

UPVLC DEMO SITE PRESENTATION

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THE FIFTH FRAMEWORK PROGRAMME

GEOCOOL

Geothermal Heat Pump
for Cooling-and Heating
along European Coastal Areas



ENERGIE

Project No: NNE5 – 2001 – 00847



THE FIFTH FRAMEWORK PROGRAMME

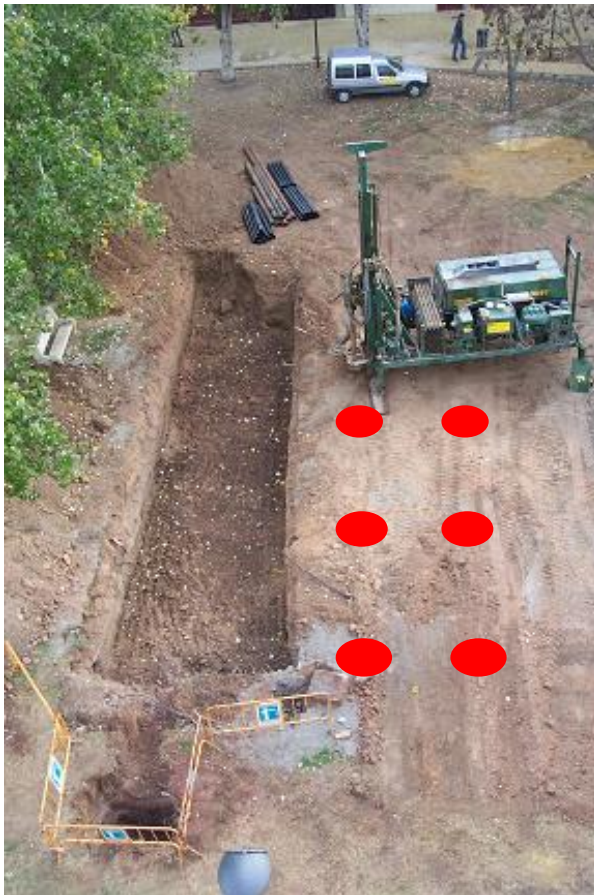
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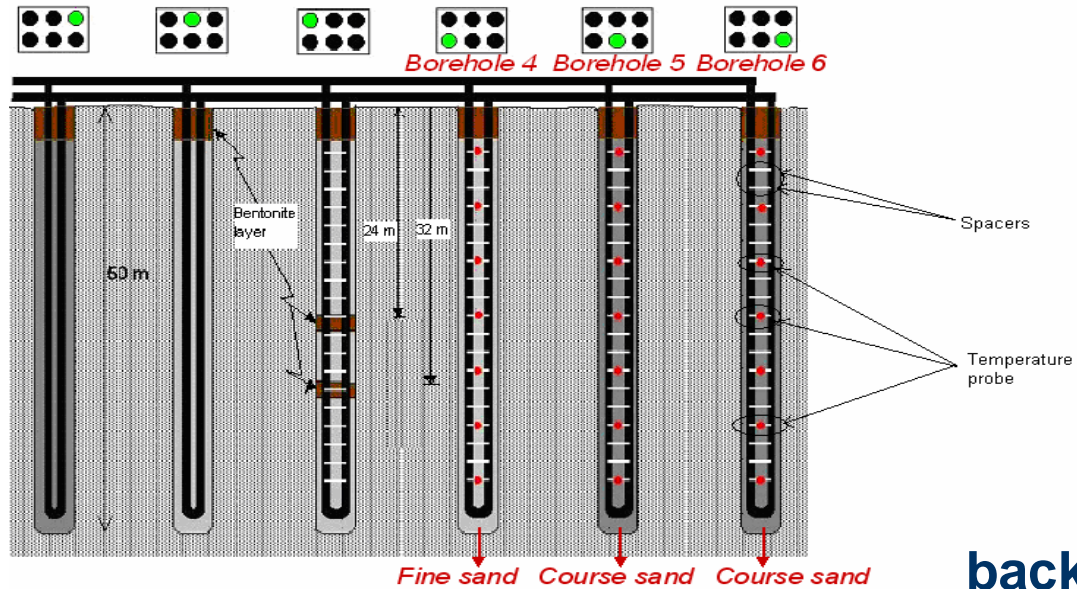
UPV
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CIATESA
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UNIVERSIDAD POLITÉCNICA DE VALENCIA, Spain
GROENHOLLAND, Holland
Compañía Industrial de Aplicaciones Térmicas S.A., Spain
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Ente per le Nuove Tecnologie, l'Energia e l'Ambiente, Italy
Asociación para la Investigación y la Diagnosis de la Energía, Spain

