Simulation of Energy ADE model FZK House

Joachim Benner
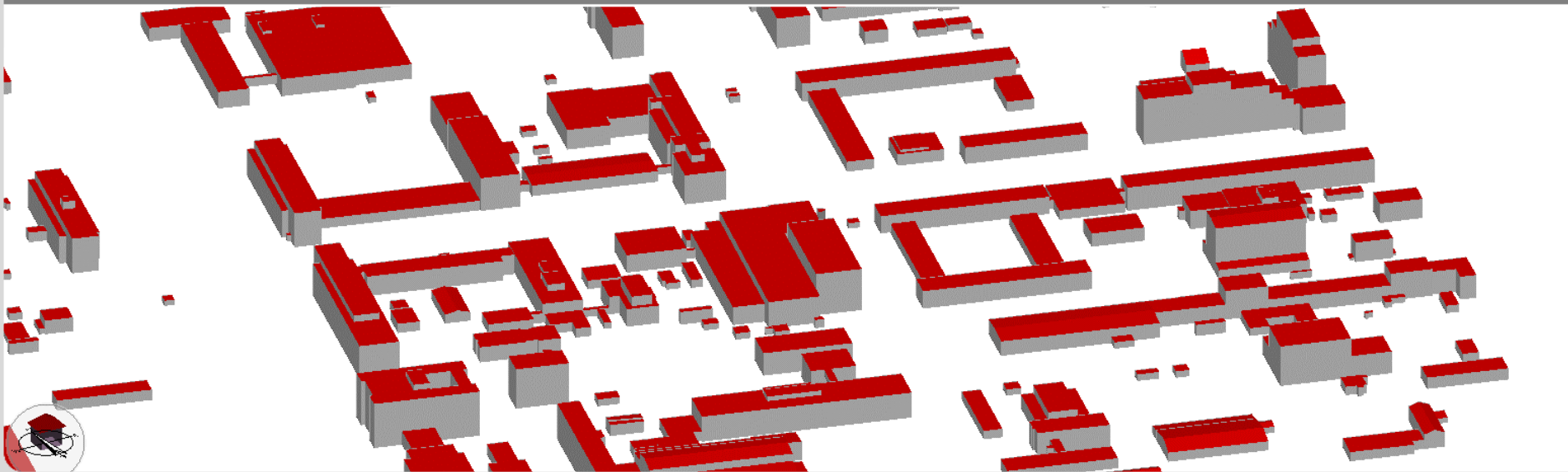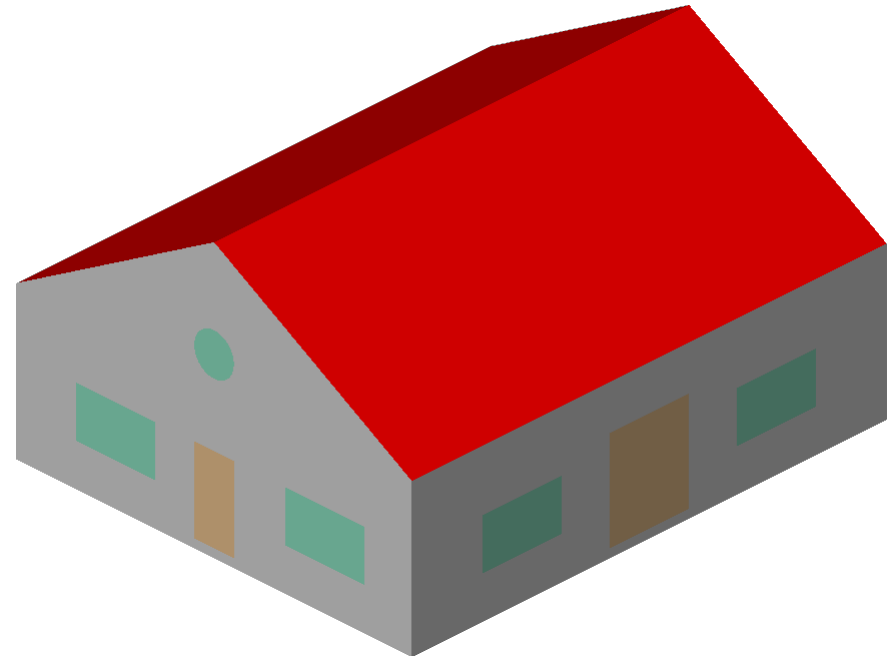
FZK-House – CityGML original data
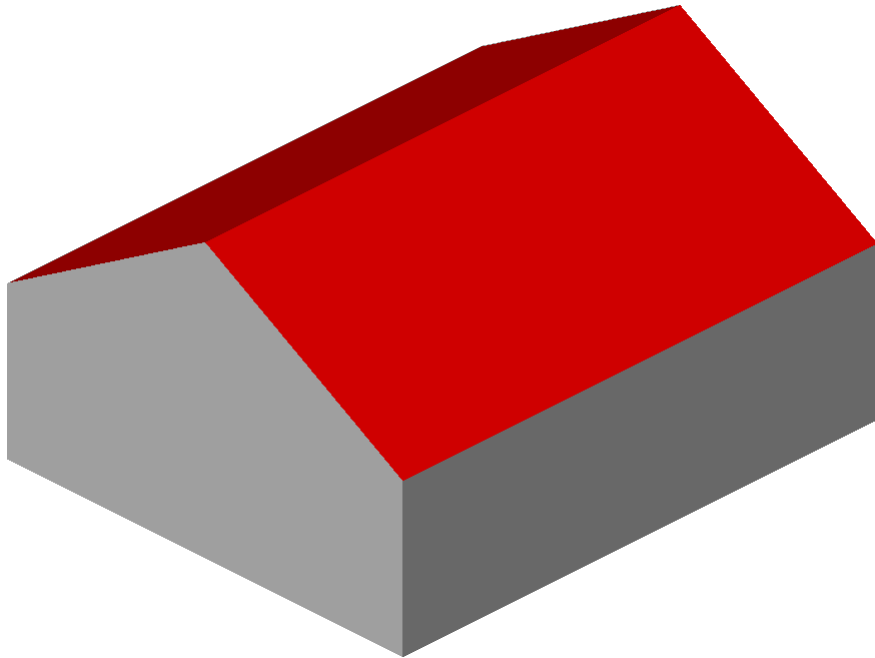
LoD2

