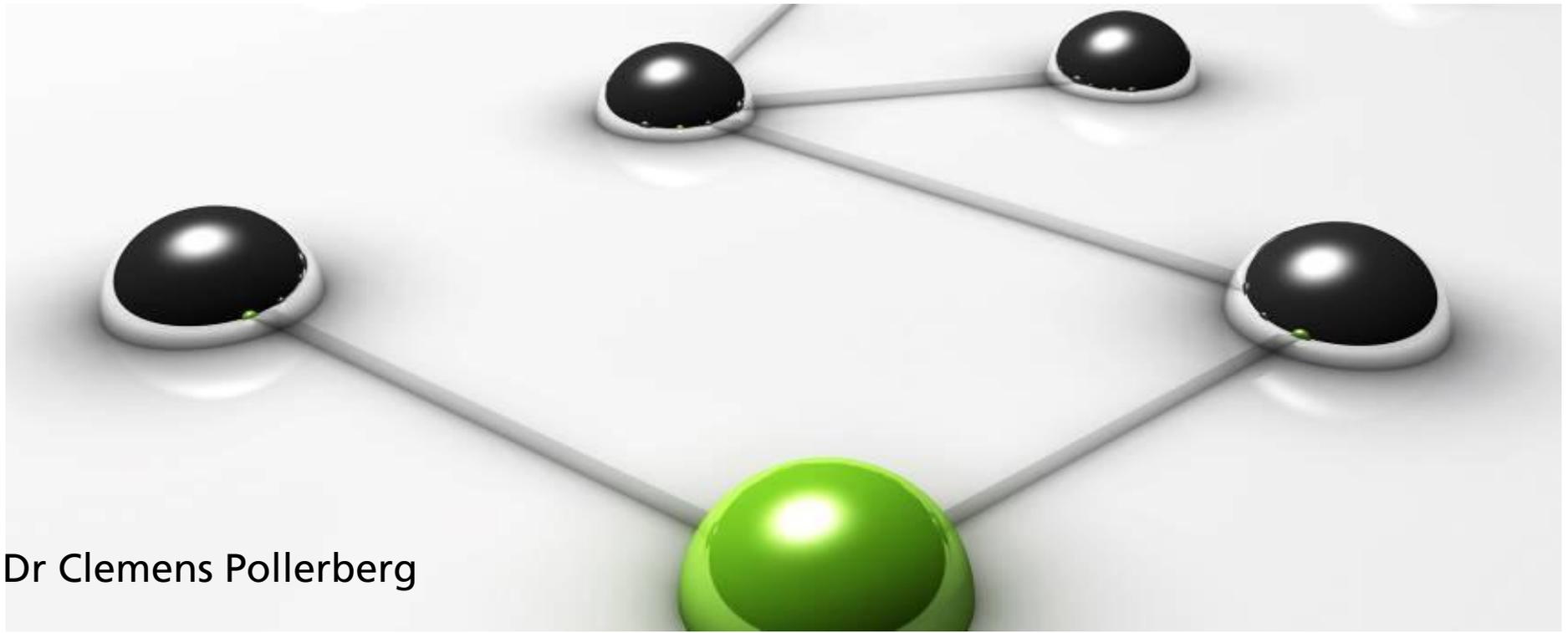


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# Solar Cooling – Current activities at Fraunhofer UMSICHT

March 21, 2013



Dr Clemens Pollerberg

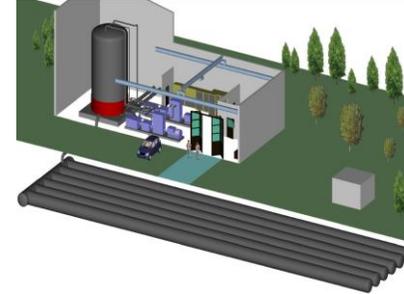
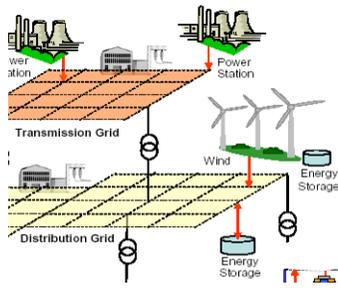
# Fraunhofer Institute UMSICHT

- Topics Products, Production and Energy
- Foundation 1990
- Budget 2011 24.8 million € (9.8 million € industry)
- Staff 345 (198 permanent staff)
- Projects ca. 300 p.a.
- Spin-Offs 13



