

GHEtool calculation report

Example feasibility study



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Table of contents

Introduction	3
Building A (150m): single U-tube	4
Building A (150m): double U-tube	5
Building A: calculate depth	6
Masterplan: 50 boreholes	7
Masterplan: 77 boreholes	9
Custom configuration	11
Conclusion	12



Introduction

GHEtool Pro v2.2.0 has the option to include a introduction into the final report, so the different scenario's or the rationale behind them can be explained in advance.



Description

A borefield just for building A, using a single U-tube of DN40 and a (turbulent) mass flow rate of 0,2kg/s per borehole. The temperature is too critical in heating regime in his configuration.

Input

Number of boreholes: 60

SCOP heating: 4,00

Average minimal borehole spacing: 6,0 m

SEER cooling: 25,00

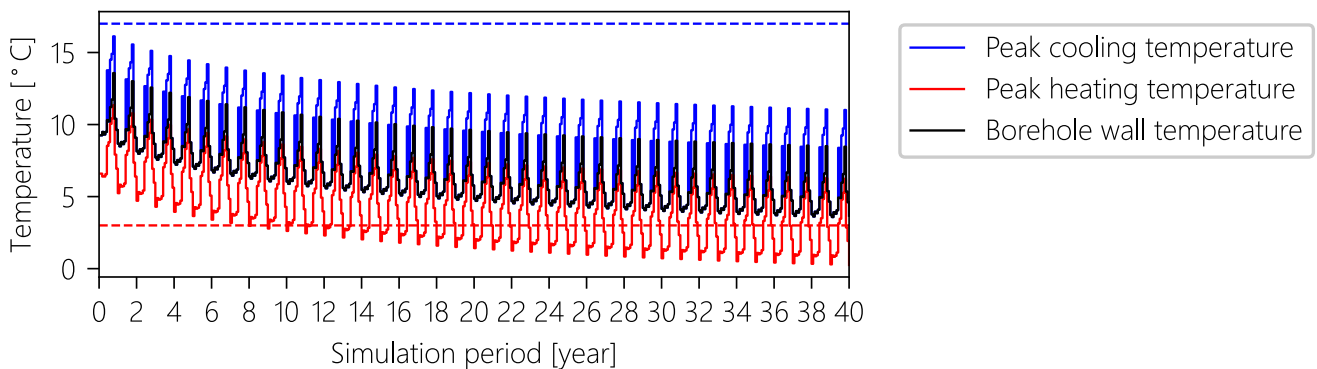
Borehole depth: 150,0 m

Heating (geothermal)		Cooling (geothermal)	
Load	370 492 kWh/y	Load	150 391 kWh/y
Peak	169,4 kW	Peak	147,3 kW

Results

Equivalent borehole thermal resistance: 0,14 mK/W

Maximal average fluid temperature: 16,12 °C, Minimal average fluid temperature: 0,26 °C



Description

A borefield just for building A, but now, using a double U-tube of DN32 and a mass flow rate of 0,2kg/s per borehole. As one can see, switching to a double U-tube does not impact the final temperature profile that much.

