IEA Task 38, expected results and opportunities of collaboration

Hans-Martin Henning
Fraunhofer-Institut für Solare Energiesysteme ISE,
Freiburg/Germany

Workshop “Solar Air-Conditioning and Refrigeration”
April 25, 2007
Aix-les-Bains, FRANCE

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The International Energy Agency

- **The International Energy Agency (IEA) is an autonomous body within the framework of the Organisation for Economic Co-operation and Development (OECD)**
- **It was established in 1974**
- **It has 26 member countries**

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Basic aims of the IEA

- To maintain and improve systems for coping with oil supply disruptions
- To promote rational energy policies in a global context through co-operative relations with non-member countries, industry and international organisations
- To operate a permanent information system on the international oil market
- To improve the world's energy supply and demand structure by developing alternative energy sources and increasing the efficiency of energy use
- To assist in the integration of environmental and energy policies

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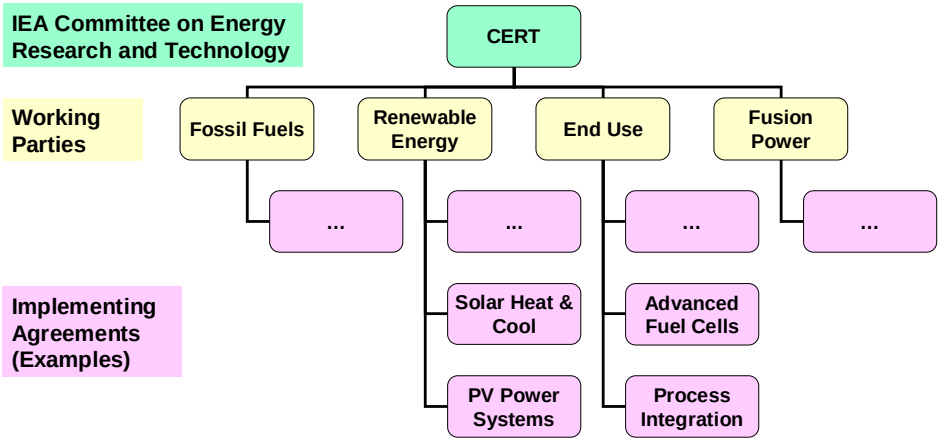
International energy technology co-operation



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Energy end-use

- **Energy end-use: Transportation**
- **Energy end-use: Industry**
- **Energy end-use: Buildings**
  - Demand Side Management
  - **District Heating and Cooling**
  - **Energy Conservation in Buildings and Community Systems**
  - **Energy Conservation through Energy Storage**
  - Heat Pumping Technologies
- **Energy end-use technologies: information centres, systems analysis**

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Renewable energy

- Bioenergy
- Geothermal Energy Research Technology
- Hydropower Technologies and Programmes
- Ocean Energy Systems
- Photovoltaic Power System (PVPS)
- Production and Utilization of Hydrogen
- **Solar Heating and Cooling Systems (SHC)**
- Solar Power and Chemical Energy Systems (SolarPACES)
- Wind Turbine Systems

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Solar Heating & Cooling Implementing Agreement

- Established in 1976
- Works on technologies that use the energy of the sun to heat, cool, light and power buildings
- 19 countries (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Mexico, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States) + European Commission
- Mission: "To facilitate an environmentally sustainable future through the greater use of solar design and technologies."
- International co-operation on a Task sharing basis

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Background - status of installed solar driven systems

- about 100-120 systems in Europe
- About 8-9 MW cooling capacity
- approx. 20000 m² collector area
- Technologies
  - 60 % absorption
  - 12 % adsorption
  - 25 % desiccant solid
  - 4 % desiccant liquid

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Background - conventional air-conditioning

- **Electricity driven**
- **Maximum consumption at peak load time**
- **HCFCs and HFCs: no ozone depletion potential but global warming potential**
  - leakage about 5-15 % p.a.
  - for mobile A/C: fade out of today's refrigerants in EU starting 2009 (new cars)

