

Light weight BI-PVT and ground heat pump

EUDP projekt 1936-0015

Stenløse Football Club - - facilities for locker rooms etc.

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- 1. Back ground for the project
- 2. The new low temperature heating system
- 3. Connecting the BI-PVT
- 4. Experience

Local newspaper 2014



Endelig skal der kigges

ross

ud af.

nisering på Aage Lundsby Andersens fotoudstilling »Den dag foråret kom til

History

2013 – last year with electric heating – total consumption 89.000 kWh el.

• The electric heating amounted 50-70.000 kWh (est.)

 2014 – new low temperature heating system with heat pump - Total el. consumption 58.000 kWh

 The heating share (HP+dir.el.) amounted to 21.000 kWh incl. DHW

- 2015 DHC extended ult. 15 (anti-legionella)
 Means increased
- 2018 BI-PVT added BMS adjustments

HP and storage



The new heating installation



BMS solar heat



The cold side of the heatpump – ground source pipes

- High temperatures
- min.temp.
- Max. temp.
- Knowledge about the ground
- Efficient heat exchangers



 I the project: 1500 m pipes under at least 1500 m2 surface

Situation of the ground source pipes



The pipes aug. 2014 / jan. 2016





Warm side: centralheating+DHW

- El-radiators out
- low system temp.
- Oversizing Ok
- Storage
- max.temp.



- Well distributed flow in the radiators
- Efficient heat exchanger
- In the project: radiators + vent. heating coil design 55-35°C
- DHC extension ult. 2015

Measurements since 2014 ECEDAL ENERGIMÂLINGER

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		år	2014	17h	2015										
		dag	16.dec.	h (timer)	16.feb.	24		12.mai							
		kl	13		14										
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Yearly consumption – el. and heat

	2013	2015	2016	5 2017			
Energy kWh/y	elvarme	dec. 14	/15 marts	15/16 marts 16/	marts 16/17		
Main meter electricity	89.000	54910	57660) målerskift			
HP+el.heat	x	20974	18453	3 15571			
HP electricity	x	7250	7962	2 11889	 		
Room heat+HP/DHW	x	30363	34400	47610	 		
COP excl. el.heat	atroner	4,2	4,3	3 4,0	 		
COP incl. el.heat	troner	2,1	2,4	4 3,3			

The new energy room





BI-PVT installed 2017

 BI-PVT can produce 70-80°C (<85°C acc. TÜF) – meaning:

PVT in warm periodes can produce DHW => +COP
PVT in periodes can produce room heating => -COP
PVT will in these periodes help the g.s.pipes=> +COP

- PVT will during long periodes supply heat to the g.s. pipes => higher PV efficiency
- PVT increases the ground temperature => better HP COP and/or less m g.s. pipes

PVT type



PVT principle



Conductive heat transfer measured inside different types of PVT absorbe Source: Fraunhofer ISE

Evishine monitoring



Heat production 2018.10.17

2018





Performance

lype	energy.he	at.total(0) U	SAGE	4
Min	0			
Мах	6375000			
Туре	flow(0) U	SAGE		44
Min	0	$M_{\rm av}$ 124	01/b	
Мах	1340	IVIAX 154	U 1/11	
Туре	temperat	ure.diff(0) NE	UTRAL	44
Min	0			
Мах	43			
Туре	temperat	ure.inlet(0) N	IEUTRAL	4
Min	0	Max 68C	from PVT	
Мах	68			
Туре	temperat	ure.outlet(0)	NEUTRAL	44
Min	0			
Мах	61	Max 61C t	o PVT	

11 kW from PVT by 61-68C

BI-PVT autum 2017







BI-PVT autum 2017







BI-PVT autum 2017

2014 April



