# Experiences from various installations

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## S.O.L.I.D. – What we do

- S.O.L.I.D. is specialized in all fields of solar thermal systems
- Large scale solar plants
  - solar air-conditioning
  - district heating nets
  - hospitals, prisons, …
  - office buildings, hotels
  - swimming pool
- Experience and competence
  - project development
  - engineering
  - construction
  - supervision
  - Maintenance
  - ESCo operation

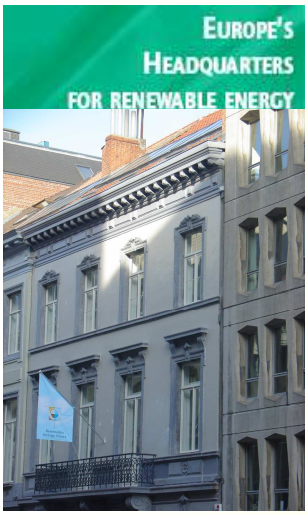
# S.O.L.I.D. – What we do

- Third-party financing models and output guarantee contracts
- R&D activities in the field of solar thermal energy
  - development of innovative solar control
  - solar collector development for higher temperatures
  - solar cooling applications
  - innovative business models

# Presentation overview

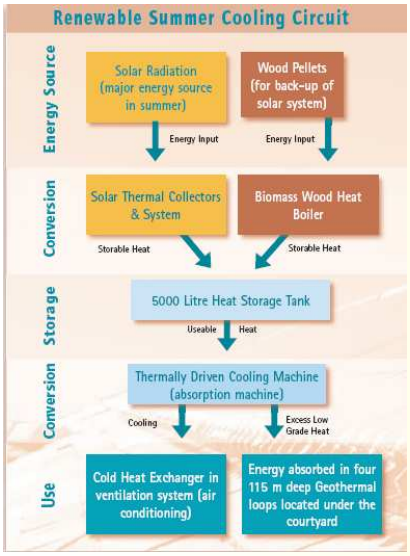
- Latest SAC projects
  - Renewable Energy House Brussels (Belgium)
  - Olympic Sailing Village Qingdao (China)
  - Desert Outdoor Center Phoenix (USA)
- Experience & outlook
  - >gluatmugl HT< collector
  - Operational support to customer
  - New SAC projects
  - Future concept for solar cooling?

# Renewable Energy House Brussels (Belgium)




- Renewable Energy House Brussels
- Headquarter for all Renewable Energy Associations
- Showcase for the European Union
- Combined solar cooling and heating
- Different renewable energy sources combined in a retrofit

# Renewable Energy House




- 2000 m² area for offices
- 80 kW biomass boiler
- 42 kW solar collectors
  - 21 kW flat plate >gluatmugl HT<
  - 21 kW vacuum tubes
- Ground loop for backcooling
  - used for heat pump in winter
- 35 kW chiller (Yazaki WFC10)
- Tuning and control of all renewable energy sources and installations performed by S.O.L.I.D.

# Renewable Energy House

- Opening ceremony & some impressions

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# Olympic Sailing Village Qingdao (China)

- Olympic Village for China 2008 Olympic Summer Games
  - Solar air conditioning for Logistics Center
  - Solar hot water for the Sports Center and for the Olympic village

# Olympic Sailing Village

- Solar air conditioning plant Logistics Center
  - 4,000 m² used area
  - 900 kW peak load
    - according to Chinese standard
  - 500 kW Sanyo chiller
  - 631 m² >gluatmugl HT< collectors
- System start up: August 2006

# Olympic Sailing Village




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# Desert Outdoor Center Arizona (USA)

- National park center near Phoenix, Arizona
  - 1,500 m² used area
  - 70 kW chiller (WFC20)
  - 126 m² of >gluatmugl HT< collectors
  - Building located at end of electricity grid

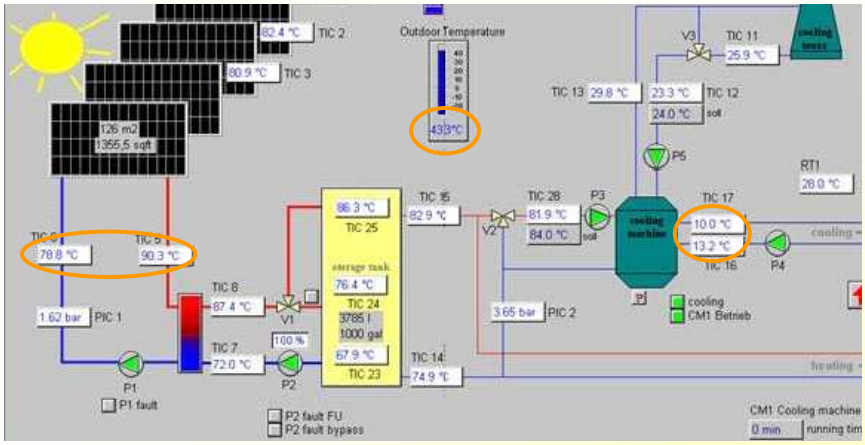
# Desert Outdoor Center

Complete system provided in a compact, pre-fabricated ‚Energy Cabin'