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Possible solutions

- **Reduction of GWP**
  - CO_2 as refrigerant ==> lower COP
  - indirect systems (no refrigerant networks) == > lower COP
  - gas driven systems (gas-motor - compressor): 400.000 units in Japan, strong growth rate in Italy (approx. 30.000 units installed) ==> primary energy?
- **Energy saving + reduction of GWP**
  - **thermally driven systems: CHP, district heat, biomass, solar**

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Drivers

- **Environmental drawbacks of conventional air-conditioning and refrigeration**
- → **Seeking for environmentally sound, sustainable solutions for building air-conditioning**
- **Small scale heat driven chillers**
  - Many companies work on new sorption systems in the range of small capacities
- **Collectors for medium temperatures (> 80℃)**
  - Many companies work on new solar collectors for medium temperatures (Task 33 Solar Industrial Process Heat)

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Main needs

- standardized systems
- small capacity systems
- advanced operation & control
- transfer to professionals

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Main objective, Scope

- **Implement measures to accelerate the market introduction of Solar Cooling systems in different sectors (residential, commercial, industrial)**
- **Technical scope**
  - Standardised, pre-engineered systems for applications in the low capacity range (residential, small commercial)
  - Develop concepts and create tools for a proper implementation in large scale applications (e.g., large office and residential buildings, hotels, industry, etc)
  - Contribute to the realisation of new research activities for the development of advanced systems and concepts

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Task structure

Subtask A

Pre-engineered systems for residential and small commercial applications

Subtask B

Custom-made systems for large non-residential buildings and industrial applications

Subtask C

Modeling and fundamental analysis

Subtask D

Market transfer activities

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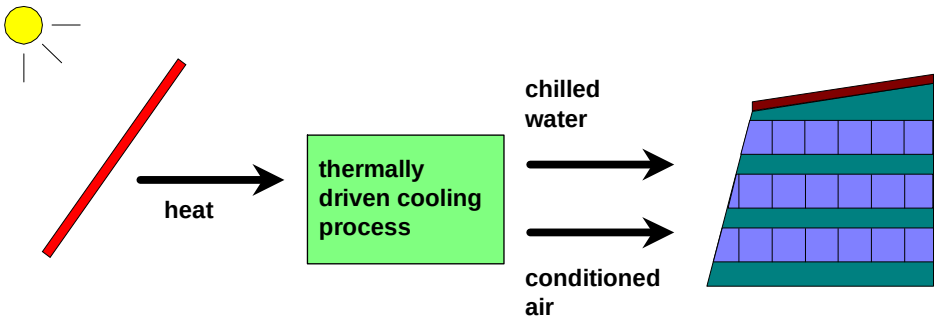
Technical scope - application



Comfort air-conditioning

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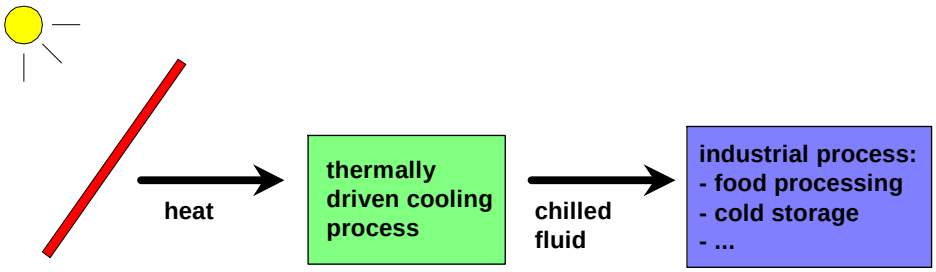
Technical scope - application