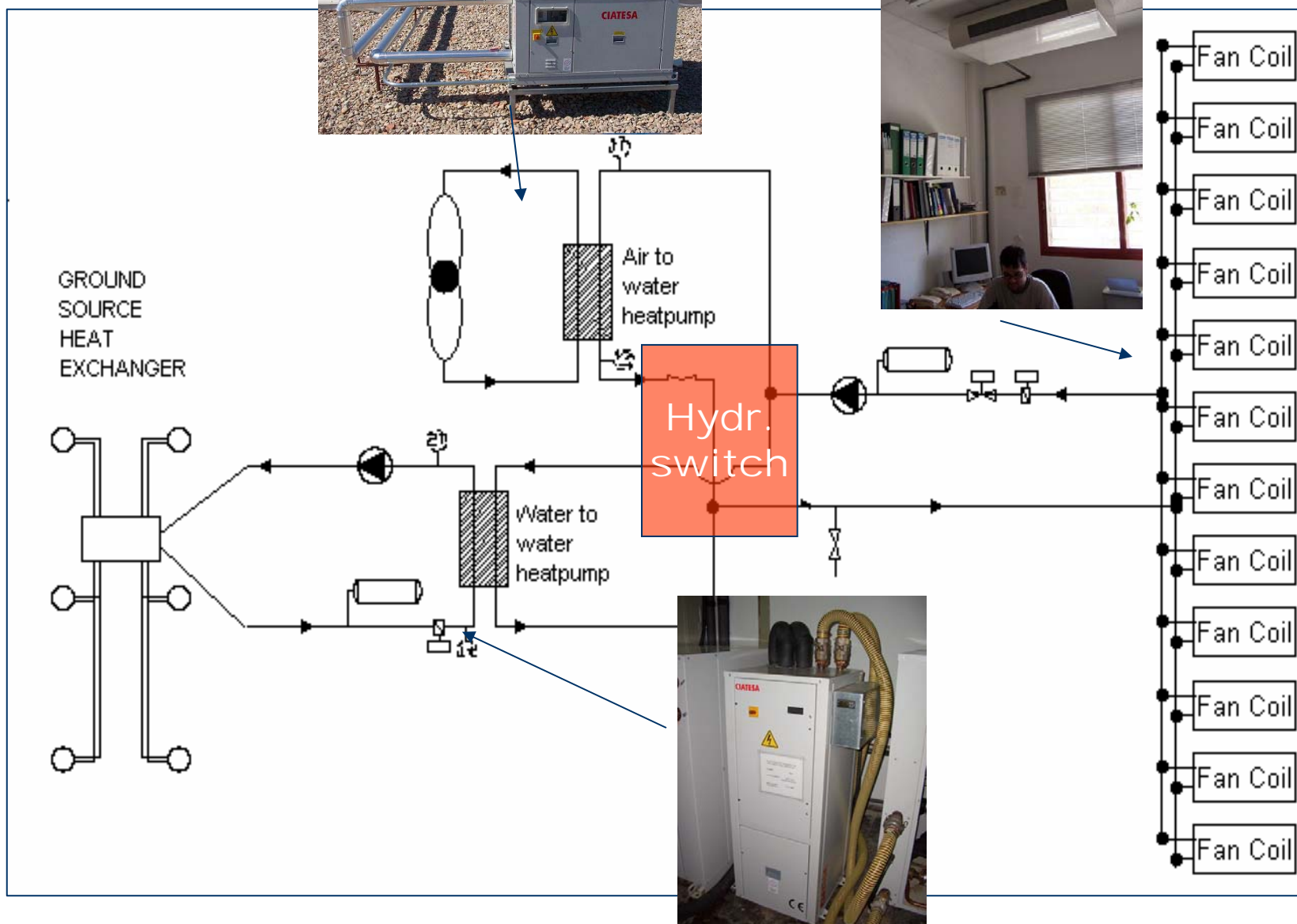
Duration: 3 years Feb. 2003 - 2006



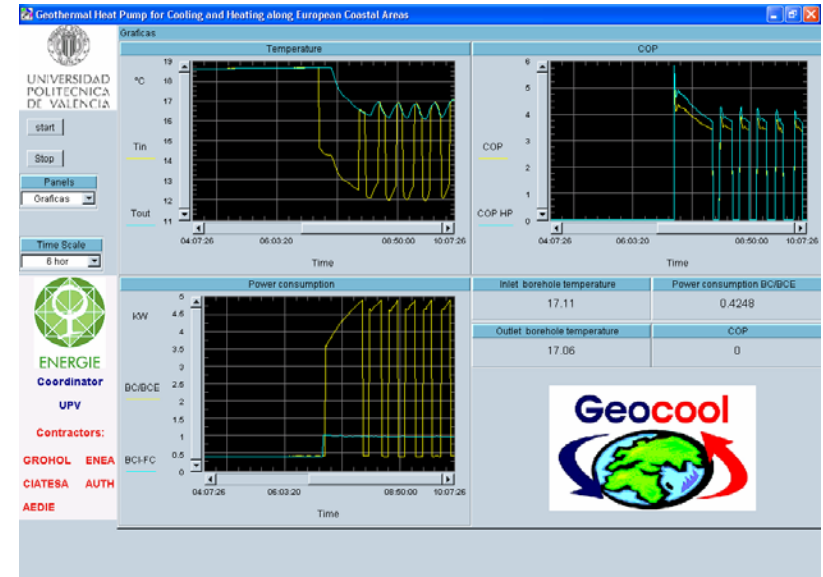
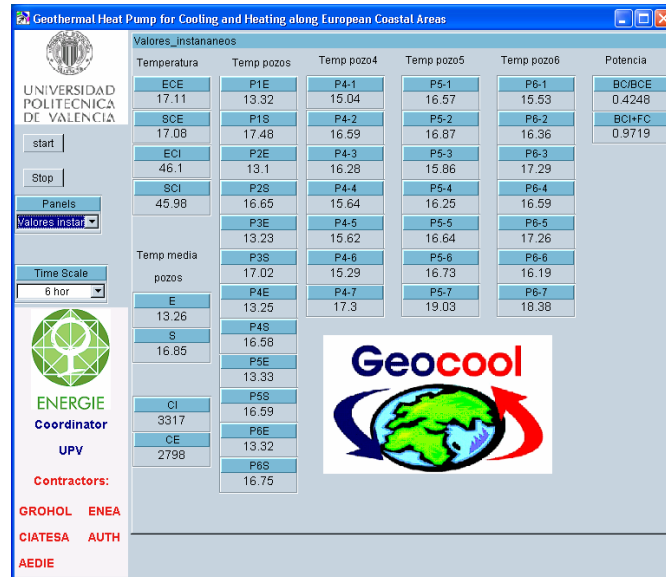
Ground Source HE



