

Daikin Altherma Selection Report

Produced on 20.10.2014 with Daikin Altherma Simulator V4.4.7 - database Central 9.7.9

Project name Energa Sistemi
Reference Airabela
Client name Energa Sistemi
Revision 1

Only the data published in the data book are correct. This program uses close approximations of these data.

1. Solution Overview

System layout	High temp - Outdoor/indoor
System model	ERRQ011AAV1
Indoor unit model	EKHBRD011ACV1
Domestic hot water tank	EKHTS260AC
Required heating capacity	7,4 kW
% covered by HP	100,0%
% covered by BUH	0,0%
Energy cost heating	578 €
Spare cap. in heating, including BUH	2,5 kW
Seasonal COP	3,0

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2. High temp - Outdoor/indoor ERRQ011AAV1

2.1. Material List

Model	Qty	Description
ERRQ011AAV1	1	Outdoor
Bottom plate heater	1	
EKHBRD011ACV1	1	Indoor
EKHTS260AC	1	Domestic hot water tank

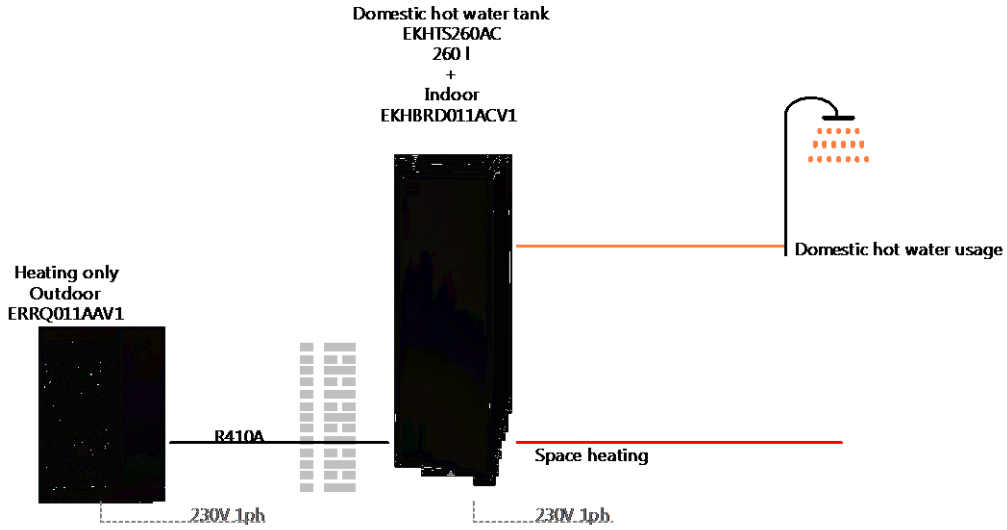
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2.2. Selection Criteria

Location	
Country	Slovenia
City	Ljubljana/Brnik
Design conditions	
Conditioned surface	100 m ²
Required capacity for space heating at min. night temp.	7,4 kW
Application	Heating only
System layout	High temp - Outdoor/indoor
Hydrobox placement	Integrated
Leaving water temperature range heating	45,0°C - 65,0°C
Power supply	400V 3Nph
Domestic hot water	
Material inside	Stainless steel
Tank type	Design tank
Volume	260 l

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2.3. System Diagram



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2.4. Technical Details

Indoor	EKHBRD011ACV1
Application	
Function	Heating only
Application	High temperature
Leaving water range heating	25,0 - 80,0°C
Technical data	
Dimensions (WxHxD)	600x705x695 mm
Weight	144kg
Drain connection	18mm
Material	Precoated sheet metal
Sound data	
Sound pressure	43dBA
Sound power	59dBA
Electrical data	
Power supply	230V 1ph
Fuse size	See installation manual
Capacity electric backup heater	
Capacity steps	0

Domestic hot water tank	EKHTS260AC
Technical data	
Water volume	260 l
Max. water temperature	75,0°C
Material inside tank	Stainless steel
Material outside tank	Galvanised steel (precoated sheet metal)
Dimensions (WxHxD)	600x1610x695 mm
Weight	78kg

