Building Blocks in Germany
(Konstanz and Wolfsburg)
Konstanz

2 buildings (2016)
12 apartments (total)
3 floors (each)
NFA 1.140 m² (total)

59.2 kWp roof
Roof slope 10° to west and east

Borehole heat exchanger
9 x 100 m

30 and 27 kWth
No PED available in practice because

- the user electricity demand has increased compared to the planning assumptions.
- the hot water demand has doubled compared to the planning assumptions.

### Konstanz

<table>
<thead>
<tr>
<th>Year</th>
<th>Planung</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
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<tr>
<td></td>
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<td>+10%</td>
<td>-12%</td>
<td>-12%</td>
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</tbody>
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![Graph showing electrical energy production, consumption, self use, feed in, and grid for different years]
Konstanz

Heating (space heating and domestic hot water) – annual and monthly consumption

Heat consumption

SH 56,3 kWh/(m²a) 71 %

DHW 23,0 kWh/(m²a) 29 %

(designed 12,5 kWh/m²a)
Electricity consumption

HP 23 kWh/(m²a) 43 %

HH+ other 31 kWh/(m²a) technicals 57 %
(designed 15.4 kWh/m²a)

Electricity (heat pump and household plus technical part) – annual and monthly consumption
PV-yield ~ 904 kWh/kWp

monthly values
LCF 9 - 63 %
SCF 25 - 93 %

yearly average
LCF 32 %
SCF 37 %
Heat pump (total)

SPF 3,2 – 4,4
(monthly values)

SPF 3,94
(annual mean value)
Wolfsburg

4 buildings (2016)
68 apartments (total)
4 floors (each)
NFA 9,500 m² (total)

27,4 kWₚ roof house A
Roof slope 45° to south
(possible PV size ~160 kWₚ)

Borehole heat exchanger and air

4x air-water-HP (14 kWₚ), 2x brine-water-HP (90 + 50 kWₚ)
Balance sheet only via heating system/production; PV yield only for heating system.

No PED available because the possible PV area on the roofs is too small for the total demand.

Dotted bars: Possible PV yield for total PV on the roof and additional electricity for household.
Wolfsburg

Heating (space heating and domestic hot water) – annual and monthly consumption

Heat consumption

SH 41,7 kWh/(m²a) 66%
DHW 21,6 kWh/(m²a) 34%
Wolfsburg

Electricity consumption

HP (incl. 20,0 kWh/(m²a) all electr.) 46%

HH 24,0 kWh/(m²a) (assumption) 54%

Electricity (heat pump and household plus technical part) – annual and monthly consumption
Evaluation for existing PV system (27.4 kWp) and heating system

PV-yield ~ 1.090 kWh/kWp

monthly values
LCF 2 - 40 %
SCF 37 - 100 %

yearly average
LCF 10 %
SCF 60 %
Heat pump (SPF) – monthly efficiency

Heat pump (total)

SPF 2.7 – 6.2
(monthly values)

SPF 3.96
(annual mean value)