Development of a technology roadmap for solar thermal cooling in Austria

Anita Preisler

IEA SHC Task 48 Expertmeeting

Milan – 26.-27. March 2012

Content

- Authors
- Background and Objectives
- Methodology
- Results
  - Packages of measures for technology development
  - Packages of measures for market penetration
  - Packages of measures to promote innovation
- Conclusions

General Information

- Authors of publishable report (German)
  - Ing. Anita Preisler, Austrian Institute of Technology/Energy Department
  - DI Tim Selke, Austrian Institute of Technology/Energy Department
  - DI Hilbert Focke, Austria Solar Innovation Center
  - DI (FH) Nicole Hartl, Austrian Energy Agency
  - DI (FH) Georg Geissegger, Austrian Energy Agency
  - Dr. Erich Podesser, Podesser Consulting
  - Dr. Alexander Thür, AEE INTEC

Background and Objectives

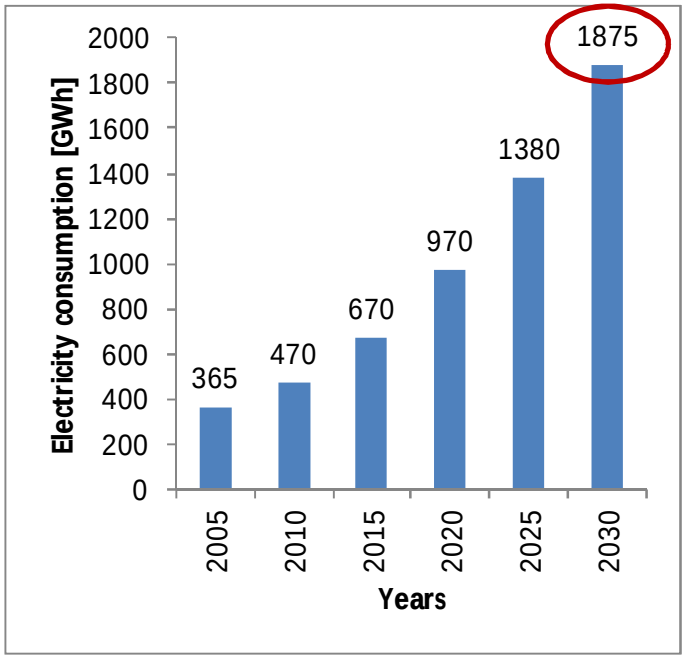
- Background
  - *Pro* solar thermal cooling development in Austria:
    - High quality products available (solar thermal collectors, absorption chillers)
    - Internationally recognised know-how (Universities, research institutions, system planning and installation)
  - *Contra* solar thermal cooling development in Austria:
    - Existing know-how concentrates on few institutions and companies
    - Few demonstration sites with mainly research character available
    - Development path and necessary measures are not clear defined
- Objectives
  - Illustration of possible technology development until 2030 and therefore necessary measures
  - Investigation of market potentials for relevant technologies
  - Position clarification of solar thermal cooling for future energy supply systems in Austria

Methodology

- Following approach was accomplished to develop the technology roadmap:
  1. Investigation of initial position
     - Existing solar thermal cooling plants in Austria (technical data, cost data, weak points)
     - Compilation of current relevant R&D results, studies and roadmaps
  2. Expert workshops
     - Scenarios for market and technological development
     - Scenarios for Austrian market relevance and cost trends
  3. Evaluation by market players
     - Interviews with component manufacturers (solar thermal collectors, ab-/adsorption chillers, ventilation systems, storages, control etc.), real estate developers, planners and research institutions
  4. Packages of measures
     - Technology development, market penetration and innovation promotion
     - Division in short-term (1-5 years) and middle-/long-term (10-20 years) packages of measures

Results

- Increase of electricity consumption in Austria caused by air-conditioning of buildings in Austria*



* Haas R., et al., Wärme und Kälte aus Erneuerbaren 2030, Dachverband Energie Klima, Energy Economics Group, Wien, 2007

Results

- Scenarios of CO2-Savings by solar thermal cooling systems for 2030 depending on:
  - Substitution of electricity consumption caused by conventional cooling technologies (5%, 10%, 20%)
  - Energy performance of solar thermal cooling system (COPel)

