

Prøvehallen, DK



Brita in Pubs, WP9 training in Copenhagen, March 31, 2008
Ove Mørck, Cenergia Energy Consultants

Energy conservation and renewable energy measures:

- Efficient ventilation – natural and mechanical
- Roof and wall insulation (+ 100 mm)
- Low energy windows
- Water saving measures
- Solar heating - PV/T with heat pump (6 kWp)
- PV integration, 19 kWp
- BEMS

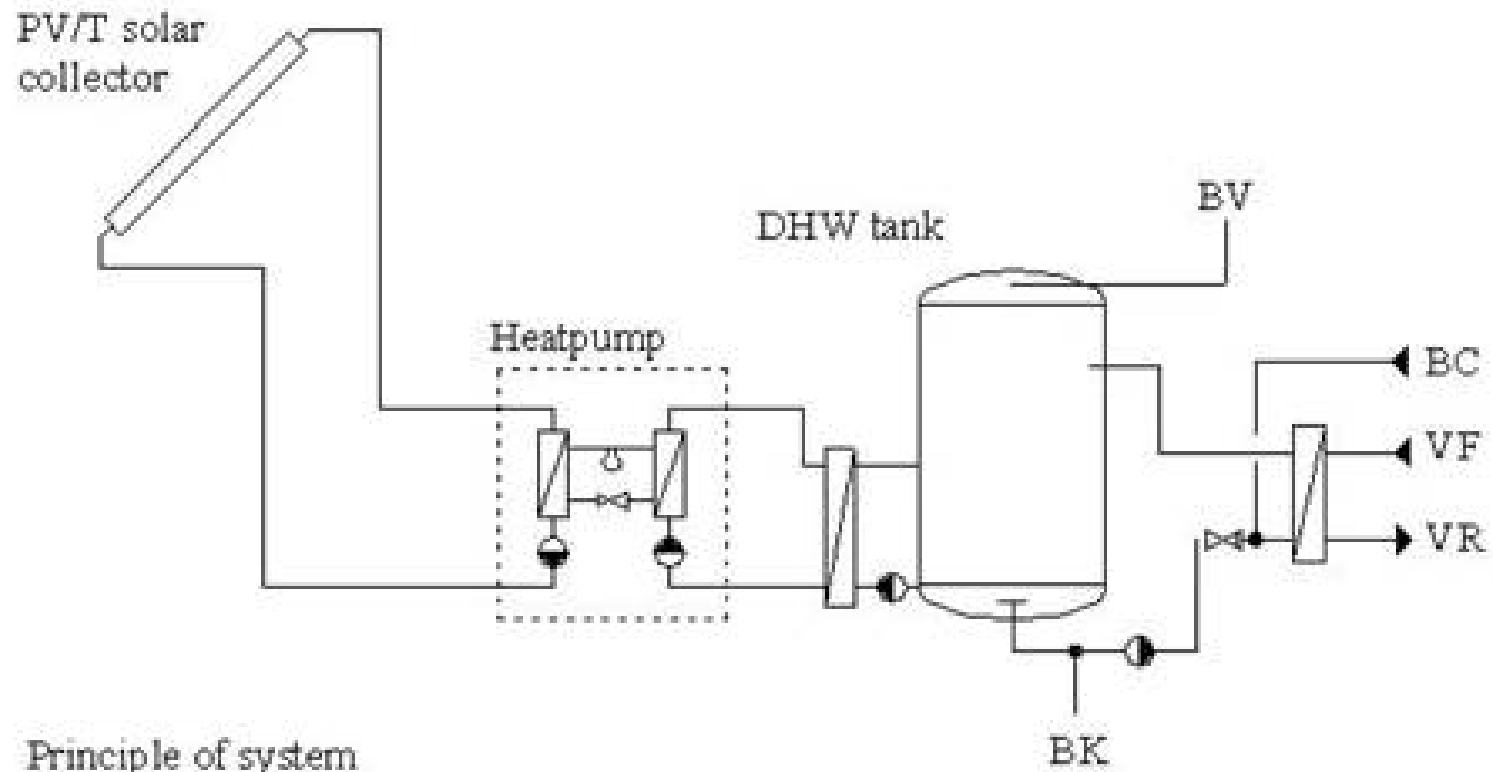
Natural ventilation



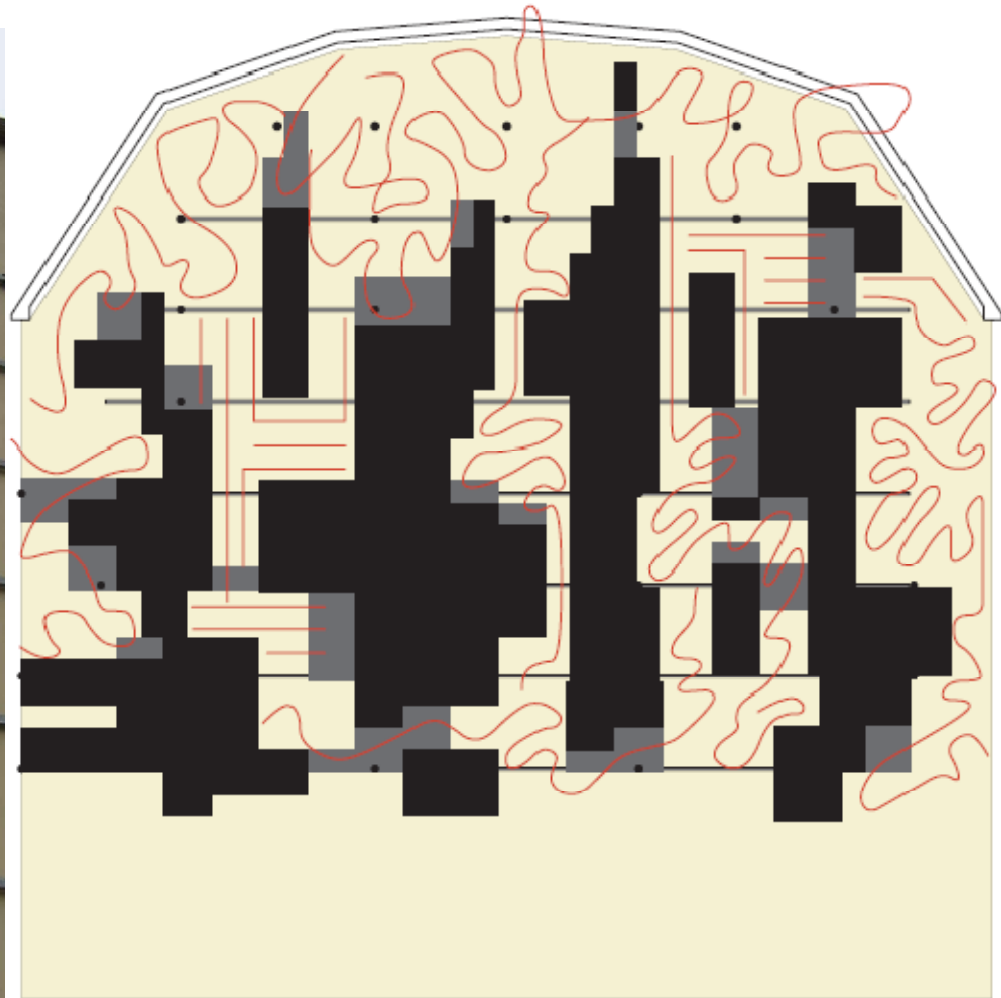
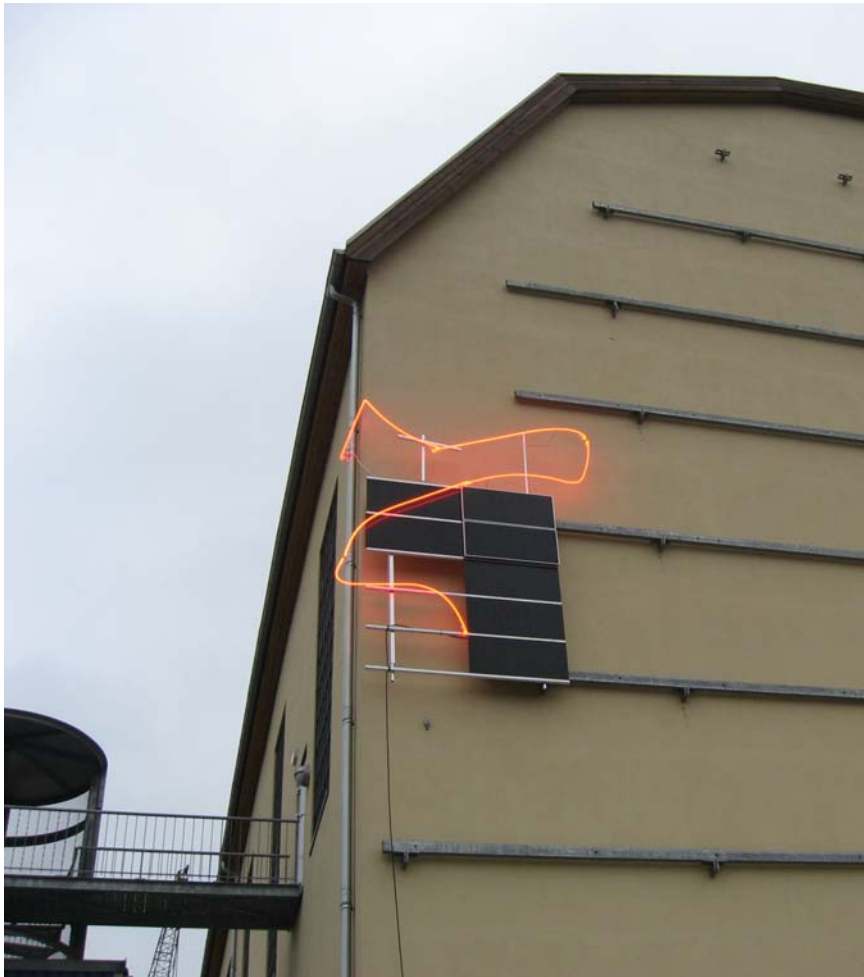
PVT-cells on neighbour building