Outdoor	ERRQ011AAV1
Performance	
Nominal heating capacity	11,0 kW
COP	3,1
Operation range heating	-20,0 - 20,0°C
Technical data	
Dimensions (WxHxD)	900x1345x320 mm
Weight	120kg
Refrigerant	R410A
Refrigerant charge	4,5kg
Sound data	
Sound pressure	52dBA
Sound power	68dBA
Electrical data	
Power supply	230V 1ph
Fuse size	See installation manual

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2.5. Energy Consumption of the Domestic Hot Water Tank

Type of usage	Hot water consumption	Water temperature	Volume per day at 40,0°C	Occurrences per day
Small	3 l	40,0°C	48 l	16
Floor	3 l	40,0°C	3 l	1
Clean	2 l	55,0°C	6 l	2
Small dishwash	6 l	55,0°C	9 l	1
Medium dishwash	8 l	55,0°C	0 l	0
Larger dishwash	14 l	55,0°C	21 l	1
Large	15 l	40,0°C	0 l	0
Shower	40 l	40,0°C	40 l	1
Bath	103 l	40,0°C	206 l	2
Total per day at 40,0°C			333 l	11,6 kWh

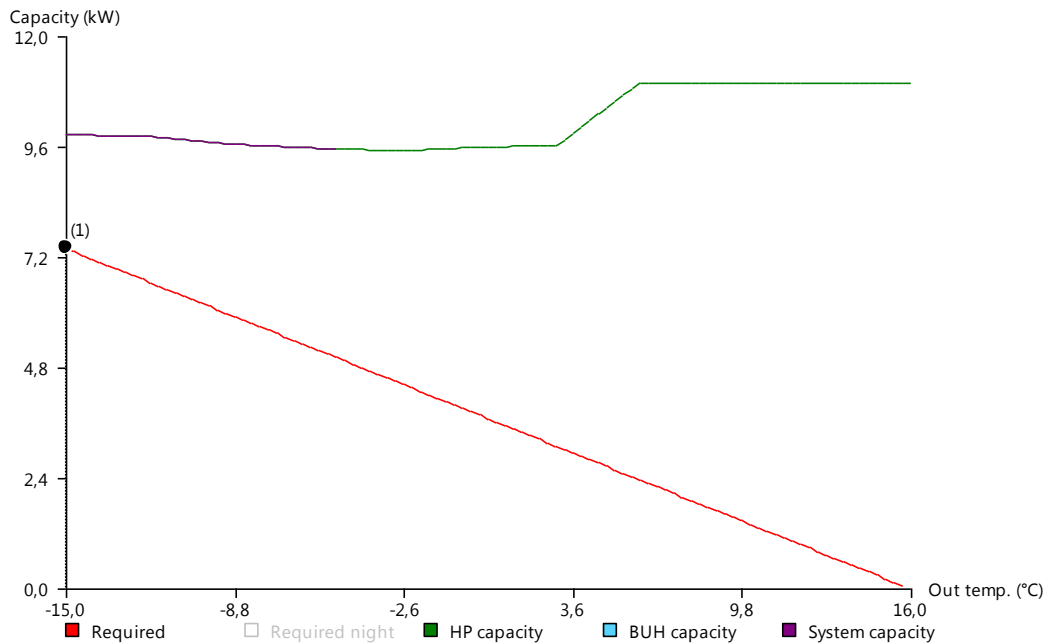
Actual total thermal energy consumption per year = 4240 kWh.

Actual total electricity consumption per year = 2000 kWh.

COP calculations for DHW heating. The COP used in the energy calculation is based on the FprEN16147 (replaces the former prEN255-3) large tapping pattern at a standard temp set of 52,5°C.

2.6. Graphs

Heating capacity



Seasonal COP 3,0 (1) Cap. space heating -15,0°C / 7,4 kW
 Space thermal energy 14745 kWh

HP capacity (Heat pump capacity):

The integrated heat generation capacity of the heat pump. This value takes into account the energy used for the defrost cycle.

Heat pump capacity depends on the outside temperature and the leaving water temperature. The simulator calculates the heat pump capacity at the minimum night temperature in the winter as described in the meteorological data, and at the selected maximum leaving water temperature.

BUH capacity (Backup heater capacity):

The nominal heat generation capacity of the electrical backup heater.

System capacity:

Total heat generation capacity of the system, i.e. the sum of heat pump capacity and heater capacity.