LoD3

Basic parameter

Parameter	Value
yearOfConstruction	2010
function	Wohngebäude
measuredHeight	6,52 m
storeysAboveGroung	2
storeysBelowGround	0
Wall area north / south	43,57 m²
Wall area east / west	50,75 m²
Roof area north / south	69,28 m²
Roof slope	30º
Ground slab area	120 m²
Gross volume	608,9 m³
Gross floor area	240 m²
Net floor area	192 m²
Window to facade ratio (LoD2 model)	**30%**

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FZK House - Energy ADE data
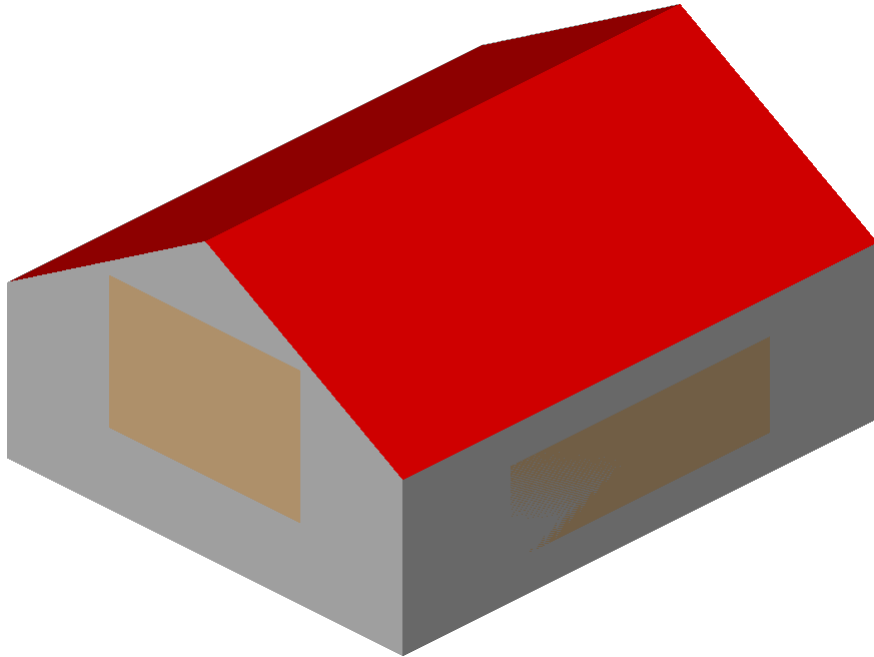
LoD2
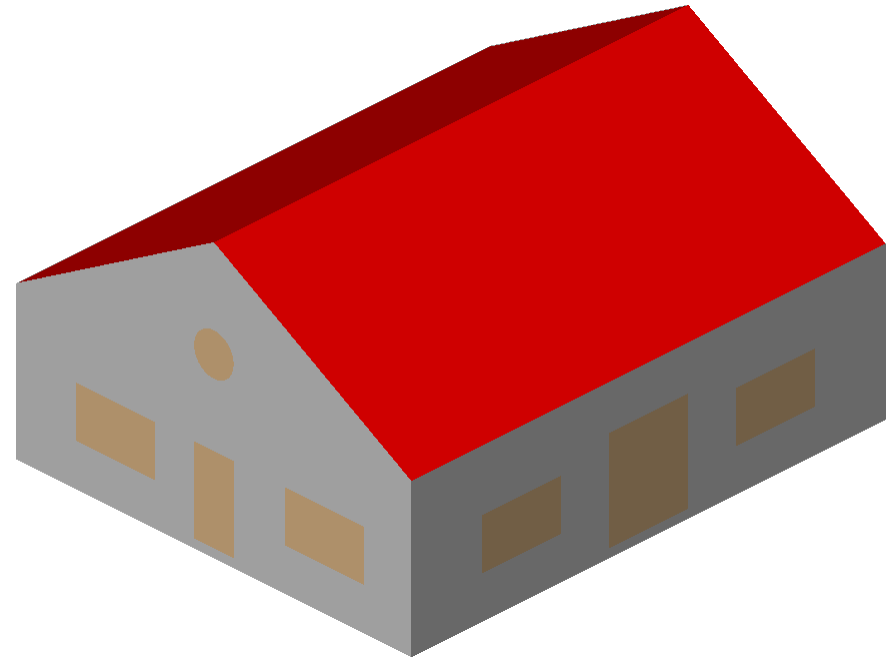
LoD3

Physical parameter

	LoD2 model	LoD3 model
Material layer	Single layer constructions	Multi layer constructions
Wall thickness	0,2 m	
Wall conductivity	0,086 W / (K*m)	
Wall U-value	~0,4 W / (K*m²)	~0,4 W / (K*m²)
Roof thickness	0,3 m	
Roof conductivity	0,13 W / (K*m)	
Roof U-value	~0,4 W / (K*m²)	~0,4 W / (K*m²)
Ground slab thickness	0,15 m	
Ground slab conductivity	0,041 W / (K*m)	
Ground slab U-value	~0,26 W / (K*m²)	~0,26 W / (K*m²)
Window U-value	1,2 W / (K*m²)	1,2 W / (K*m²)
Window transmittance	0,6	0,6
Window glazing ratio	0,7	0,7

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Usage parameters LoD2 and LoD3 model

