Generic system with gas boiler for existing single family houses (Germany)

INFO Sheet D14-Germany-SFH-heatdemand-23.5MWh-generic-gas

Description:	*Definition of a generic system with gas boiler for existing single family houses in Germany*
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Introduction

This document describes the generic system with gas boiler for existing single family houses for domestic hot water preparation and space heating in Germany / Potsdam. The system is modelled with Polysun to calculate the gas consumption and electric energy needed to provide the required domestic hot water and space heating (see info sheet D13 for description of the building, weather data and load profiles). The results in terms of kWh/a (gas, oil, wood, electricity, etc.) will be used as input for the LCA and LCoH calculation.

Results

Energy demand	
Gas demand	2505 m^3/a
Gas energy content	10.5 kWh/m^3
Gas demand	26302.0 kWh/a
Electricity demand	210.0 kWh/a
Electricity supply	
Supply to heating system	0 kWh/a
Supply to household	0 kWh/a
Supply to the grid	0 kWh/a
Detailed results	
Electric consumption of solar loop pump per year	0.0 kWh/a
Electric consumption of boiler and controller per year	144.0 kWh/a
Electric consumption of pump for charging store per year	16.0 kWh/a
Electric consumption of pump for space heating per year	50 kWh/a
Electric consumption of pump for circulation per year	0 kWh/a

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Location and load (further details see Info sheet D 13)

Location	Germany, Potsdam
Type of system	system with gas boiler
Weather data including - hemispherical irradiance on horizontal surface - beam irradiance on horizontal surface - diffuse irradiance on horizontal surface - ambient temperature	Test reference year (TRY Potsdam 2015) $\Sigma G_{hem,hor} = 1064.0$ kWh/(m^2 a) $\Sigma G_{beam,hor} = 501.0$ kWh/(m^2 a) $\Sigma G_{diff,hor} = 563.0$ kWh/m^2 a) $T_{amb,av} = 9.8$ °C
Load information including - heat demand for space heating - heat demand for DHW - heat demand for circulation	 22112.0 kWh/a /1/ 1428.0 kWh/a /2/ 0 kWh/a (no circulation system)

Hydraulic scheme of the system

Description of the components required for simulation

Gas boiler	
Type of auxiliary heating	Gas condensing boiler
Boiler capacity	15.9 kW
Mass flow	1,300 kg/h
Efficiency factor of boiler based on calorific value	0.93

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Electric power of boiler and controller in standby/operation mode	3 W / 27 W
Heat store	
Heat store volume	149 l
Store height (with dished ends)	1.00 m
Rel. height of heat exchanger inlet (0 = bottom, 1 = top)	0.54
Height of heat exchanger	0.40 m
Rel. height of hot water outlet (0 = bottom, 1 = top)	1.00
Rel. height of cold water inlet (0 = bottom, 1 = top)	0.05
Rel. height of sensor (0 = bottom, 1 = top)	0.62
Switch on temperature for charging	45 °C
Switch off temperature for charging	50 °C
Heat conductivity of insulation of store	0.030 W/(m·K)
Thickness of insulation of store	Top/mantel: 60 mm, bottom: 30 mm
Area of heat exchanger	1.02 m²
Ambient temperature of heat store	15 °C

Abbreviation

DHW   domestic hot water

HX   heat exchanger

References

/1/ SFH building heat demand ISO 52016

/2/ synPRO load files

/3/ info sheet D13 (building)