

Energy-efficient building

Energy balance of the low-energy house

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Agenda

- The object of the low energy house
- The building envelope
- Energy consumption of the low-energy house
- Conclusion



Objective of the low-energy house

- Demonstrate energy saving potentials
- Build a low-energy house in Sisimiut
- Energy for heating: 80 kWh/m²
- 50% of the energy frame of the coming building code in Greenland.



Focus

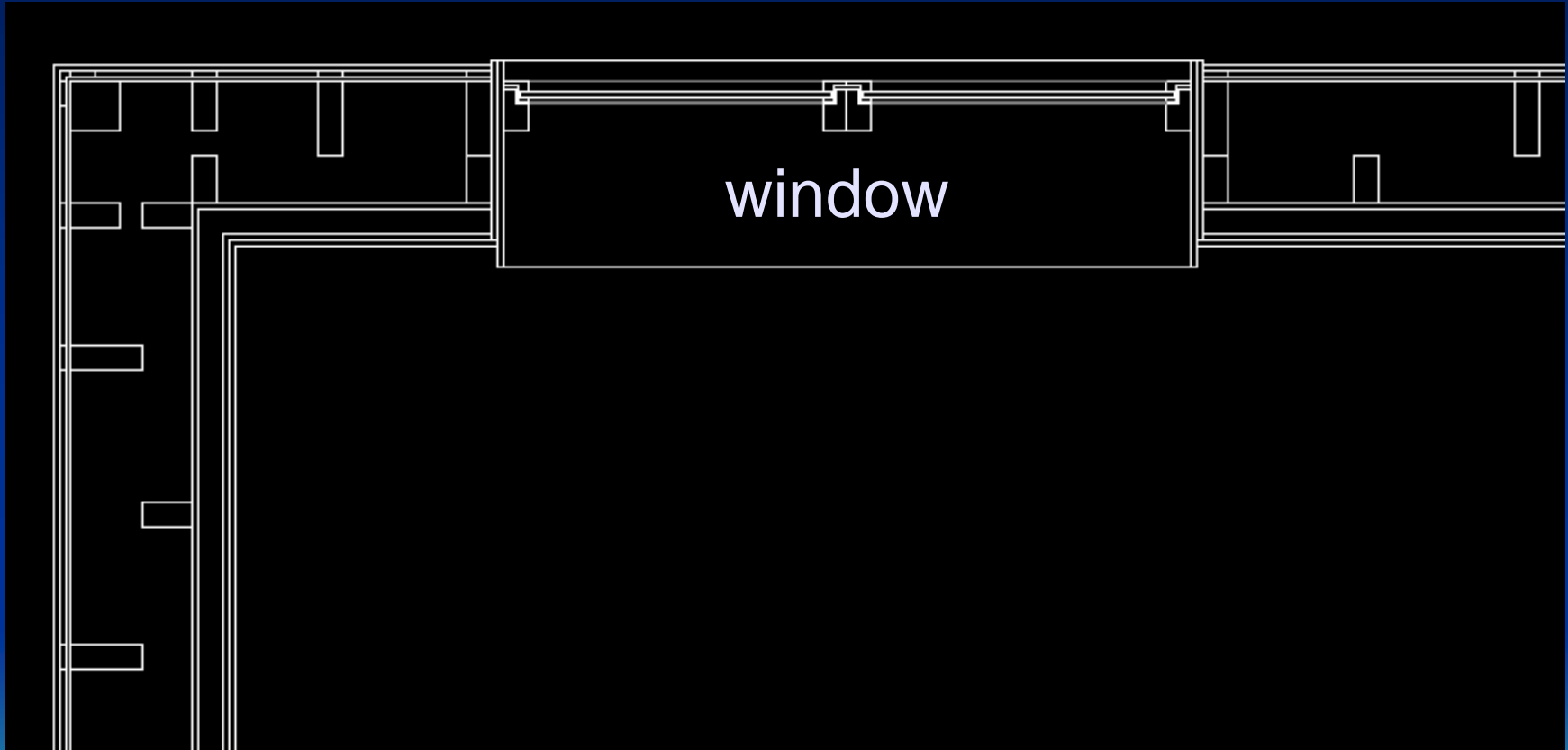
Saving energy for heating:

- Insulation thicknesses
- Thermal bridges in the building envelope
- Windows with high net energy gain
- Ventilation with heat recovery
- Solar heating of domestic hot water

