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

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

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

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

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

\[ 1 \text{ m}^2 = 0.7 \text{ kW}_\text{th} \]
Solar Thermal’s Global Contribution

Total Capacity in Operation [GW$_{el}$], [GW$_{th}$] and Produced Energy [TWh$_{el}$], [TWh$_{th}$], 2008

- Total capacity in operation [GW] 2009
- Produced Energy [TWh] 2009

<table>
<thead>
<tr>
<th>Source</th>
<th>Total Capacity Operation [GW]</th>
<th>Produced Energy [TWh]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar Thermal Heat</td>
<td>189.0</td>
<td>137.0</td>
</tr>
<tr>
<td>Wind Power</td>
<td>158.0</td>
<td></td>
</tr>
<tr>
<td>Geothermal Power</td>
<td></td>
<td>83.0</td>
</tr>
<tr>
<td>Photovoltaic Power</td>
<td></td>
<td>23.0  24.0</td>
</tr>
<tr>
<td>Solar Thermal Power</td>
<td></td>
<td>0.7</td>
</tr>
<tr>
<td>Ocean Tidal Power</td>
<td></td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.7</td>
</tr>
</tbody>
</table>
Market Development

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