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# Projet IEA Solar heating and cooling

## Task 32 Advanced storage concepts for solar and low energy buildings

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Durée prévue du projet (de - à)	De juin 2003 à décembre 2006

### RÉSUMÉ

#### TASK 32: ADVANCED STORAGE CONCEPTS FOR SOLAR AND LOW ENERGY BUILDINGS

**Jean-Christophe Hadorn****BASE Consultants SA**

Task 32 Operating Agent for the Swiss Federal Office of Energy

The main goal of this Task is to investigate new or advanced solutions for storing heat in systems providing heating or cooling for low energy buildings.

The first objective is to contribute to the development of advanced storage solutions in thermal solar systems for buildings that lead to high solar fraction up to 100% in a typical 45N latitude climate. The second objective is to propose advanced storage solutions for other heating or cooling technologies than solar, for example systems based on current compression and absorption heat pumps or new heat pumps based on the storage material itself.



## Travaux effectués et résultats acquis

The ambition of the Task is not to develop new storage systems independent of a system application. The focus is on the integration of advanced storage concepts in a thermal system for low energy housing. This provides both a framework and a goal to develop new technologies.

The Subtasks are:

- **Subtask A: Evaluation and Dissemination (Subtask Leader in 2004: Switzerland)**
- **Subtask B: Chemical and Sorption (Subtask Leader : Chris Bales, Sweden)**
- Subtask C: Phase Change Materials (Subtask Leader: Wolfgang Streicher, Austria)
- **Subtask D: Water (Subtask Leader; Germany to be confirmed)**

## Duration

The Task was initiated in July 2003 and will be completed in December 2006.

## ACTIVITIES DURING 2004

1. In 2004, two meetings gathered 20 experts from 8 countries plus invited persons. The main outcomes are:

- there are new Phase Change Materials that are suited to solar applications and are being tested in combisystems,
- the recent process of microencapsulation of PCM can bring new ideas for storage of solar heat or collecting heat with slurries,
- the improvement in density of storage compared to water will be however hardly higher than a factor 1.5,
- storage based on sorption principles could bring interesting new solutions, but more for reversible heat and cold heat pumps than for long term storage. Mainly because a low grade heat source is still needed in wintertime, a new option from expert H. Kerkes might however bring a long term storage solution,
- chemical storage are not deeply investigated in participating countries due to the lack of funding
- improvement in classical market standard water stores is still possible in a few directions that are being investigated both theoretically and experimentally,
- a PCM storage can improve the environmental emissions of a classical boiler by limiting the on/off cycling,
- apart from models for advanced storage techniques, a model for a boiler in transient mode is missing in the TRNSYS library and will have to be developed.

2. The Task web site is [www.baseconsultants.com/iea32](http://www.baseconsultants.com/iea32)

A presentation of the scope of the Task, of the participants and some official reports can be found on the site. Links to manufacturers of special storage material for solar and low energy buildings can be found. All internal reports and articles of the Task 32 (about 100 documents) are in a section of the site with restricted access to Task participants.

3. An improvement of the previous IEA-SHC Task 26 FSC method to compare designs of solar installations has been derived theoretically. FSC' covers now systems able to produce heat and cold from solar and eventually operating with a long term storage. It will have to be validated against detailed simulation results.

4. The *State-of-the-Art Report on the Heat/Cold Storage Solutions for Solar Houses* was originally planned for 2004. Due to external contributions and a more ambitious table of contents than anticipated in 2003, the final publishing date will be April 2005. Two draft versions have been issued during 2004 but for internal use only.

5. Two new participants joined in 2004, an expert in PCM from Spain and EDF Research from France are now active in the Task

6. An electronic Newsletter has been issued in December 2004 and distributed.

## **WORKED PLANNED FOR 2005**

Task 32 will proceed in 2005 by simulation of a common reference case (a low energy house placed in 4 climates) but with different kind of storage alternatives, and experimental validation of devices, units or systems depending on each project status and financial resources.

Each team in the Task will proceed with laboratory measurements on their project and development of new storage component model for TRNSYS.

A 4 pages brochure describing the Task in an illustrated manner will be produced and distributed.

Task 32 provides a unique technology platform on Heat and Cold storage, a top priority in many countries for developing the market share of solar technologies.

## **REPORTS PUBLISHED IN 2004**

- Annex XXXII text
  - Task 32 Description of projects in a common reporting format
  - T32 SubA Extended FSC method for cooling and or larger storage capacities Dec 2004
- See [www.baseconsultants.com/IEA32](http://www.baseconsultants.com/IEA32) under reports and working\_documents (restricted access to Task members)

## **REPORTS PLANNED FOR 2005**

- *State-of-the-Art Report on the Heat/Cold Storage Solutions for low energy Houses*
- *Report on Reference conditions for the common system*

## **MEETINGS IN 2004**

### **Third Experts Meeting**

#### **Combined with ECES Annex 17 meeting**

June 8-10

Arvika, Sweden

### **Fourth Experts Meeting**

December 1-3

Graz, Austria

## **MEETINGS PLANNED FOR 2005**

### **Fifth Experts Meeting**

May 18-20

Lleida, Spain

### **Sixth Experts Meeting**

November 23-25

Paris, France