Solar Cooling Design Guide
Results of an expert survey

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INTRODUCTION

- **Task 48**

- Lack of
  - efficient,
  - reliable and
  - cost competitive SHC solutions

- Summary of experiences / lesson's learned
  - General findings → 10 key principles
  - Specific outcomes → 3 examples

- The Solar Cooling Design Guide, Case Studies of Successful Solar Air Conditioning Design
INTRODUCTION

- As companion to Solar Cooling handbook
- Specific description of design for already built and successful SHC examples.
- Promoting of solar cooling!?

INTRODUCTION

- Solar Energy Paper, Special Issue: Solar Cooling
- Scientific background
  - Literature in context of Task48
  - Recent literature review
  - expert survey
- Expert Survey
  - About the 10 key principles
  - Assessment of importance
  - elucidate of expert experiences

- Thanks to all supporter’s of our book and paper!!
10 key principles

- **Principle 0:** Reduce energy demand before applying renewables
- **Principle 1:** Choose applications where high annual solar utilization can be achieved
- **Principle 2:** Avoid using fossil fuels as a backup for single effect ab-/adsorption chillers
- **Principle 3:** Design the ab-/adsorption chiller for relatively constant operation at near full load
- **Principle 4:** Use wet (or hybrid) cooling towers whenever possible
- **Principle 5:** Design the solar collectors for operation at average (not peak) solar radiation levels
10 key principles

- Principle 6: Keep the process flowsheet simple and compact
- Principle 7: Provide thermal storage capacity and hydraulics in a form that matches the thermal requirements of each application
- Principle 8: Minimise parasitic power
- Principle 9: Minimise heat losses
- Principle 10: Apply appropriate resources to designing, monitoring and commissioning

→ Importance and significance of 10 key principles?
→ Survey under solar cooling experts
Expert survey

- 5 questions, open- and closed ended
- 27 Experts provided feedback (20 of IEA Task 53)
- 230 SHC plants
- Different net samples
  - Origin (south/north)
  - Profession (scientist, consultant, company)
Rating

- “Controversial”
  - **Principle 3**: Design the ab-/adsorption chiller for relatively constant operation at near full load
  - **Principle 4**: Use wet (or hybrid) cooling towers whenever possible
  - **Principle 5**: Design the solar collectors for operation at average (not peak) solar radiation levels
Rating

- „Important“
  - **Principle 2:** Avoid using fossil fuels as a backup for single effect absorption/adsorption chillers
  - **Principle 7:** Provide thermal storage capacity and hydraulics in a form that matches the thermal requirements of each application
  - **Principle 9:** Minimise heat losses
Rating

- "Essential"
  - **Principle 1:** Choose applications where high annual solar utilization can be achieved
  - **Principle 6:** Keep the process flowsheet simple and compact
  - **Principle 8:** Minimise parasitic power
  - **Principle 10:** Apply appropriate resources to designing, monitoring and commissioning
Summary

- 10 key principles support successful design
- Three categories were found
  - Essentials: undisputed
  - Important: from second attention
  - Controversial: different solutions possible
- Further work in Task 53
  - Include operation
  - Include new generation – ST & PV
  - ....

- Thank you for your support of the survey!
Thank you for your attention!