Spare capacity:

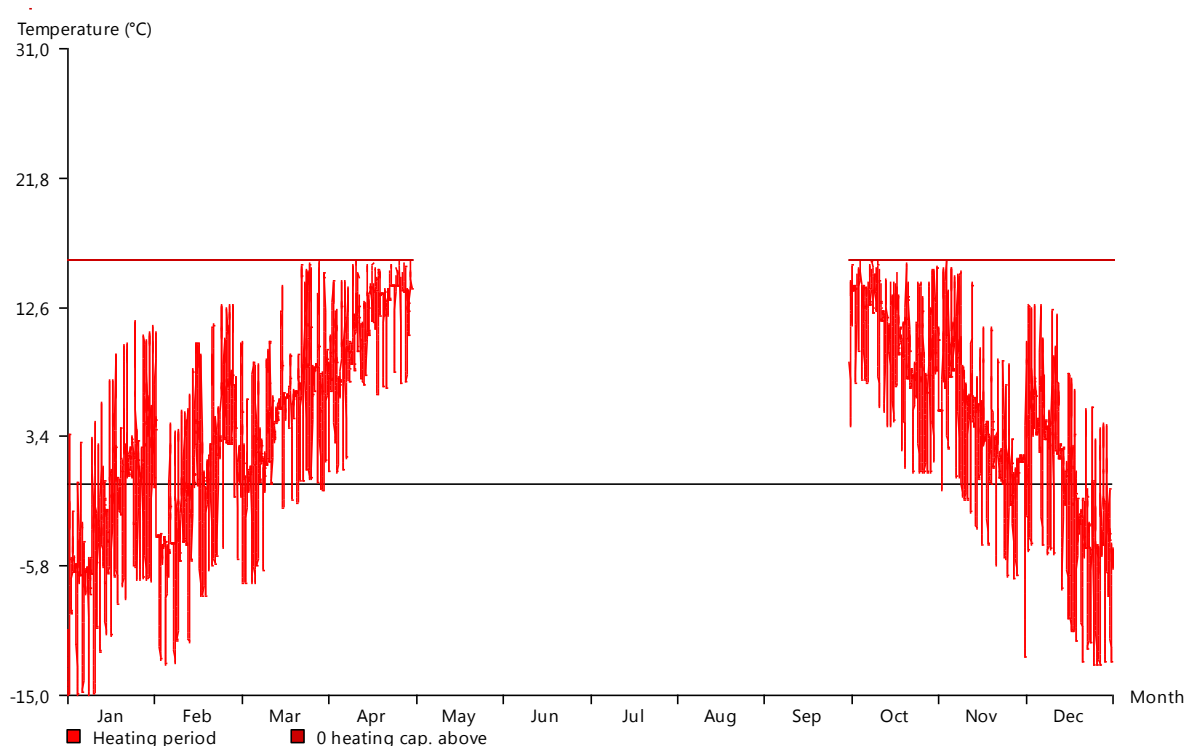
The surplus in heat generation capacity when compared to the required heating capacity, i.e. the difference between system capacity and required capacity.

Equilibrium point or equilibrium temperature:

The outside ambient temperature at which the heat pump capacity matches the heating demand. It is therefore the lowest outside temperature at which no additional heat source is needed. The heat pump can cover the entire heating demand down to this outside temperature. For outside temperatures below this equilibrium temperature, additional heat from the backup heater is required to fulfill the heating demand. During transient conditions at system heat-up, the equilibrium point can shift to a higher temperature than the one it would be at during normal operations.