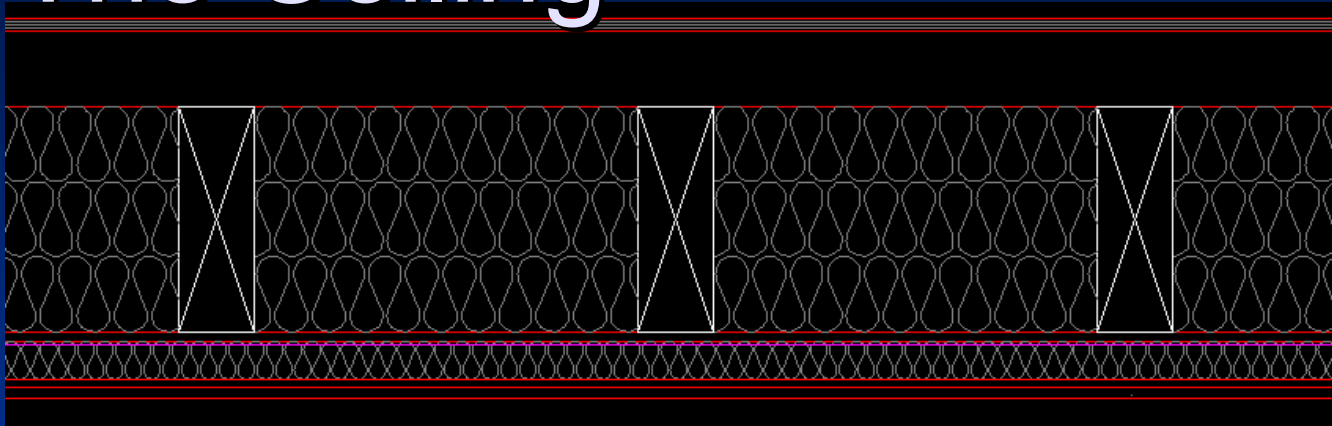
Saving of electricity not in focus



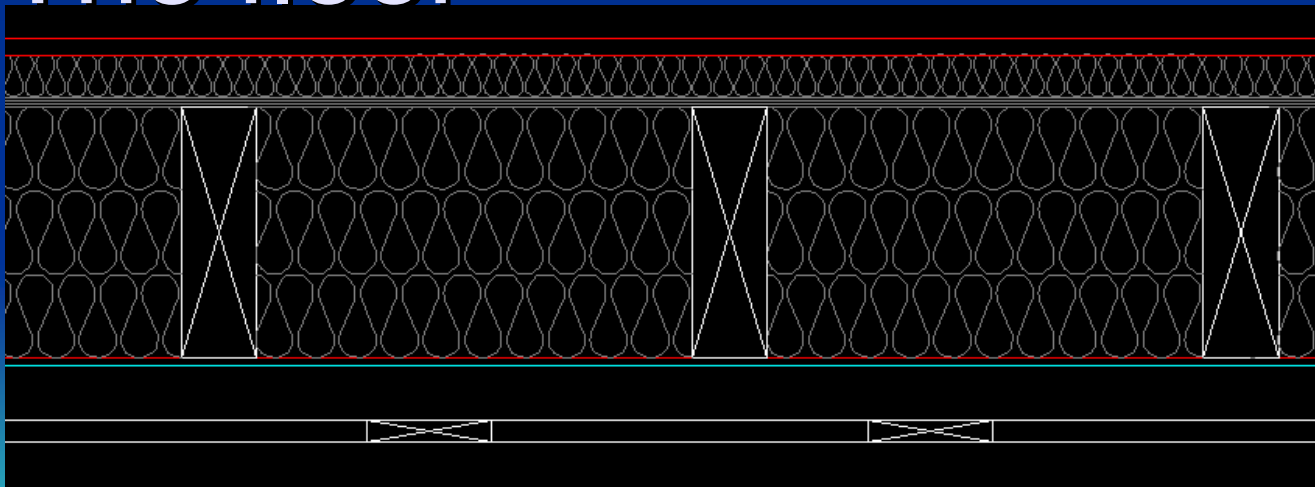
The walls



The Ceiling



The floor



The wood construction



Insulation thicknesses

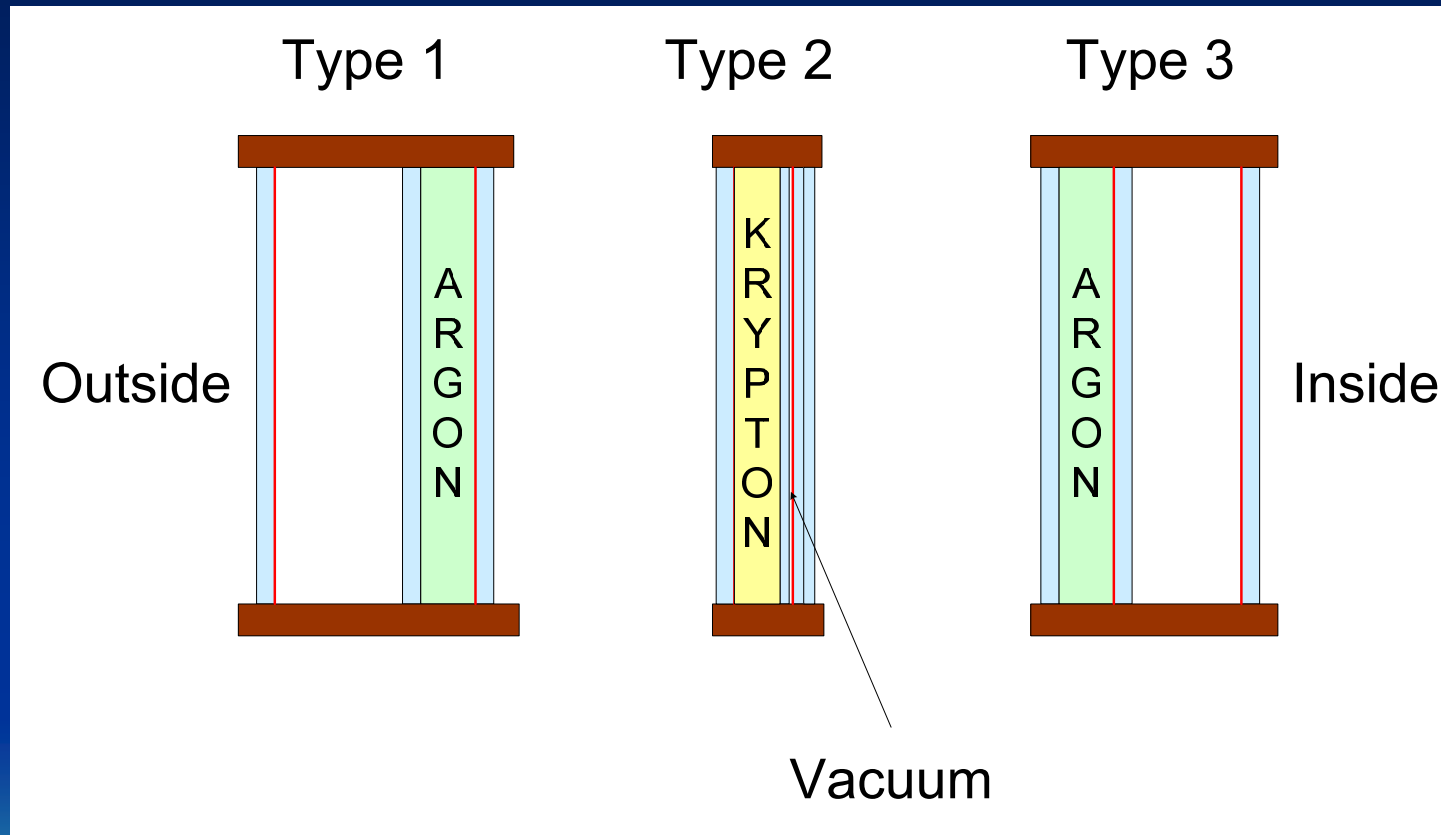
Insulation thicknesses in mm	Low-energy house	Greenland New building code 2005	Denmark New building code 2005
Floor	300	250	300
Walls	300	200	200
Ceiling	350	300	300

Windows

U-value	Low-energy house	Greenland New building code 2005	Denmark New building code 2005
Windows	1.0 – 1.1	1.8	1.5



