

Solar combisystems in Denmark and China

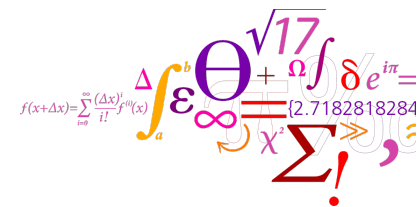
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Aims:

- **Development of a drain back solar combi system with evacuated tubular collectors.**
- **Optimization of drain back solar combi systems.**
- **Demonstrations of solar combisystems in Denmark and China.**

Partners:

- Technical University of Denmark
- Beijing Solar Energy Research Institute Co., Ltd.
- Beijing Institute of Technology
- Beijing University of Chemical Technology

Period for Danish project:

April 1, 2010 ----- December 31, 2013

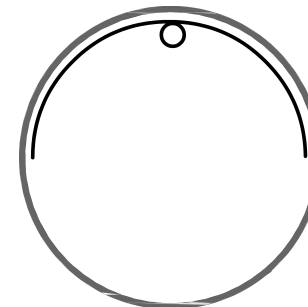
Plan:

➤ Investigations of solar collectors (experimental and theoretical)

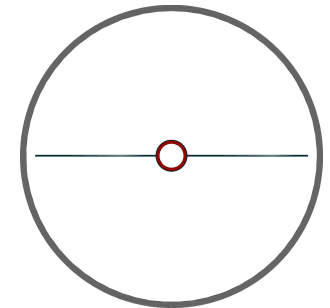
(1) Test in an outdoor facility

In Denmark 3 evacuated tubular collectors will be tested:

SEIDO 1-16, SEIDO 5-16, SEIDO 10-20,

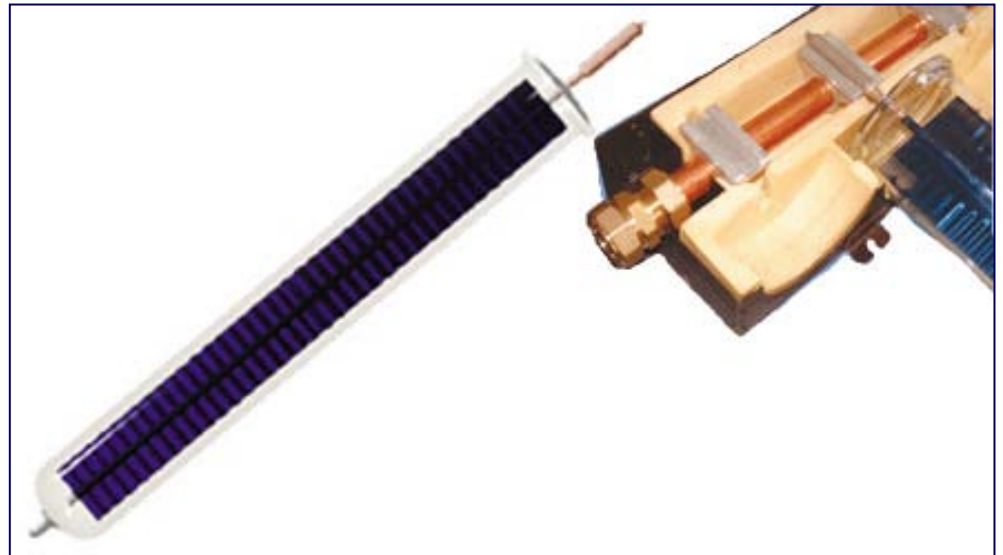
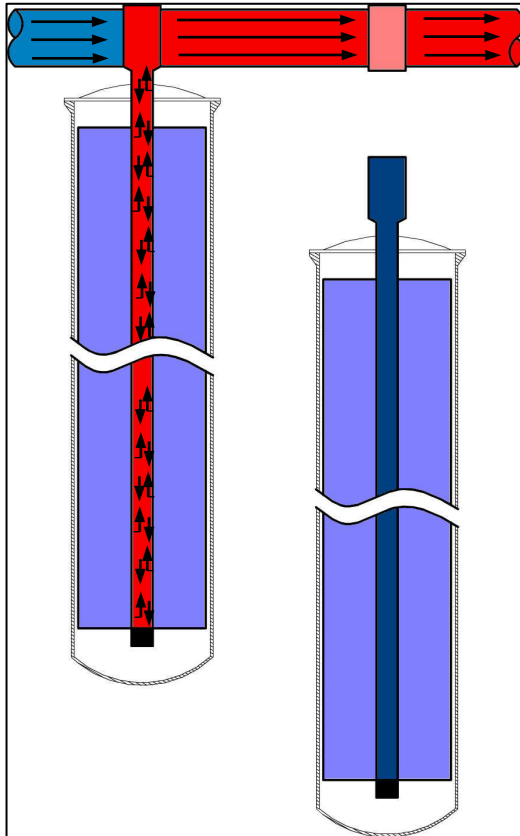