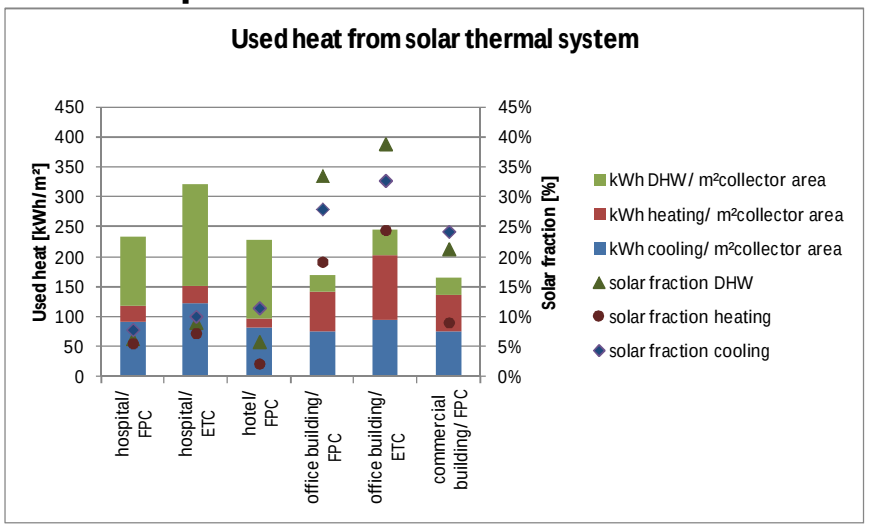
  → only cold side of solar thermal cooling system

Substituation of electricity consumption caused by conventional cooling technologies COPel 2,7 - 3,5		Scenario 1: 20 % Savings COPel 3,4 - 4,4		Scenario 2: 40 % Savings COPel 4,5 - 5,8		Scenario 3: 60 % Savings COPel 6,8 - 8,8	
%	GWh/a	GWh/a	t CO_2/a	GWh/a	t CO_2/a	GWh/a	t CO_2/a
5	93,8	18,8	12.750	37,5	25.500	56,25	38.250
10	187,5	37,5	25.500	75,0	51.000	112,5	76.500
20	375,0	75,0	51.000	150,0	102.000	225	153.000

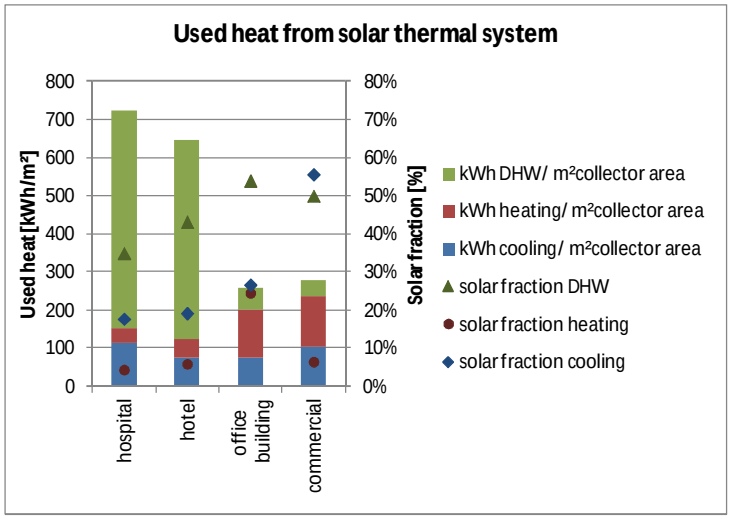
Results

- Calculated specific energy supply by solar thermal cooling systems in Austria (source: ROCOCO-Project*):
  - Different applications: hospital, hotel, office building, commercial building
  - Using different collector types: flat plat collectors (FPC) or evacuated tube collectors (ETC)