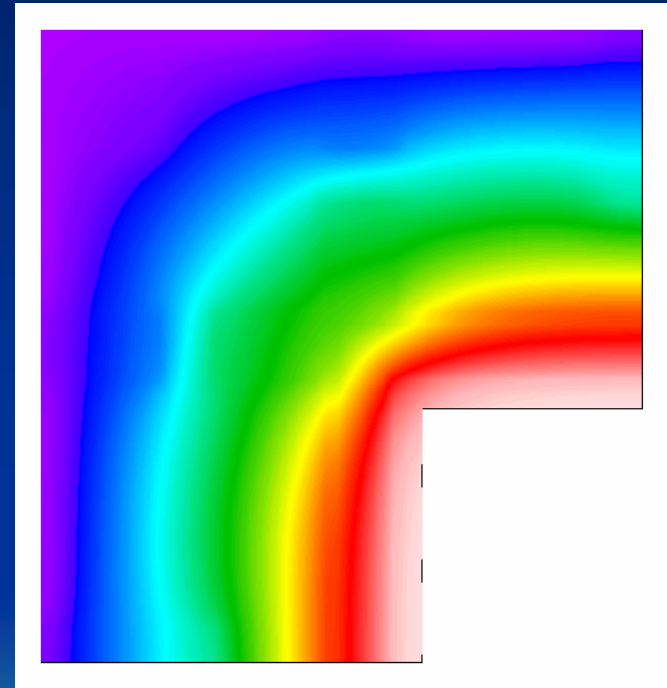
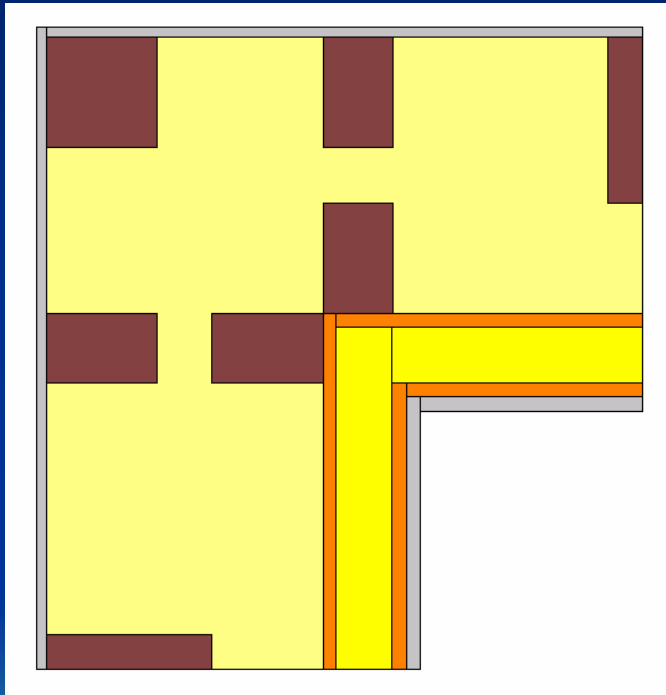
The glazing units



