Feasibility study

TECSOL
Bureau d'études techniques en énergie solaire

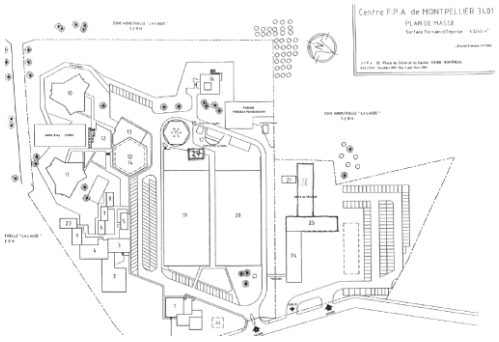
26th November 2009

Solar heating/cooling system

AFPA St Jean de Védas

Targeted building

AFPA area: 28 buildings, 2 boiler rooms.



Targeted buildings: buildings 24 & 25

- ➔ Homogeneous activity all year long
- ➔ Enough space for the solar collectors
- ➔ Enough space for the technical premises
- ➔ Educational purpose: training courses delivered in these buildings

Solar heating/cooling installation

Existing heating/cooling device

- ✓ Heating: Gas boiler De Dietrich GT305; 80-100 kW
- ✓ Air conditioning: 5 split units in direct détente
- ✓ Distribution system: 3 heating networks

Equipment to be installed

- ✓ Collectors: Schüco's high efficiency flat plate collectors; 30° slope; 15° azimuth; 40 m² (16 collectors)
- ✓ Drain back mode (safety)
- ✓ Absorption chiller: 10kW capacity (Climatewell for example)
- ✓ Heat rejection: a dry cooler is possible

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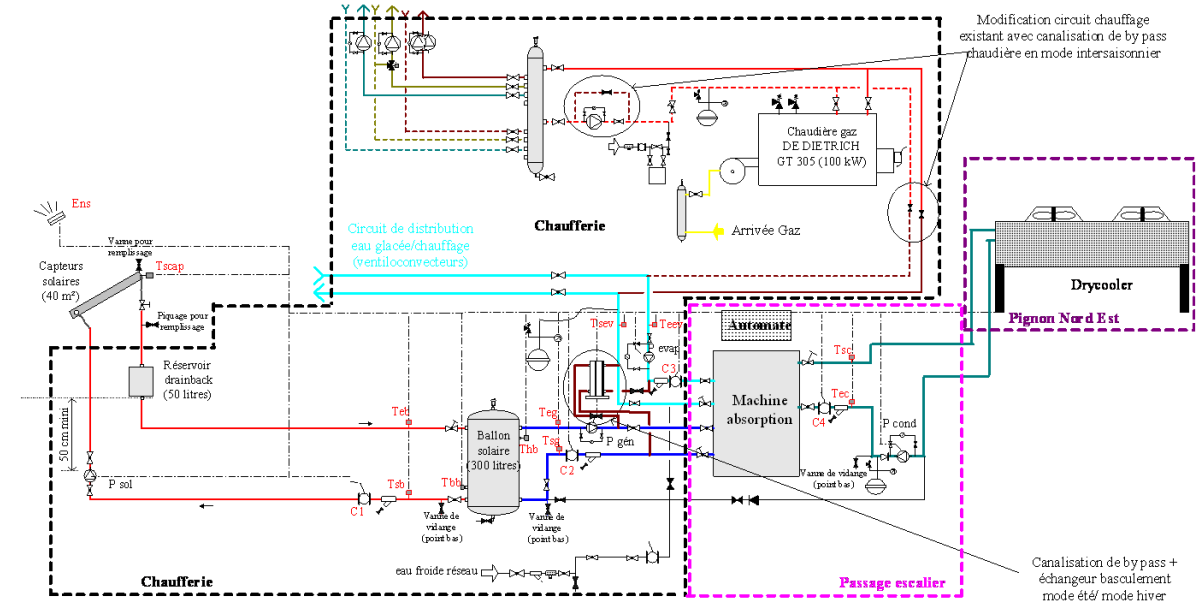
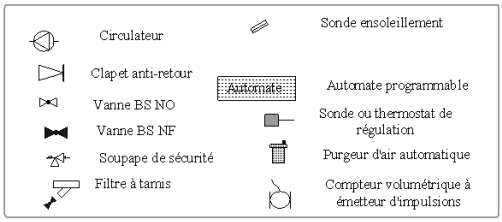
The technical premises

Installation scheme



Basculement manuel été/hiver
Circuit primaire et autres circuits : eau

	Schéma n° 01	Novembre 2009
TECSOL	BP 90434 - 66004 PERPIGNAN Tél : 04.68.16.16.40 Fax : 04.68.16.16.41	
AFPA - St Jean de Védas (34)		
Etude de Faisabilité Climatisation/chauffage solaire	Principe solaire	