Absorption



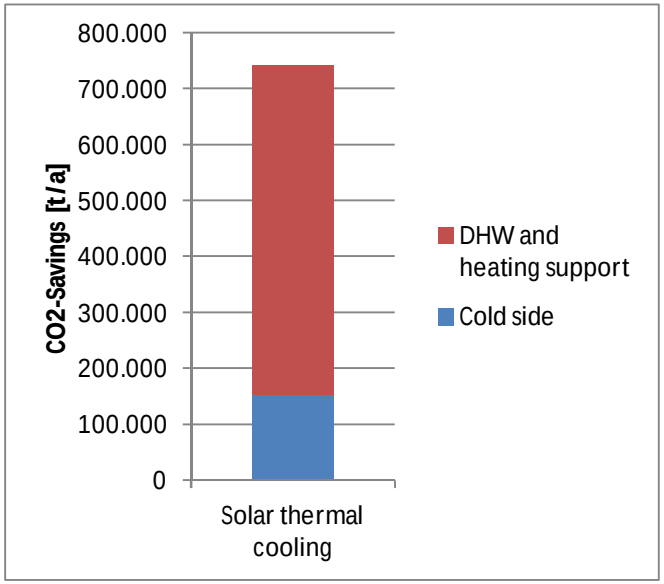
DEC-Systems

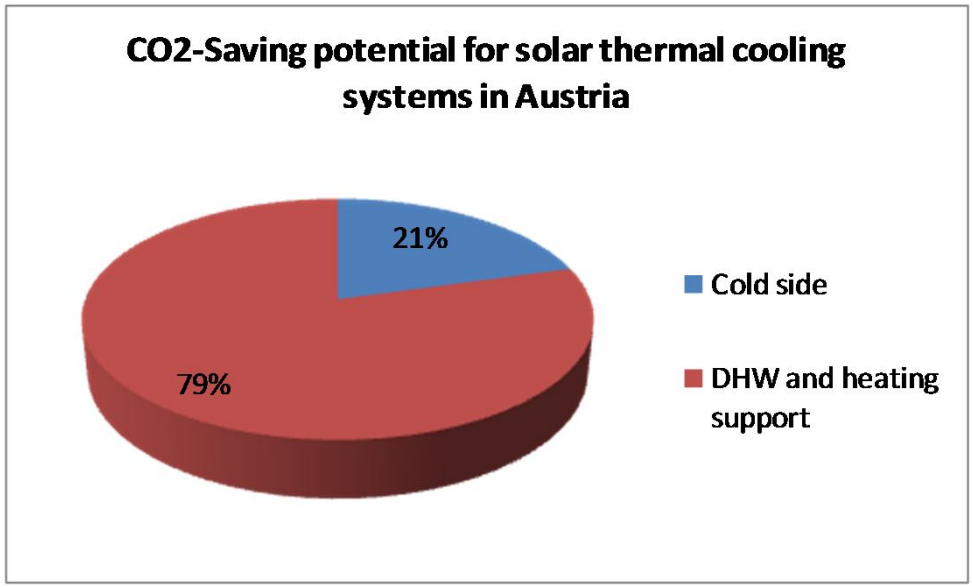


*Preisler A., Selke T., Sisó L., LeDenn A., Ungerböck R., ROCOCO – Reduction of Costs of Solar Cooling Systems, European Project in 6th Framework Program, TREN/05/FP6EN/SO7.54855/020094, Specific Support Action, Wien, 06/2008