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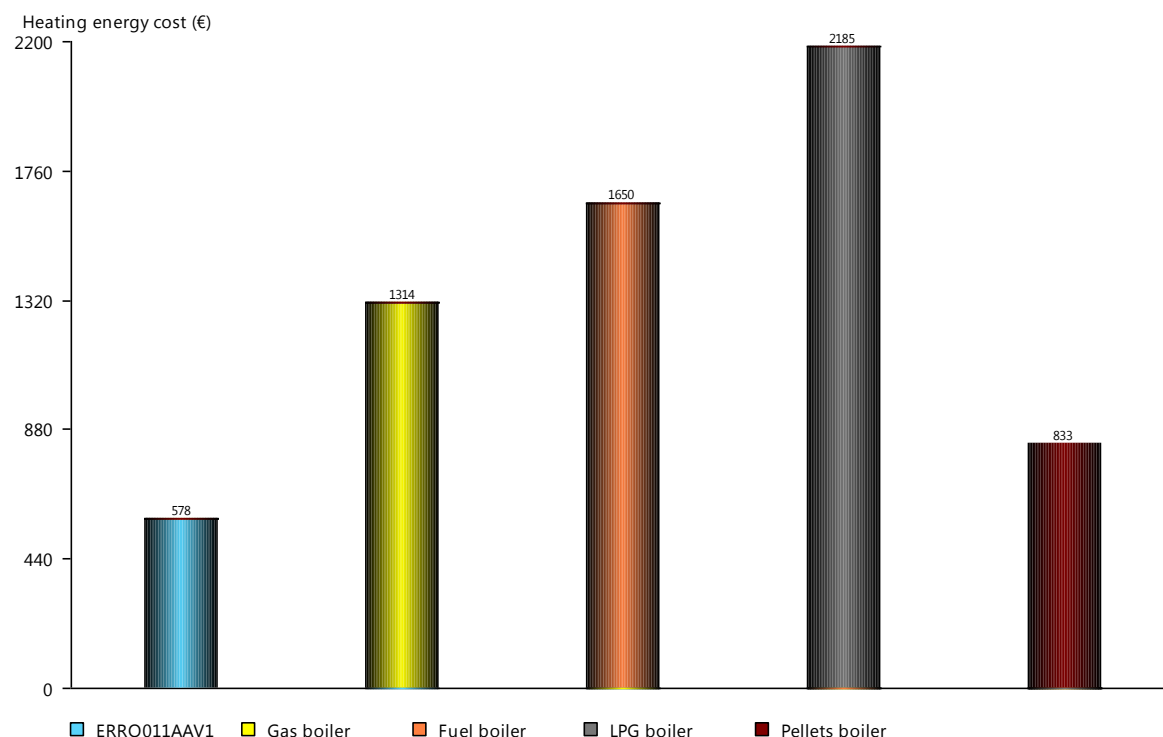
Operation period



Location	Country	Slovenia
	City	Ljubljana/Brnik
Temperatures (min / max)	Summer Day	25,6 / 30,1°C
	Summer Night	16,6 / 21,1°C
	Winter Day	2,7 / 11,6°C
	Winter Night	-15,0 / -6,1°C

The graph shows the simulated outdoor temperature variations within the defined heating months. For heat pumps the graph also shows the temperatures in the cooling months.