Input

Number of boreholes: 60

SCOP heating: 4,00

Average minimal borehole spacing: 6,0 m

SEER cooling: 25,00

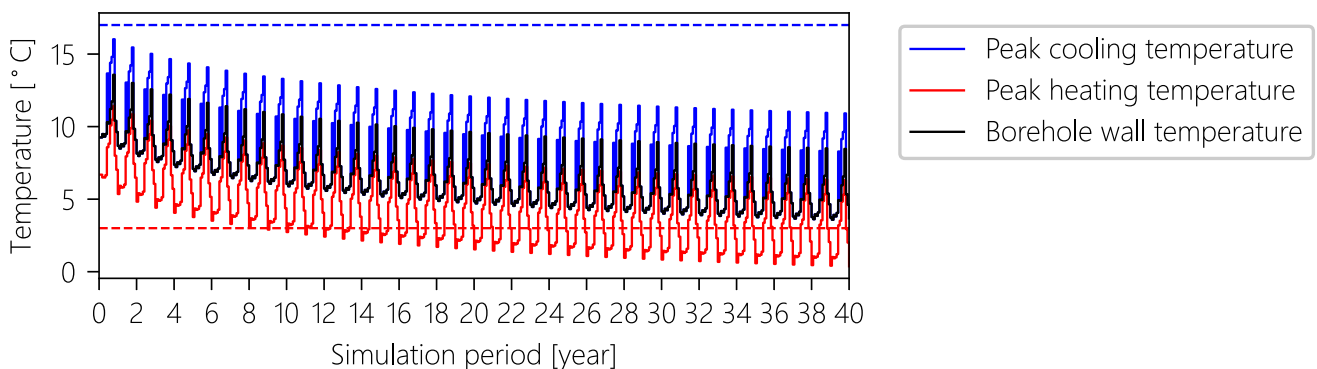
Borehole depth: 150,0 m

Heating (geothermal)		Cooling (geothermal)	
Load	370 492 kWh/y	Load	150 391 kWh/y
Peak	169,4 kW	Peak	147,3 kW

Results

Equivalent borehole thermal resistance: 0,13 mK/W

Maximal average fluid temperature: 16,02 °C, Minimal average fluid temperature: 0,37 °C



Description

When the borefield is drilled to a depth of +/- 208m, the average ground temperature is high enough so that the borefield stays between its temperature limits. This 208m however exceeds the legal threshold, so permission has to be obtained.

Input

Number of boreholes: 60

SCOP heating: 4,00

Average minimal borehole spacing: 6,0 m

SEER cooling: 25,00

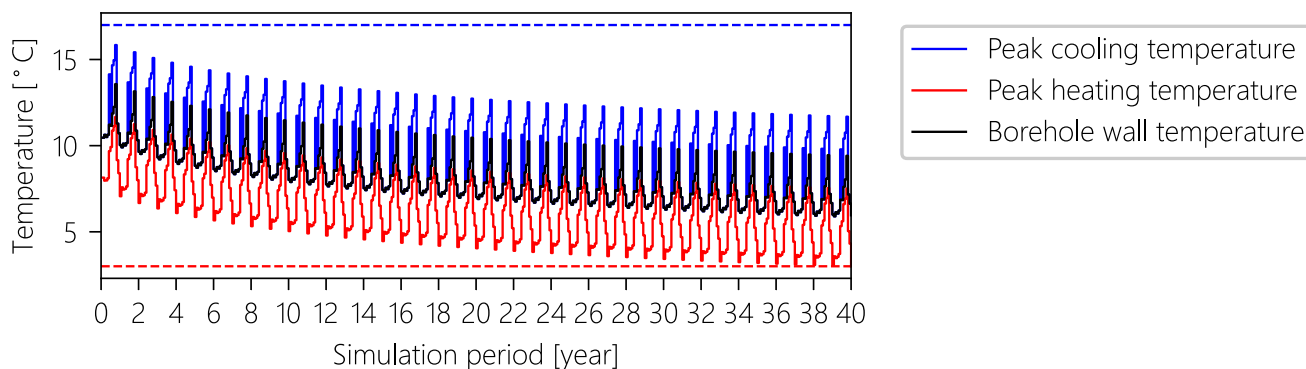
Borehole depth: 208,2 m

Heating (geothermal)		Cooling (geothermal)	
Load	370 492 kWh/y	Load	150 391 kWh/y
Peak	169,4 kW	Peak	147,3 kW

Results

Equivalent borehole thermal resistance: 0,17 mK/W

Maximal average fluid temperature: 15,84 °C, Minimal average fluid temperature: 3,00 °C



Description

Load optimisation for the whole masterplan, with a central borefield of 5x10 boreholes.