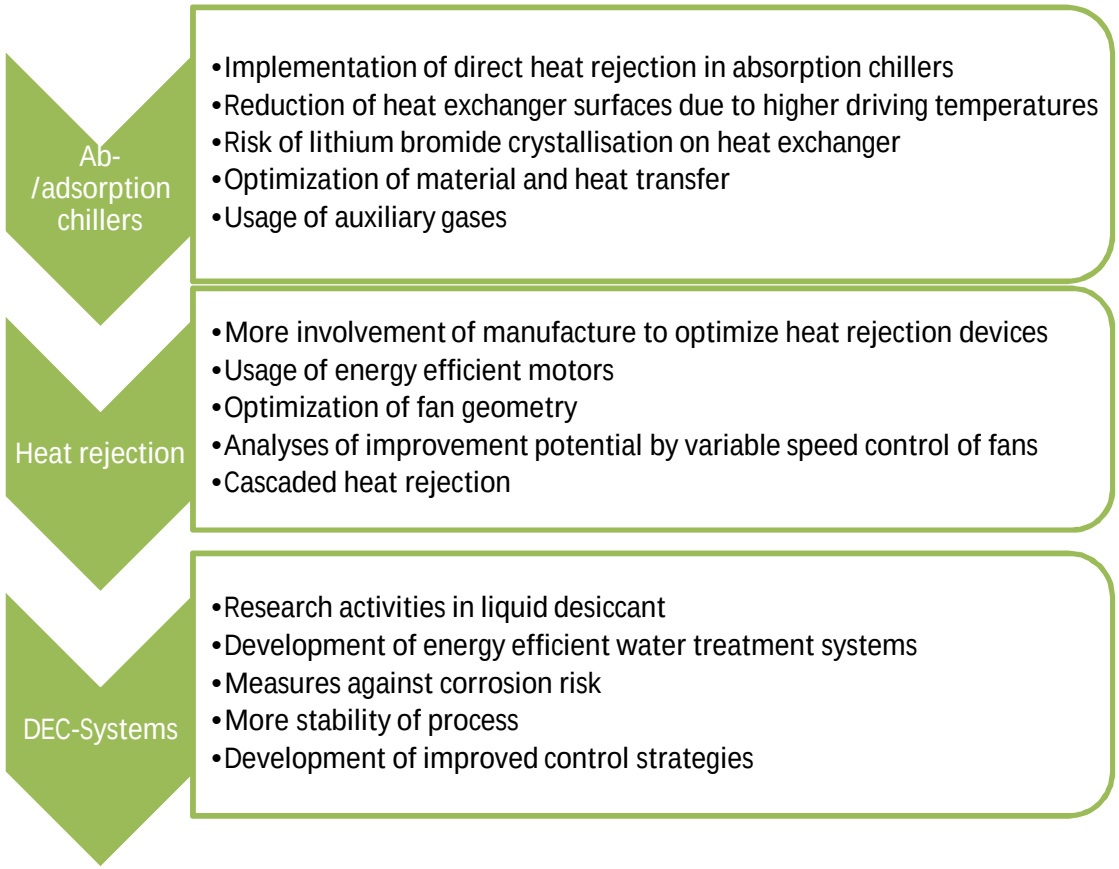
Results

- CO2-Saving of high potential solar thermal cooling systems in Austria for cooling demand in 2030:
  - Scenario with 20% Substitution of electricity consumption caused by conventional cooling technologies
  - High energy performance (COPel >7)