Refrigeration

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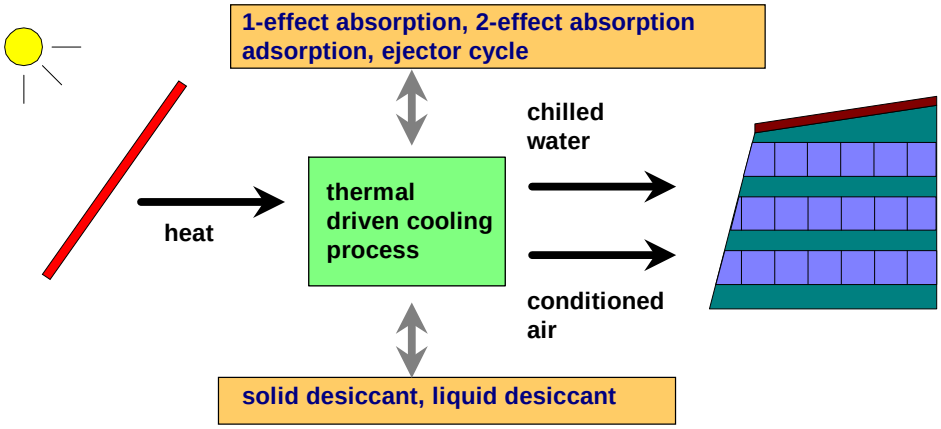
Technical scope - technologies



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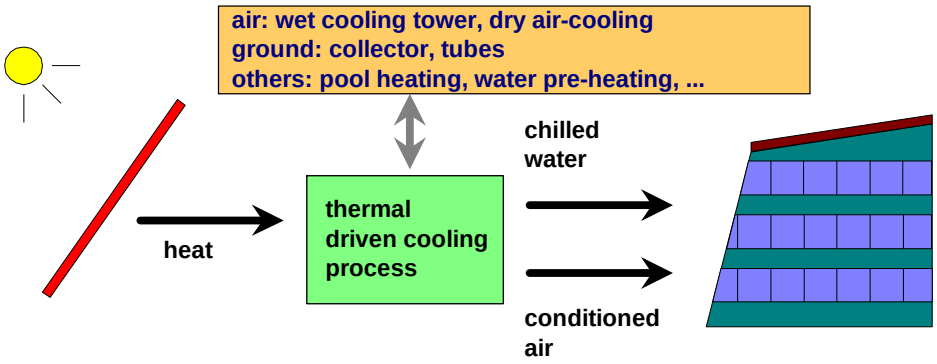
Technical scope – heat rejection



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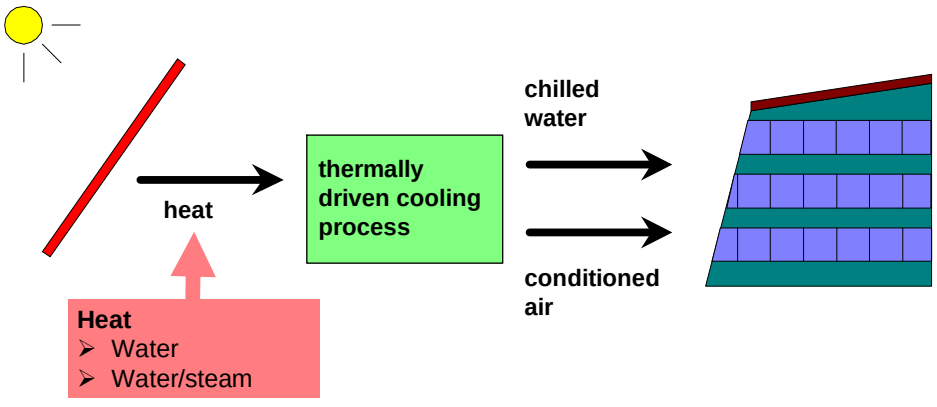
Technical scope – storage



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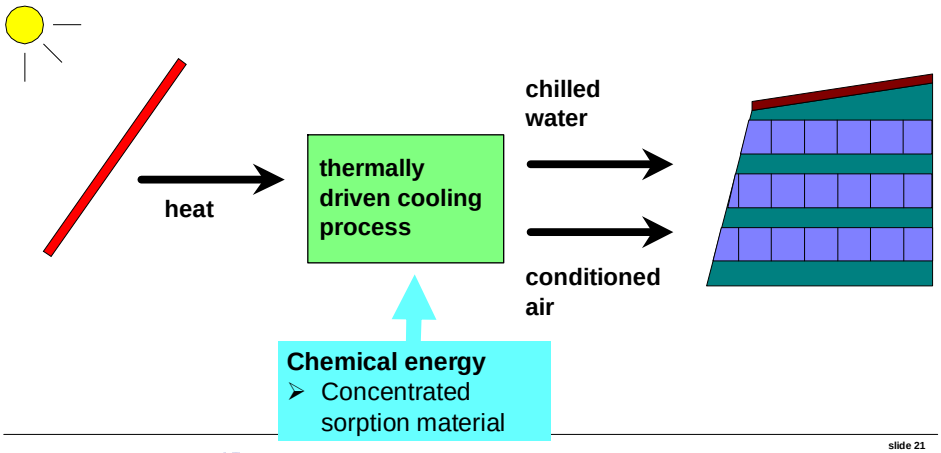
Technical scope – storage