Input

Number of boreholes: 50

SCOP heating: 4,00

Average minimal borehole spacing: 6,0 m

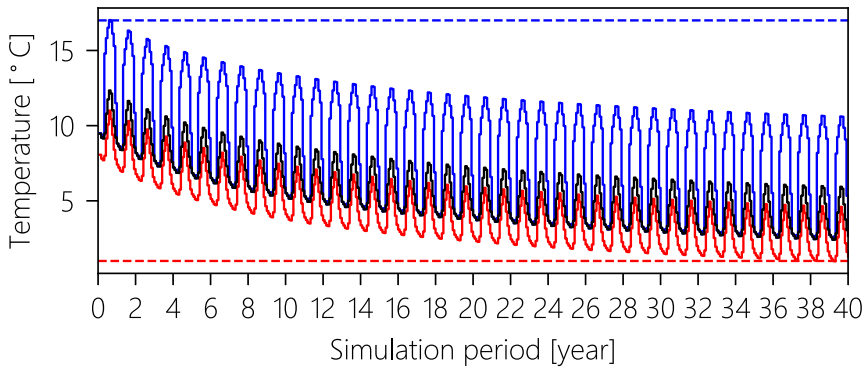
SEER cooling: 25,00

Borehole depth: 150,0 m

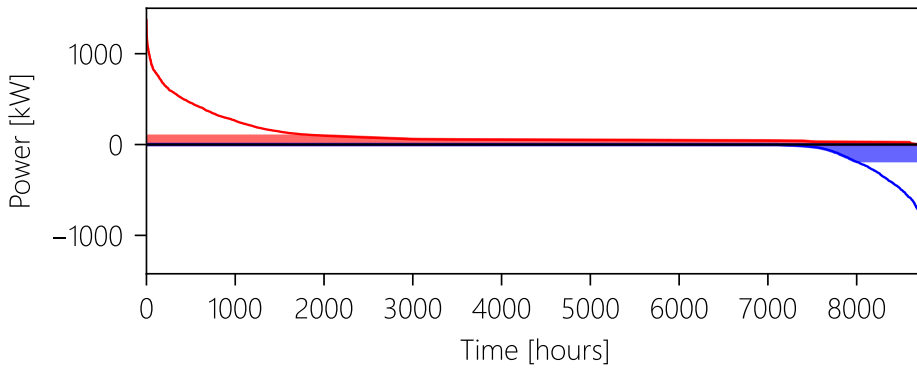
Results

Heating (geothermal)		Cooling (geothermal)	
Load	506 540 kWh/y	Load	184 544 kWh/y
External load	477 962 kWh/y	External load	201 056 kWh/y
Geothermal percentage	51,5 %	Geothermal percentage	47,9 %
Load	91,9 kW	Load	177,7 kW
External load	1 275,5 kW	External load	1 112,0 kW
Geothermal percentage	0,1 %	Geothermal percentage	0,1 %





- Peak cooling temperature
- Peak heating temperature
- Borehole wall temperature



- Heating demand
- Cooling demand
- Geothermal heating
- Geothermal cooling



Description

Load optimisation for the whole masterplan, now with a larger field of 77 boreholes.