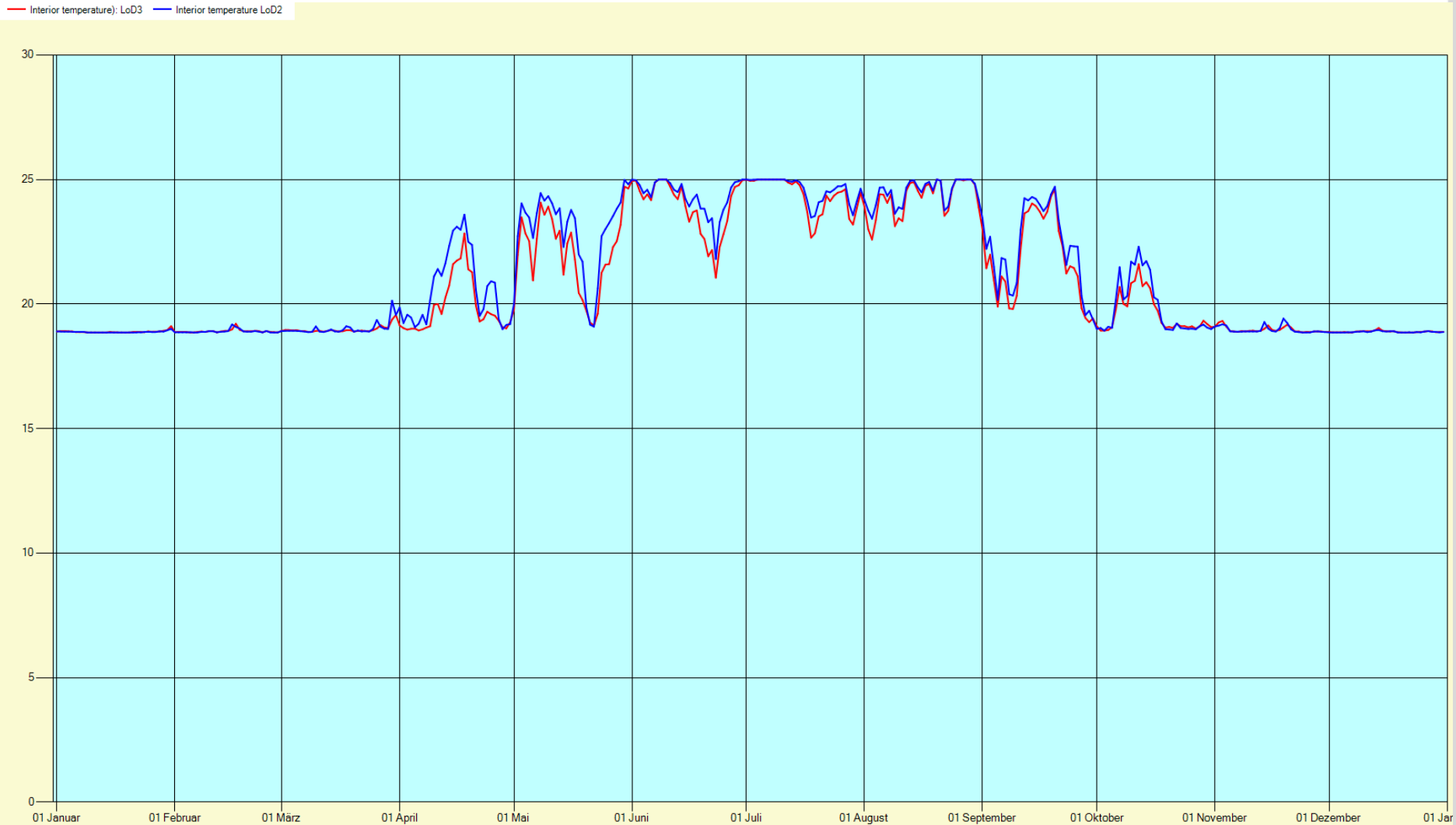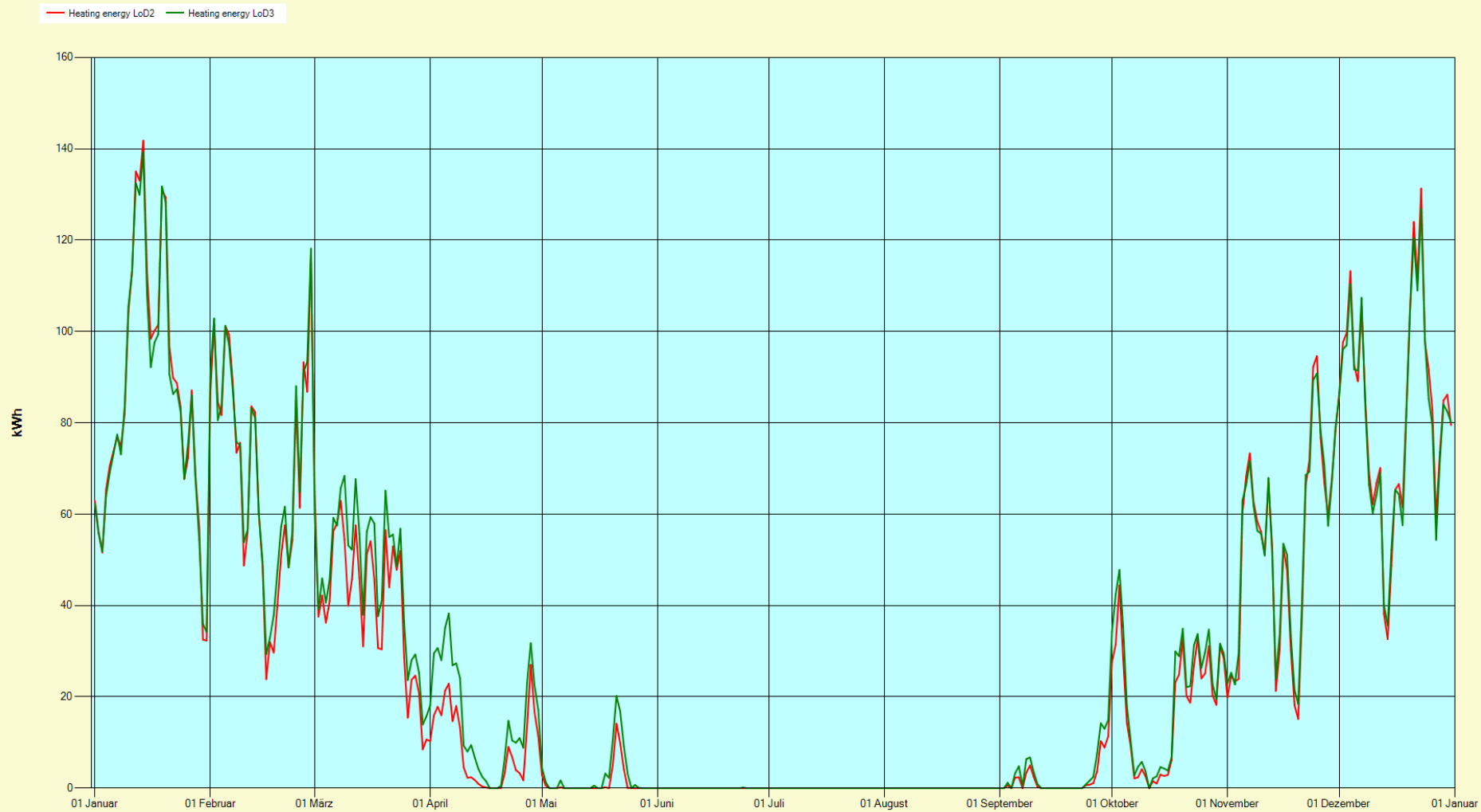| Parameter	Value
Heating schedule	20 °C from 6:00 h - 22:00 h 16 °C otherwise
Cooling schedule	25 °C all time
Ventilation rate	0.5 Air changes / hour all times
Internal gains elect. devices	4 W / m² floor area all times
Internal gains occupants	-
Internal gains lighting	-

