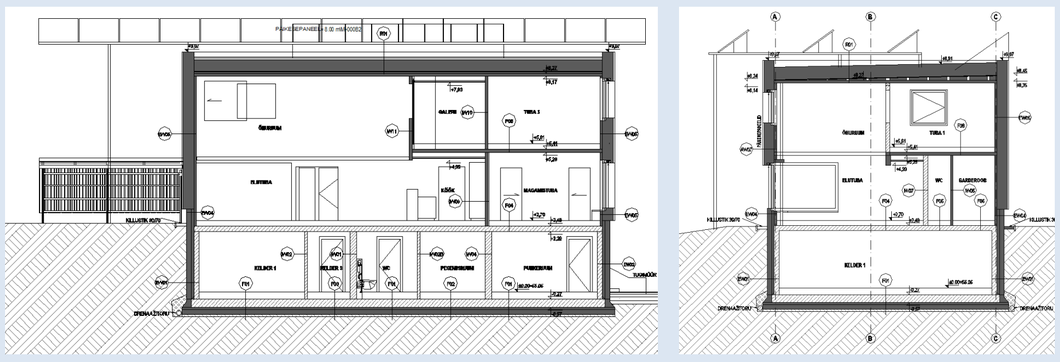
Monitoring

Winter performance of certified Passive House building in Northern European cold climate

Background

Single-familiy home (TFA 281 m²) was built in 2012. It is a pilot certified Passive House in Estonia [Reinberg 2013]. Building aims to cover the energy demand from local renewable sources.



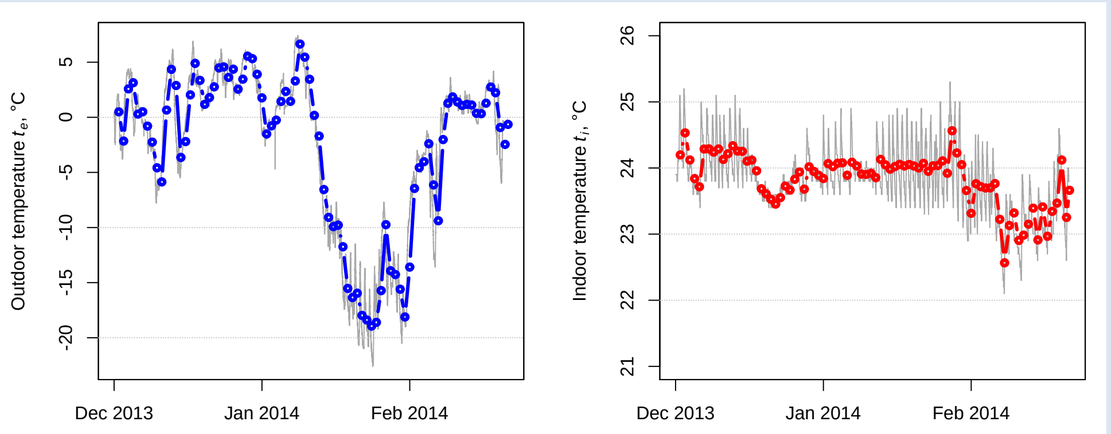
View from SW and the sections from the house

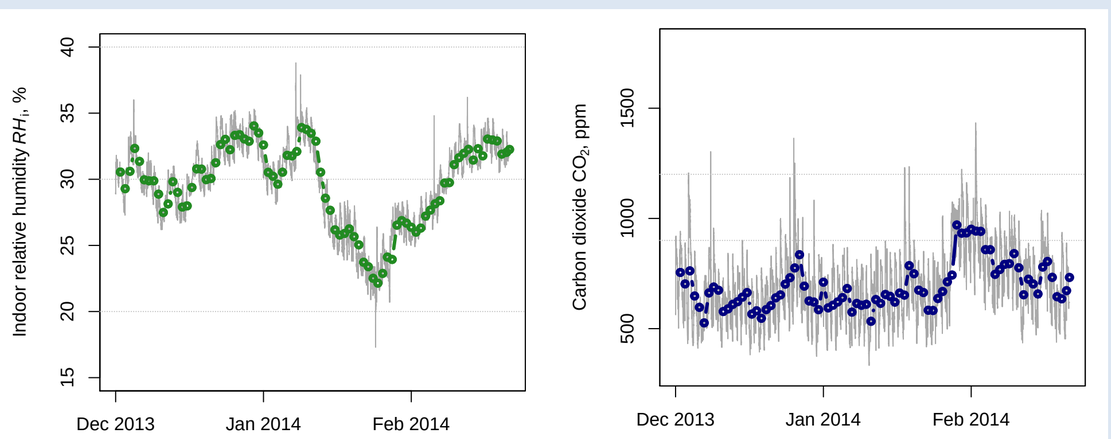
Location
58,0531° N
27,0517° E
Põlva, Estonia

Climate
Ambient air temperatures:
- occassionally below -30 °C
- frequently below -15 °C

Monitoring results

Monitoring is performed within joint research project by University of Tartu and Tallinn University of Technology (code 3.2.0801.11-0035).

