Using building energy simulation to study the effect of renovation of a post-war multi-family building in Sweden

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# Renovation of a small multifmaily building in Sweden

The construction

Segment	Area	Construction (old)	U-value (old)	Changes	New U-value
External walls	613 m²	Light weight concrete (260 mm)	0,44 W/m²K	+ 100 mm insulation	0,21 W/m²K
Windows	143 m²	3-pane windows	2 W/m²K	3-pane LE	1,1W/m²K
Bathroom windows	10 m²	2-pane windows	2,9 W/m²K	3-pane LE	1,1 W/m²K
Roof (towards attic)	236,6 m²	concrete and 120 mm insulation	0,321 W/m²K	-	-
Floor	236,6 m²	Concrete and insulation	0,53 W/m²K	-	-

Old transmission losses = 786 W/°C

New transmission losses = 468 W/°C

	Flow	Air changes per hours	Heat recovery	Infiltration
Old ventilation (F-system)	0,707 m³/s	0,75 ACH	0%	0,32 l/s/m² At -50 Pa
New ventilation (FTX- system)	0,430 m³/s	0,47 ACH	Ca. 75%	-

IDA ICE-model
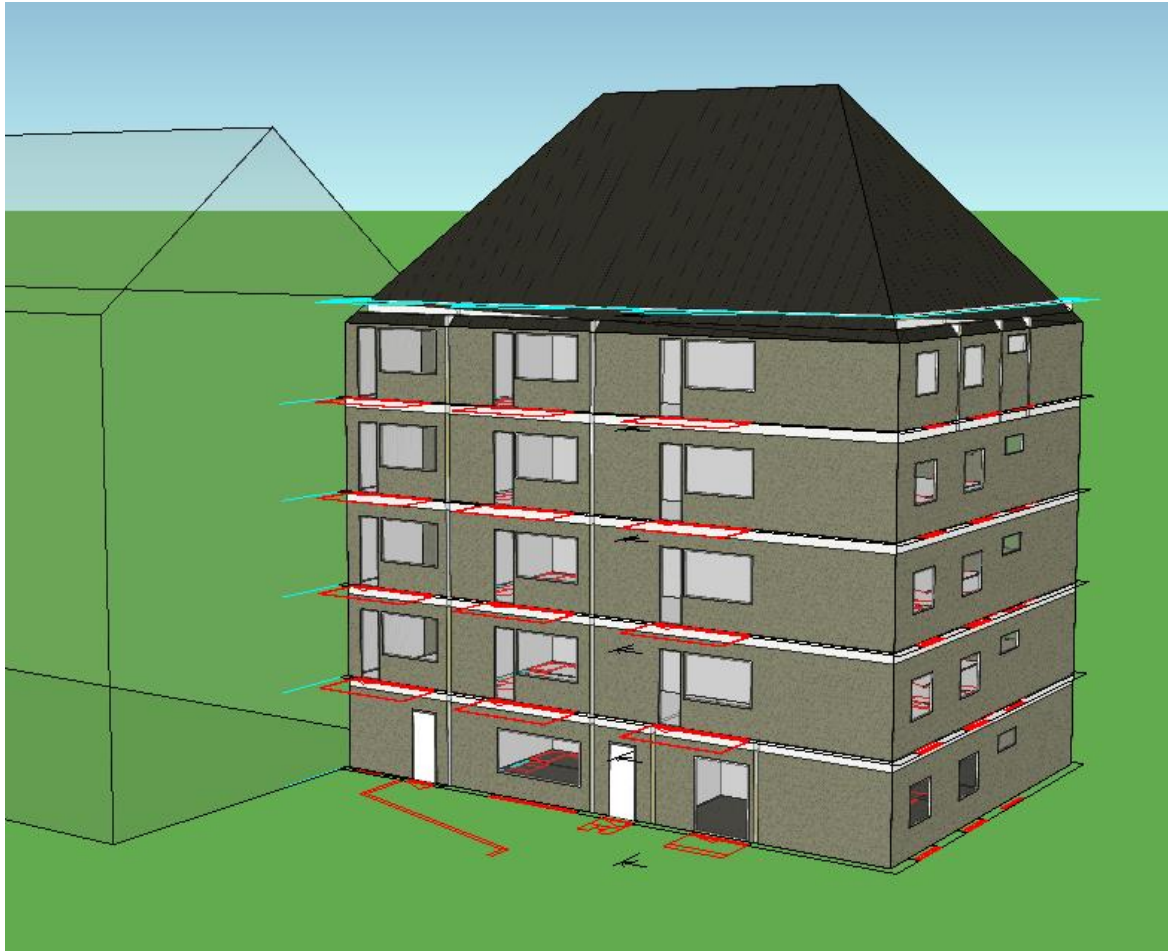
IDA ICE-model
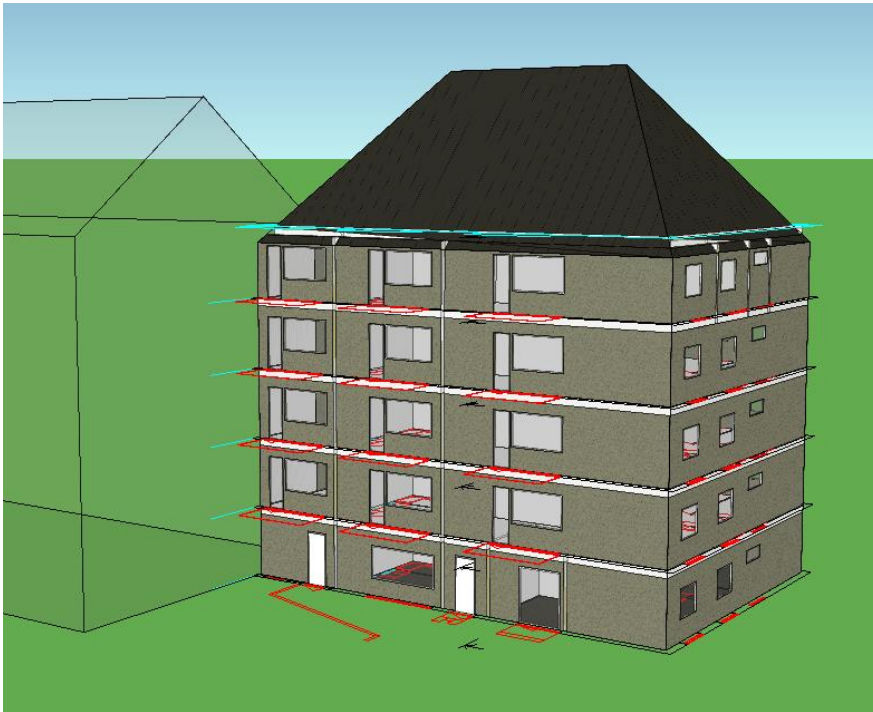
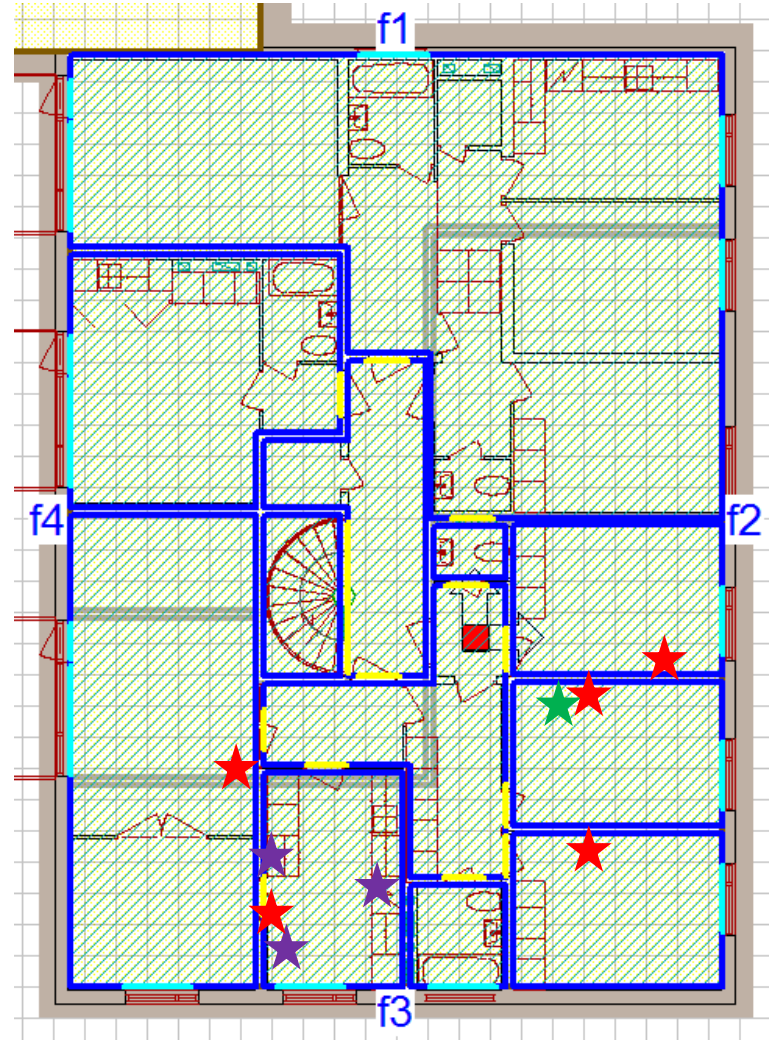| Month	Zone heating IDA (kWh)	Measured 2012 (kWh)	Measured 2013 (kWh)	Measured 2014 (kWh)
1	17 095	10 640	19 745	16 313
2	15 589	16 929	16 610	13 461
3	13 112	11 141	20 665	3 147
4	4 912	9 618	8 174	435
5	2 649	3 623	2 302	74
6	500,9	1 608	603	726
7	4,6	210	409	78
8	60,7	361	409	339
9	2 186,0	3 538	2 988	
10	10 066,0	8 425	6 889	
11	11 211,0	10 979	9 976	
12	19 042,0	16 982	12 523	
Total	96 428,2	94 055	101 295	