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RESULTS
30% WINDOW RATIO

Simulation results

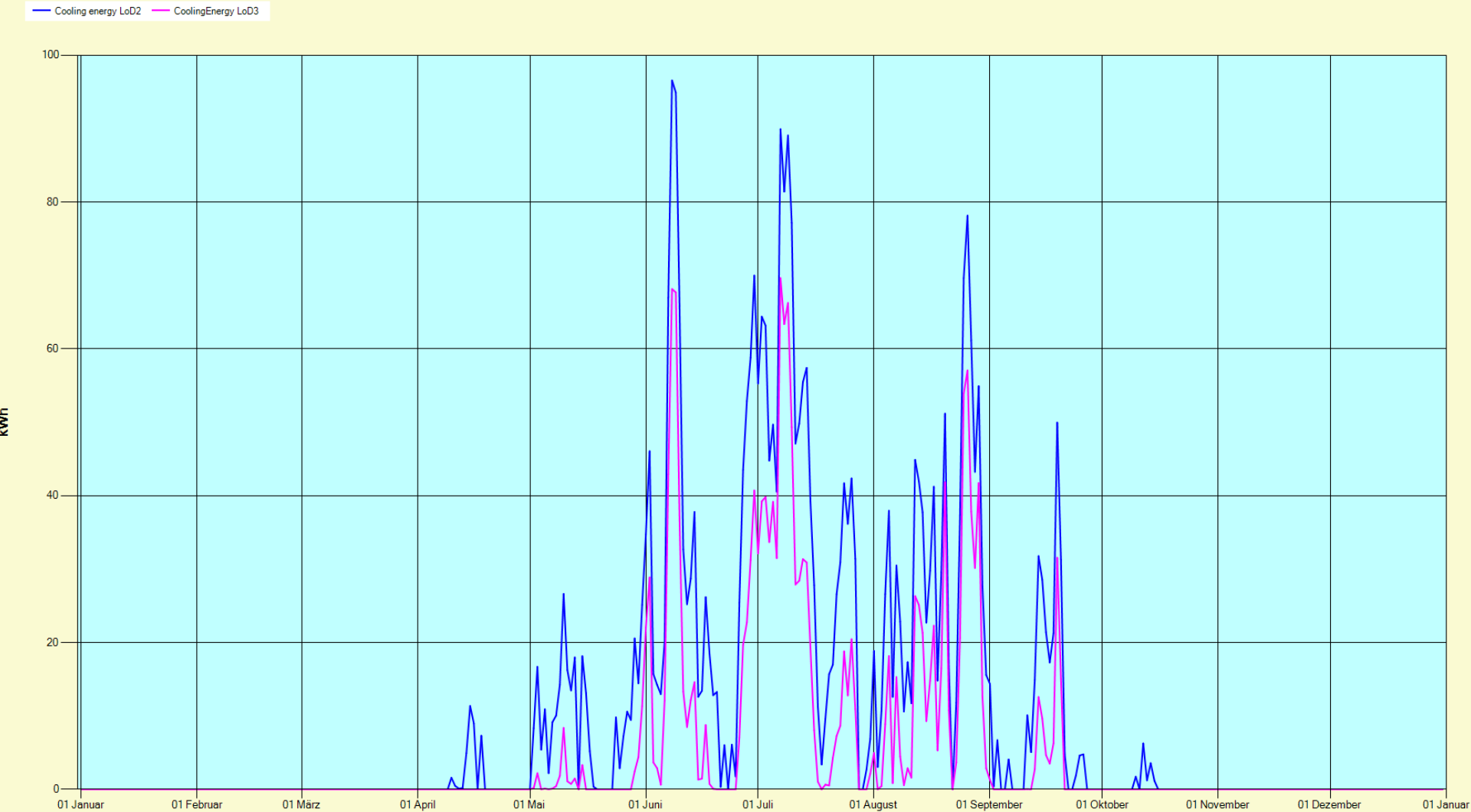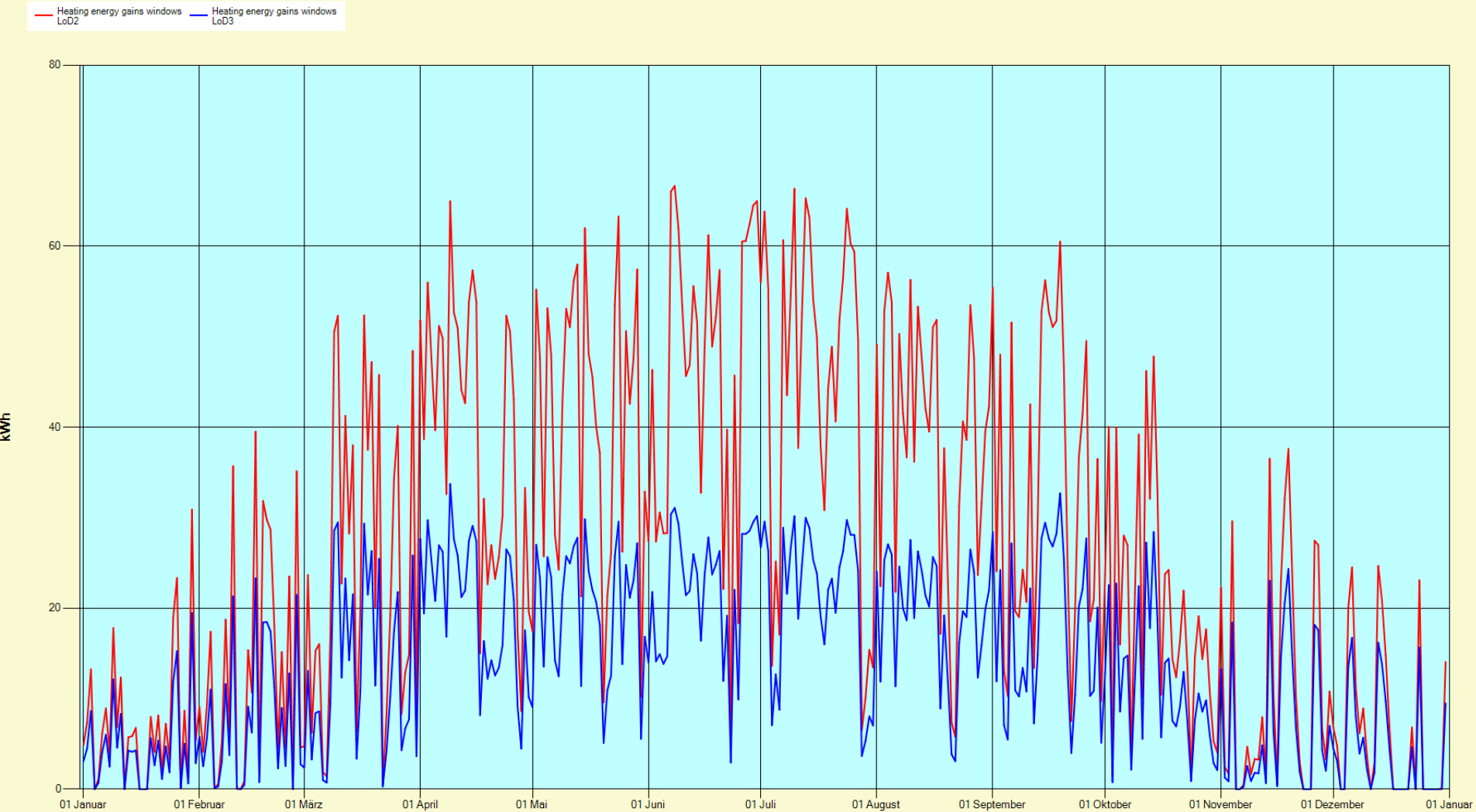| Parameter	LoD2 (30% Windows)	LoD3
Annual heating demand [kWh]	10.936	11.464,3
Annual cooling demand [kWh]	3.705,3	1.802,7
Internal energy gains [kWh]	6.727,7	6.727,7
Energy gains windows [kWh]	9.909,1	5.151,1
Energy losses windows [kWh]	3.562,4	1.796,8
Energy losses ventilation [kWh]	9.197	9.021,8

