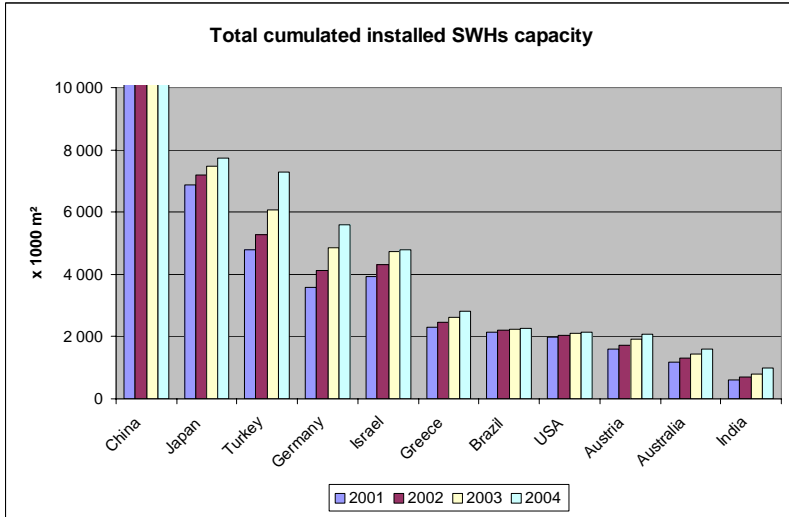


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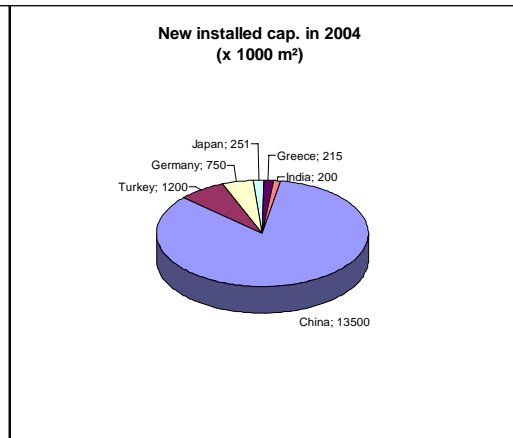
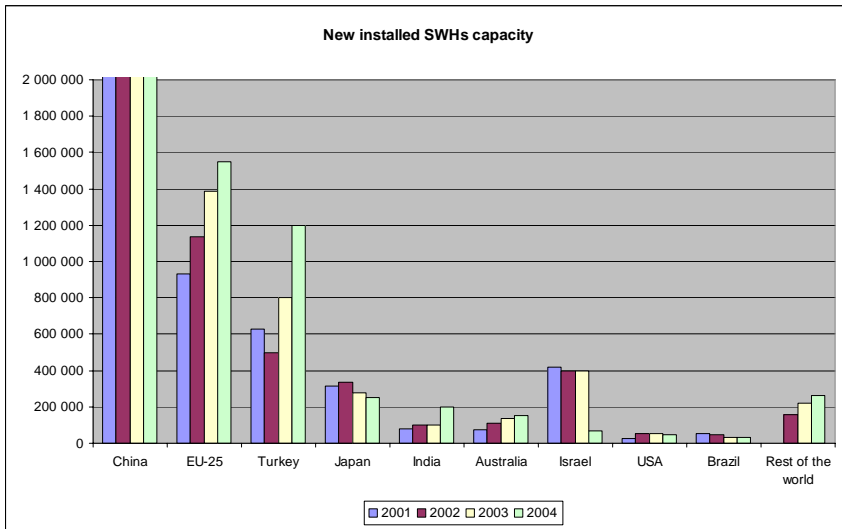
SWHs total installed capacity



- The cumulated installed capacity in the world in 2004 was approx. 106 million m² (glazed solar collectors)
- ... of which 62 Mm² installed in China (58% of world total)
- Significant installed capacities in Brazil, India, South Africa, Mexico, ...