backfilling:
sand (course and fine)
or sand/bentonite
alternative use of
spacers

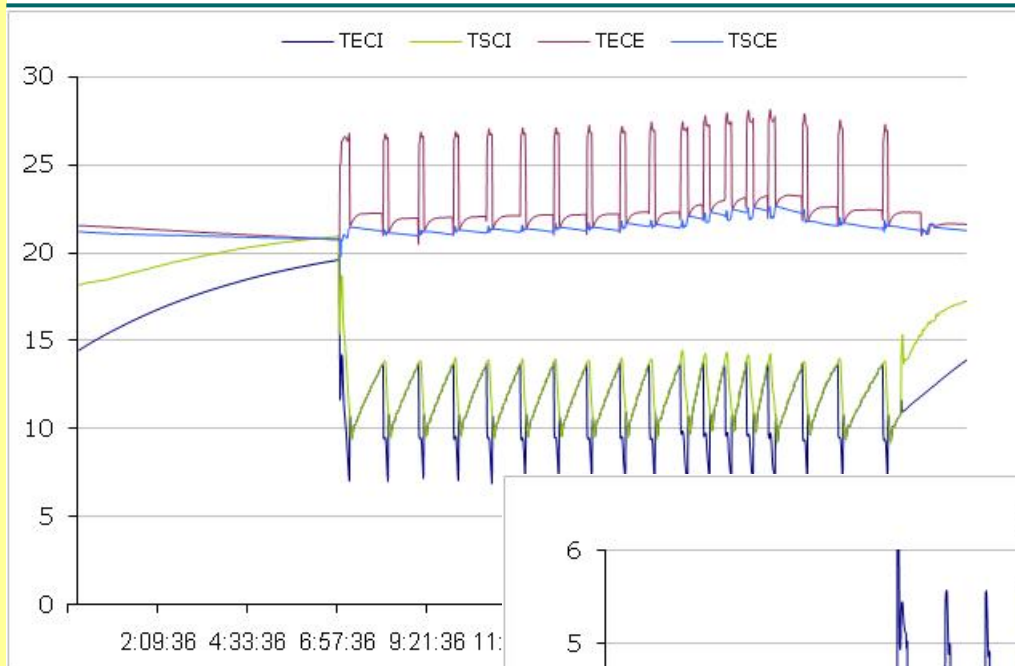


GeoCool data acquisition system

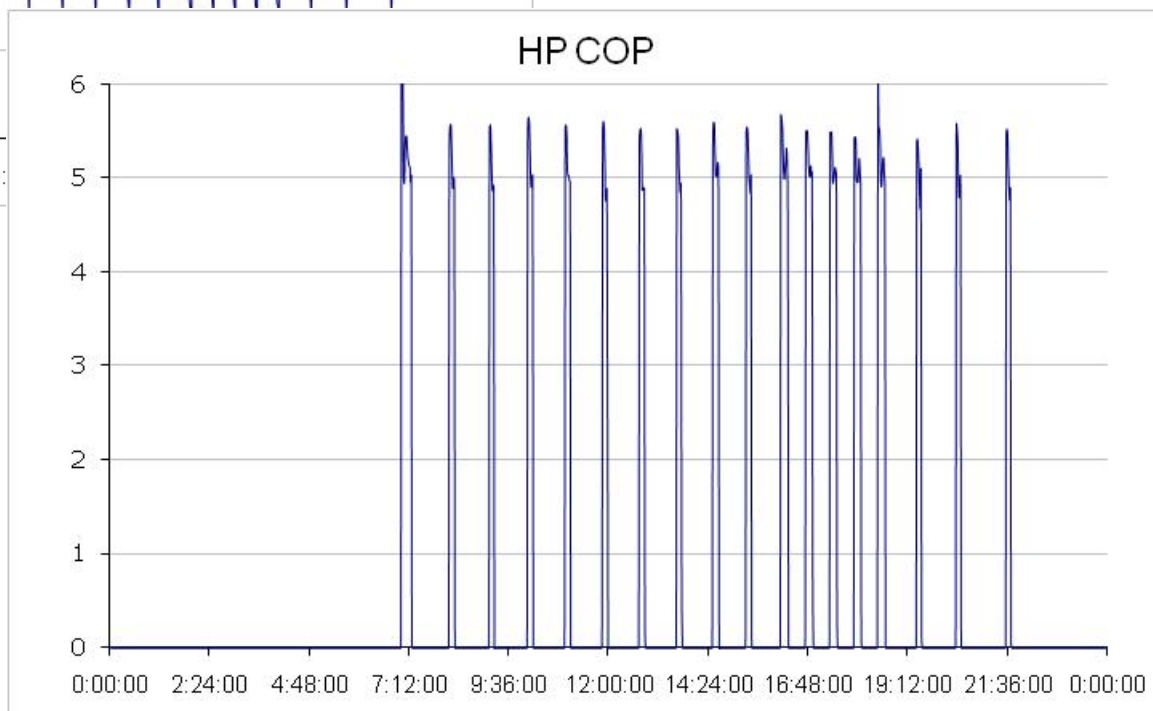


44 sensors in the loop (PT100, coriolis mass flowmeters and wattmeters)
On site automatic meteorological station w. 22 parameters
1 min sampling during 1 year

