

Net Zero by 2025?

Client's perspective on a deep eco-refurbishment

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Green Building Store Webinar 26th March 2021



eco Design Consultants
Architects & Environmental Consultants



● WARM: Low Energy Building Practice

CLIENT BACKGROUND



Oxford Commission on
Sustainable Consumption



living witness
Quakers for Sustainability

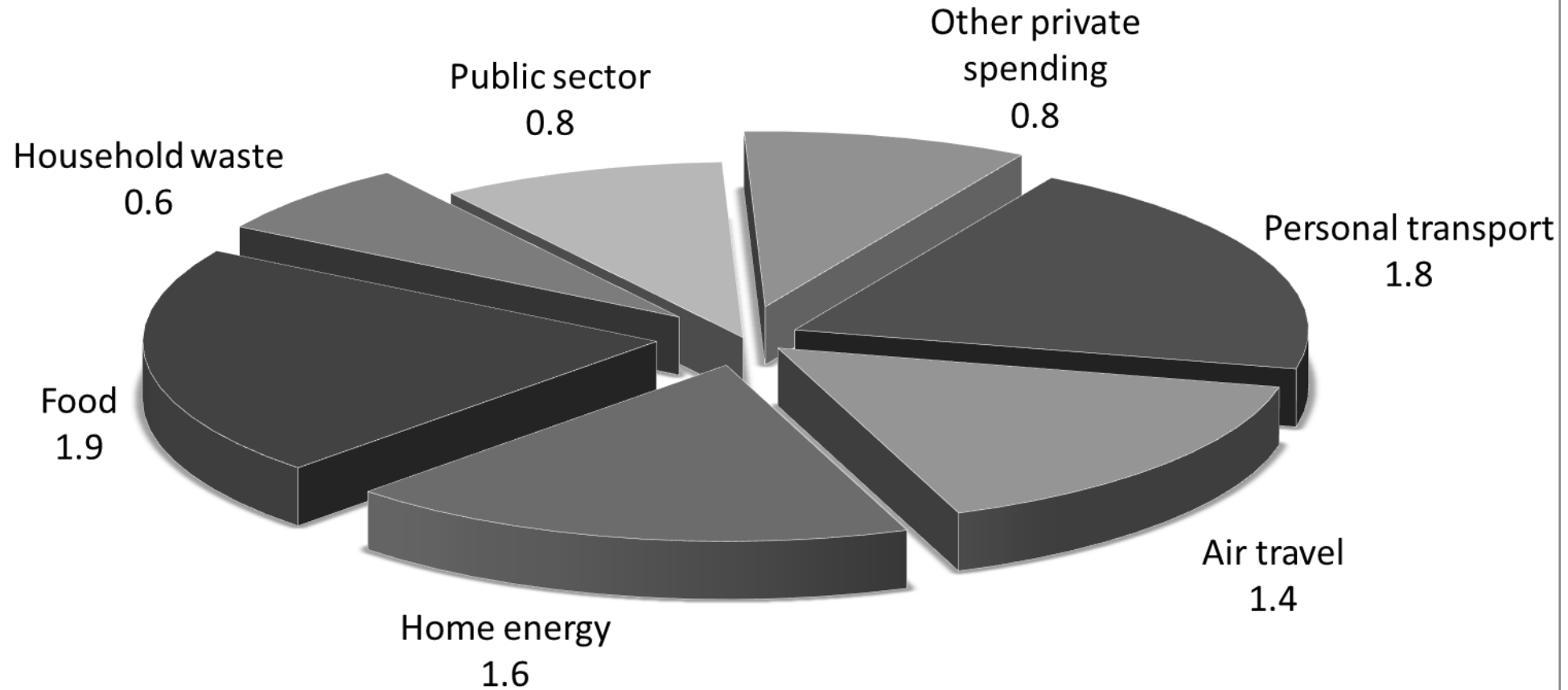
FACING
DIFFICULT
TRUTHS

