

Contract/Proposal No. 019988

POLYSMART

POLYgeneration with advanced Small and Medium scale thermally driven  
Air-conditioning and Refrigeration Technology

Integrated Project

Call: FP6-2004-TREN-3

Priority: SUSTDEV-1.1.4 - POLYGENERATION  
Demonstration Projects

## **D3-24 SP4a-System Assembled**

Due date of deliverable: month 20

Actual submission date: 2008-07-30

Start date of project: 2006-06-12

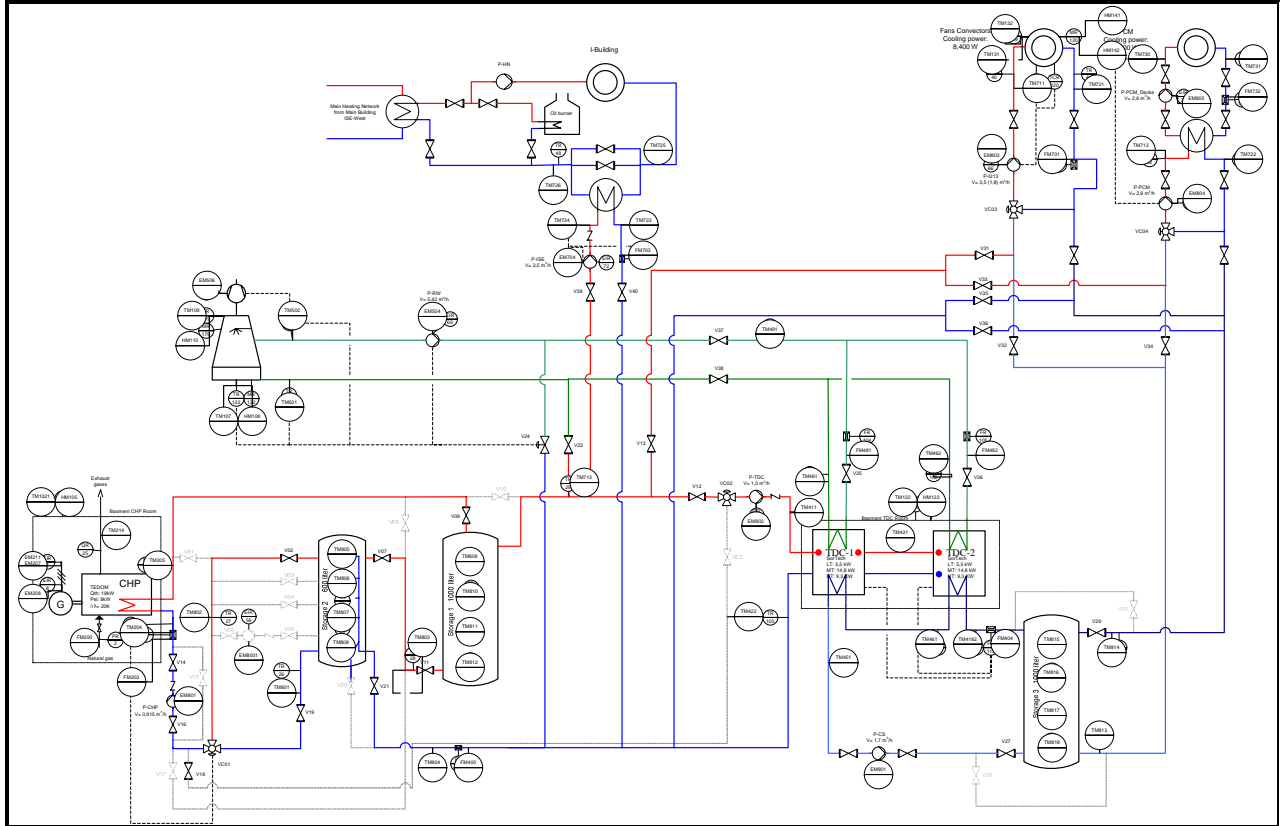
Duration: 48 months

Organisation name of lead contractor for this deliverable: ISE  
Revision: final]

Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)		
Dissemination Level		
<b>PU</b>	Public	X
<b>PP</b>	Restricted to other programme participants (including the Commission Services)	
<b>RE</b>	Restricted to a group specified by the consortium (including the Commission	
<b>CO</b>	Confidential, only for members of the consortium (including the Commission Services)	

## Subproject SP4a – system assembled/erected Demonstration System in Freiburg / Germany

### 1) Description of assembled system



#### Kind of load, building description

The load is divided into two groups:

1. The first office has a floor area of about 150m<sup>2</sup>. in the first floor with up to 25 students working at computers (standard desk-top computers) It has a large window front of about 17m<sup>2</sup> facing east. A part from the internal loads due to the people and computers an additional heat load comes from experimental equipment that is placed in the basement (the floor below the office). This equipment produces a considerable heat input to the office. The cooling load is estimated in 8kW.
2. The second load consists of 5 small offices with 2 to 4 persons each working with standard desktop computer. The size of each office is between 15 and 25m<sup>2</sup>. Three of these offices face east, two face west. The main load of the offices are the internal load as well as solar input through the windows, specially for the offices facing west. The cooling load af these offices is estimated in 6kW.

#### Heat and cold distribution system

The heat and cold distribution systems are different for the two set of offices:

1. for the large office a set of 7 fan coils arranged in four independently control groups has been chosen.
2. The five small offices are equipped with PCM chilled ceilings. These elements consists of a standard building integrated chilled ceiling where the plaster is equipped with a PCM material in order to increase the heat capacity of the unit.

Both systems are planned to be used both for heating and cooling operation. Nevertheless, as the heat load might not be enough, also the conventional heating network of the building is used as a heat sink.

### Heat rejection

A 30kW dry heat rejection system with a water spray function for a maximum of 50h a year operation is installed. The system is designed for inlet/outlet temperatures of 40°C/35°C at 32°C ambient temperature with a water flow rate of 5500l/h and 19400m<sup>3</sup>/h air flow rate.

### mCHP

Tedom Mirco S8 natural gas fired internal combustion engine with 8kW electric and 19kW thermal power.

### TDC

2 SorTech silica gel adsorption chillers for with 5,5kW cooling power each (pre-series model of the SorTech ACS05). Hot and chilled water loop are connected in series in opposite direction. This means, the TDC with the hotter inlet temperature is ought to produce the colder chilled water outlet. Cooling water is connected in parallel.

### Storage

3 storage tanks are installed; two on the hot side, one on the chilled water side. On the hot side a 1000 litre hot water storage tank is installed in the CHP outlet, a 600 litre mixing storage is installed in the TDC outlet in order to even-out the temperature peaks coming out from the TDC. A 1000 litre chilled water tank is installed in the chilled water circuit in order to provide some chilled water storage and act as a hydraulic switch.

### Data acquisition system

Two data acquisition systems have been installed taking into account two purposes:

1. Multiplexer for high accuracy temperature measurement.
2. ICPs for pulse counter technology, signal detection, and low quality measurements (temperature, pressure, humidity).

### Sensors

Installed sensors are divided into two groups: those corresponding to the 'Common Measuring Scenario' (CMS) and those corresponding to the 'Specific Measuring Scenario' (SMS). The list of sensors is contained in the file: 'PolySMART\_SMSdescription\_SP4a\_v0.xls'.

## 2) Pictures of assembled system

External view of the building:



Fan coils



PCM chilled ceilings



Hydraulic installation



Switchboard



CHP unit



heat rejection system