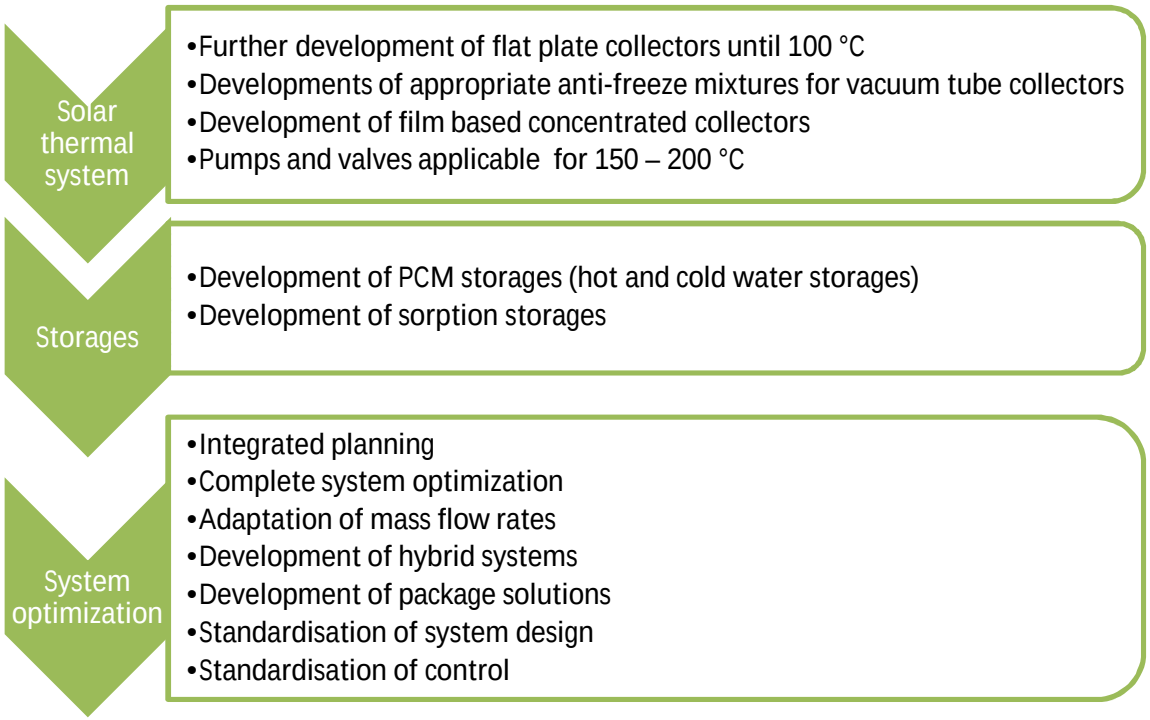




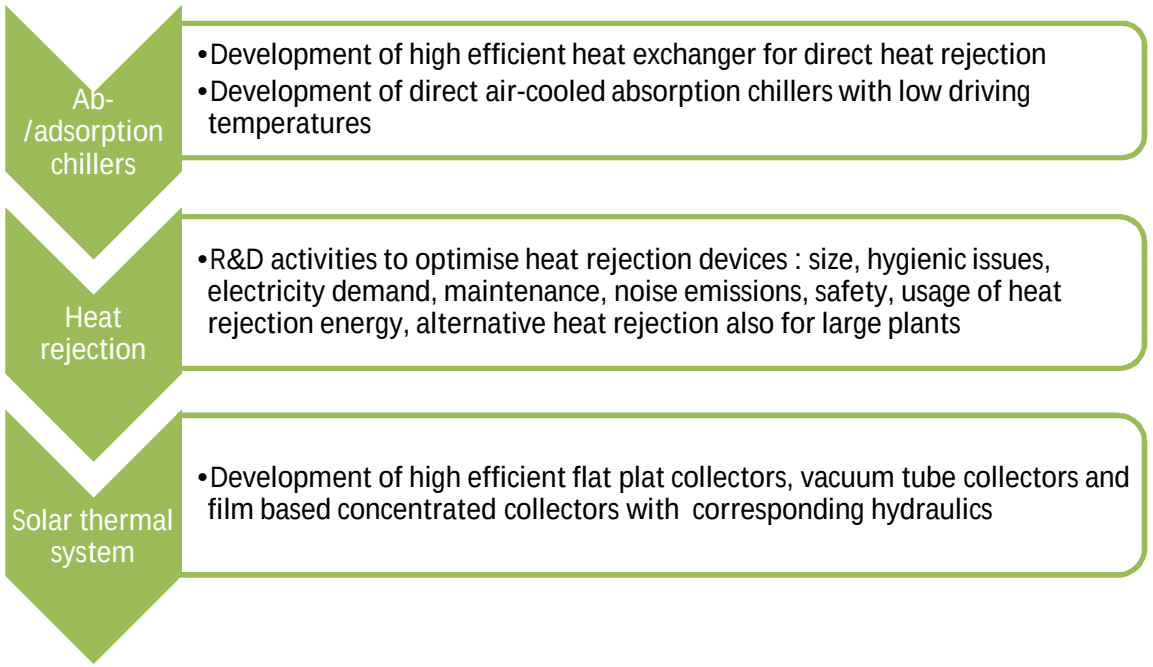
Short-term packages of measures for technology development



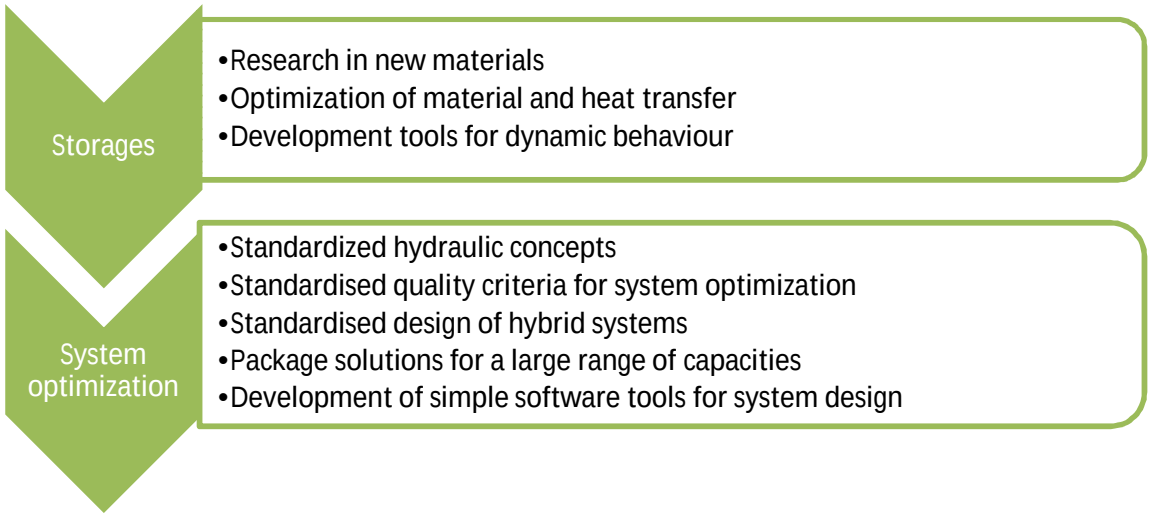
Short-term packages of measures for technology development