Climate Psychology Alliance

Most greenhouse gas emissions can be traced to lifestyles

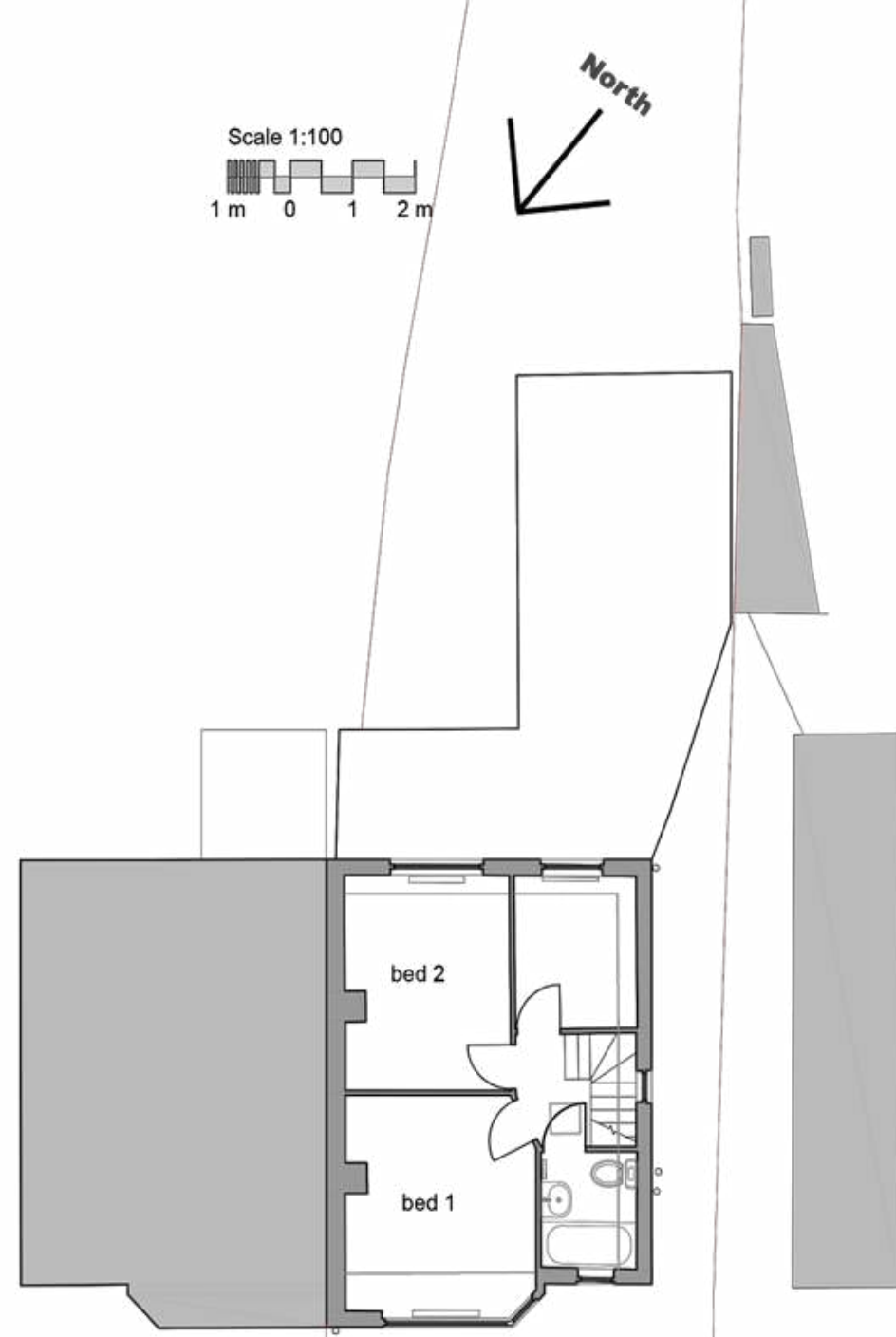
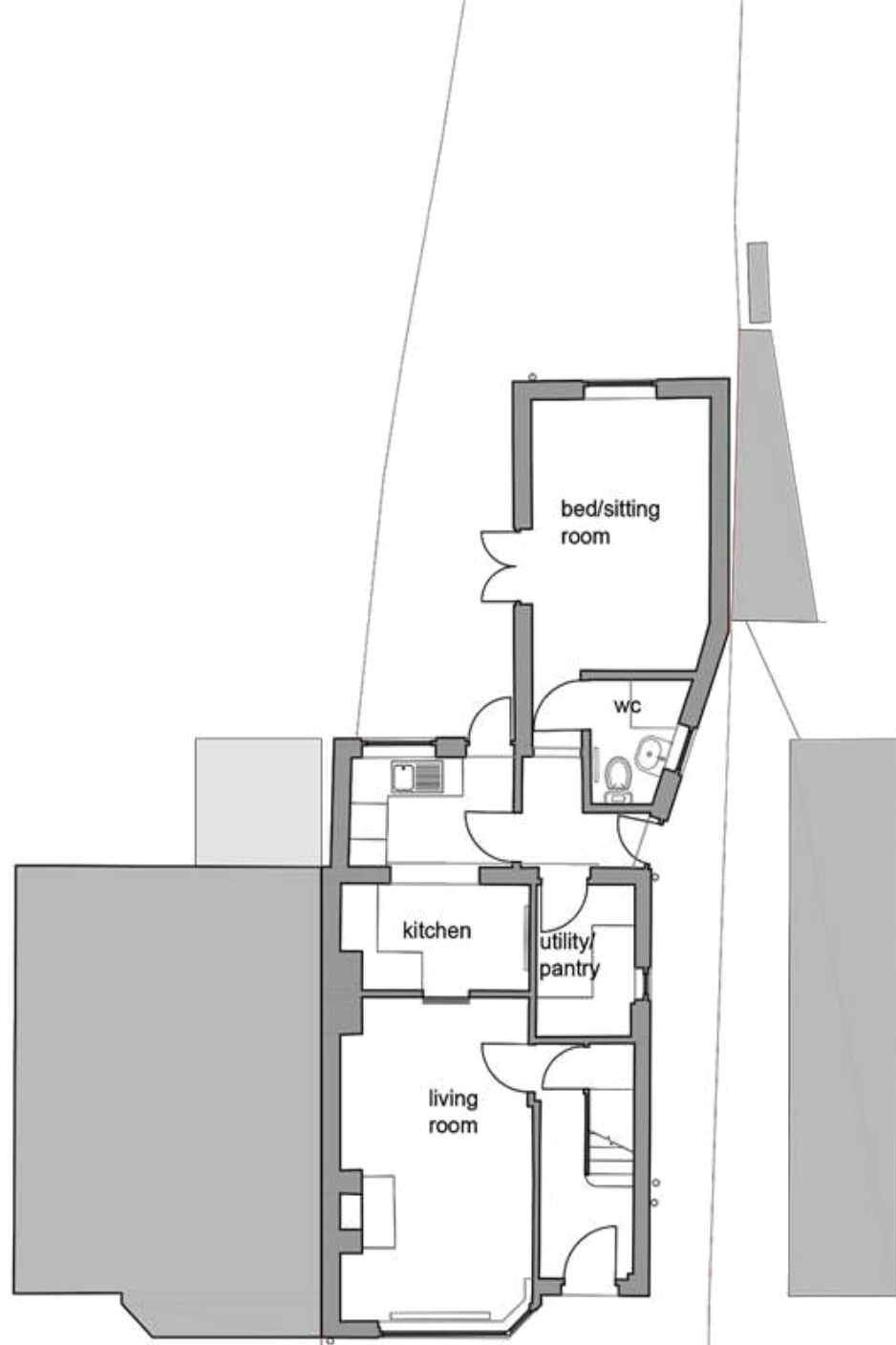
Emissions per average UK resident - approx 9 tonnes/year CO₂-equivalent