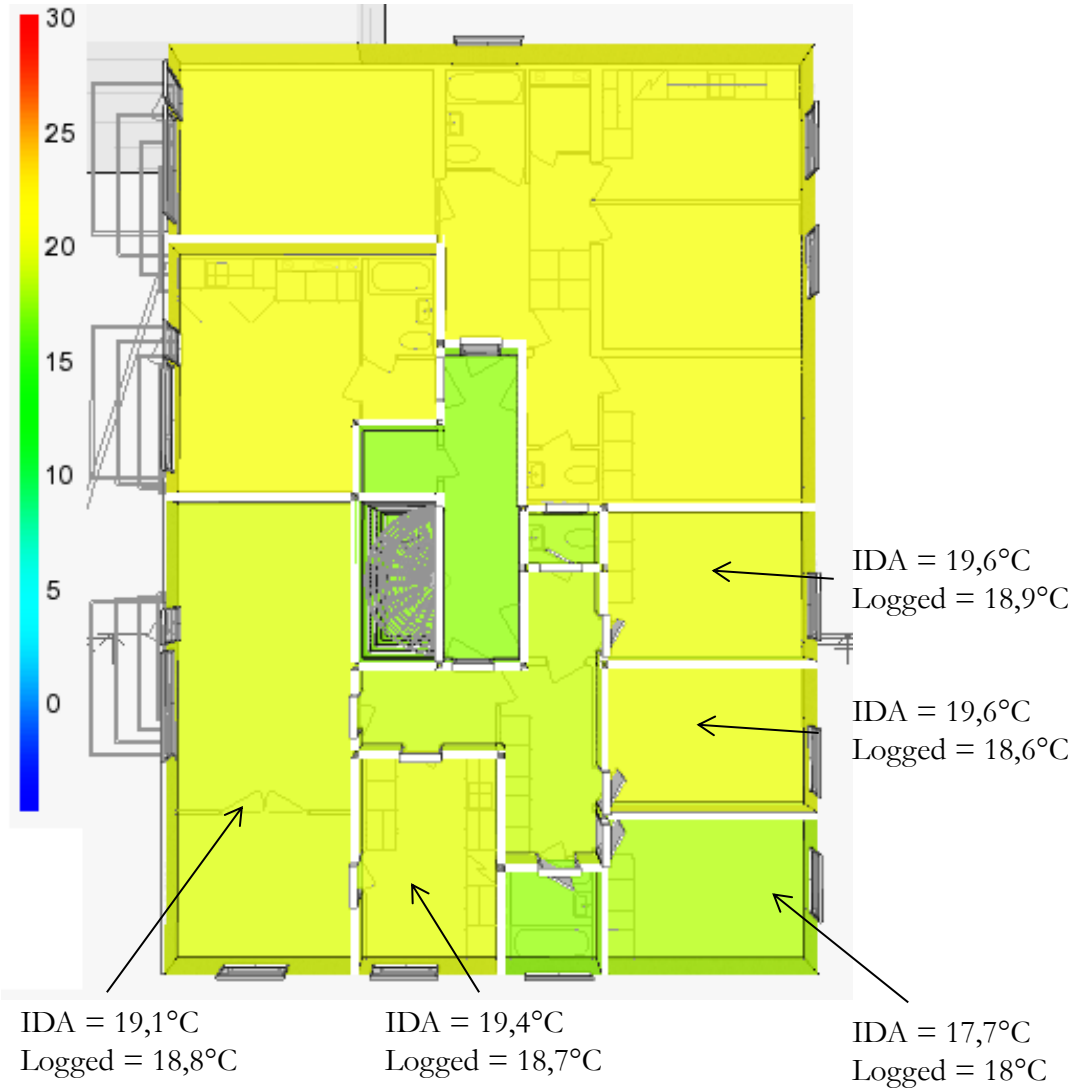