PV/T Heat pump system



Test/mock-up of PV cell installation on gable wall



Location near the railroad – interesting for the solar artist design of the PV-gable wall



Costs and payback times – individual technologies and integrated concept

Energy saving measure/investment	Area [m²]	Total costs [EUR]	Eligible costs [EUR]	Saving [EUR/a]	Pay-back periods [a]
High efficient ventilation		33.557	33.557	8.870	3,8
Improved insulation	1.500	60.403	60.403	1.128	53,6
Low-e windows	393	26.376	26.376	1.503	17,5
Heat savings (water use)		6.711	6.711	1.729	3,9
BEMS (heating savings)		20.134	20.134	2.255	8,9
<i>PV/T with HP thermal + electrical</i>		<i>102.500</i>	<i>102.500</i>	<i>2.595</i>	<i>39,5</i>
High efficient fans		13.423	13.423	5.326	2,5
BEMS (el. savings)		20.134	20.134	1.718	11,7
PV-cells, 19kWp		<i>136.800</i>	<i>136.800</i>	<i>3.351</i>	<i>40,8</i>
Water savings		6.711	6.711	2.148	3,1
Total		<i>426.749</i>	<i>426.749</i>	<i>30.623</i>	<i>13,9</i>

Monitoring programme – sensors and motors

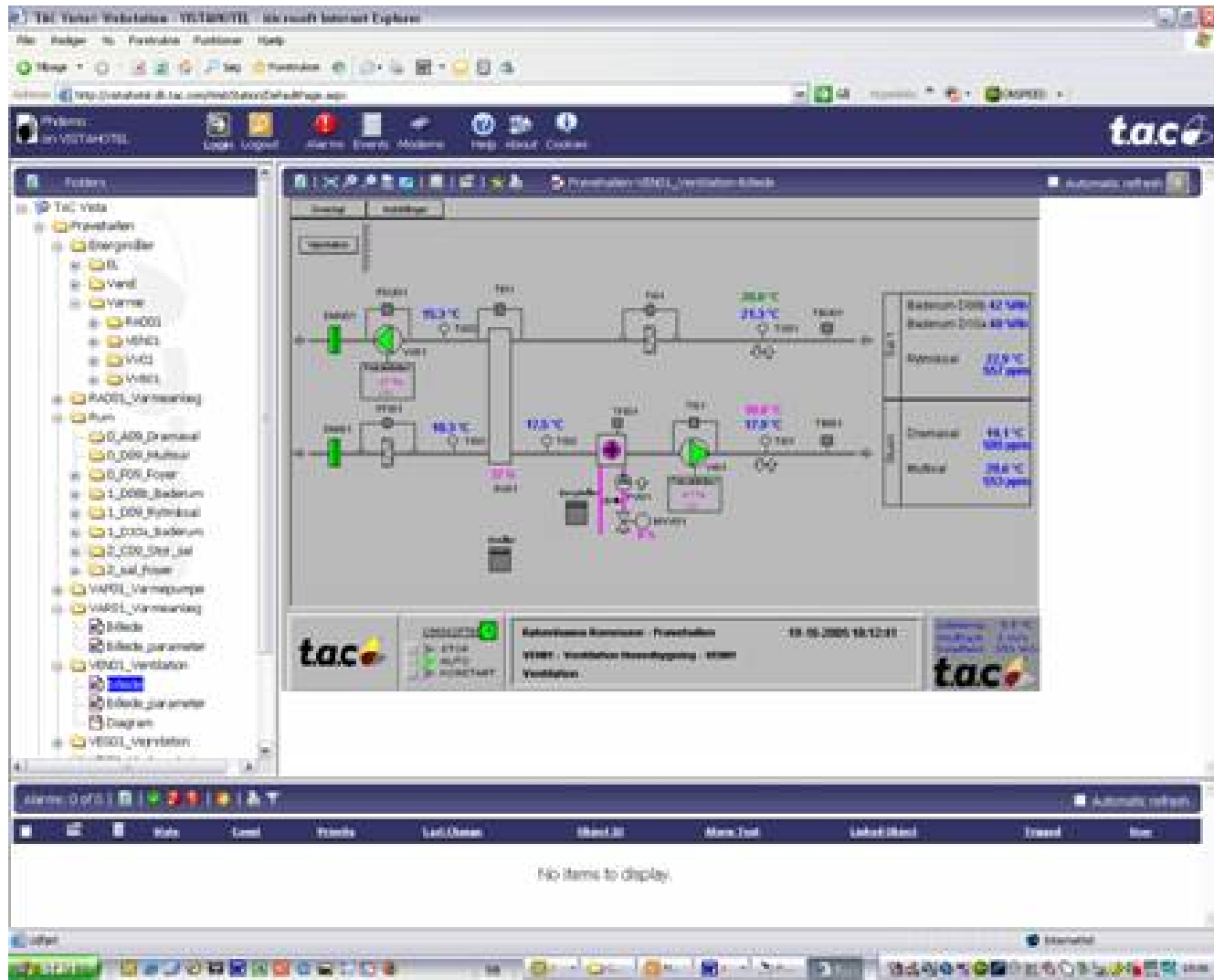
Room number/sensors	Temp.	Humidity	CO2	Window opener	Smoke ventilation	Room designation
0-F09	1		1	1 (2) *1	1 (2)	Entrance hall
0-A09	1		1			Theater-hall
0-D09	1		1			Multi-hall
1-D09	1		1			Music-hall
1-D08b		1				Bath
1-D10a		1				Bath
2-C09	1		1	1 (10)	1 (8)	The big hall

Monitoring programme

– fans and meters

Room number/meter	Fans	Heating Energy – space	Heating Energy- Warm Water	Electricity	Weather-station	Room designation
3-H08	2					Teknical room
3-H08				1 - vent		Teknical room
3-H08				1 – PV		Teknical room
New addition		2 - total and vent. preheat	1	1 total	1 – Recitherm	Teknical room
New addition		2 Heating energy in and out of HP, PLC		1 PV/T		Teknical room
New addition					1 Weather-Station	Roof

BEMS – <http://vistahotel.dk.tac.com>



Oversigt

Prøvehallen Energi

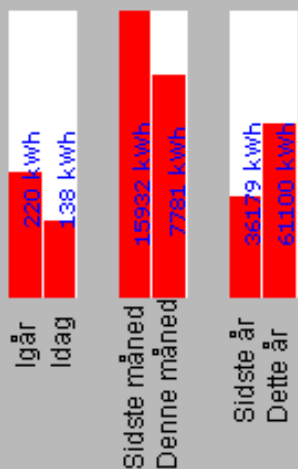
Varmemålere :