Heating energy cost

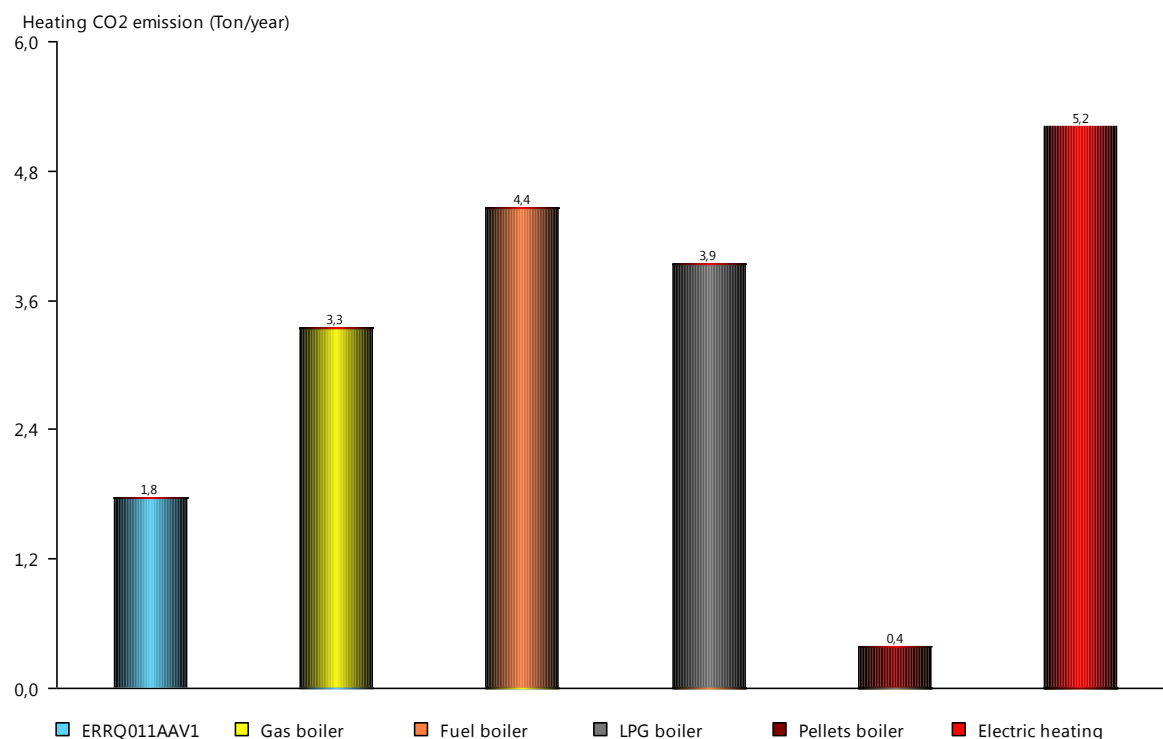


Electricity normal tariff	High price period	0,14307 €/kWh
	Low price period	0,09724 €/kWh
Electricity heat pump tariff	High price period	0,14307 €/kWh
	Low price period	0,09724 €/kWh
Electricity	Direct heater efficiency	100%
	Connection cost	10 €
Gas	Tariff	0,0781 €/kWh
	Efficiency	89%
	Connection cost	20 €
Fuel	Tariff	1,0130 €/l
	Efficiency	89%
LPG	Tariff	0,9642 €/l
	Efficiency	90%
Pellets	Tariff	0,2550 €/kg
	Efficiency	95%
Design conditions	Conditioned surface	100 m ²
	Required capacity for space heating at min. night temp.	7,4 kW
	Zero heating capacity at outside temperature	16,0°C

The graph shows a comparison of the simulated annual running costs for Daikin Altherma, a gas boiler and an oil boiler. The calculation is based upon the selected buildings yearly required thermal input, each systems coefficient of performance (without pump) and the inputted energy prices.

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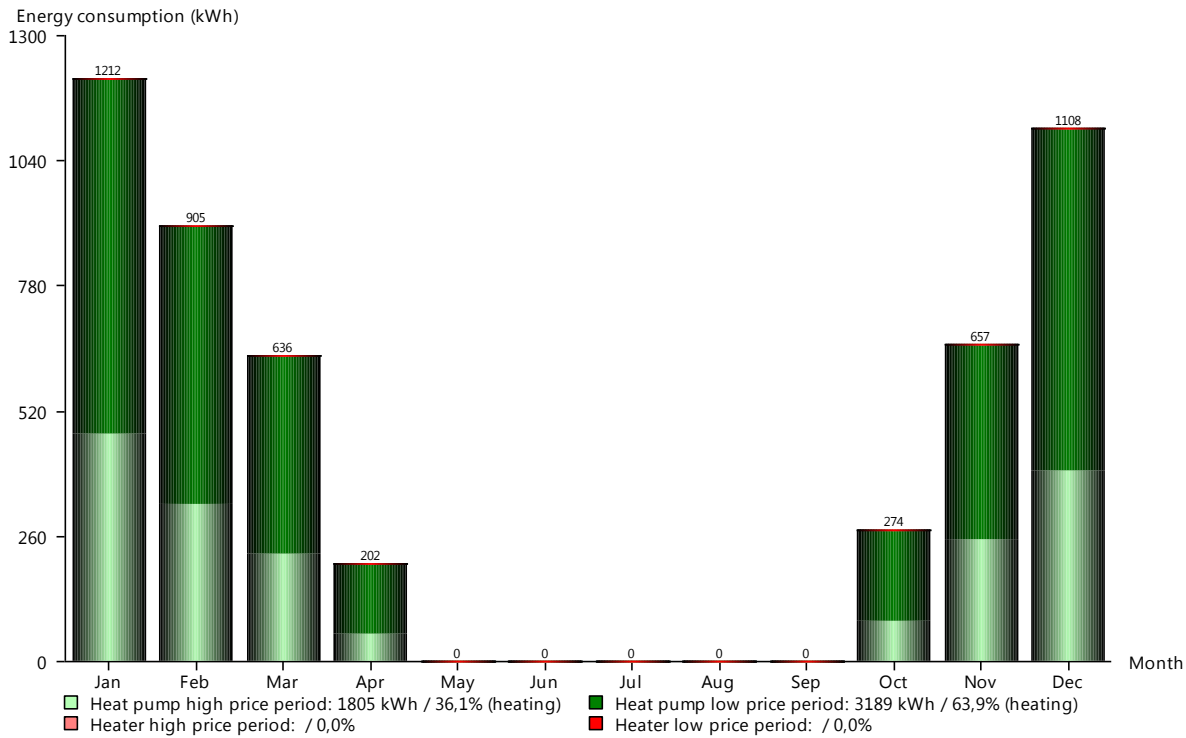
Heating CO2 emission