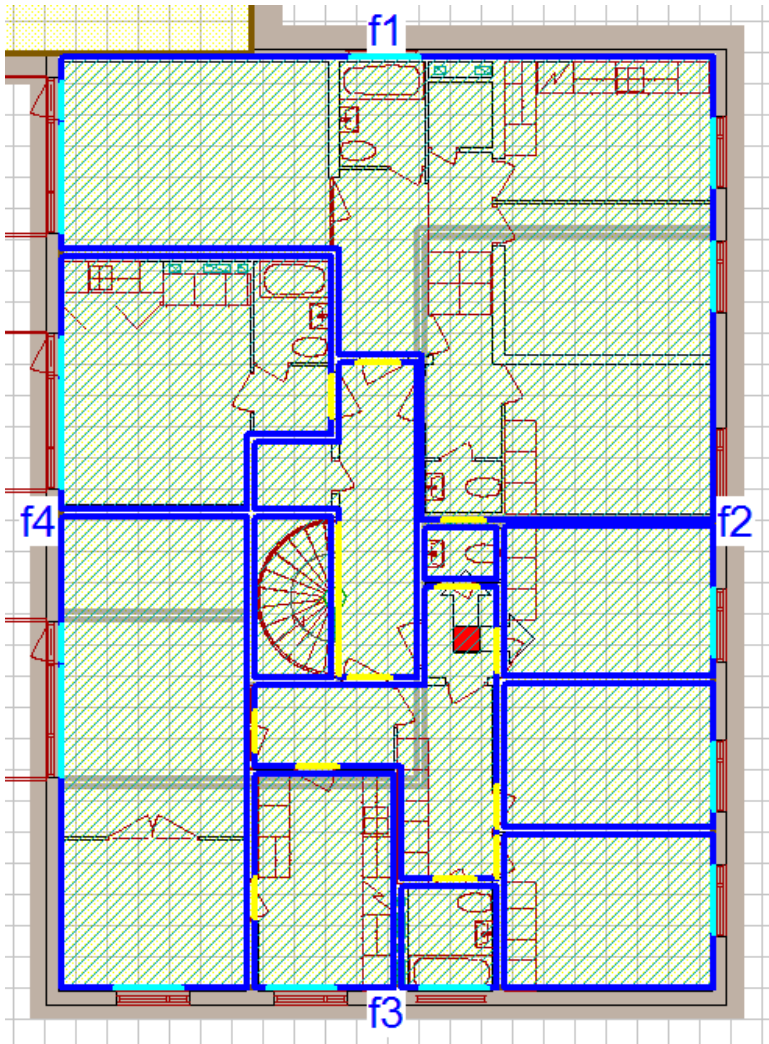# Validation of IDA-model