Thermal bridges

Outer wall corners

Linear thermal transmittance: 0.015 W/mK



Calculation of the low-energy house energy consumption

Simulation model made in the program BSIM2002

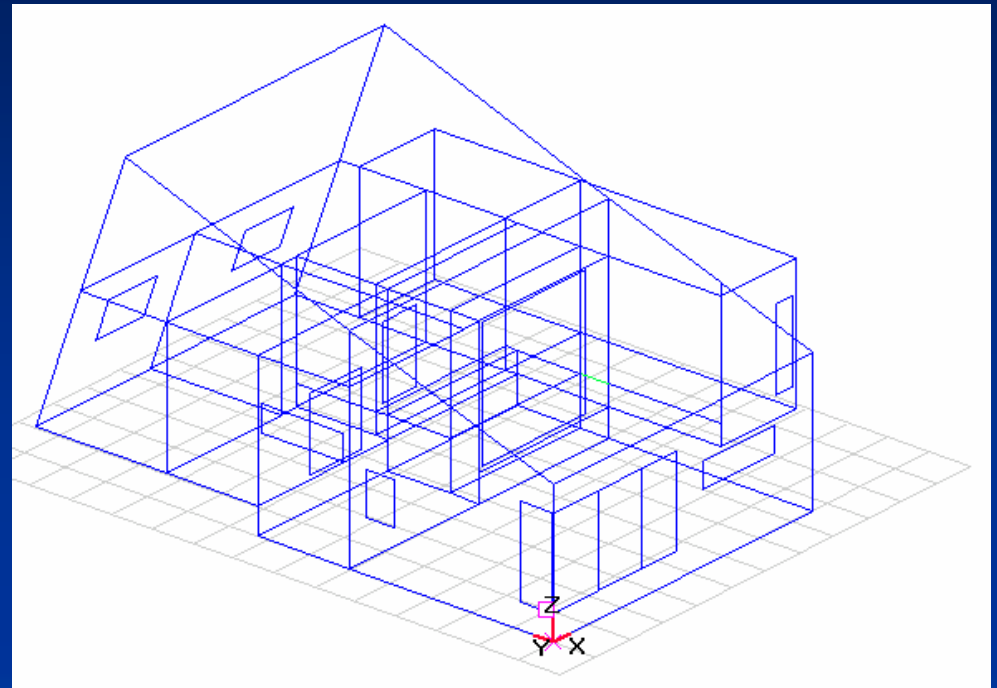
Heating set point temperature: 20°C

Heating system: Floor heating

Internal heat gain: 5 W/m²

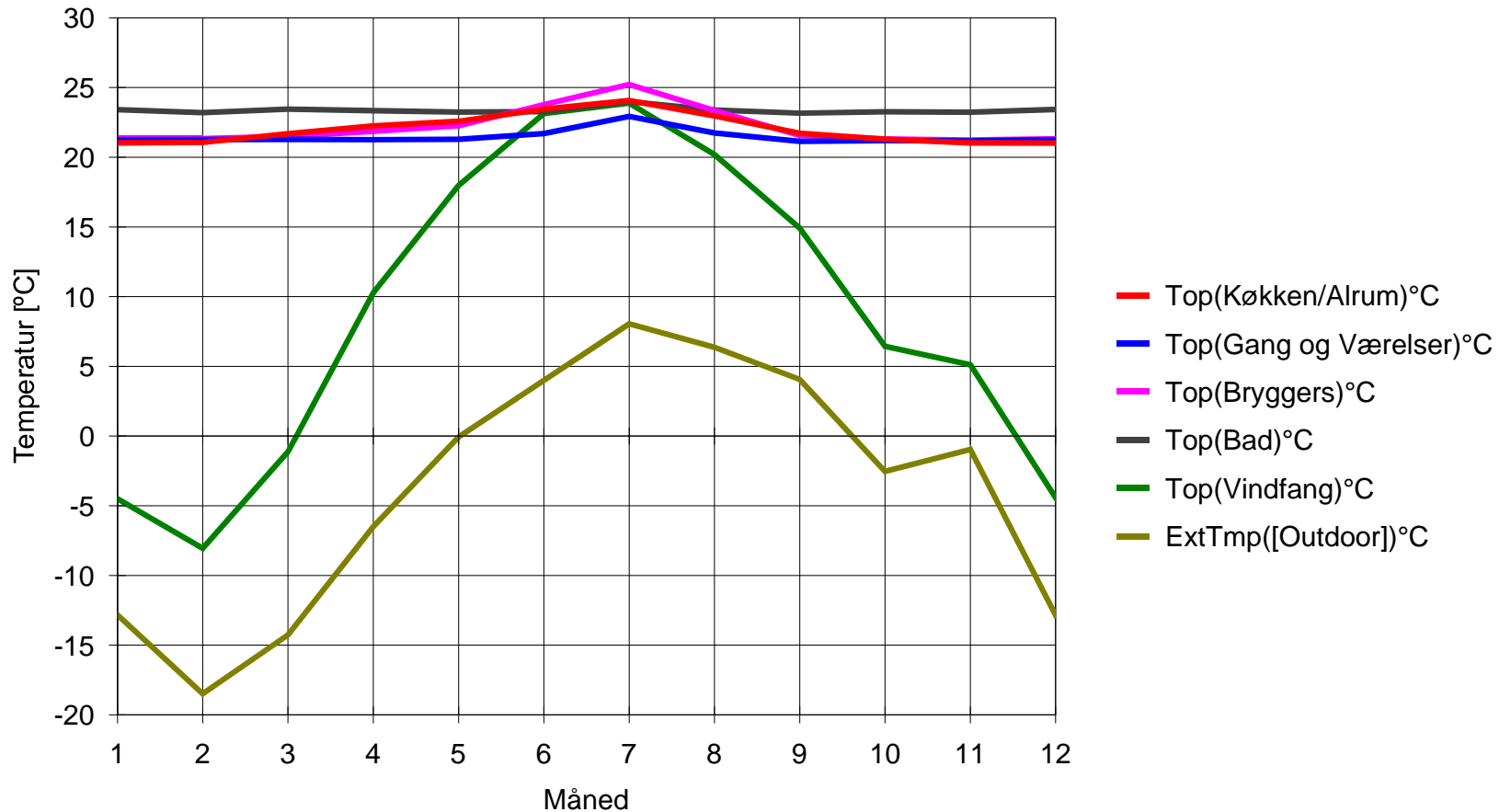
Ventilation rate according to the building code

