SOLAR HEATING PLANTS
(WG 2E - ESTTP)

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Electric (Wind power, EV), Energy (Bioenergy – CHP, Fuels, CO₂). Physical resources, environmental aspects and innovation systems

Responsible for the evaluation of the 1st two SH plants built in 1979 and 1980
Growing interest and market !?

< 1% ”large” systems !?
More plants in DK in 2010 and continuing...!?
RE share - Ecoheatcool WP4

Bioenergy?  Geothermal?  Solar heat!?
SOLAR HEATING PLANTS

- Heating & Cooling
- Block and District heating plants for new and existing building areas
- Plants for new and existing large building complexes e.g. industries, hotels, etc.

- Large-scale systems > 500 m² or > 350 kW_{th}

Collector mounting for a Solar Cooling Plant in Qingdau, China, 2006
VISION

“Solar generated heat makes a considerable share (>10%) of the heat generated for block and district heating systems in Europe”

1% would be feasible within 10-20 years?!

10% would require seasonal stores ..!?
SWOT

• **S:** Renewable heat ... everywhere ...

• **W:** Low energy density ... Size / placing ...
  
  (Bio fuels > 30 times the land area !!!)

• **O:** RE district heat in villages and cities ....
  New business opportunities ...
  RE district cooling ... cooling function ..?!

• **T:** Lack of incentives, interest and knowledge ...
  (policy, desision makers, utilities, etc.)
  Gas networks ... waste heat ...
• Experienced consultants and contractors ...
• Co-operation with District Heating Associations
Success Factors in Solar District Heating

Available on www ...

More to come ..

by

CIT Energy Management AB
STATUS (2009)

- A small no of pilot plants ...
  > 125 plants > 500 m² / 350 kW\textsubscript{th}
  Misc. solar heating and cooling plants ...

- > 30 plants > 1 MW\textsubscript{th} / 1 400 m²
  > 15 solar plants in district heating systems ...
  > 10 large solar block heating plants ...
  > 5 plants with (large) seasonal storages ...
  > 5 solar cooling plants ...

- > 20 years operational experience ... but a small no of specialized manufacturers and contractors ...
> 126 Solar heating and cooling plants > 500 m² / 350 kWₜₜ

End 2009
~40 Solar heating and cooling plants > 1 MWth (2009)
Solar heating plants
in operation in SE/DK (2007)

~ 50% of collector area in plants with >350 kW_th

- > 350 kW_th
- > 3500 kW_th
Ærø ~ 4 sqm per capita (Austria 0,4 sqm)

1 sqm per capita ~ 5 % of DH in SE
Covers >20% of heat demand
Denmark

Energy woods need 30-40 times the land area

Marstal - 18 300 m² - 13 MW<sub>th</sub> - 1996-2003-
Sweden

Kungälv - 10 000 m²  ~ 7 MW\textsubscript{th} - 2000
Combination with wood chips
Falkenberg - 5500 m² - ~4 MW<sub>th</sub> - 1989

Recycled 2008: 40t Al; 2t Cu; 1.4t Fe; glass; insulation...
.. Germany ..

Solar block heating with seasonal storage for new built

SDH – Marstal – 22 September 2010
Block and District heating
(Nah- und Fernvärme)
Central/Primary
Austria

Distributed solar district heating
Fernheizwerk/AEVG - 2006-

- Waschplatz: 444 m²
- Boxenhalle: 632 m²
- Ablagenhalle: 880 m²
- Gregoritschhalle: 1.600 m²
Distributed/Primary
Distributed/Primary

Roof modules

Return 40-50 °C
Prefabricated sub-station (SE)
... new business opportunities for DH?

Sven Werner, Professor and DH expert
SUMMARY

• Positive solar market and industry developments ..!
• Solar heat one of three main alternatives in district heating systems..
• Positive DH market and industry developments ..?
• Increased “solar“ interest from “customers“ .. EPBD !
• SDH technology demonstrated for decades ..
• So, let’s role .. But !
• … be careful out there ..!
QUESTIONS?

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