Energimåler

Radiatorvarme Sidebygning

VAR01-QM01

500 kwh 10 Mwh 100 Mwh

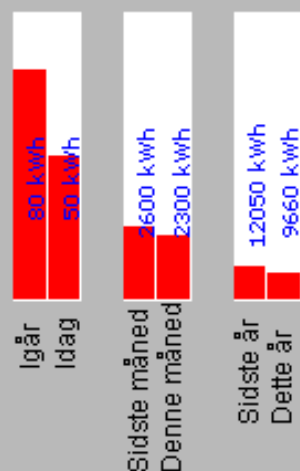


Energimåler

Varmt Brugsvand Fælles

VVB01-QM01

100 kwh 10 MWh 100 MWh

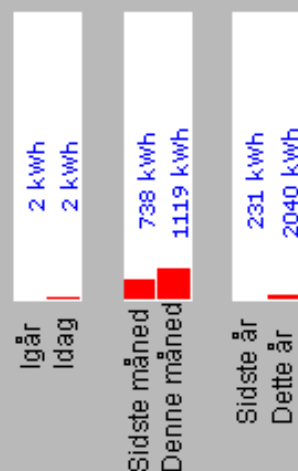


Energimåler

Ventilationsvarmeblade

VEN01-QM01

200 kWh 10 MWh 100 MWh



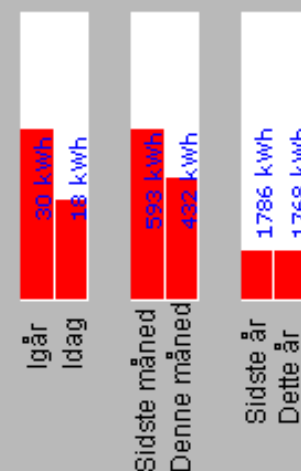
Elmålere :

Elmåler

Ventilationstavle

CTS01-EM01

50 kwh 500 kwh 10 Mwh



Københavns Kommune - Prøvehallen

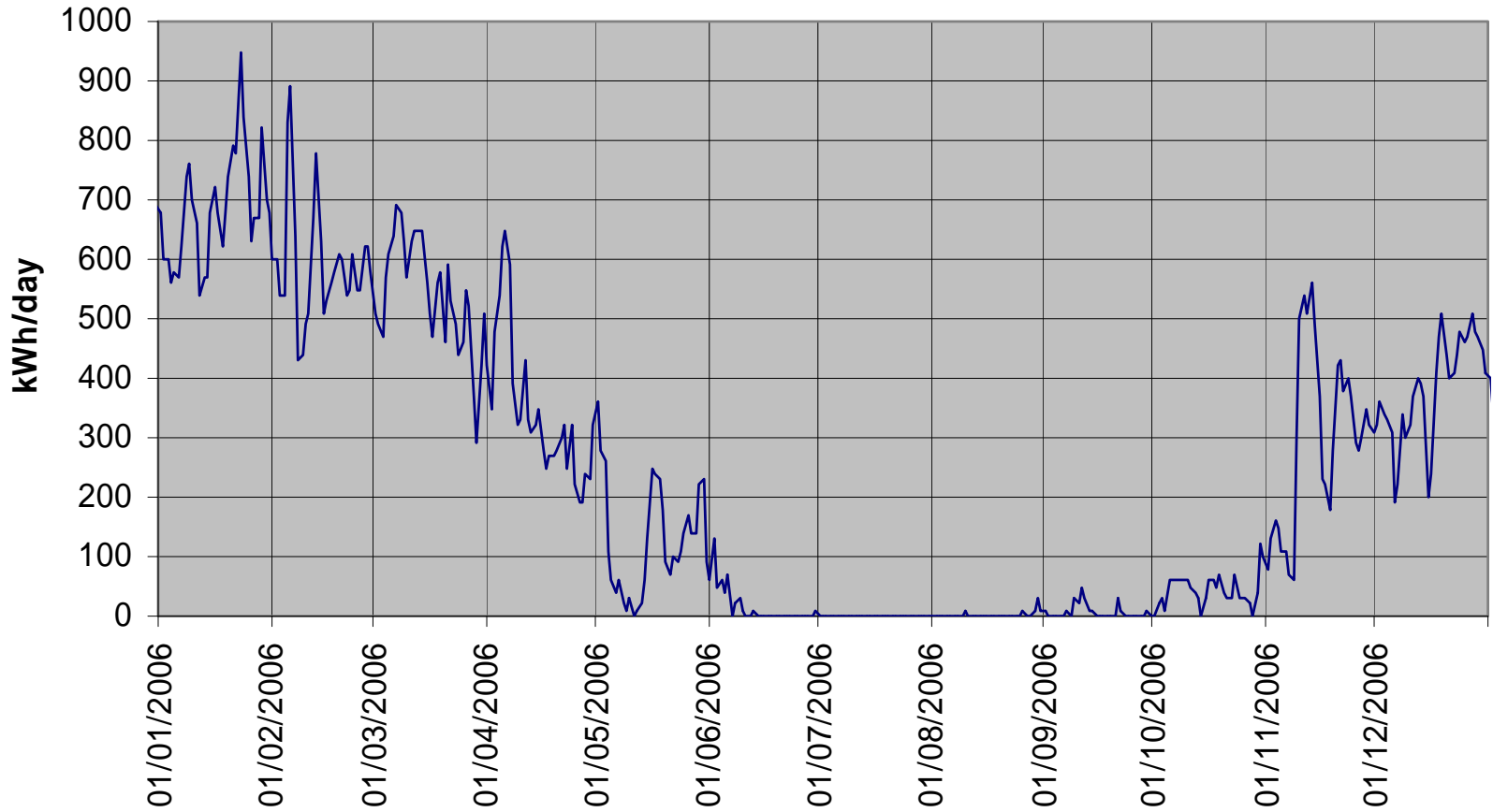
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Energi Oversigt