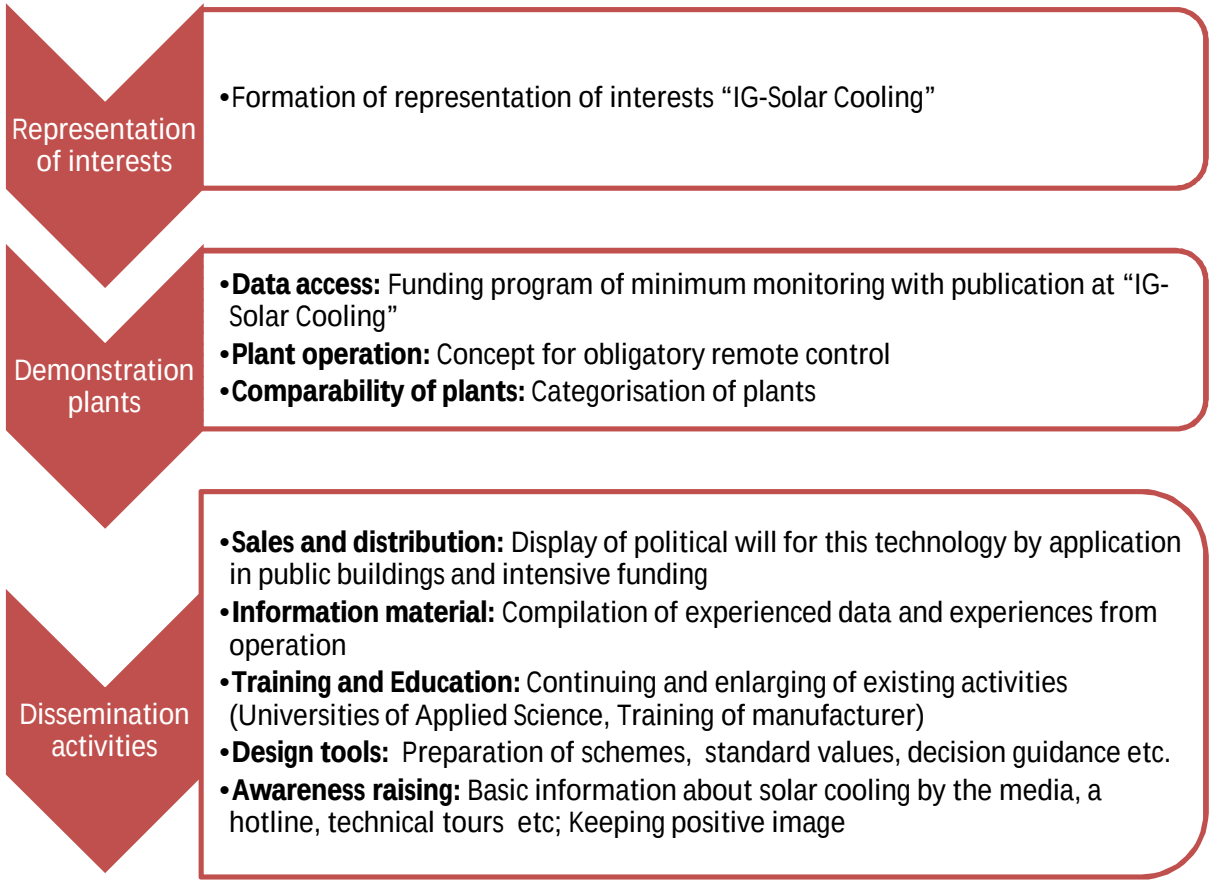
Medium-/long-term packages of measures for technology development