SEIDO5



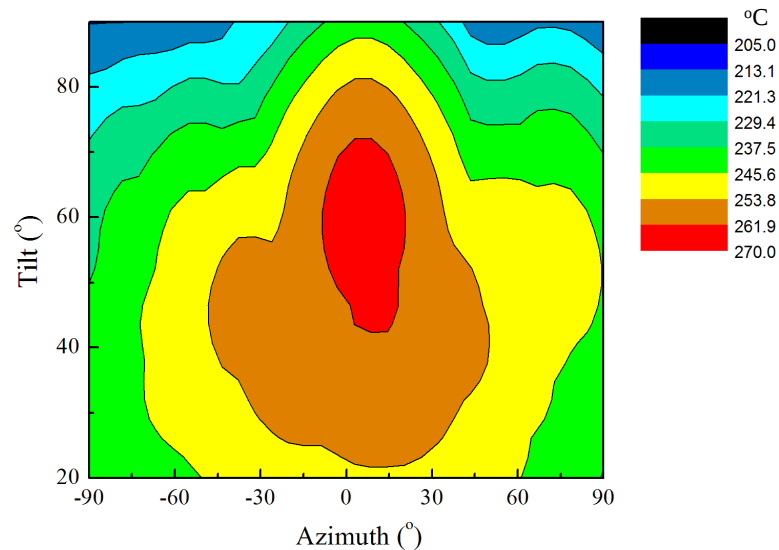
SEIDO1

Heat pipe evacuated tubular collector



Drain back system:

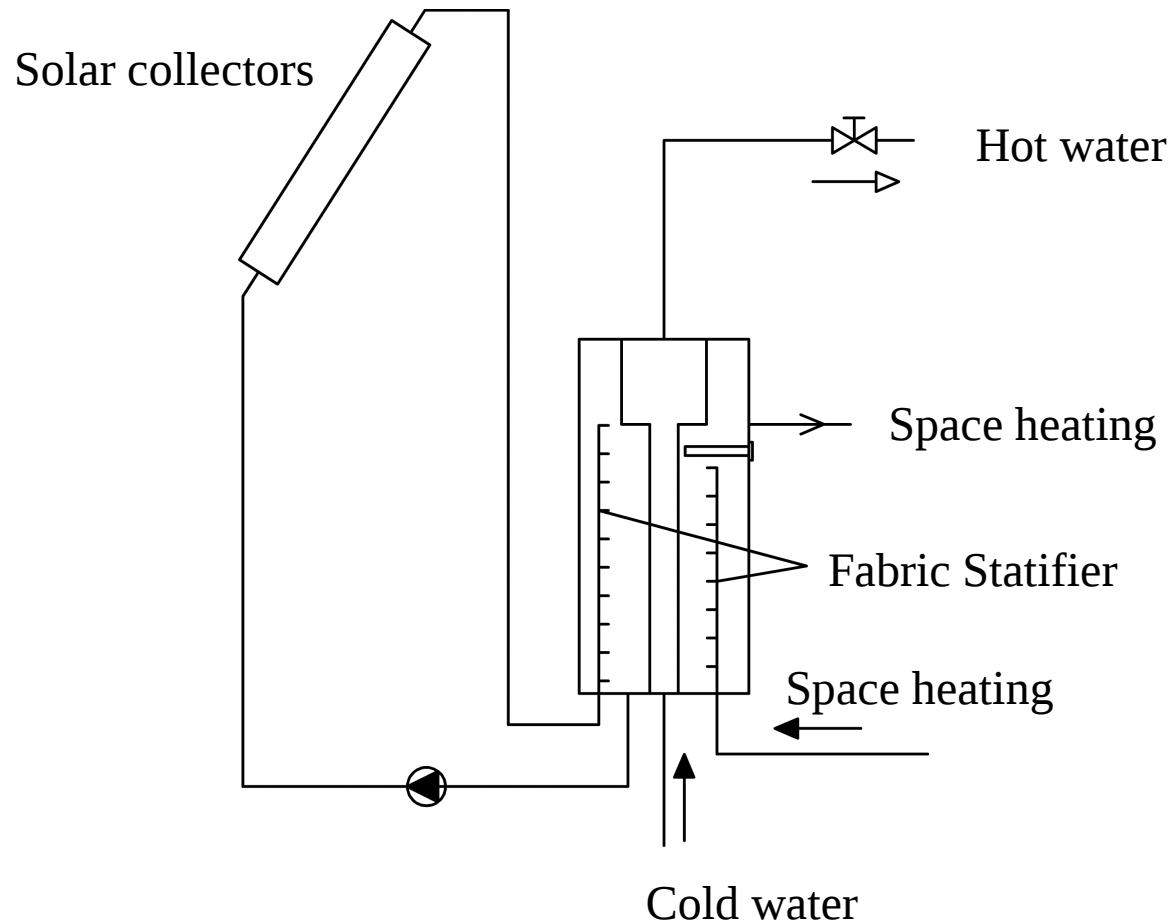
- Will the solar collectors survive high temperatures during sunny stagnation periods and cold temperatures during winter periods without sunshine?



Contour of the highest temperatures of solar collector for different azimuths and tilts for SEIDO 1-16

Plan:

➤ Investigations of heat storage with high thermal stratification



Plan:

- **Test of a solar combisystem for space heating and water heating in the laboratory facility**
- **Development of TRNSYS model of the solar combi system for space heating and water heating**
- **Validation of the TRNSYS model**
- **Design and installation of the demonstration solar space heating and water heating combisystem in a single family house**
- **Measurement of the thermal performance and energy saving of the demonstration system**
- **Exchange of researchers**
- **Seminars/workshops in Denmark and China**

Chinese Partners:

- Beijing Solar Energy Research Institute.Co.Ltd
- Beijing University of Technology
- Beijing University of Chemical Technology

Danish Partner:

- Technical University of Denmark

Period for Chinese project:

July 1, 2010 —December 31, 2012

- Optimization of solar combi system with flat plate collectors
- Demonstration of a solar combi system in China
- Using phase change material (PCM) in solar heating technology