Location	Country	Slovenia
Electricity	Heating CO2 emission	0,3540 kg/kWh
	Direct heater efficiency	100%
Gas	Heating CO2 emission	0,2020 kg/kWh
	Efficiency	89%
Fuel	Heating CO2 emission	0,2686 kg/kWh
	Efficiency	89%
LPG	Heating CO2 emission	0,2400 kg/kWh
	Efficiency	90%
Pellets	Heating CO2 emission	0,0250 kg/kWh
	Efficiency	95%
Design conditions	Conditioned surface	100 m ²
	Required capacity for space heating at min. night temp.	7,4 kW
	Zero heating capacity at outside temperature	16,0°C

The graph shows a comparison of the annual CO2 emissions for Daikin Altherma, an electric heating system, a gas boiler and an oil boiler sized to cover the yearly heat load for the simulated building. Neither Daikin Altherma nor the electric heater will have any direct emissions. The emission from these systems is based on calculations according to the average CO2 emission from the selected country's electricity production.

Energy consumption per month

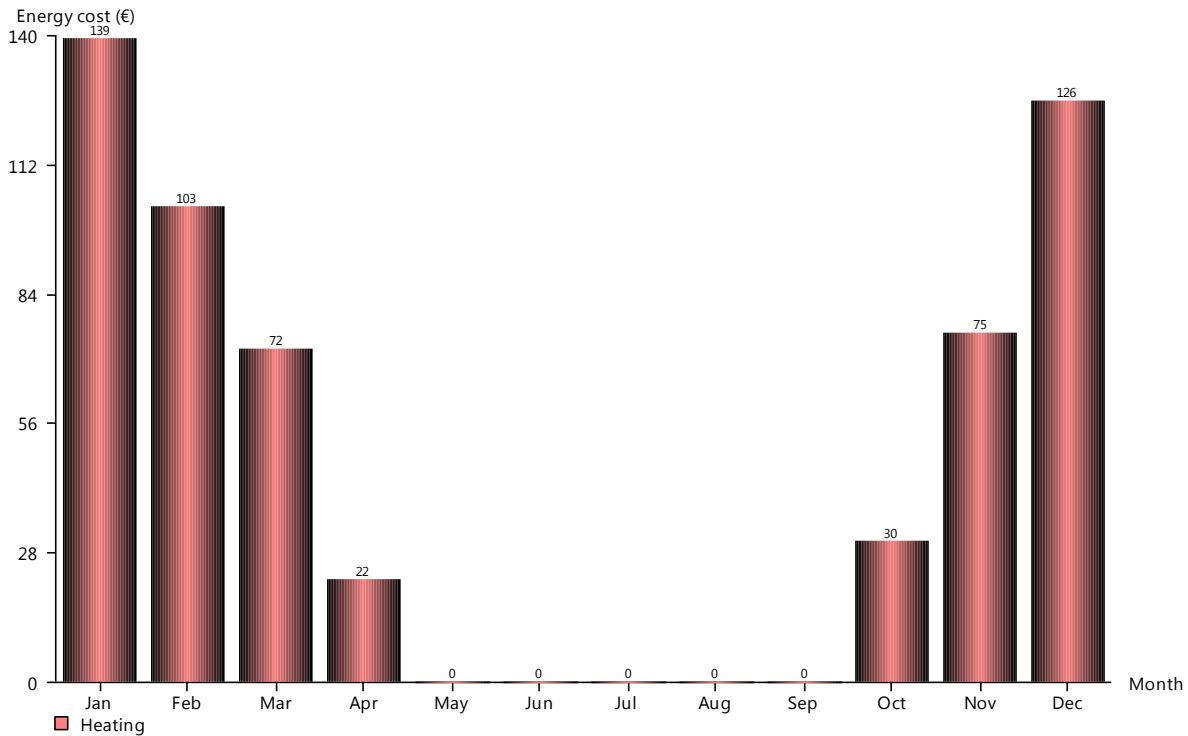


Yearly energy consumption (heating)