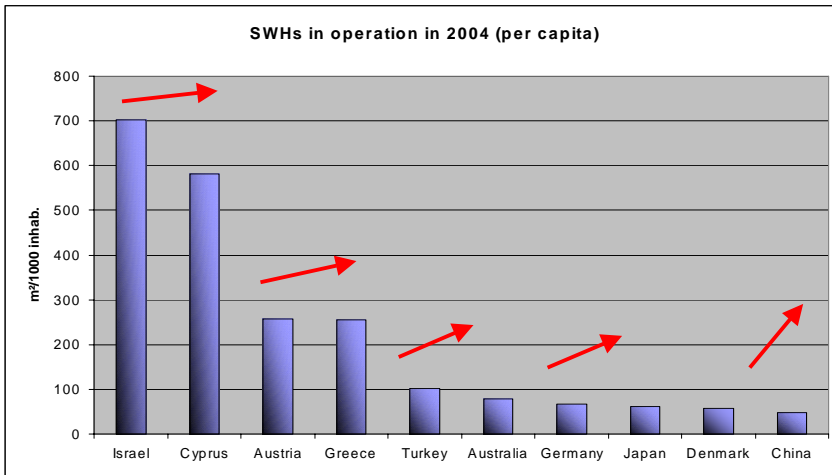
SWHs new installed capacity (annual sales)



- World annual sales in 2004 : 17 Mm²
- ... of which 13.5 Mm² in China (80% of world total)
- Yearly average growth rate of sales in China : 20% (ie 1.5 to 2.0 millions of new installed surface per year)



SWHs installed surface per capita



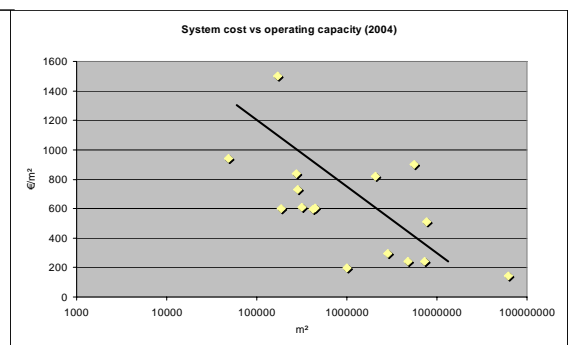
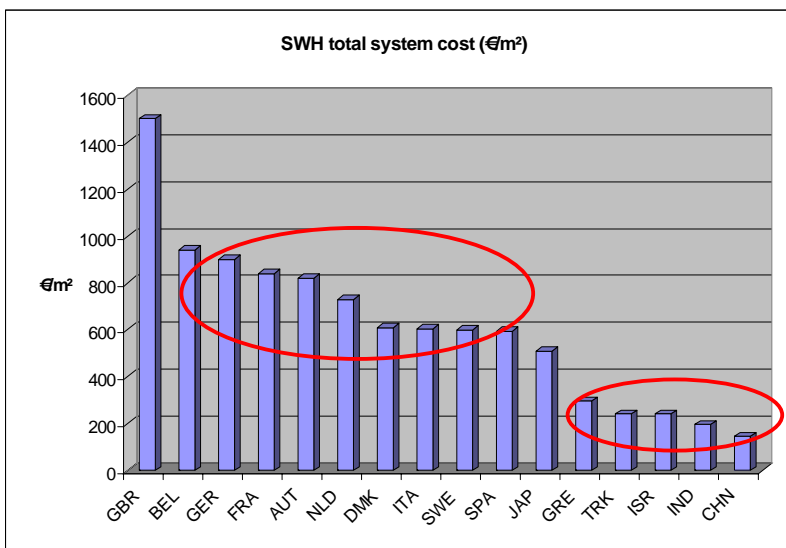
Evolution of installed surf per cap.

	2000	2001	2004	2006
Germany		44	68	
Turkey		70	101	
China	20		48	80

- Very high market penetration in Israel / Cyprus (historic markets) - slow progression (5 – 7%/yr between 2001-04)
- High market penetration in Germany, Turkey, ... : 80 – 100 m²/ 1000inhab. Still increasing : 13 – 16 % /yr between 2001-04
- Still limited market penetration in China (50 m²/1000inhab.) but fastly increasing (30 % /yr between 2001-04)



Cost of SWH systems



- ❑ Low prices in countries with large markets (economies of scale)
- ❑ Low prices in Southern Europe
- ❑ High prices in Northern Europe (more sophisticated systems)

- Between 600 – 900 €/m² in EU compared to 200 – 300 €/m² in Turkey, Israel, India, China
- System cost varies between 300 -400€ in China and 5 000- 7000 € in Northern Europe