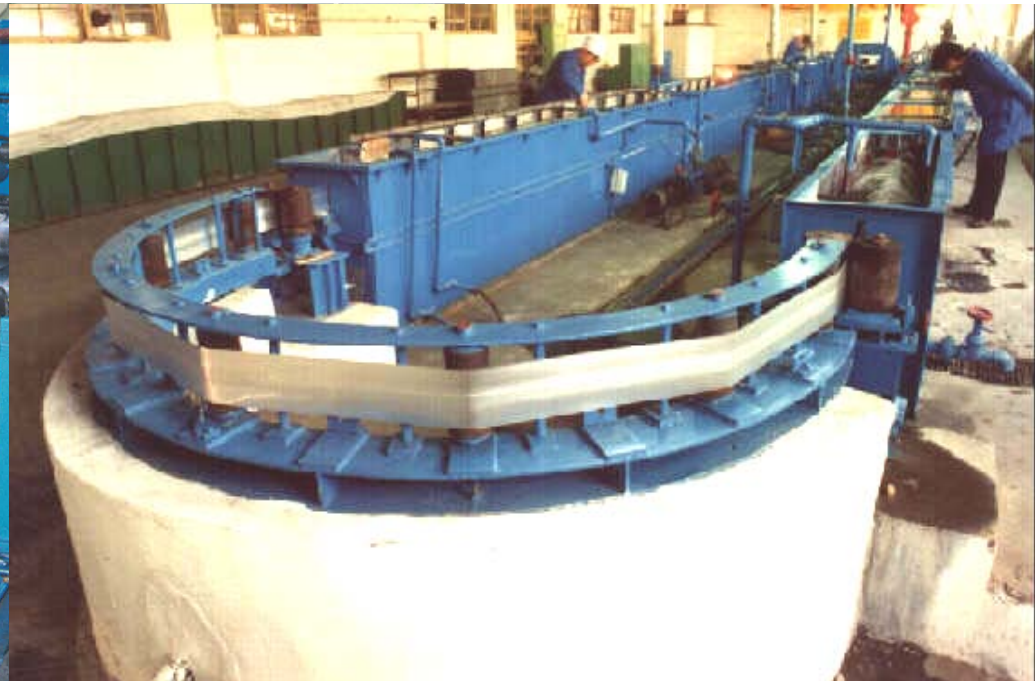
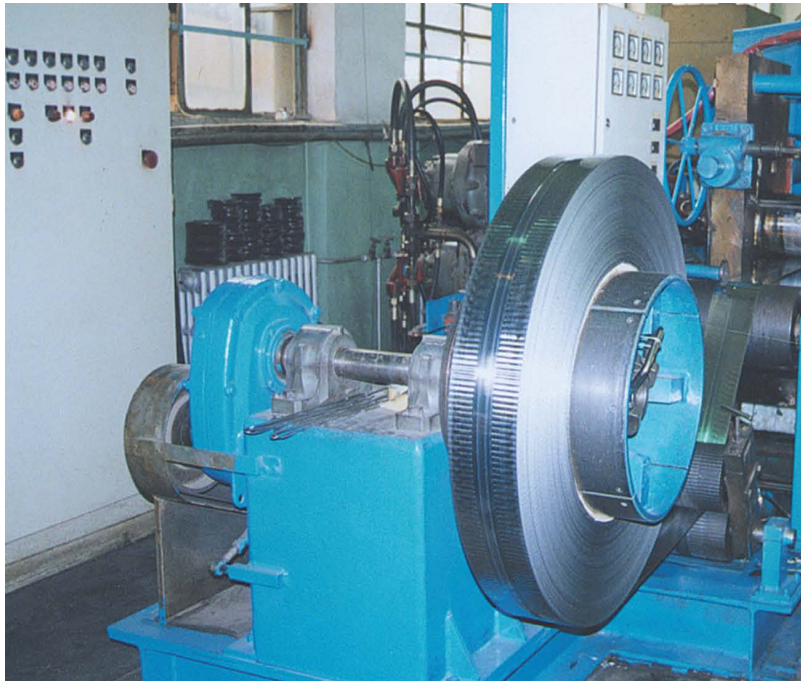
Plans:

- R&D on high performance flat plate collectors



high performance flat plate collector:
double covers(glass+teflon membrane)

Production base for flat-plate collectors



Plans:

- Investigation on stratified tank and thermal storage system
- Investigation and optimization on solar combi system performance
- Participation in development of TRNSYS model
- Design and installation of a demonstration solar combi system
- Exchange of researchers
- Monitoring of the solar combi system

Time Table:

Activities/milestones	Time
R&D of solar collectors	07,2010—06,2011 11,2011—06,2012
Investigation of heat store	10,2010—05,2011 01,2012—07,2012
Test of solar heating system	04,2011—12,2011
Development of TRNSYS models	01,2011—08,2011
Design and install demonstration system	03,2011—09,2011
System performance monitoring	10,2011—12,2012
Exchange of researchers	08,2010 & 06,2011

More information about the project:

<http://www.solvarme.byg.dtu.dk/Sino-Danish%20Research%20Project.aspx>

Thank You!