

Design of a heat pump heating system with Aquarea Designer  aberla Project: 11 Chauncy Rd M40 3GG Date: 19/12/2019 RENEWABLE	
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Hausdaten

<i>Address</i>	Northwood 11 Chauncy Rd M40 3GG
<i>Location</i>	Cawood (GB) (from database)
<i>Building area</i>	47 m ²
<i>Standard heating requirement</i>	3.0 kW
<i>Cooling</i>	-- kW
<i>Internal gains</i>	1175 kWh/year
<i>Solar gains (windows)</i>	940 kWh/year
<i>Indoor design temperature</i>	20 °C
<i>Outdoor temp. limit for heating 'on'</i>	15 °C
<i>Heat distribution</i>	Underfloor heating by -- % Radiator heating by 100 % Wall heating by -- %
<i>Max. flow water temperature</i>	45 °C
<i>Max. return water temperature</i>	28 °C
<i>Solar collector area</i>	-- m ²

Service hot water

<i>Type of service</i>	Hot water with heat pump
<i>Tank volume</i>	190 litre
<i>Average daily need</i>	100 litre
<i>Cold water inlet temperature</i>	10 °C
<i>Target tank temperature</i>	50 °C
<i>Exchange losses</i>	5 K
<i>Electrical auxiliary heating necessary</i>	no

Rate data

<i>Description</i>	UK default_ (from database)	
<i>Shut off times total</i>	0.0 h/day	
<i>Weekends with shut off times</i>	yes	
<i>Daytime rate of heat pump</i>	Time for daytime rate 5 - 19 o'clock	16.0 pence/kWh
<i>Nighttime rate of heat pump</i>	Time for nighttime rate 19 - 5 o'clock	16.0 pence/kWh
<i>Heat circulation pump(s)</i>	like heat pump: yes	-- pence/kWh
<i>Heating element for monoenergetic operation</i>	like heat pump: yes	-- pence/kWh
<i>Heating element for post heating of hot water</i>	like heat pump: yes	-- pence/kWh

Climatic data

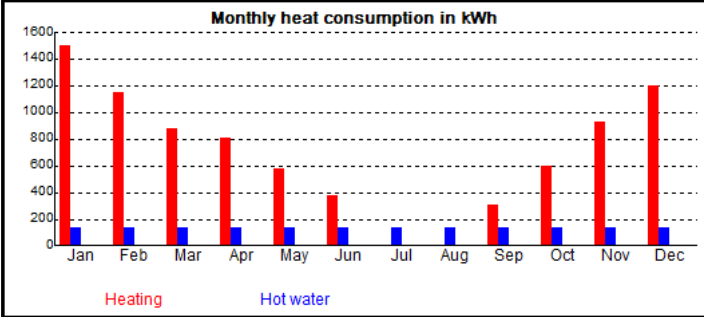
<i>Climatic location</i>	Cawood (GB) (from database)		
<i>Monthly average temperatures in °C</i>			
<i>Jan</i>	-0.6	<i>Jul</i>	16.3
<i>Feb</i>	3.6	<i>Aug</i>	16.0
<i>Mar</i>	6.9	<i>Sep</i>	13.8
<i>Apr</i>	7.7	<i>Okt</i>	10.2
<i>May</i>	10.5	<i>Nov</i>	6.3
<i>Jun</i>	12.9	<i>Dec</i>	3.0

Used Panasonic heat pump

<i>Description</i>	WH-SDC05H3E5
<i>Sanitary tank</i>	PAW-TE20E3STD
<i>Heat pump type</i>	air / water
<i>Wattage at 2/35</i>	heat: 4.2 kW, electric: 1.2 kW
<i>Recommended flow-through of air</i>	1700.0 m ³ /h
<i>Max. flow temperature</i>	55 °C
<i>Mode of operation</i>	monovalent
<i>Design/Bivalent temperature</i>	-6.0 °C
<i>Number of heat pumps used</i>	1
<i>Wattage of fan</i>	
<i>(included in heat pump performance data: yes)</i>	60 W
<i>Wattage of heat circulation pump(s)</i>	29 W

Calculation results

Monthly heat consumption



Total heat consumption

Heat consumption supplied	Space heating	Service hot water	Cooling
by heat pump	8328 kWh	1681 kWh	-- kWh
by second heat source	0 kWh	0 kWh	

Power consumption

by heat pump	
for space heating	2221 kWh/year
for cooling	-- kWh/year
for service hot water	560 kWh/year

By Hot water heating rod	(additional power for non-monovalent mode of operation)
for space heating	0 kWh/year
for service hot water	0 kWh/year

By auxiliary components	
Fan (included in heat pump performance data: yes)	124 kWh/year
Heat circulation pump(s)	153 kWh/year

Operating time of heat pump

for space heating	1727 h/year
for cooling	-- h/year
for service hot water	334 h/year

Heat withdrawal from heat source

for space heating	5933 kWh/year
for service hot water	1144 kWh/year

Annual energy costs

Caused by heat producers

Heat pump	468 £
Hot water heating rod	0 £

Caused by heat consumers

Space heating	356 £
Cooling	0 £
Service hot water	88 £
Heat circulation pump(s)	24 £

Total

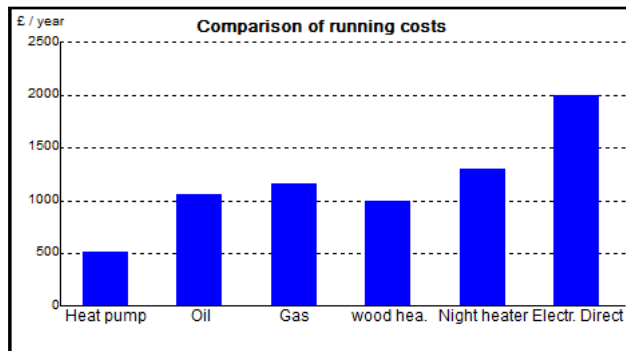
468 £

Annual C.O.P.