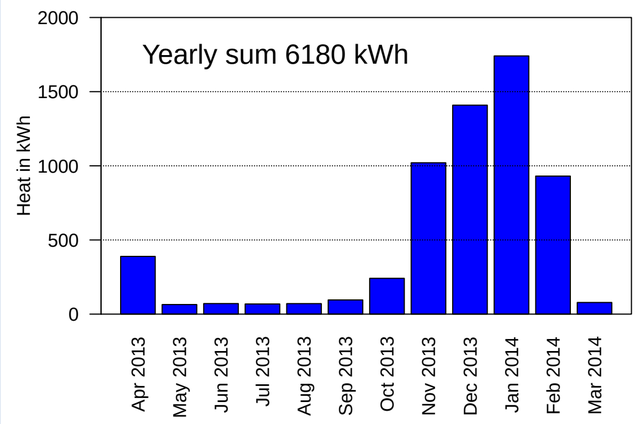




Measured hourly values, dots indicate the daily mean values.

Space heating

Sontex heat meter.

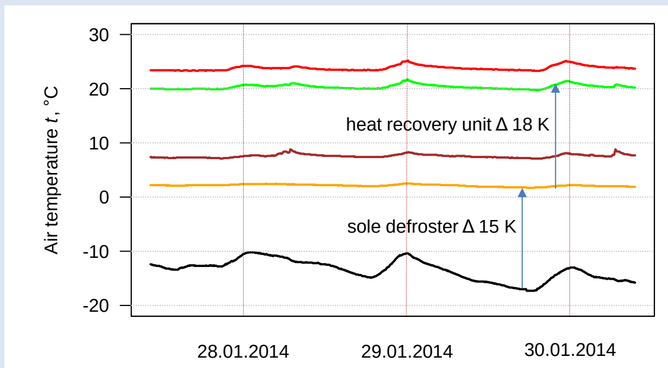


Measured @ 24°C
22,0 kWh/(m² a)
(6180 kWh / TFA 281m²)

PHPP calculated @ 20°C
14,4 kWh/(m² a)
(certification)

PHPP calculated @ 24°C

Ventilation unit temperatures



extract air (ETA)
supply air (SUP)

Paul Novus 300

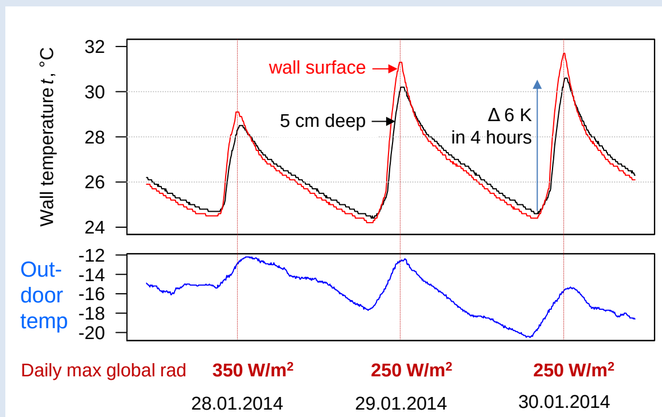
exhaust air (EHA)

outdoor air
after pre-heater (ODA)

outdoor air
before pre-heater

Paul Sole Defroster
SD-550, 226 m contour

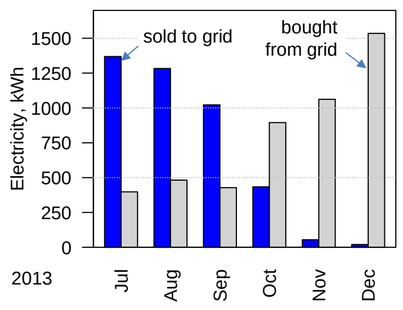
Interior wall temperature

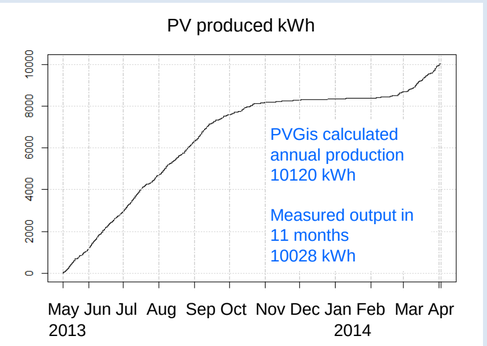


Massive clay wall temperature daily amplitude

Example, cold and sunny winter days, no heating is used.

Grid-connected PV operation





Conclusions

- Space heat demand is in good accordance with calculated values; ventilation air sole defroster pre-heating has shown as very stable and effective in cold days.
- PV system energy delivery fits well with initial PVGis calculation; the system was able to deliver in the second halfyear 2013 balance almost all the energy the building and occupants need.
- Solar thermal system and heat pump functioning was fully adjusted first in April 2014, thus the final energy demand in cold period is not properly assessed yet.

Project data

Building owner: Kuldar Leis
Architects: G. W. and M. Reinberg, www.reinberg.net
Project lead: Sense OÜ, www.sense.ee
Energy modelling: PassiveHouse OÜ, www.passivehouse.ee

References

Reinberg [2013] . Reinberg, G., Mauring, T., Hallik, J., Valge, M., Kalbe, K. First Certified Passive House in Estonia. In: Feist, W. (Ed.), Proceedings of 17th International Passive House Conference (in germany), pages 315-321 (2013).

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