Consumption basis - includes GHG embodied in trade

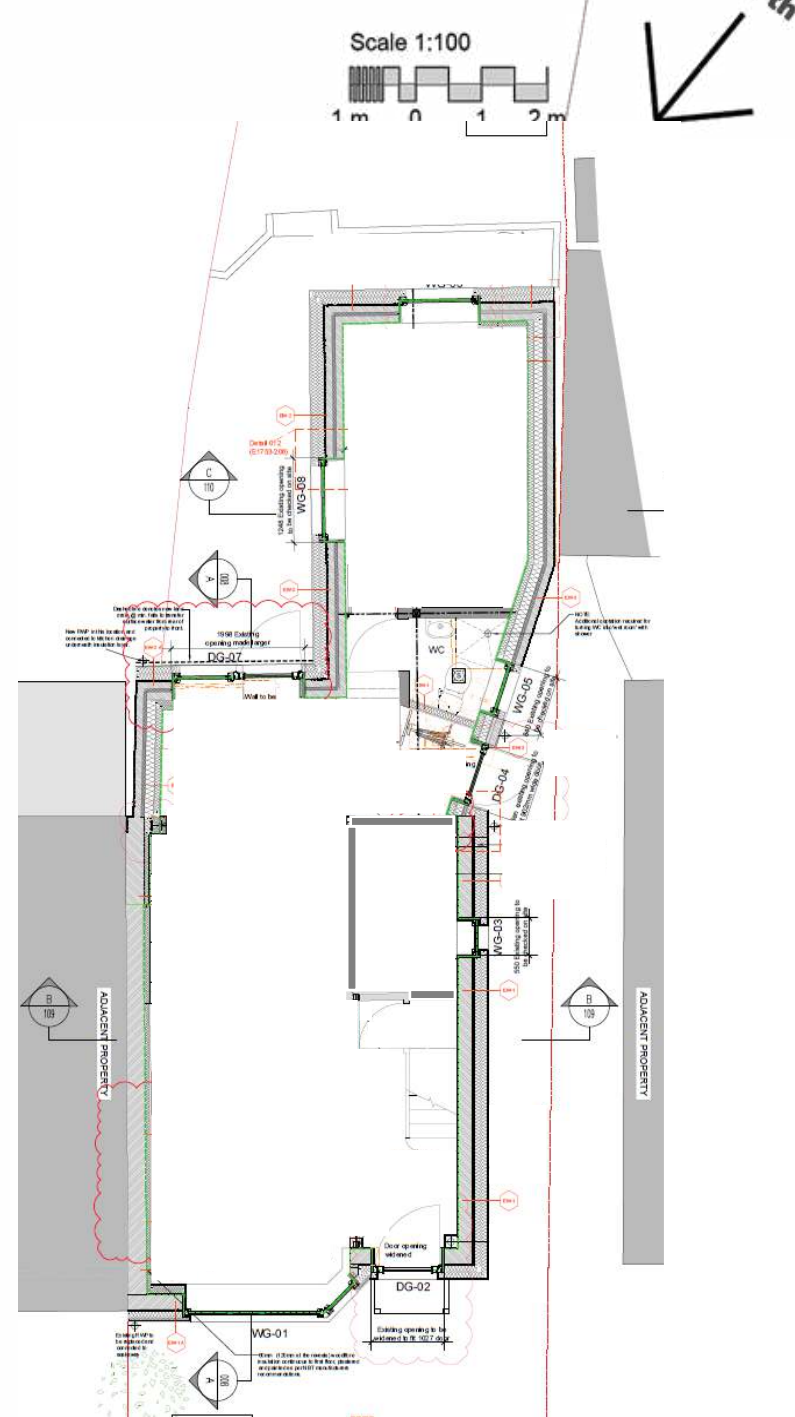
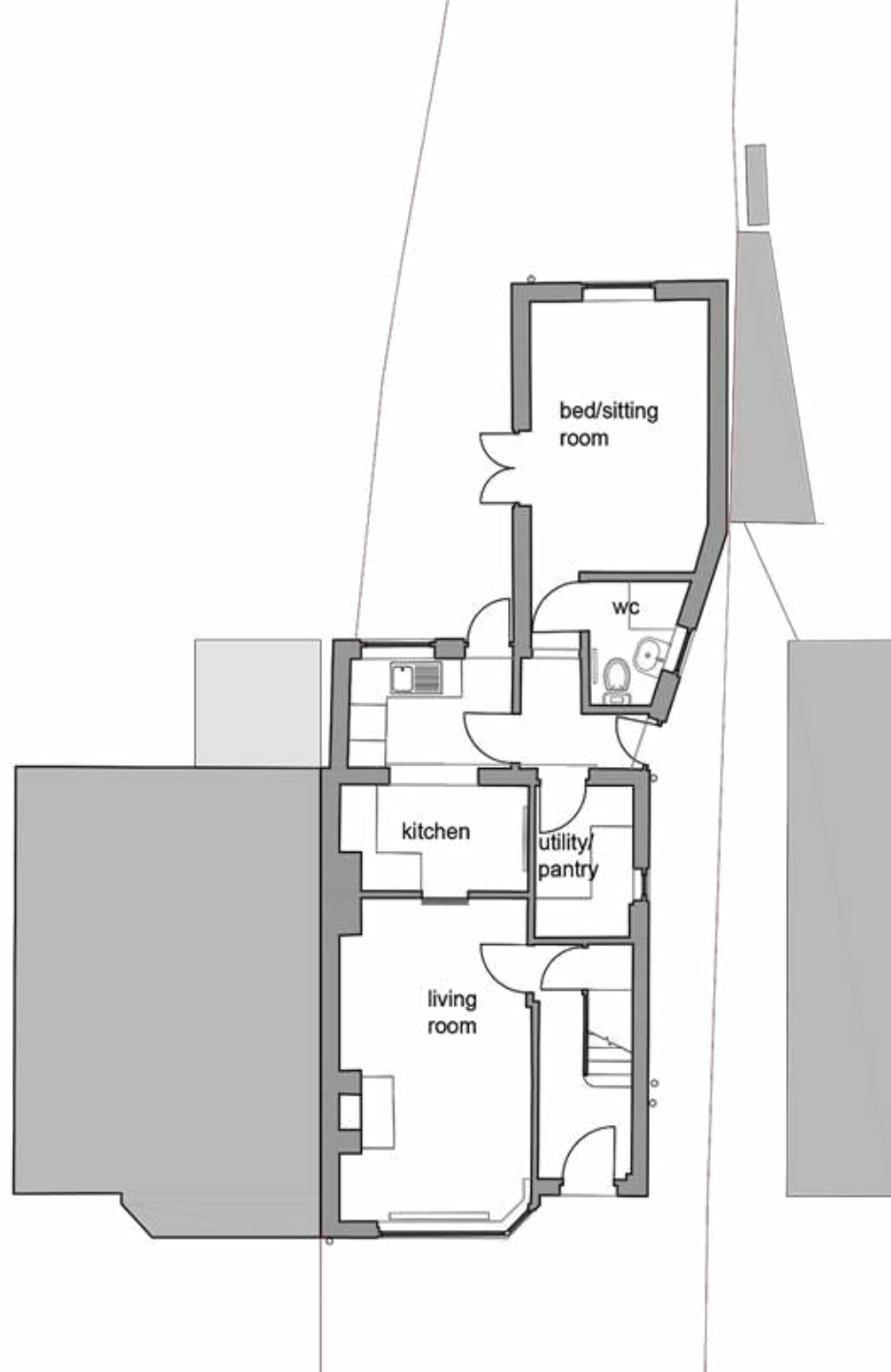