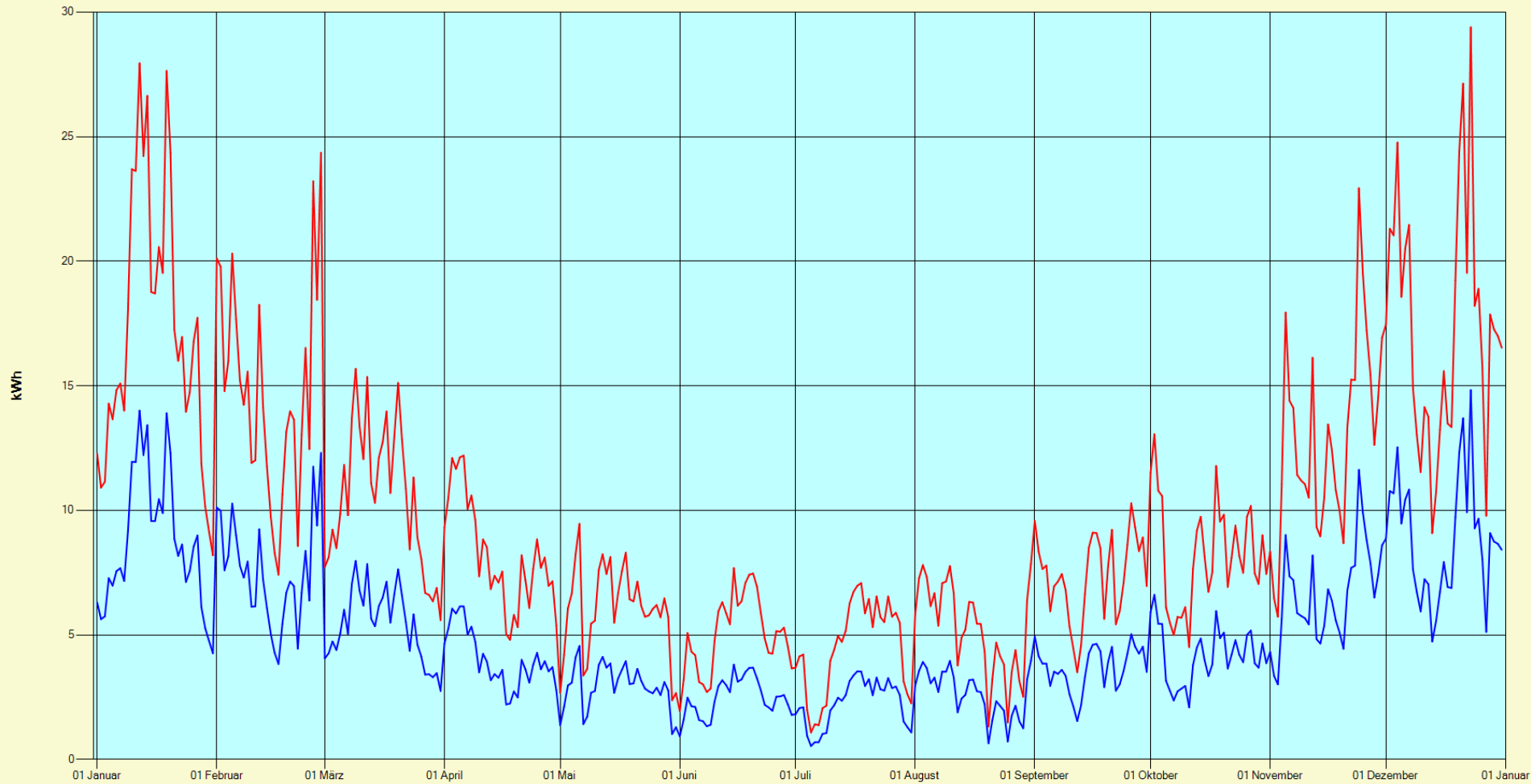# Daily averages: Inside temperature

Daily values: Heating demand

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Daily values: Cooling demand

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Daily values: Energy gains windows

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Daily values: Energy losses windows

RESULTS
20% / 10% WINDOW RATIO