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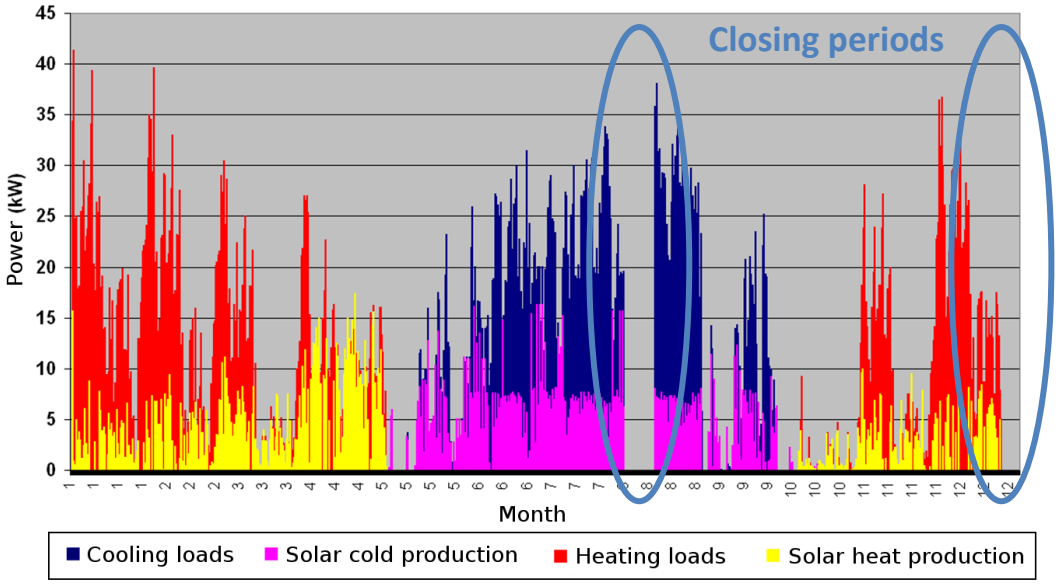
Thermal loads and solar production

Overall thermal balance



Recap thermal balance table

	Heat production (kWh)	Cold production (kWh)	Electric consumption (kWh)	Solar productivity (kWh.m^{-2})	Electrical COP (-)	Thermal load cover (%)
January	452	0	62	11.3	7.3	5.3%
February	584	0	67	14.6	8.7	8.9%
March	993	0	90	24.8	11.0	23.1%
April	1883	0	77	47.1	24.5	27.5%
May	32	662	116	42.2	6.0	45.4%
June	0	1566	241	97.9	6.5	23.5%
July	0	1758	256	109.9	6.9	20.0%
August	0	1027	145	64.2	7.1	14.0%
September	0	688	163	43.0	4.2	30.3%
October	195	11	80	5.6	2.6	49.9%
November	624	0	76	15.6	8.2	13.6%
December	426	0	41	10.7	10.4	5.5%
TOTAL	**5 189**	**5 712**	**1 414**	**487**	**7.7**	**16.6%**

Solar productivity = 487 kWh.m^{-2}.year^{-1} > 450 kWh.m^{-2}.year^{-1}

Annual electrical COP = 7.7 > 5

} Project eligible for the Emergence program

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Economic balance

Project cost

	Object	Estimated costs
Demonstration project		
Demonstration solar system	Solar collection	23 000
	Chiller	15 000
	Piping	15 000
	Equipment (tank, pumps, etc.)	10 000
	Dry cooler	10 000
	Sub-total solar system	**73 000**
Monitoring	Regulation	7 000
	Monitoring	5 000
	Sub-total monitoring	**12 000**
	Work sub-total	**85 000**
	Engineering (10%)	8 500
	TOTAL 1 HT	**93 500**
	TOTAL 1 TTC	**111 826**
Educational project		
Educational monitoring	Equipment (PC, signs, applications)	3 000
	Monitoring engineering and enhancement (2 years)	14 000
	TOTAL 2 HT	**17 000**
	TOTAL 2 TTC	**20 332**

TOTAL PROJECT COSTS (€ HT)	**110 500**
TOTAL PROJECT COSTS (€ TTC)	**132 158**

Grants and project viability

Maximum grant from ADEME + Region + FEDER (70%): 77 100 €

- 2009 AFPA budget available in 2010: 60 000 €
- Estimation of the total project costs: 132 158 €
  - ➔ Grant asked: 132 160 - 60 000 € = 72 160 €
  - ➔ Possibility to use the new Emergence program (35 000 €/TEP)

Maintenance (about 2% of the total project cost every year): 1500 €/year

Saved money for primary energy by 20 years:

- 1360 €/year (energy +10%/year)
- 785 €/year (energy +5%/year)

Avoided expenses (a heat pump must be replaced every 10 years): 30 000 € by 20 years

Environmental balance

The solar heating/cooling installation will prevent the exhaust of 2.4 tons of CO_2 every year. This is equivalent to 2 cars traveling 8 500 km every year.