Primary energy use (heating)		4994 kWh
Electricity normal tariff	High price period	12484 kWh
	Low price period	0,14307 €/kWh
Electricity heat pump tariff	High price period	0,14307 €/kWh
	Low price period	0,09724 €/kWh
Design conditions	Conditioned surface	100 m ²
	Required capacity for space heating at min. night temp.	7,4 kW
	Zero heating capacity at outside temperature	16,0°C

The graph shows the energy consumption (input) per month for the heat pump and back up heater. There is made a separation between day and night operation to show the amount of energy consumption that falls under day and night tariff.

Energy cost per month



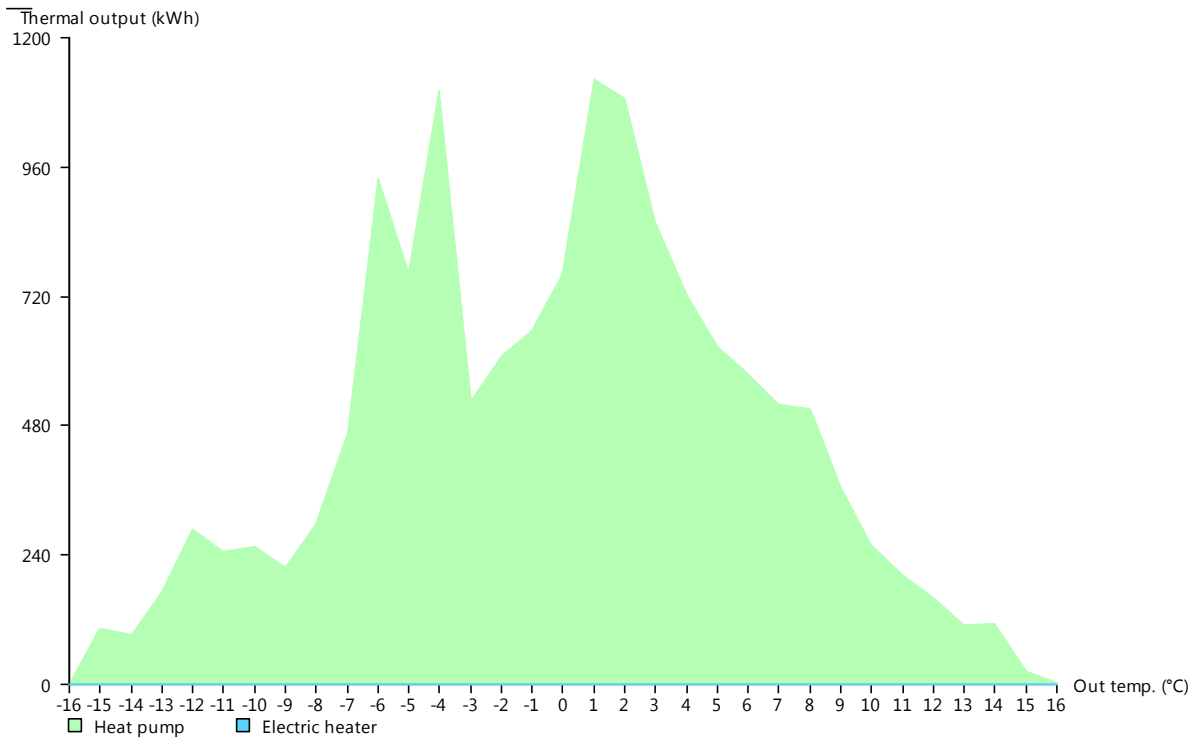
Total cost for year (heating)

578 €

Electricity normal tariff	High price period	0,14307 €/kWh
	Low price period	0,09724 €/kWh
Electricity heat pump tariff	High price period	0,14307 €/kWh
	Low price period	0,09724 €/kWh
Design conditions	Conditioned surface	100 m ²
	Required capacity for space heating at min. night temp.	7,4 kW
	Zero heating capacity at outside temperature	16,0°C

The graph shows the running cost per month for Daikin Altherma according to the inputted electricity prices and the power input as given in the graph "energy consumption per month".