Case study : Austria

- **Market :**
 - ✓ Very large and still increasing (above 2 millions m² installed in 2004)
 - ✓ 300 m²/1000 inhab.
- **Incentives / drivers**
 - ✓ **Financial incentives** have played (and still play) a role in the growth of the market
 - ✓ But also high prices for conventional energy, environmental awareness, ...
 - ✓ and a **well developed distribution network**
- **Present situation**
 - ✓ SWH is a **standard / mature option** (almost all heating installers also offer solar systems)
 - ✓ Easy access to information, equipment, installers and some financial incentives
- **Main issues**
 - ✓ **Enlarging the market** toward new applications (multi storeys buildings, hot water plus space heating systems)



Case study : China

- **Market :**
 - ✓ The **biggest market** in the world (80% of world total additions in 2004 were in China)
 - ✓ Over 60 million installed m² (over 70% of total world market).
- **Incentives / drivers**
 - ✓ China is one of the few countries with a **commercial SWH market** - No subsidies or low interest loans – competition among manufacturers
 - ✓ Main drivers :
 - ✓ Increasing demand for hot water resulting from higher income and increasing urban population
 - ✓ Availability, « reliability » and competitive prices for SWHs
- **Present situation / perspectives**
 - ✓ New government programs for technology standards, building codes, and testing and certification centers
 - ✓ Use of solar systems encouraged by Renewable Energy Law
 - ✓ National goal to 230 million m² in 2015 (270 Mm² in 2020 ?)
- **Main issues**
 - ✓ Remaining problems with **low quality products / installations** (lack of enforcement for standards)
 - ✓ Development of new technologies in order to facilitate **building integration**



Case study : Mexico

- **Market :**
 - ✓ Still limited (residential) but growing (700 000 m² in operation)
 - ✓ Mostly centered on **unglazed collectors for swimming pool** heating applications, and commercial applications – low penetration in residential applic.
- **Barriers**
 - ✓ **High system prices** compared to other emerging countries (China, India) as a result of limited market
 - ✓ Low conventional energy prices
 - ✓ **Low equipment quality**, limited availability of system, lack of qualified installers
- **Incentive measures**
 - ✓ **No significant financial measures** at the national level ; specific measures / programs in Mexico
 - ✓ Solar thermal equipment standards, technical workshops for installers,
- **Main issues**
 - ✓ Limited perspectives in the short term because **unfavorable economic conditions** (long payback period) and **mixed/ negative perception** among the general public
 - ✓ Market is growing anyway in the absence of major incentives (rising energy prices)

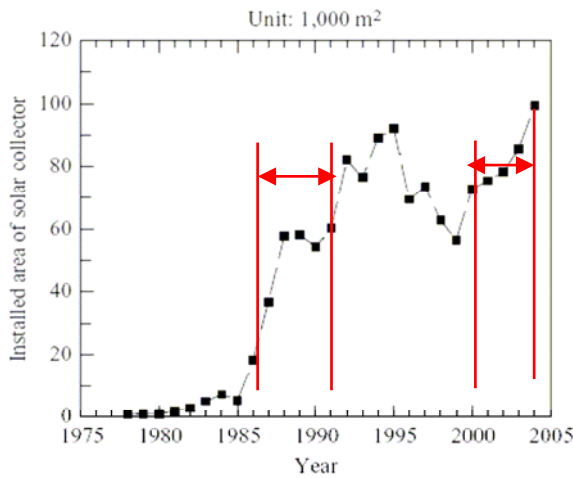


Dissemination of SWHs : Key issues

- **Main barriers to the development of SWH :**
 - ✓ High **initial costs**, uncertain economic profitability, long payback time
 - ✓ **Limited quality**, low reliability, lack of skilled installators
 - ✓ Lack of interest / **sensibilisation / knowledge**, limited perceived reliability
- **Even in the most « mature » markets, some kind of public support is needed for market**
 - ✓ Subsidies to improve profitability in some countries
 - ✓ Financing,
 - ✓ Quality improvement,
 - ✓ Information,
 - ✓ ...
- **Main incentive options used to stimulate SWH markets**
 - ✓ **Direct financial incentives** to overcome high initial costs – exist in most countries with different models
 - ✓ **Quality management** to increase customers confidence in solar systems and installers (standards and labels)
 - ✓ **Information or awareness programs** to stimulate demand
 - ✓ **Regulation** that forces the use of solar systems in private or public buildings