# Desert Outdoor Center

- Pre-fabricated solar cooling container (‚Energy Cabin')
  - including Yazaki chiller (WFC20)
  - cooling tower on top of container
  - heat storage outside near container

# Desert Outdoor Center




- Tele-monitoring data from August 2006

# Experience with the AR-tower plant

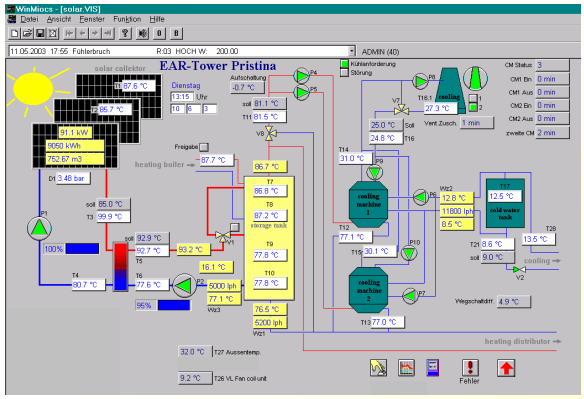
- Office Tower of the European Agency of Reconstruction of Kosovo
- 39° North
- 2.300 m² net area
  1.426 m² HVAC area
- Reconstructed 2002/2003
- Calculated cooling load:
  210 kW/ 60 tons
- Calculated heating load:
  170 kW.

# Design Data

- 2 thermally driven absorption cooling machines with total load of 90 kW
- 226 m² /160 kW solar collectors
- 4 m³ storage tank
- Back cooling unit
  220 kW
- Back up for peak load:
  compressor chiller
  30 kW.

EAR-tower

# Telemonitoring

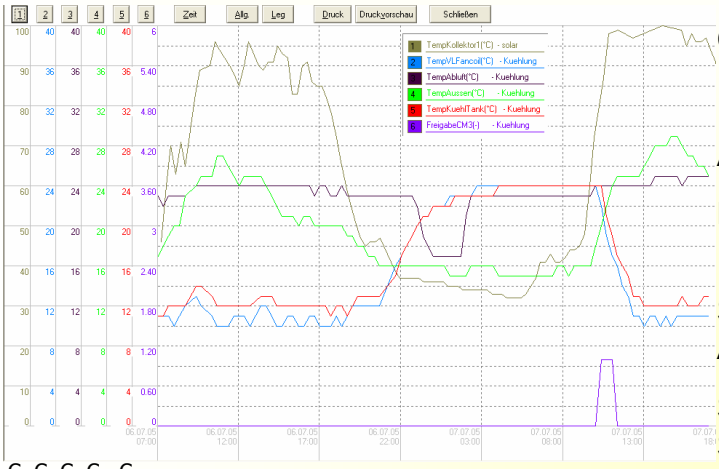



- Output solar plant: 91,1 kW
- Input cooling machines: 77,8 kW
- Output cooling machines: 59,5 kW
- Collector supplies 99,9 °C

Date: 10.06.2003 Time: 13:15

EAR-tower

# Telemonitoring 6.+7. July 2005




Collector

Ambient

Exhaust

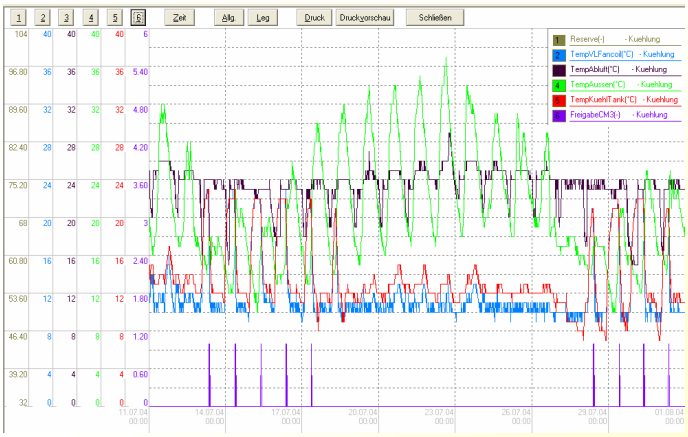
Supply AHU

Second Stage

C C C C C

EAR-tower

# Telemonitoring July 2004




Ambient

Exhaust Air

Supply AHU

Second Stage

Conventional Chiller just in early morning on days with cloudy weather!