3.6	(auxiliary power included: Heating elements)
--	(with cooling)

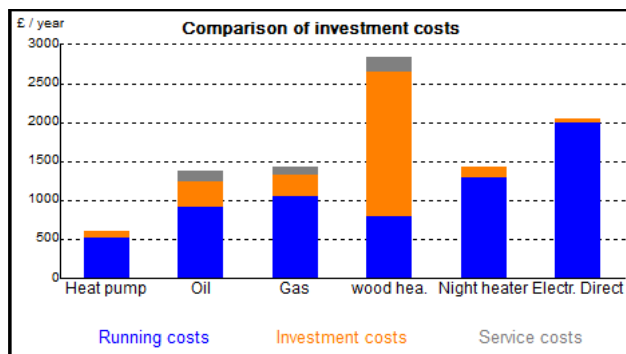
Operational costs

Type of heating	Price in pence/kWh	Efficiency [%]	Additional costs in £/year	Total costs in £/year
<i>Heat pump</i>			50	518
<i>Oil</i>	6.5	85	265	1060
<i>Gas</i>	7.0	90	350	1158
<i>Electric night storage heater</i>	12.0	100	100	1301
<i>Electric heating element</i>	20.0	100	0	2001
<i>wood heating</i>	5.0	80	343	998

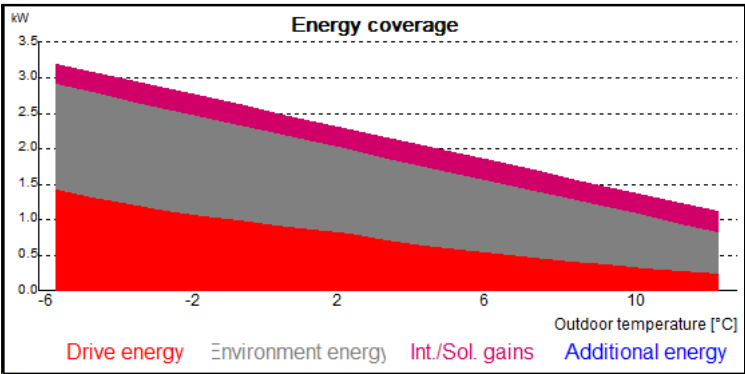
**Investment costs**

<i>Reference period:</i>	20 years
<i>Rate of interest:</i>	6.0 %

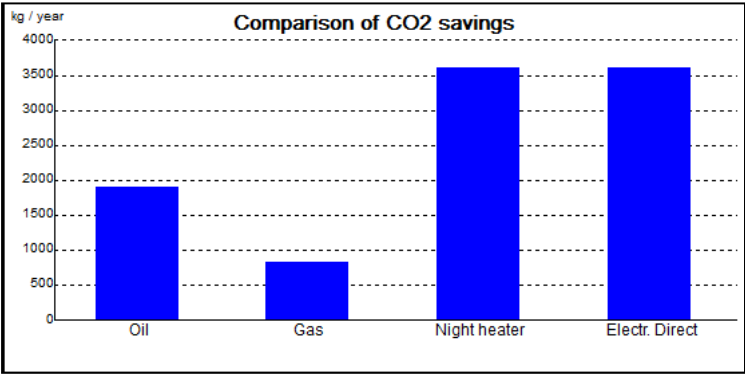
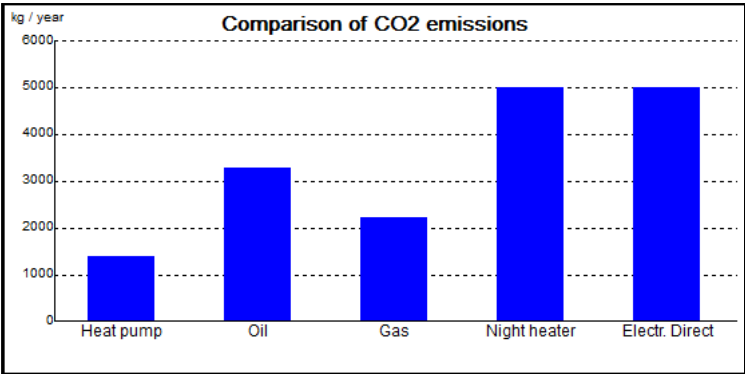
Type of heating	Sum of investment costs in £	Operational costs in £/year	Investment costs in £/year	Total costs in £/year
<i>Heat pump</i>	1000	518	87	605
<i>Oil</i>	4000	1060	319	1379
<i>Gas</i>	3700	1158	276	1434
<i>Electric night storage heater</i>	1500	1301	130	1431
<i>Electric heating element</i>	500	2001	43	2044
<i>wood heating</i>	21500	998	1845	2843



Energy coverage



Comparison of CO₂-Emissions



This calculation is based on user values and valid for normal meteorological conditions. The correct adjustment of the heat pump heating system is assumed. This calculation cannot guarantee that the calculated values are fulfilled in practical operation.