Dynamic behaviour

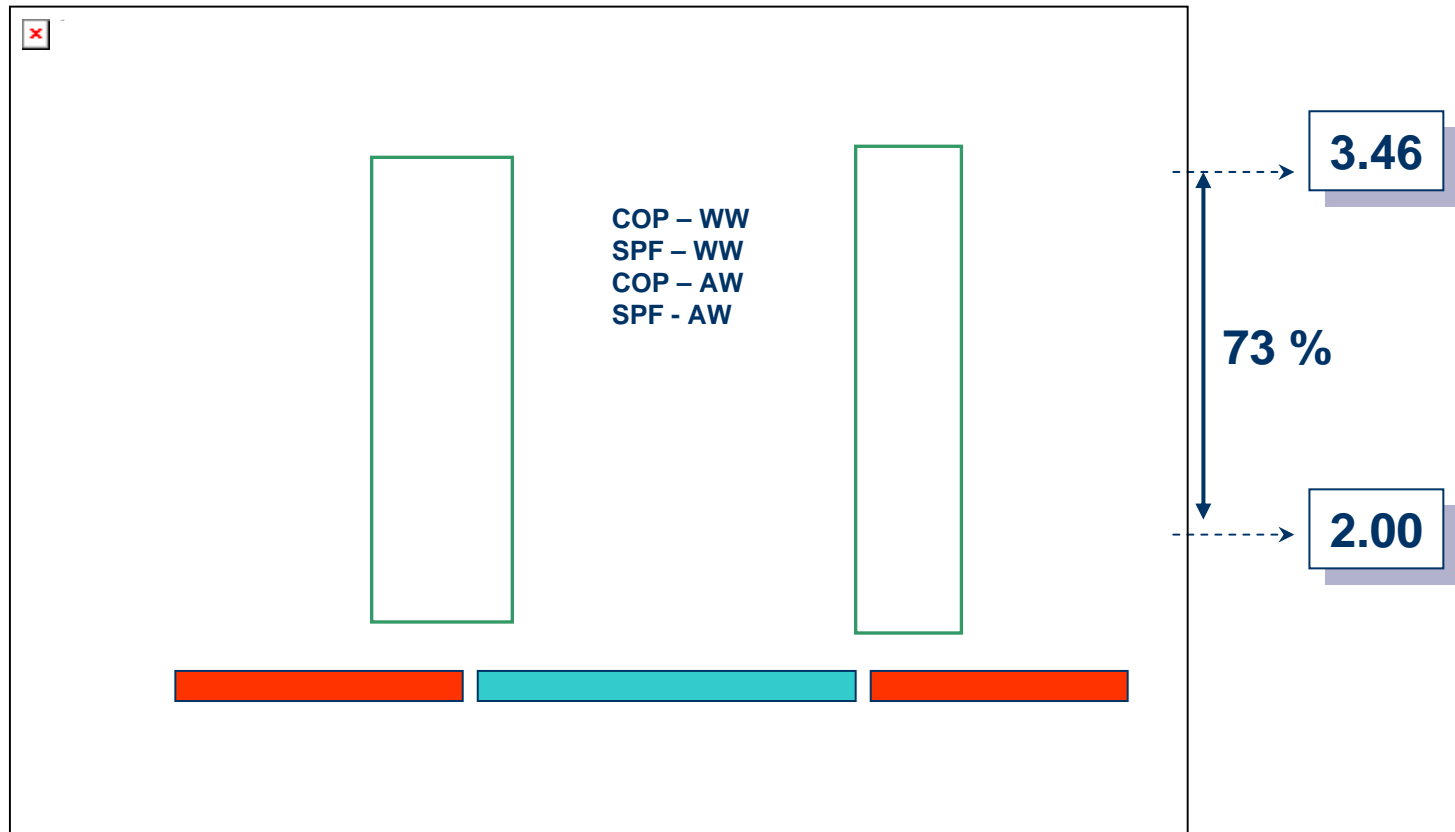


Cooling Mode

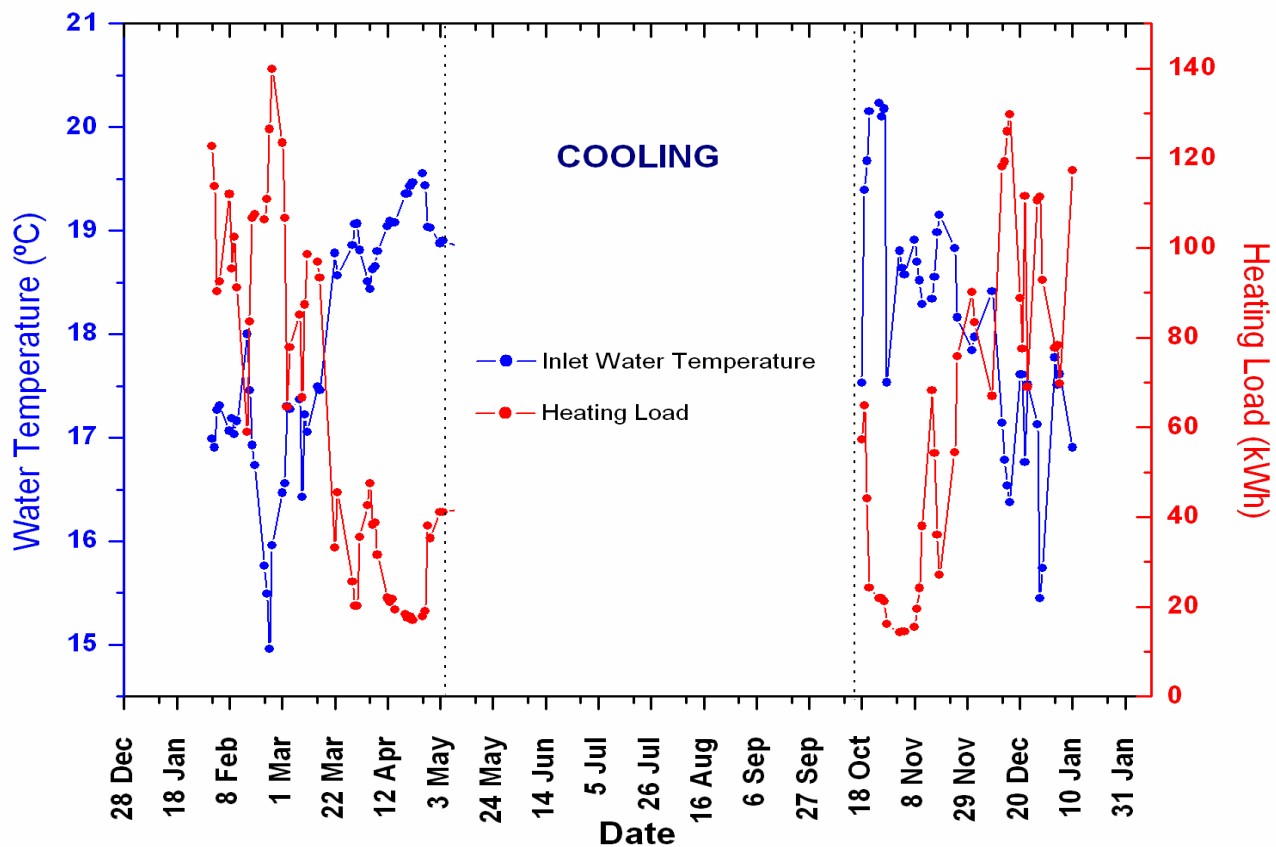