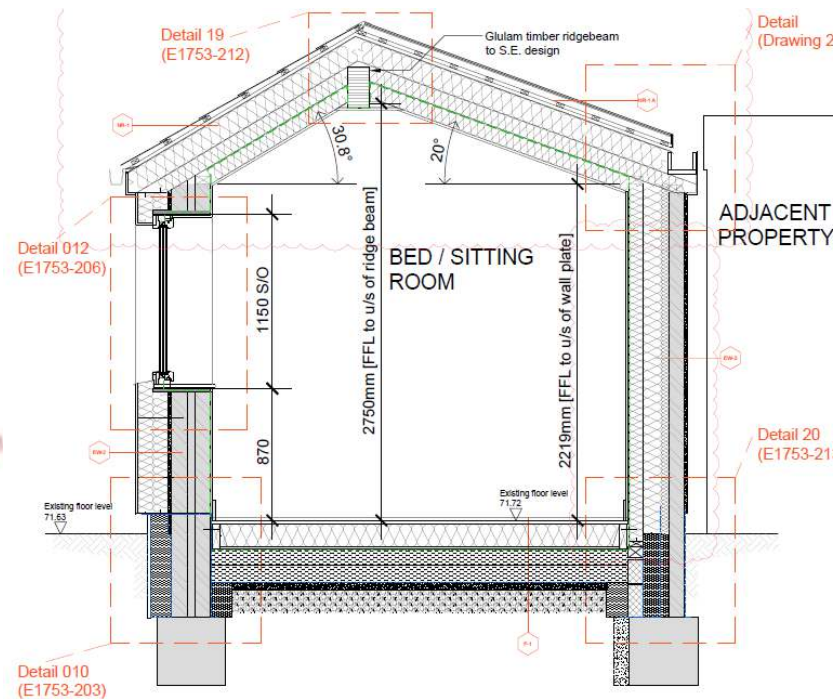
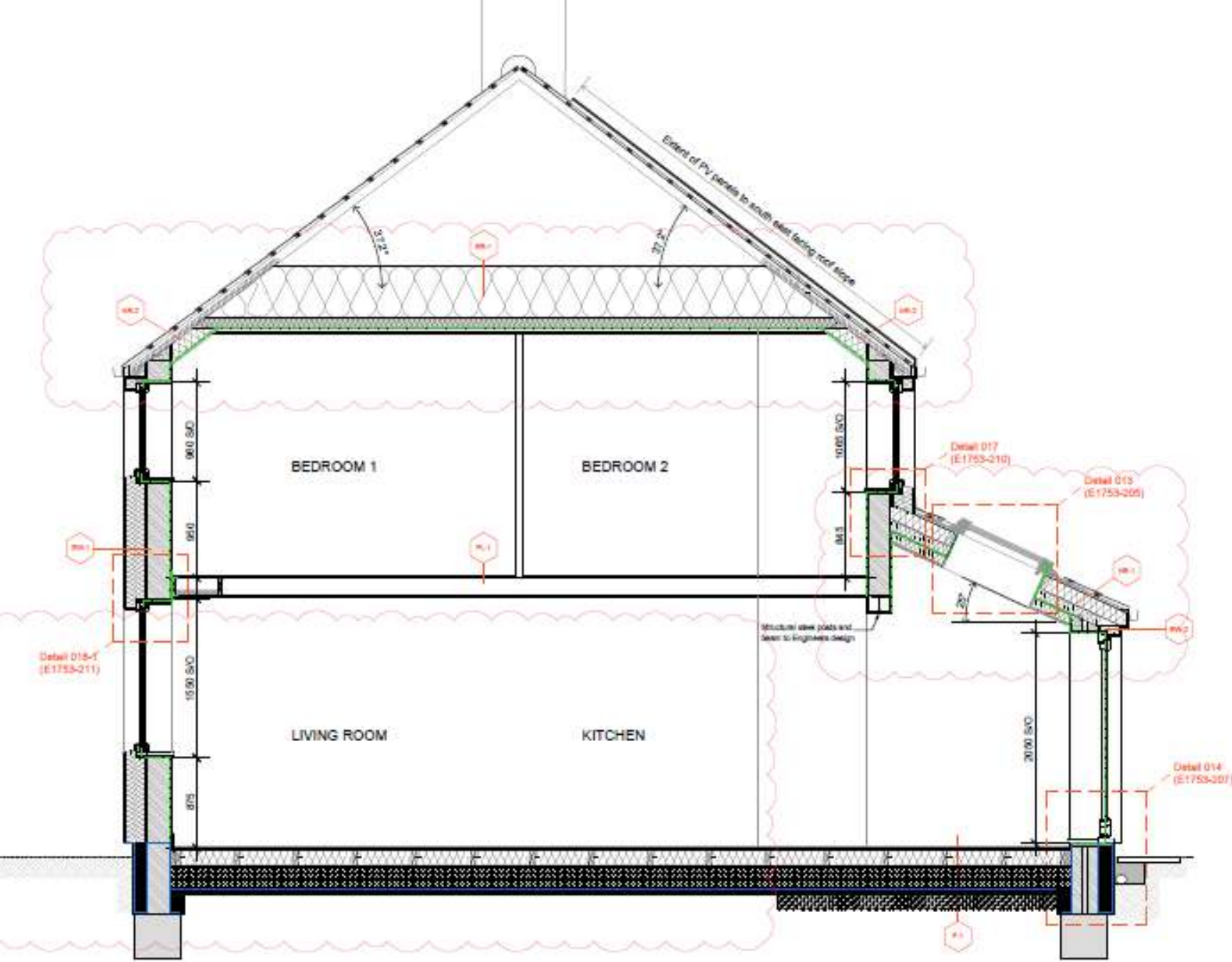
Public sector includes schools, hospitals, government buildings, the military etc.