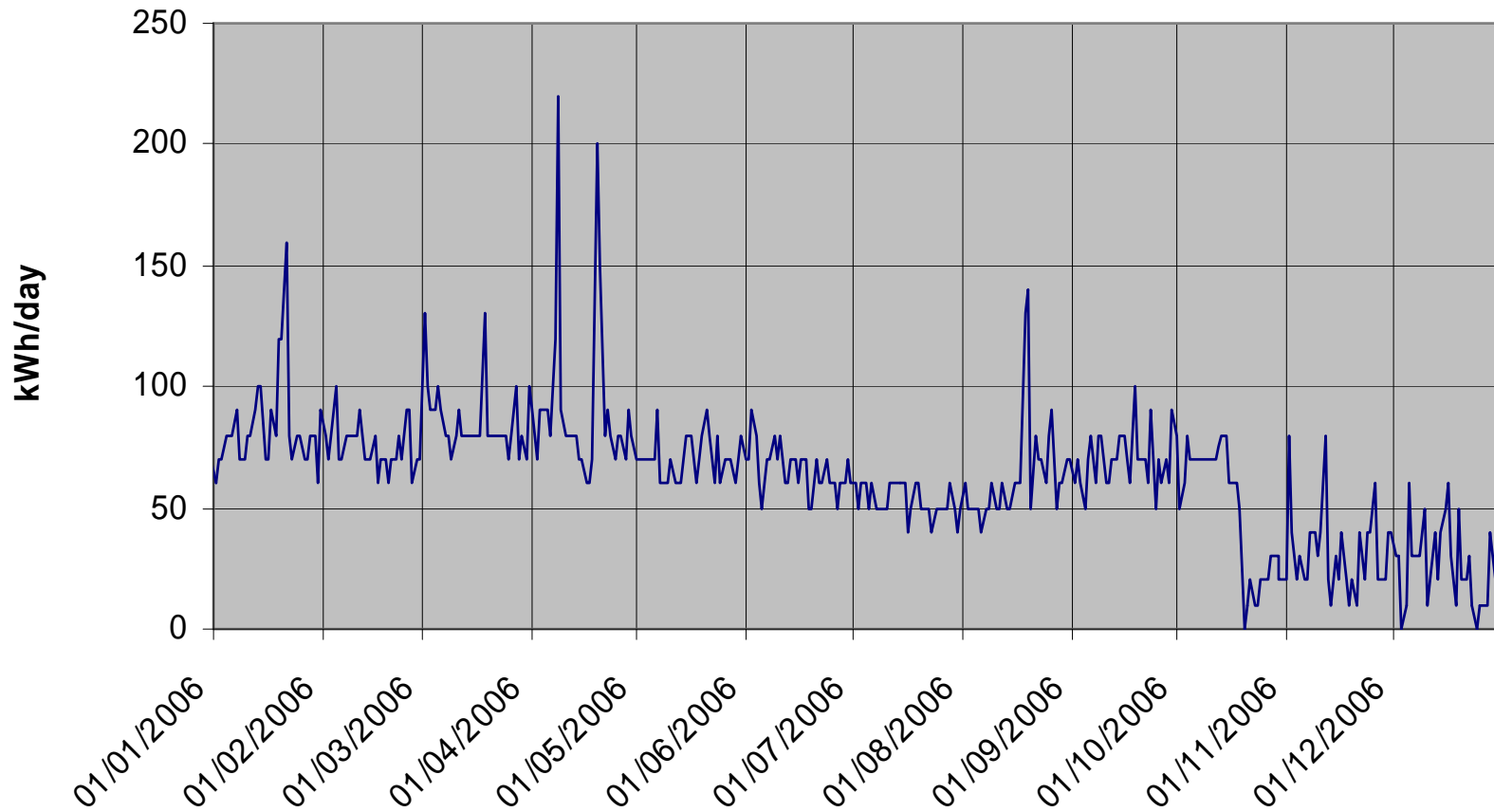
Udetemp. 12.9 °C
Vindhast. 3 m/s
Soleffekt 376 W/m²