# Topic Energy

- Energy Systems Engineering  
(Development of ORC for biogas plants, compressed air energy storage)
- Energy Systems  
(Analysis, modelling/simulation and benchmarking of energy supply concepts, integration of electrical energy storages)
- Chemical Energy Storage  
(Thermo-chemical storage, generation and use of biogas)
- Electrical, Thermal Energy Storage  
(Redox-Flow batteries, Phase Change Slurries, thermally driven cold generation for CHPC or solar cooling)



# Thermal Storage and Systems



## ■ Thermal energy storage

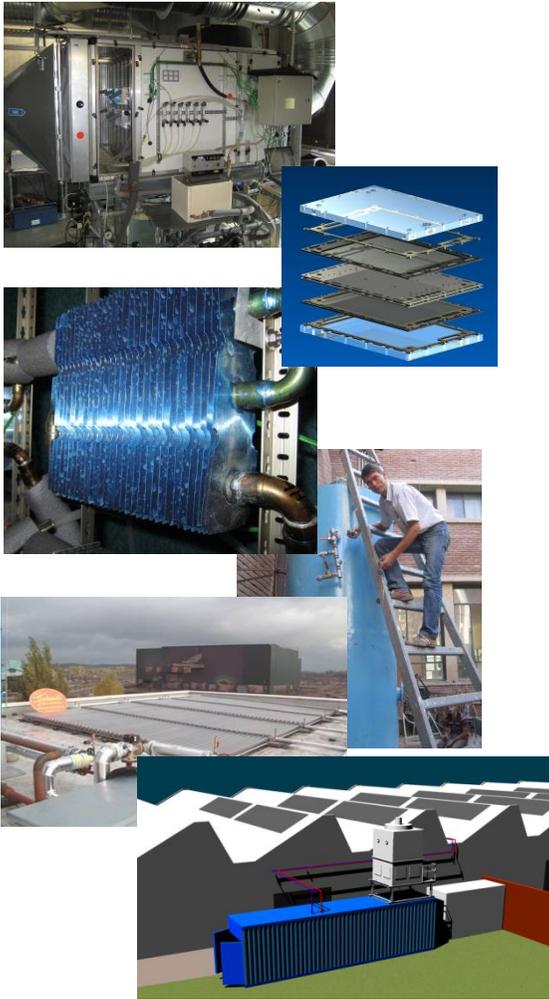
- Cold storage and low temperature heat storage based on phase change slurries
- Stationary and mobile applications, temperature range 0 – 50 °C
- Development and characterisation of the fluid as well as concept- and system development

## ■ Thermally driven cold generation

- Absorption and jet ejector chiller for CHPC and solar cooling
- Development of the technology as well as system integration and realisation
- Exploitation of technology:  
Spin-Off „VSM Solar Private Limited“ in India



# Projects related to solar cooling



- **Membrane absorption chiller**  
Development of a small absorption chiller, surface coatings of dry coolers used for heat rejection
- **ProSolarDSKM**  
Solar-driven steam jet ejector chiller, steam generation by evacuated tube collectors, latent heat and cold storage
- **Solar Cooling India**  
Realisation of a demonstration plant and consultancy during start up phase of a company

## Project in acquisition

- **Solar Cooling for Egypt**  
Cooperation with the university of Assiut, investigation into the possibilities of solar cooling for this region

# Main interests in the New Task

- Subtask A: Components, Systems & Quality
  - A2: Adapted compression chillers and heat pumps for solar cooling  
→ Solar Cooling for Egypt
  - A3: new generation solar production for cooling (PV and others)  
→ Solar Cooling for Egypt and ProSolarDSKM
  - A4: Storage  
→ Phase Change Slurry activities
- Subtask C: Testing and demonstration projects
  - C2: System selection for field test and demo project  
→ Solar Cooling for Egypt and ProSolarDSKM
  - C3: Monitoring data analysis on technical issues  
→ Solar Cooling for Egypt and ProSolarDSKM
  - C4: Monitoring data on performances  
→ Solar Cooling for Egypt and ProSolarDSKM

# Concrete inputs to the Work plan

- Subtask A: Components, Systems & Quality
  - D-A3: Technical report on recent and on-going R&D work on the topic
  - D-A5: Technical report on best practices for energy storage including both efficiency and adaptability in solar cooling systems
  - D-A6: Techno-economical analysis report on comparison between thermal and PV existing solar cooling systems
- Subtask C: Testing and demonstration projects
  - D-C2 : Catalogue of selected systems (with full description)
  - D-C3 : Technical report on monitoring data analysis (technical issues + performances)
  
- Desire/request for the New Task: Enlarge scope to other applications than building cooling, e.g. cooling of electronic shelters, food stocks!?!)



# Fraunhofer

## UMSICHT

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