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Simulation results

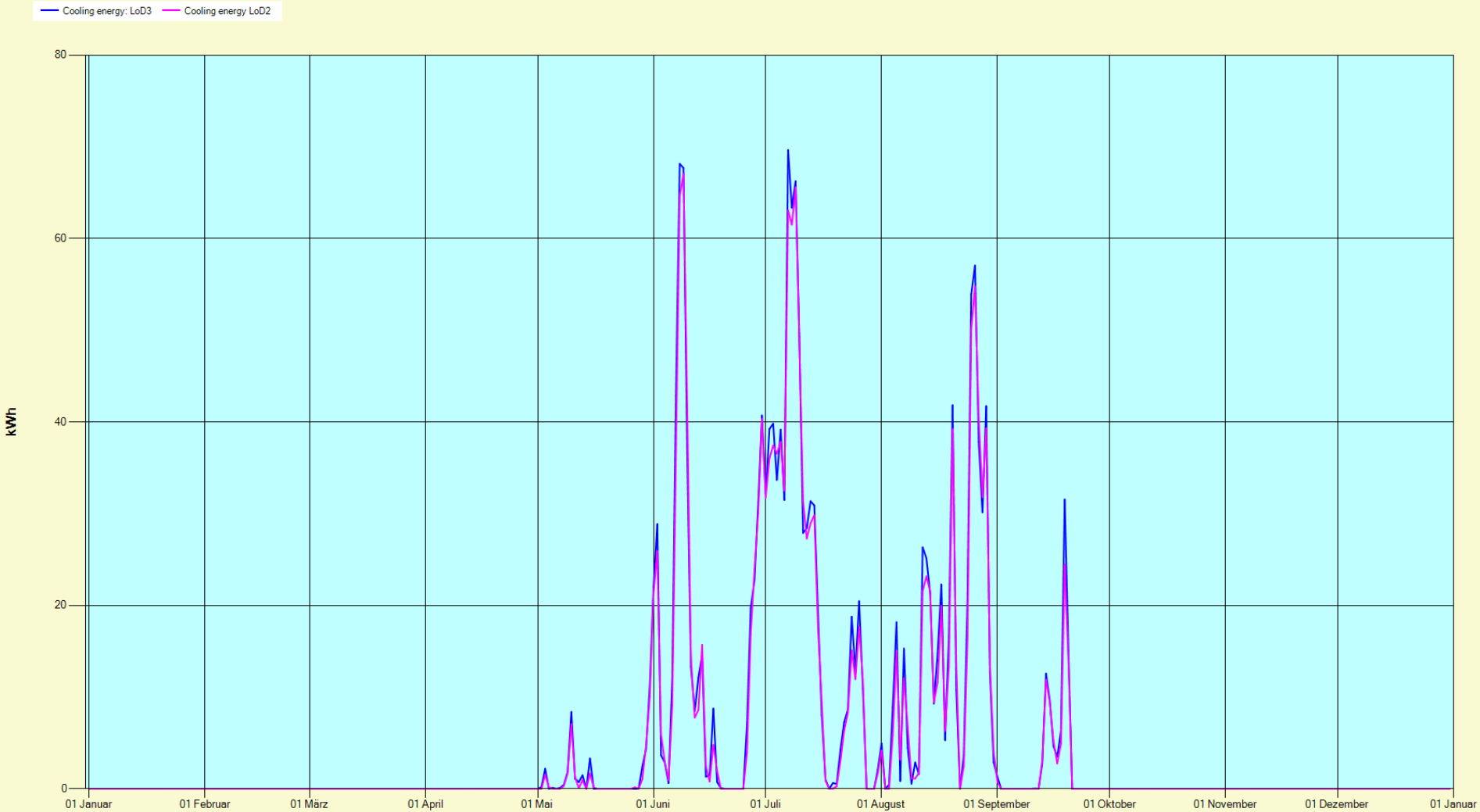| Parameter	LoD2 (10% / 20% Windows)	LoD3
Annual heating demand [kWh]	11.298,1	11.464,3
Annual cooling demand [kWh]	1.710,9	1.802,7
Internal energy gains [kWh]	6.727,7	6.727,7
Energy gains windows [kWh]	4.839,1	5.151,1
Energy losses windows [kWh]	1.720,4	1.796,8
Energy losses ventilation [kWh]	8.985,2	9.021,8