Total Heat demand 2006

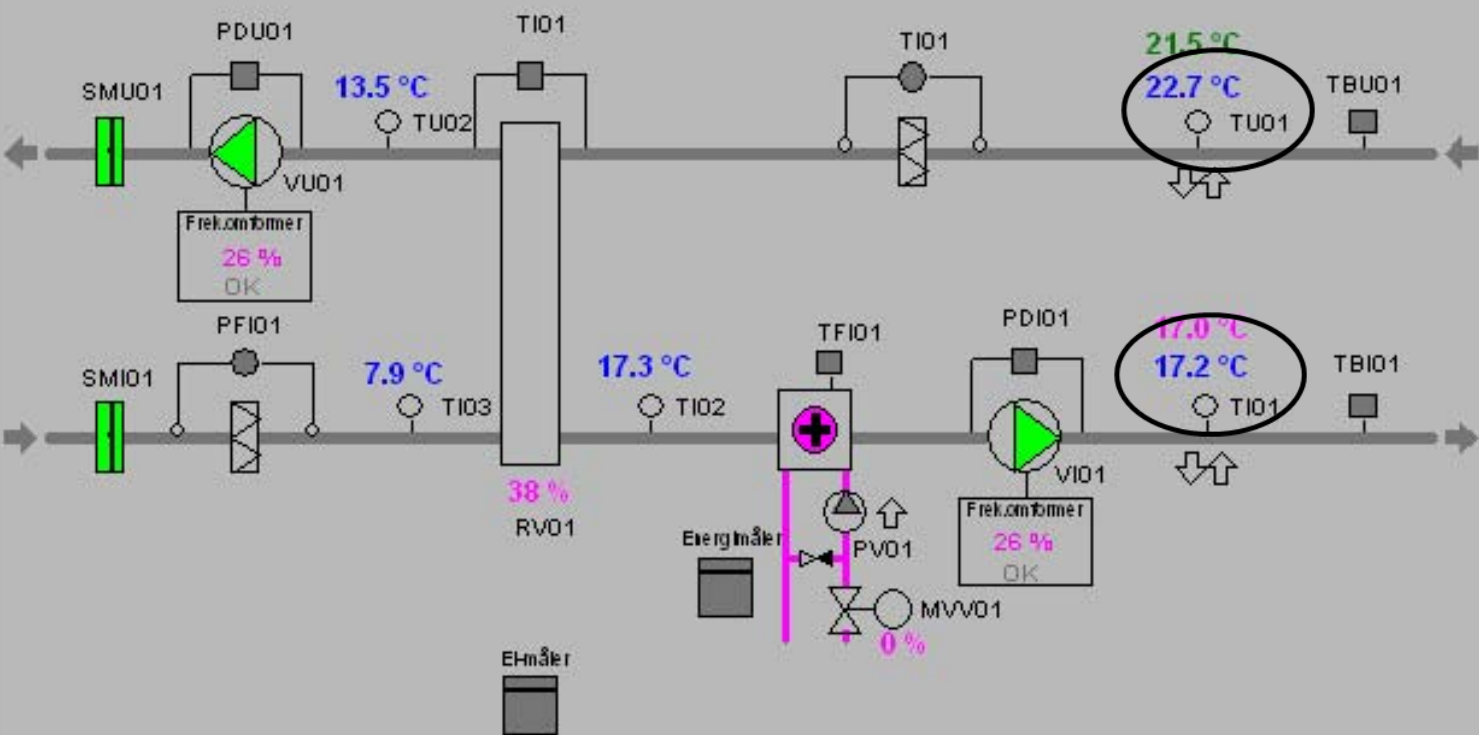


Domestic Hot Water, 2006



Oversigt Indstillinger

Vejrstation



Sal 1	Baderum D08b	33 %Rh
	Baderum D10a	32 %Rh
	Rytmiksal	22.9 °C 559 ppm
Stuen	Dramasal	21.4 °C 553 ppm
	Multisal	22.3 °C 578 ppm