Experimental results

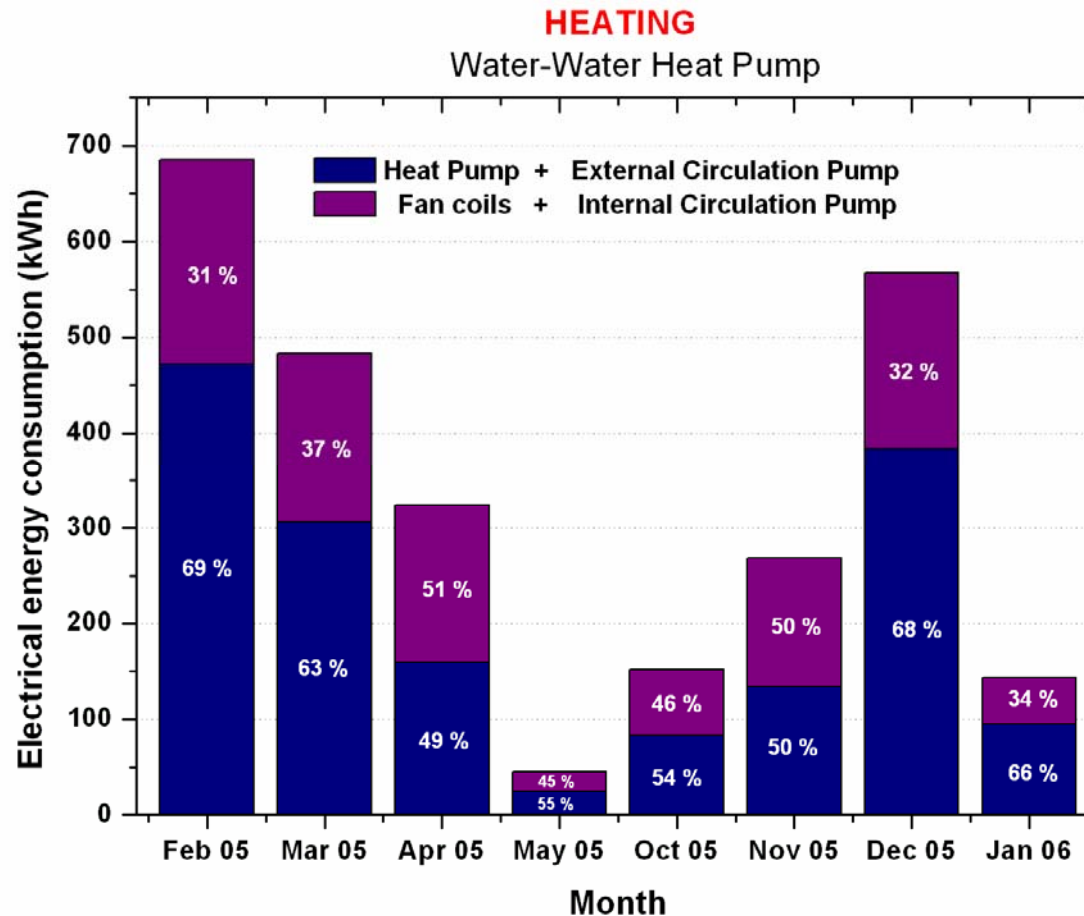
System performance in heating mode