**PEAK AVOIDING TECHNOLOGY !** EAR-tower

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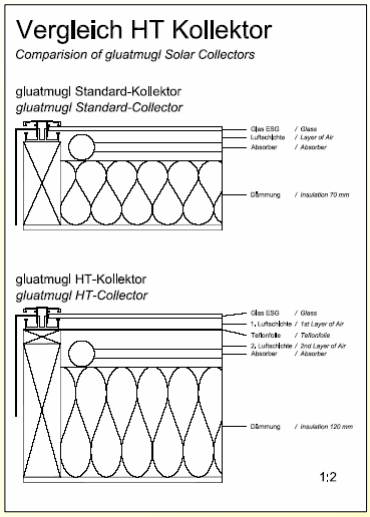
  - New SAC projects
  - New concept for solar cooling
  - Summary

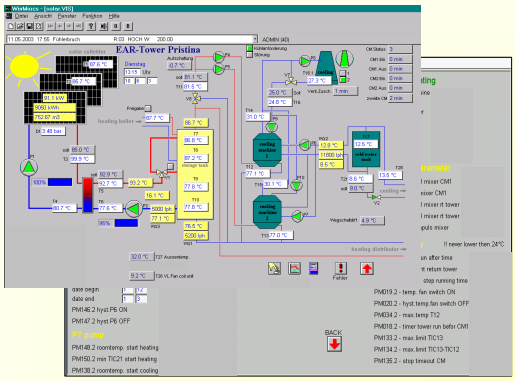
# >gluatmugl HT< collector

- Special high temperature flat plate collectors >gluatmugl HT< give significant efficiency advantage
  - improved design for reduced heat losses
  - double glazing (teflon film)
  - increased insulation
  - up to 25% more power in high temperature range
  - official certification (Solar Keymark) will follow – we expect heat losses of less than 2.5 W/m²*K



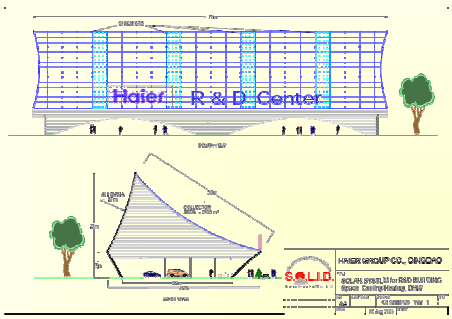

# Operational Support

- Optimization is absolute *must-have* for every solar plant
  - especially important for solar air conditioning!
- Aftercare of the system after placing into operation
  - Eduction of local O&M staff
  - Optimization with tele-control system after placing into operation
  - Ongoing control and analysis of key data
  - If necessary: joint trouble shooting with customer
  - Ongoing service & maintenance if desired



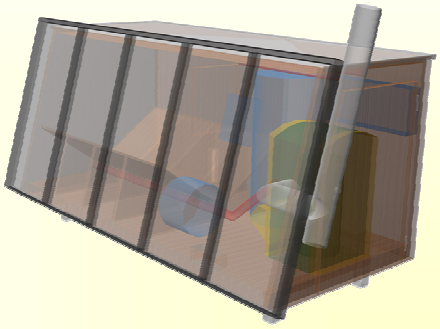
# New SAC projects…

- Lisbon
  - 2,000 m² project for bank headquarters
  - Space cooling, heating, DHW
  - Integration into complex existing system
  - Currently in detailed engineering phase…
- Qingdao (China)
  - 2,000 m² project for R&D building of engineering company
  - Space cooling, heating, DHW
- Many projects are in the planning phase
  - Hotels, Industry companies, office buildings, hospitals, …




# New concept for SAC?

- Pre-assembled ‚Energy Cabins'
  - available for heating, cooling and combined heating & cooling
- Main advantages
  - easy to transport
  - cost-efficient through pre-assembling
  - avoids troubles with different local plumbering techniques
  - Available from 17 kW to 210 kW
- Automatically quality control
  - Automatically function control and automatically control for the optimal energy output



# Solar cooling - summary

- The solar technology is a proven technology
- The implementation in an existing building is normally easy
- Low number of moved parts – longer lifetime
- The lifetime of the used parts are more than 20 years
- New concepts are available
- Telemonitoring and optimisation during the first months is important for a solar cooling plant

# Solar cooling - summary

- The amortisation time is between 7-15 years and depends from:
  - The local situation (roof, existing systems, …)
  - The existing energy costs
  - Available funds for solar plants
  - …
- The maintenance costs are very low
- **Solar cooling is the future!**

# *Thank you!*

*Large scale solar plants with S.O.L.I.D.*

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