OMSKIFTER

STOP
 AUTO
 KONSTANT

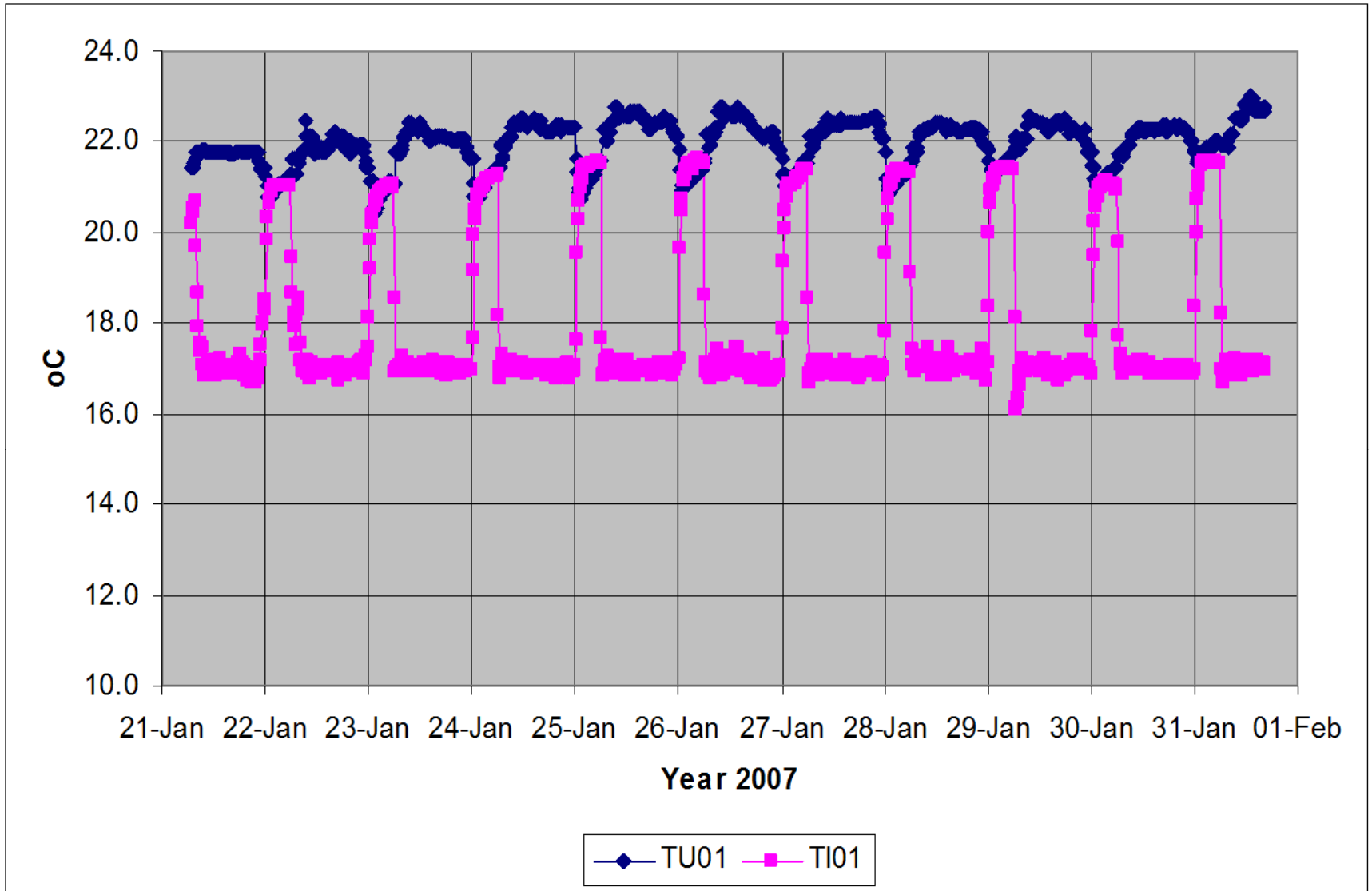
Københavns Kommune - Prøvehallen 31-01-2007 16:23:47

VEN01 - Ventilation Hovedbygning - VEN01

Ventilation

Udetemp. 7.8 °C
 Vindhast. 9 m/s
 Soleffekt 50 W/m²

Temperature in Ventilation System



Heat loss: 34.6 kWh/dayK
1.44 kW/K
0.8 W/m²K (Area = 1809 m²)
25,5 W/m² (dT = 34 °C)