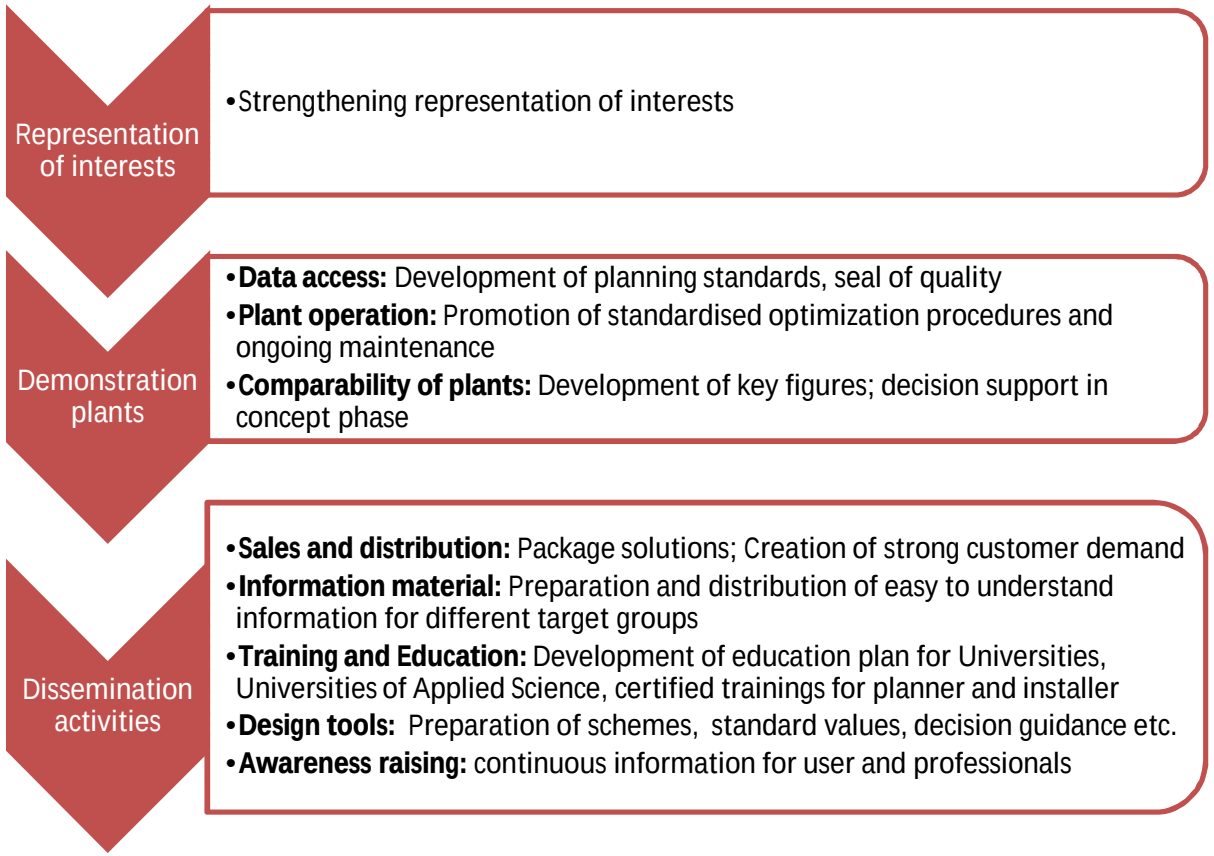
Medium-/long-term packages of measures for technology development



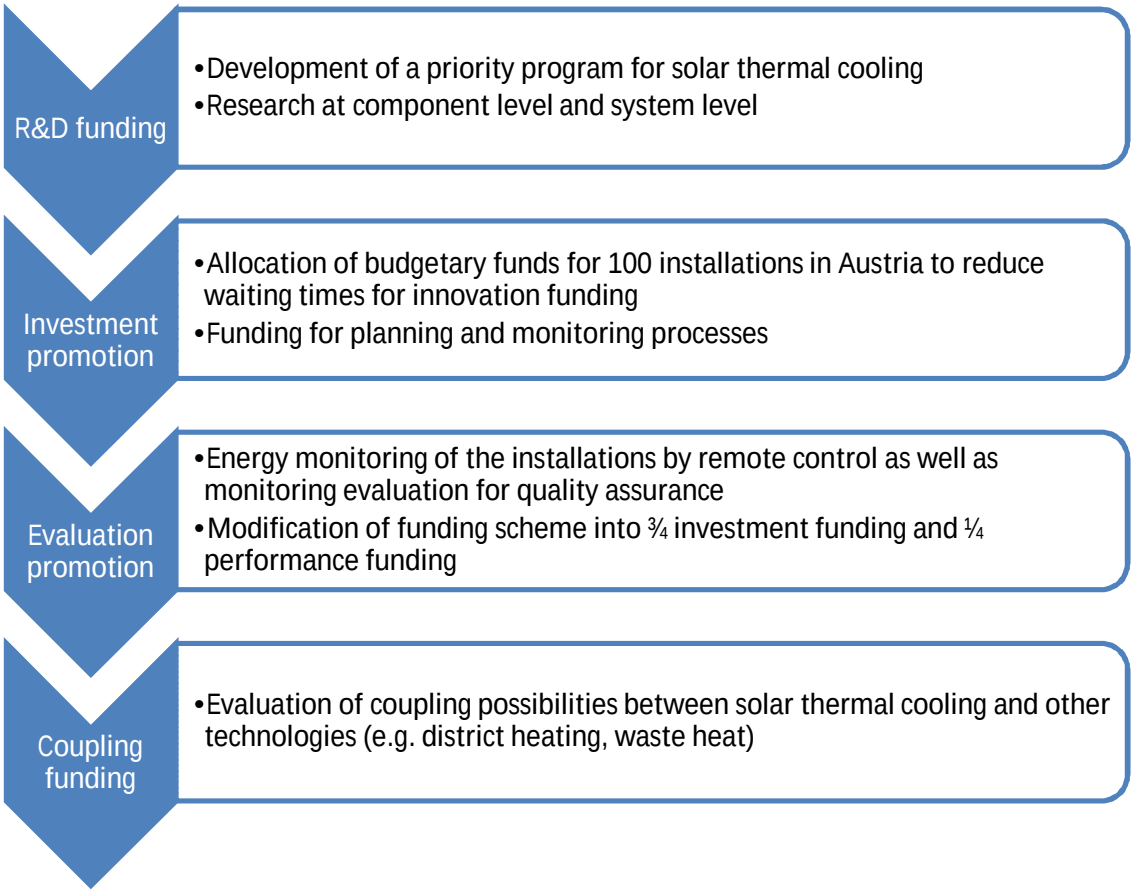
Short-term packages of measures for market penetration