Weather data: Sisimiut



Simulation model of half the double house

Simulated temperature during the year in the low-energy house



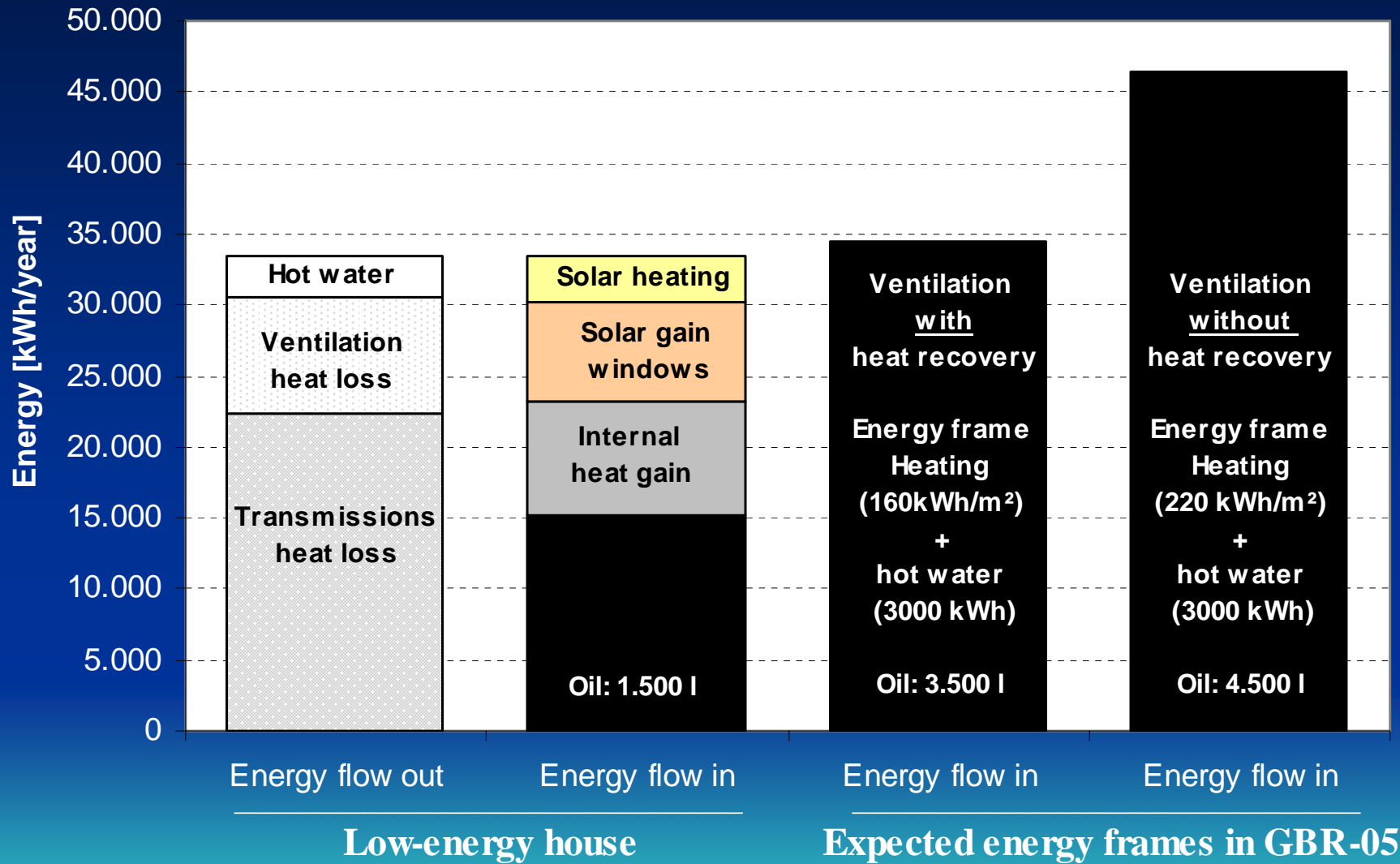
Results for the double house

Heating	15.400 kWh	78 kWh/m ²
Windows - solar gain	7.100 kWh	36 kWh/m ²
Internal heat gain	8.100 kWh	41 kWh/m ²
Transmission heat loss	22.300 kWh	113 kWh/m ²
Ventilation Infiltration Venting	8.300 kWh	42 kWh/m ²

Total floor area: 197 m²



Energy balance of the low energy house



Conclusion:

- Calculated energy consumption:
78 kWh/m² or 800 l oil for 100 m²

**Low-energy house
in Sisimiut, Greenland
has been realized**