Impact of financial incentives : Taiwan



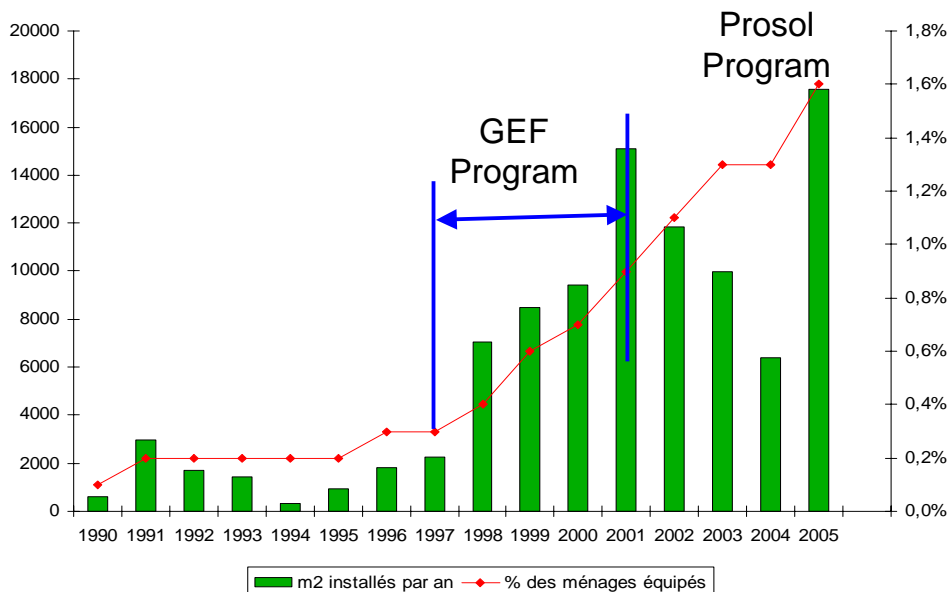
In Taiwan, the incentive programs have had a clear impact on the sales of SWH:

- First period of incentive program (1986–1991).
- Second period of incentive program (2000–2004)

Sales of Solar water heaters in Taiwan (K. Chang, et al., 06)



Removing financial incentives too early may affect the market: Tunisia



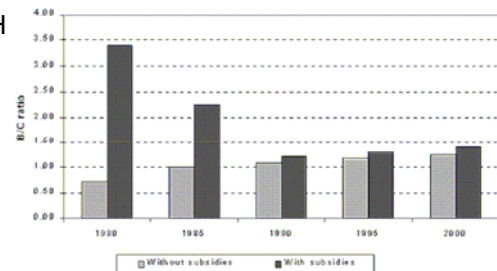
Source: Enerdata from ANME

1. The GEF program (direct financial incentives, no custom duties, no VAT on SWH, plus training, information, standards) has stimulated demand from 1997 to 2001
2. The discontinuation of subsidies has negatively impacted the sales of SWHs until the implementation of the new PROSOL



Removal of financial incentives is possible with a mature market: Greece

Benefit / cost ratio for a typical SWH system (Argiriou et al., 03)



- **Initial incentive policies:**
 - ✓ Income tax reductions, soft loans, grants (up to 50% of total system cost in the 80's)
- **Steady performance improvement and reduction of subsidies**
 - ✓ Improvement of B/C ratio (without subsidies) due to technical progress / economies of scale, etc.
 - ✓ From 2000, B/C ratio is superior to 1.
 - ✓ In 2003 no subsidies were allocated to SWHs anymore.
- **Existing market drivers**
 - ✓ Limited up front costs : a typical solar system costs 700 € in Greece (4500 € in Germany)
 - ✓ Payback periods between 4 to 6 years
 - ✓ Domestic solar heaters are standard products like fuel boilers, etc.