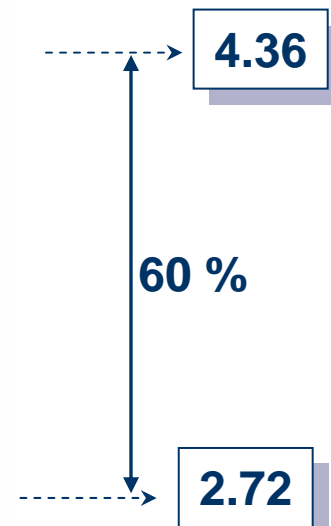
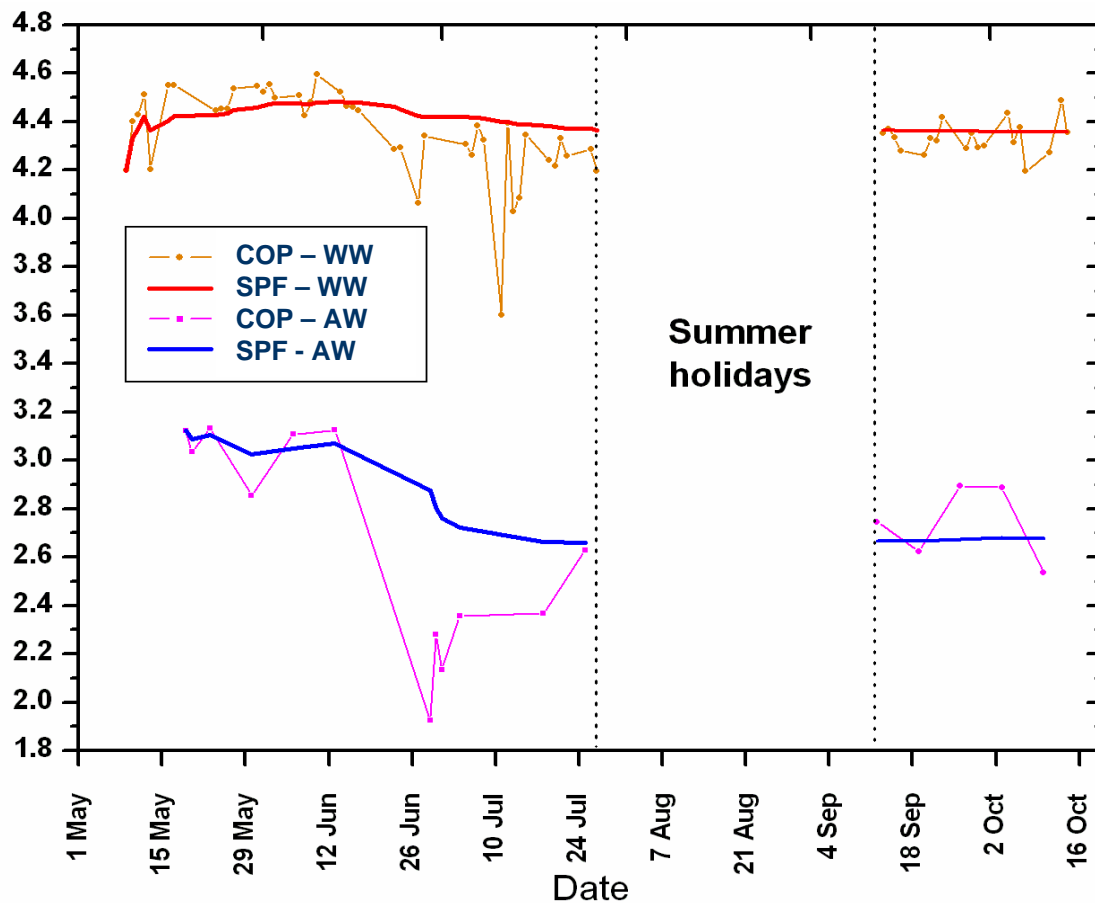
Heating mode – Return WT