Heating thermal output by source

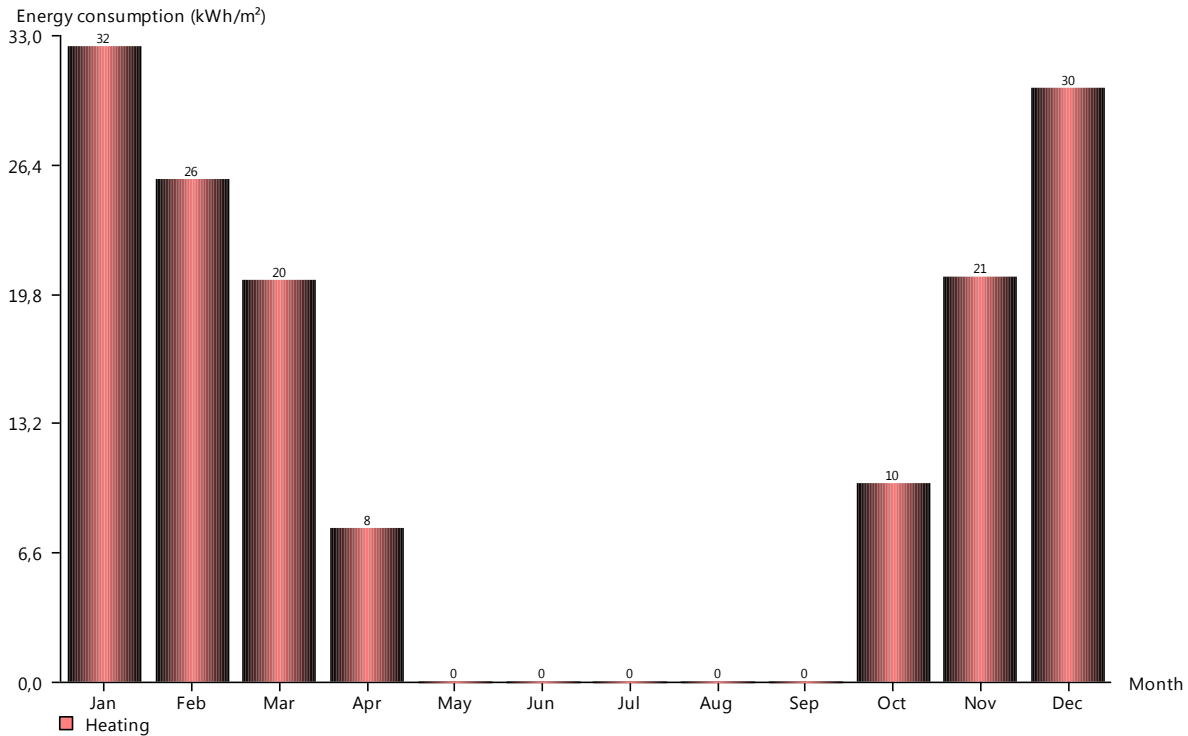


Thermal output (kWh) is given in intervals of 1°C

Temperature range	Heat pump	-15,0 / 16,0°C
Percentages for year	Heat pump	100,0%
Design conditions	Conditioned surface	100 m ²
	Required capacity for space heating at min. night temp.	7,4 kW
	Zero heating capacity at outside temperature	16,0°C

The graph shows the simulated thermal output in kWh for the heat pump and back up heater through one year. The back up heater is only operational at low temperatures. The main portion of the output is at moderate temperatures where the heat pump can cover the entire heating requirement.

Energy consumption per surface



Total for year (heating)		147 kWh/m²
Seasonal COP		3,0
Total thermal energy (heating)		14745 kWh
Design conditions	Conditioned surface	100 m ²
	Required capacity for space heating at min. night temp.	7,4 kW
	Zero heating capacity at outside temperature	16,0°C

The graph shows the total emitted energy per living surface per month. The required energy varies with the buildings insulation standard and the weather conditions at the location.