★ Temperature/RH at 5 min interval

★ Electricity at 5 min interval

★ CO_2-concentration at 5 min interval

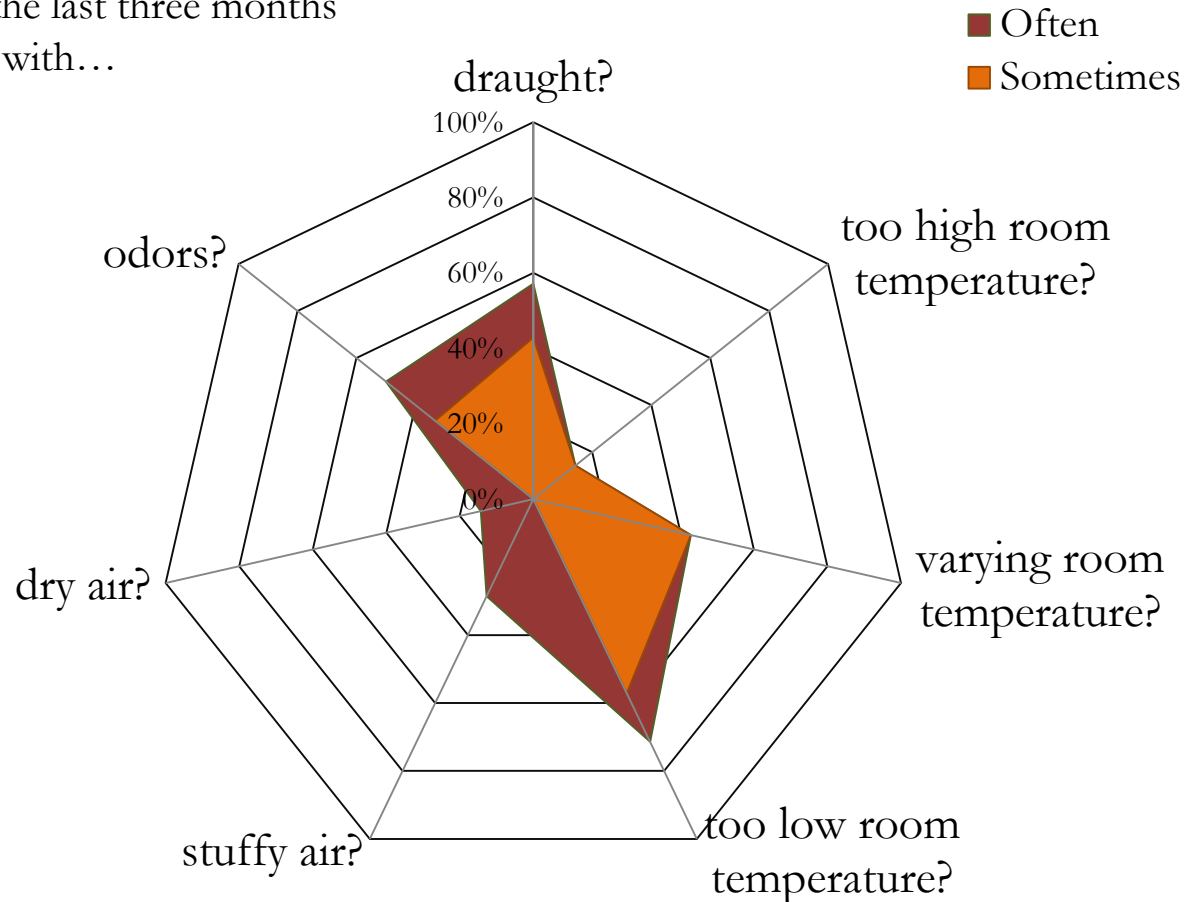+ total electricity for the entire apartment

Validation of IDA-model

IDA = 19,6°C
Logged = 18,9°C

IDA = 19,6°C
Logged = 18,6°C

IDA = 19,1°C
Logged = 18,8°C

IDA = 19,4°C
Logged = 18,7°C

IDA = 17,7°C
Logged = 18°C

LiU

Perceived indoor environment

Have you any time in the last three months experienced problems with…

Expected results and interest…

- Increase knowledge on energy renovation – communication between academia and practitioners
- Effects from retrofitting with FTX
  - Energy, indoor environment, cost…
- Effect on indoor environment
- Primary energy use and related CO_2-emissions

Thank you for listening!
Questions or comments?

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