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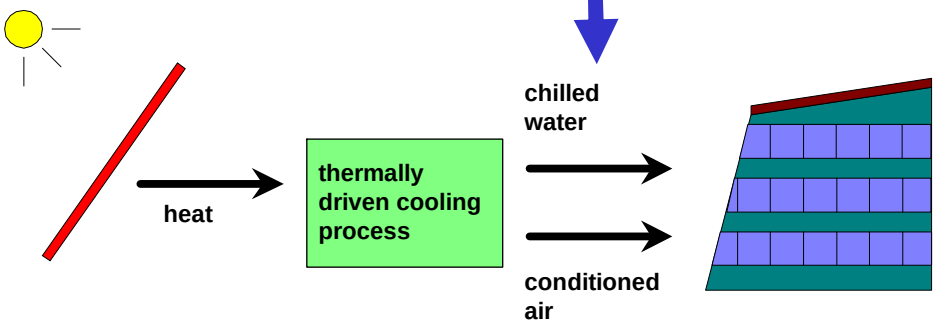
Technical scope – storage

Cold side
- Chilled water
- PCM (slurry)
- Ice



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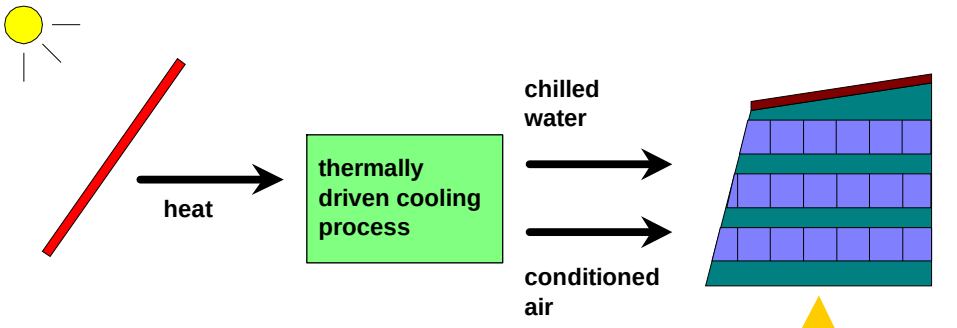
Technical scope – storage



Building integrated
- Thermally acti-vated building components
- Building integra-ted PCM

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Participating countries

- **Definitely participating**
  - Austria
  - Australia
  - Canada
  - Denmark
  - France
  - Germany
  - Italy
  - Mexico
  - Portugal
  - Spain
  - Switzerland
- **Interested but not so clear**
  - Netherlands
  - Sweden
- **Countries with some interest being no member of the Implementing Agreement**
  - Greece
  - Malta (not yet)
  - UK

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Operating Agent and Subtask Leadership

- **Operating Agent**
  - ➔ Germany: Fraunhofer ISE (Hans-Martin Henning)
- **Subtask A Pre-engineered systems**
  - ➔ Austria: AEE INTEC, Gleisdorf (Dagmar Jähnig)
- **Subtask B Custom-made systems**
  - ➔ Italy: EURAC Research, Institute for Renewable Energies, Bolzano (Wolfram Sparber)
- **Subtask C Modeling and fundamental analysis**
  - ➔ France: Institut National d'Energie solaire INES, Chambery (Rene Wurtz)
- **Subtask D Market transfer activities**
  - ➔ Italy: Polytecnic di Milano (Mario Motta)

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… thank you for your attention!

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