Solar Thermal at a Global Level
and the need for estimating annual solar collector energy output

Werner Weiss
IEA Solar Heating & Cooling Programme
Chairman

www.iea-shc.org
Worldwide Statistic
IEA SHC Solar Heat Worldwide

53 countries included (4 new)
South Korea, Chile, Uruguay, Zimbabwe

4.5 billion people represent
85-90% of the solar thermal market worldwide

Data provided by:
10 ExCo members
56 external experts, governmental sources and associations
The initial problem

What is a $m^2$ in terms of power?
The 1st Solution

\[ P_{\text{solar thermal}} = 0.7 \text{ kW/m}^2 \times A_a \]

\[ 1 \text{ m}^2 = 0.7 \text{ kW}_{\text{th}} \]
Market Development

Installed capacity [kWth/a/1,000 inh.]

- Middle East
- Australia + New Zealand
- Central and South America
- China
- Europe
- Africa
- United States + Canada
- Japan
- Asia

Solar Thermal’s Global Contribution

Total Capacity in Operation $[GW_{el}]$, $[GW_{th}]$ and Produced Energy $[TWh_{el}], [TWh_{th}]$, 2008
Collector Yields – IEA SHC

Collector yield [GWh/a]

- China + Taiwan: 49,847
- Others: 14,464
- Europe: 9,561
- Japan: 3,316
- United States + Canada: 1,460
- Australia + New Zealand: 727
Collector Yields – IEA SHC Calculation

Based on:
- installed capacity
- share of applications

Calculation of the collector yield
- Reference Collector
- Reference System / application
- Reference Climate
Solar thermal production

For solar thermal energy IEA and Eurostat consider as primary energy the first usable form of energy

This is defined as: “Solar thermal production is the heat available to the heat transfer medium minus the optical and thermal collector losses”
Optical collector losses

Thermal collector losses

Solar thermal production
Simplified method for the calculation of annual collector output

Based on:

• Final summary report from the EU ThERRA project, 2009

• Detailed calculations of IEA SHC Solar Heat Worldwide
Thank You