# 2014 HIGHLIGHTS

## SHC Task 45
## Large Scale Solar Heating and Cooling Systems

### THE ISSUE

Large solar heating and cooling systems are very cost effective in some applications, for example supplying heat to an existing district heating system. The market for "Solar District Heating Systems" is developing fast in northern Europe as well as in China – and has big potential in other places. Use of seasonal storage and heat pumps makes it possible to obtain a high solar fraction (> 50%) and to interact with and level out dynamics in the electricity grid (these dynamics are increasing due to increased supply from wind turbines and PV systems). Solar district heating systems are getting rather large (a 50 MW solar collector field with a 200,000 $m^3$ water pit storage in Denmark will begin operation in the spring of 2015).

### OUR WORK

The main aim of this Task is – through international cooperation – to establish a solid knowledge basis for the design and construction of large scale solar heating systems. The main output from the Task is a series of technical "Fact Sheets" on a broad range of topics, including guidelines for collector field/loop installation, best practice and guidelines for materials and construction of seasonal storages, system performance guarantees, models for ESCo financing, improved test procedures for large collector modules, and guidelines for simulation of large collector fields http://task45.iea-shc.org/fact-sheets.

**PARTICIPATING COUNTRIES**

Austria
Canada
China
Denmark
France
Germany
Italy
Spain


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|---|---|
| **Task Date** | **2011 - 2014** |
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## KEY RESULTS OF 2014

### Improved Collector Testing

Testing of collectors at DTU in Denmark and at Exova in Canada has shown that present international standards for testing collector performance should be improved by including the following parameters: collector tilt, flowrate and fluid type:

- Concerning the tilt of the collector, the influence on the collector heat loss coefficient is in the area of 5-10 %.
- Concerning the flow rate and fluid type, it is important for the thermal performance that the collector operates with turbulent flow – a shift from laminar to turbulent flow increases the zero-loss efficiency as much as 5%!

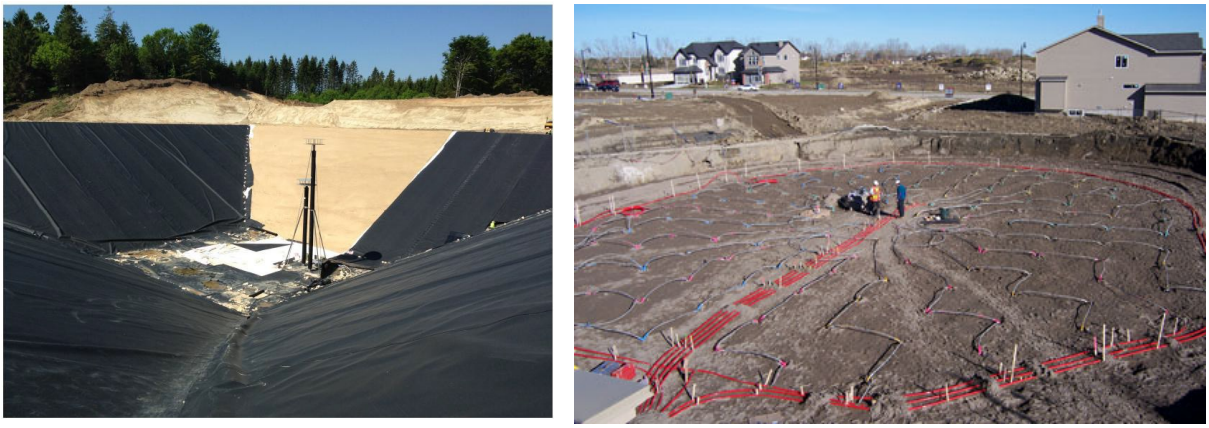
### Guidelines for Materials and Construction for Large Seasonal Storages

Two comprehensive Task 45 Fact Sheets have been published on large seasonal storages:

- Seasonal storages: bore hole heat storage – Guidelines for materials & construction (Natural Resources Canada)
- Seasonal storages: water pit heat storage – Guidelines for materials & construction (PlanEnergi, Denmark)

The Fact Sheets include detailed descriptions of operating storages and provide useful information on:

- design of storage,
- materials for components,
- influence of/requirements for geotechnical conditions/investigations,
- ground water conditions,
- calculation and optimization, and
- costs.



**Seasonal Storage under Construction.**
**Left: SUNSTORE 3's 60,000 m³ water pit storage in Dronninglund, Denmark**
**Right: Connecting U-tubes in the bore hole storage at Drake Landing Solar Community in Okotoks, Alberta, Canada**

SHC Task 45 is a 4-year collaborative project that ended in December 2014.