Input

Number of boreholes: 77

SCOP heating: 4,00

Average minimal borehole spacing: 6,0 m

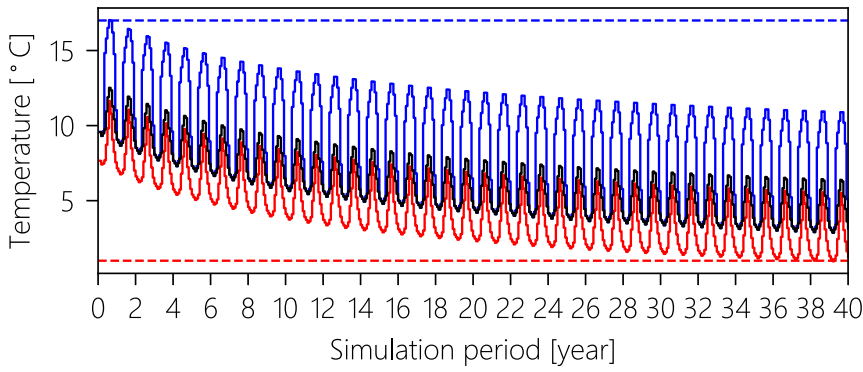
SEER cooling: 25,00

Borehole depth: 150,0 m

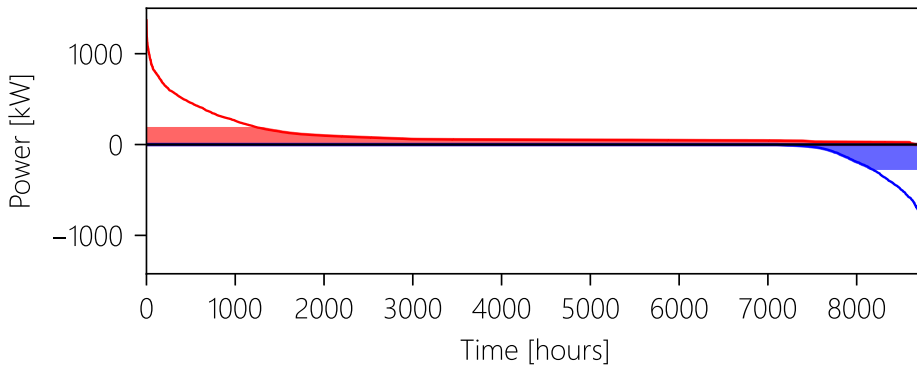
Results

Heating (geothermal)		Cooling (geothermal)	
Load	639 827 kWh/y	Load	242 525 kWh/y
External load	344 675 kWh/y	External load	143 075 kWh/y
Geothermal percentage	65,0 %	Geothermal percentage	62,9 %
Load	174,9 kW	Load	261,4 kW
External load	1 192,5 kW	External load	1 028,3 kW
Geothermal percentage	0,1 %	Geothermal percentage	0,2 %





- Peak cooling temperature
- Peak heating temperature
- Borehole wall temperature



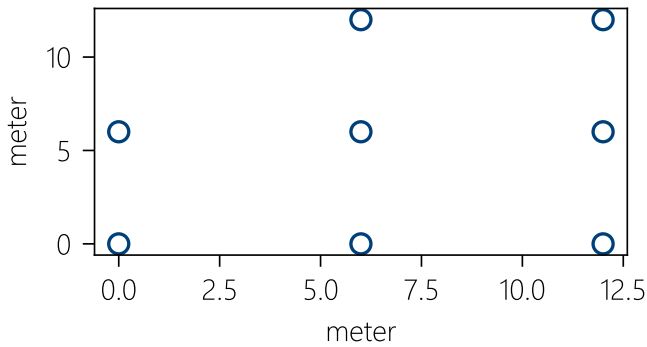
- Heating demand
- Cooling demand
- Geothermal heating
- Geothermal cooling



Description

This is an example of a scenario with a custom borefield that can now also be shown in the report.

Input



- Number of boreholes: 8
- Average minimal borehole spacing: 6,0 m
- Borehole depth: 94,0 m
- Buried depth: 1,0 m
- Borehole diameter: 15,0 cm

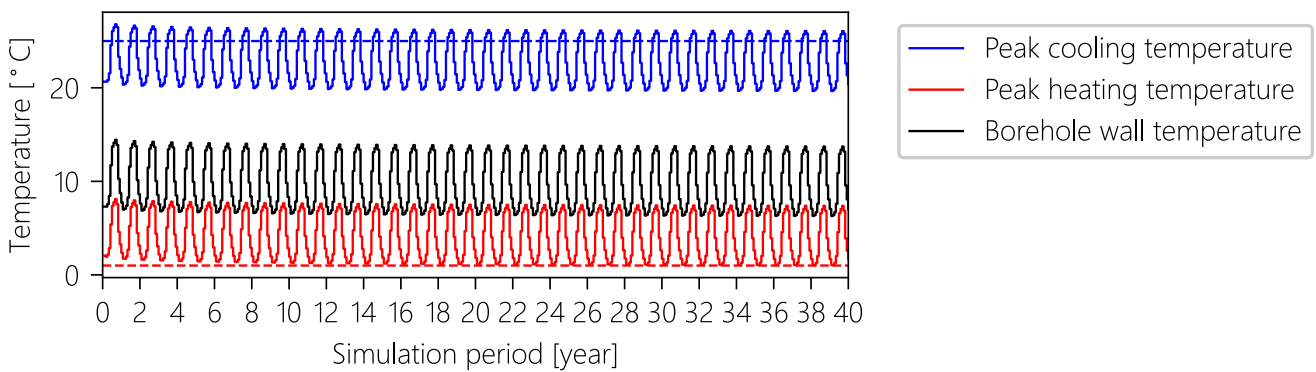
SCOP heating: 4,50; SEER cooling: 5,00

Heating (geothermal)		Cooling (geothermal)	
Load	42 280 kWh/y	Load	34 440 kWh/y
Peak	23,3 kW	Peak	49,2 kW

Results

Equivalent borehole thermal resistance: 0,12 mK/W

Maximal average fluid temperature: 26,79 °C, Minimal average fluid temperature: 1,03 °C



Conclusion

This is a final conclusion of the report. This conclusion has been added in GHEtool Pro v2.2.0.





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