Daily averages: Inside temperature
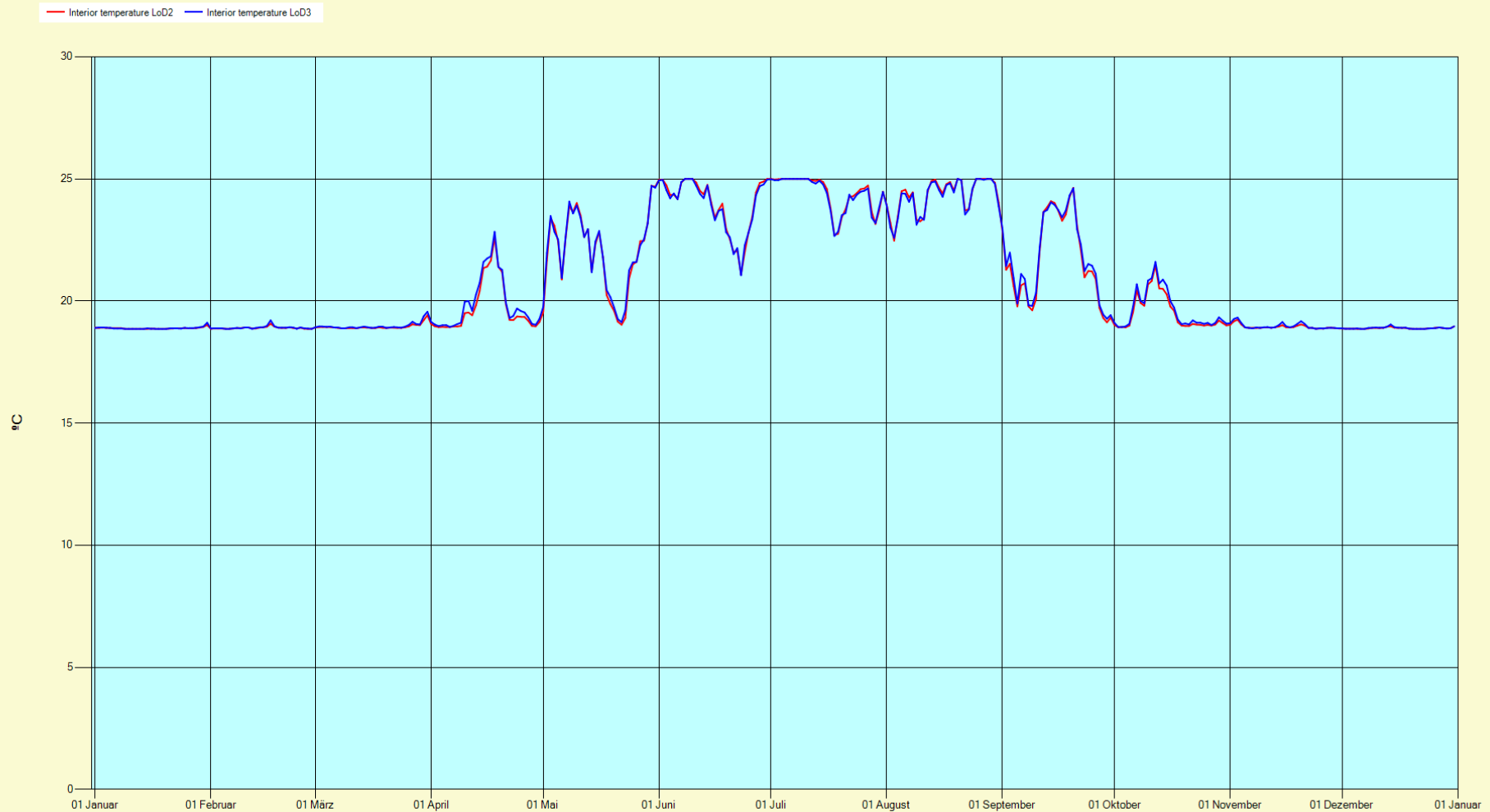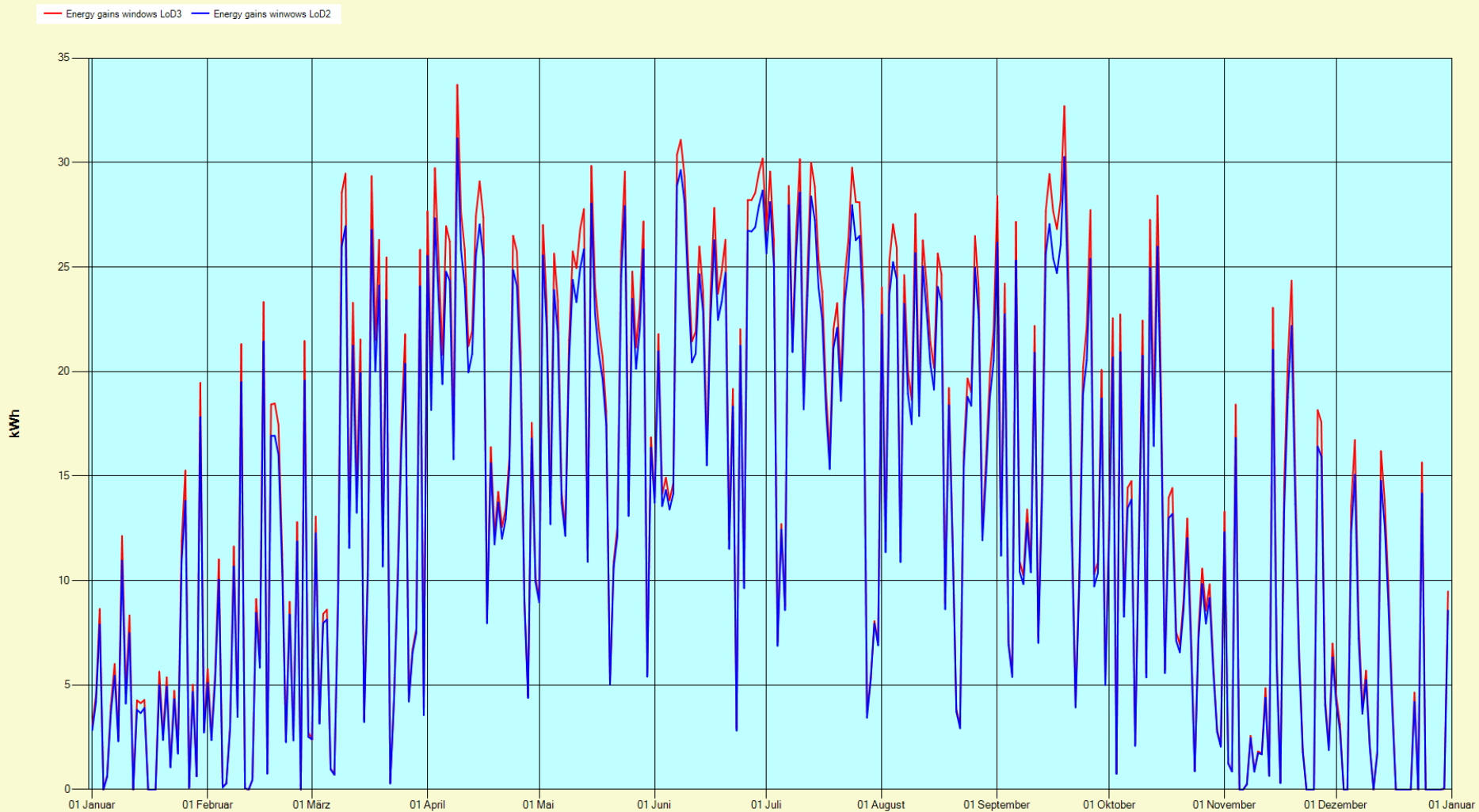
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Daily values: Heating demand