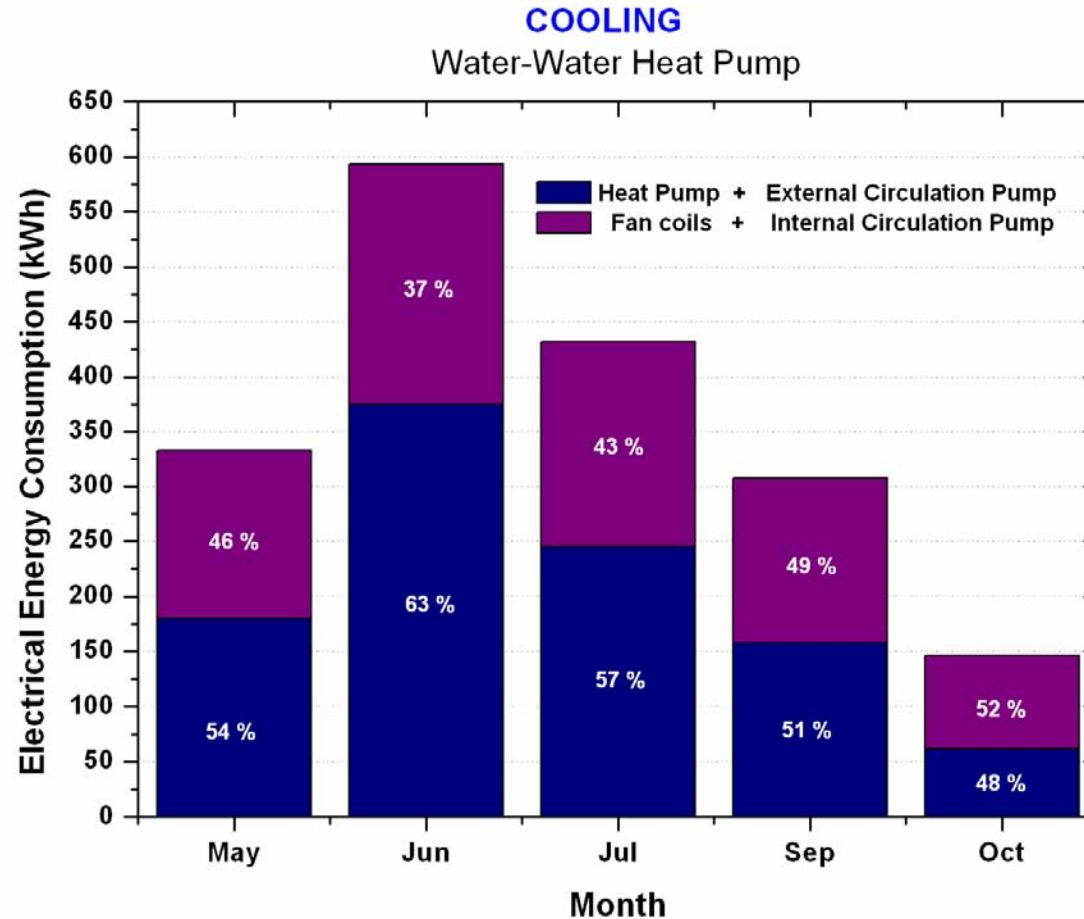
Energy distribution in heating



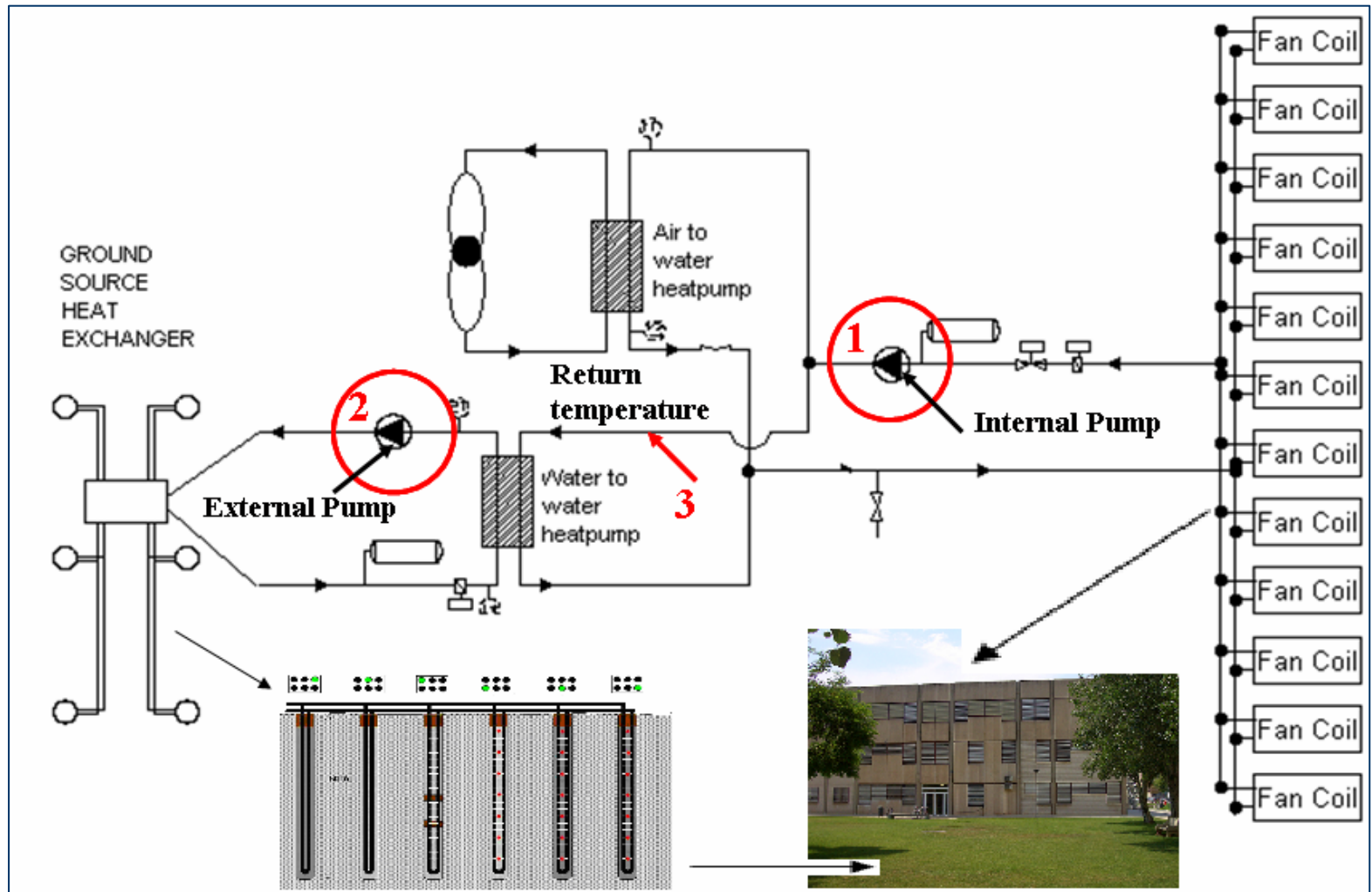
COP and SPF in cooling mode



Energy distribution in cooling



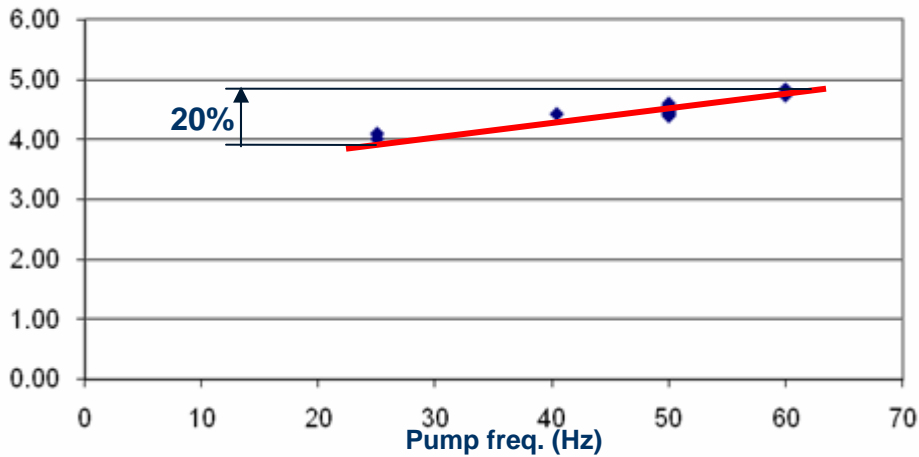
OPTIMUM FLOW RATES



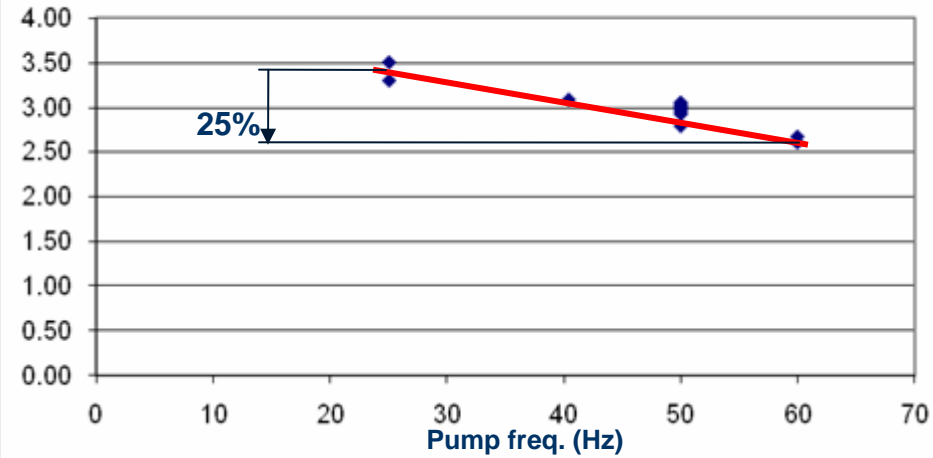
OPTIMUM FLOW RATES COOLING MODE



HP - COP

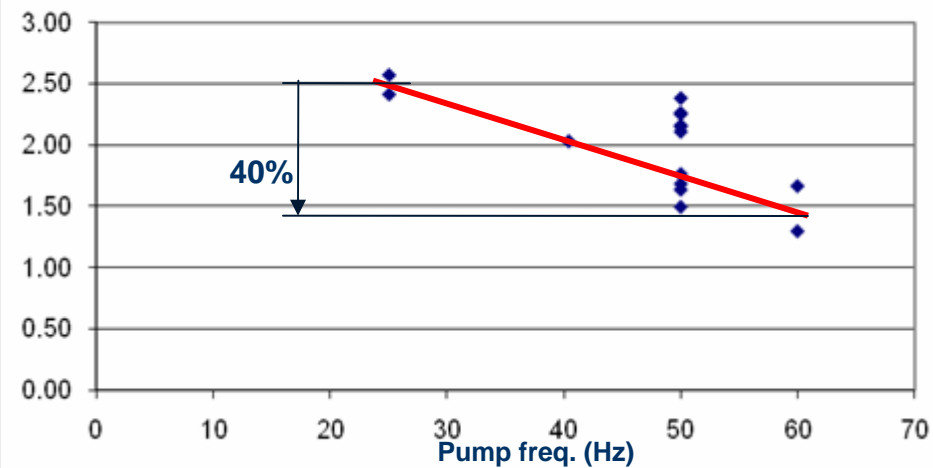


SYSTEM - COP (HP on)



Both pumps at same speed

DAILY SYSTEM COP



- In **heating mode**, **41%** energy savings
- In **cooling mode** **38%** energy savings
- **Capacity adaptation strategies** are needed to improve load factor and efficiency of (both) systems.
- High impact in electricity consumption of **auxiliary elements**
- Improved control strategies should be implemented.

Ground Source HE main parameters



GROUND(test IN-SITU)	
Ground thermal conductivity	1.800 W/m·K
Volumetric heat capacity	2.4MJ/m ³ ·K
Ground surface temperature	18.5 °C
BOREHOLE	
Configuration:	6 : 2 x 3, rectangle
Borehole depth	50 m
Borehole spacing	3 m
Borehole installation	SINGLE-U
Borehole diameter	0.14 m
U-pipe diameter	0.032 m
U-pipe thermal conductivity	0.430
W/m·K(Polyethylene)	
HEAT CARRIER FLUID:	Water
HEAT PUMP: IZE70 + R290	(UPV-CIATESA)