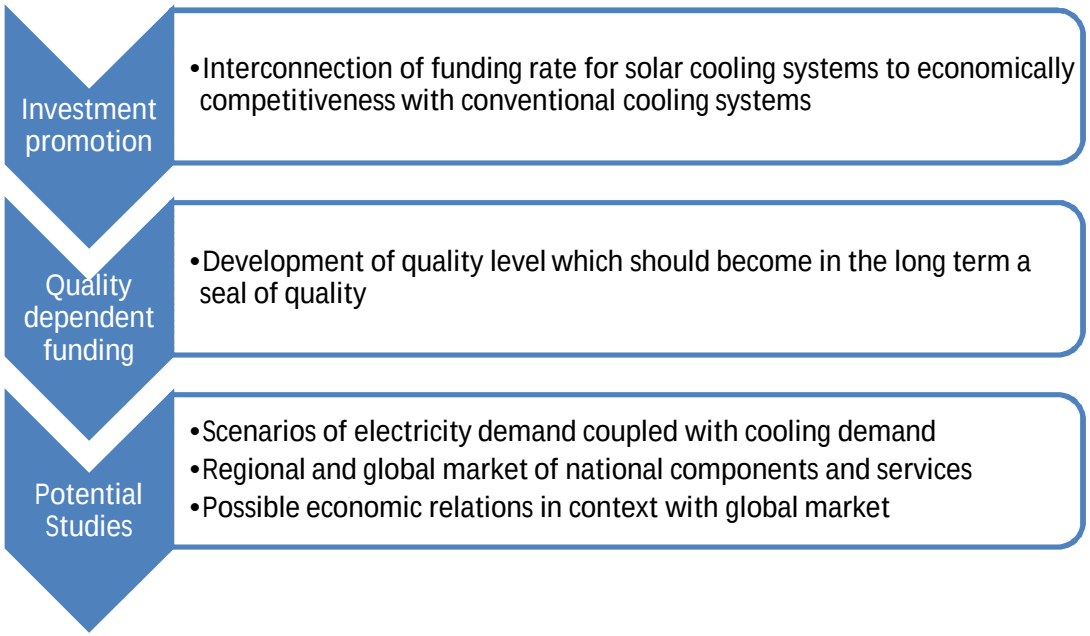
Medium-/long-term packages of measures for market penetration



Short-term packages of measures to promote innovation



Medium-/long-term packages of measures to promote innovation



Conclusions

- Technology strength in solar thermal cooling was built up in the last 5 to 10 years in Austria
- Goal now is to get from currently few demonstration sites into a broader market penetration with competitive plants to compression cooling
- DEC Technology has high potential in Austria especially in winter, due to heat and humidity recovery
- CO2-savings of solar thermal cooling systems in Austria are mainly achieved by hot water preparation and heating support, not by the cold side
- Recommended measures:
  - R&D on component and system level to increase COPel of systems
  - Initiation of solar thermal cooling funding program
  - Investment funding for demonstration sites with high replicability
  - Setting up quality assurance procedures
  - Training and education measures for planners and installers
- Final Report (German) will be available until May 2012 at: www.energiesystemederzukunft.at