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Daily values: Cooling demand

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Daily values: Energy gains windows

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Daily values: Energy losses windows

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ENERGYPLUS – ETU GEBSIM – TEASER+

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Daily values – Heating demand
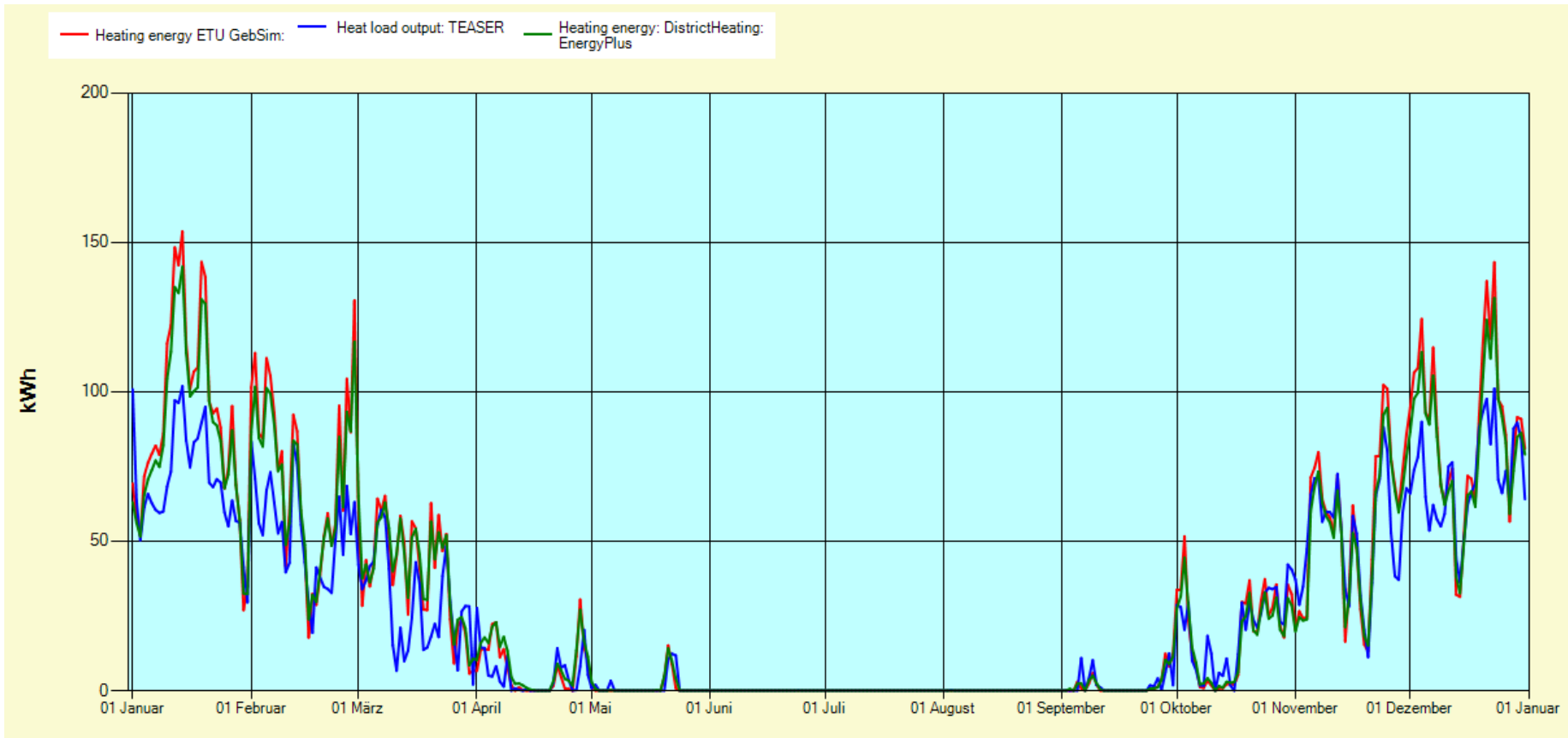
Hourly values, 5. – 6. January