Main incentive options (1): Financial incentives

- **Type of incentives :**
 - ➔ Capital grants (rebates),
 - ➔ Tax reductions,
 - ➔ Low / no interest loans
- **Objective :**
 - ✓ Improve competitiveness (shorten payback time)
 - ✓ Reduce initial capital expenditure
- **Impacts :**
 - ✓ Highly effective to stimulate sales
- **Drawbacks :**
 - ➔ Cost in public funds
 - ➔ Possible negative impact if subsidies are withdrawn too rapidly
 - ➔ Markets anticipating withdrawal or introduction of subsidies
 - ➔ Adjustment of prices in anticipation of rebates introduction



Main incentive options (2): Standards and labels

- **Type of incentives :**
 - Equipment or installers must conform to a given set of technical specifications
 - Standards are mandatory and labels are generally voluntary
- **Objective :**
 - ✓ Limit penetration of poor quality products
 - ✓ Stimulate quality improvement (equipment / installation)
 - ✓ Improve customers confidence
- **Example :**
 - ✓ Keymark voluntary certification scheme in EU
- **Drawbacks / risks:**
 - ✓ Testing and certification centers must be set
 - ✓ May increase the system price (removing of low quality products)



Main incentive options (3): Regulation

- **Type of incentives :**
 - Regulation making the use of renewable energy mandatory
- **Objective :**
 - ✓ Extending dissemination where non-economic barriers prevent adoption of SWHs (lack of information, motivation, awareness or trust in new technologies, transaction costs, ...)
- **Example :**
 - ✓ Barcelona Ordinance
- **Drawbacks / risks:**
 - Agreement must be reached among actors in the construction sector
 - Impact on construction cost (extra cost of solar installations)
 - Possible bottleneck in equipment supply
 - Pressure to decrease installation costs leading to lower / insufficient quality



Packages of measures (1): Financial incentives AND access to credit

- **Issue :**
 - ✓ Even with direct subsidies or tax credits/rebates, **purchase of SWH equipment may be out of reach** for low income families (espec. in developing countries)
 - ✓ Financing schemes may be necessary to provide the initial investment outlay
- **Complementary measures :**
 - ✓ Direct subsidies plus
 - ✓ ... low interest financing
 - ✓ ... third part financing
- **Example :**
 - ✓ Loans repayments through electricity bills (GEF Program in Tunisia)



Package of measures (2): Financial incentives AND quality labels

- **Issue :**
 - ✓ Promoting technical progress and higher quality
 - ✓ Direct incentives stimulates dissemination but does not guarantee quality improvement (Ex. of Tunisia)
- **Complementary measures :**
 - ✓ Possibility to link financial incentives with quality requirements (ie rebates if technical standards or labels)
 - ✓ Incentives may also be associated with qualified installators to guarantee high performing systems
- **Example :**
 - ✓ In France the sytem of tax credit is applicable to SWH equipment that are awarded Solar Keymark certification



Package of measures (3): Regulation / financial incentives AND standards

- **Issue :**
 - ✓ Solar regulation may induce extra construction costs
 - ✓ ... or (if construction price is capped) lead to lower quality installations and loss in consumer confidence
- **Complementary measures :**
 - ✓ Financial incentives to lower extra cost and specific financing schemes to facilitate access to credit
 - ✓ Labels and technical standards to induce quality improvement
- **Additional support :**
 - ✓ Information and awareness programs
 - ✓ Training and certification schemes for installers
 - ✓ Specific support on supply side (R&D, production capacity increase)



Quantitative impact of SWHs : some figures from China

	2020	2050
Cumulated Installed capacity	270 Mm²	500 Mm²
Electricity saved	81 TWh	150 TWh
Reduction in peak power load	110 GW	200 GW



Some conclusions (to be completed)

- **Direct economic incentives** (rebates, tax exemption, tax credit, etc.) **are an effective** way of stimulating growth
- To **lower investment barrier**, economic incentives should be **used in conjunction with financing mechanisms** (low interest loans)
- Removing economic incentive may affect emerging markets but experience shows that is it possible on matured markets (cf. Greece for ex.)
- **Other measures are still necessary** when SWHs approach competitiveness with conventional hot water heating systems (soft loans but also awareness raising campaigns, quality labels, standards, etc..)
- **Regulatory measures** can complement economic incentives and **enlarge dissemination when technology has matured** (limited incremental cost, skilled installers, etc.)
- The experience of the Solar Ordinance (Barcelona) shows that the **complementarity of measures may be vital** for the succes of a program : information towards general public, standard / labels to maintain quality, training and certification of installers, urban supply side measures, planning regulation, etc.