"Other private spending" includes clothing, furniture, electrical equipment, house building, and services such as telecoms, finance and entertainment.









Main insulation types

EWI, some IWI
and new roof
phenolic foam



Some IWI
Woodfibre

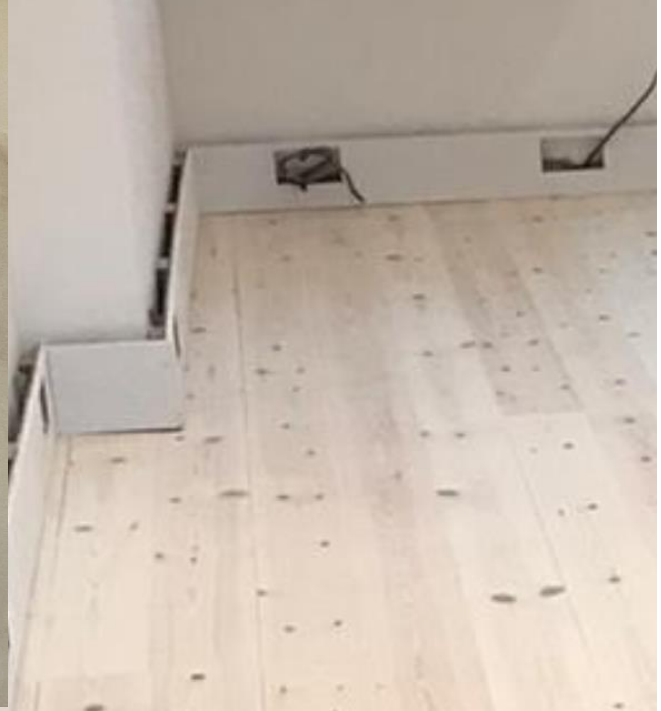
Floor
PIR (polyisocyanurate)



Walls below DPM to
foundations
XPS (expanded polystyrene)



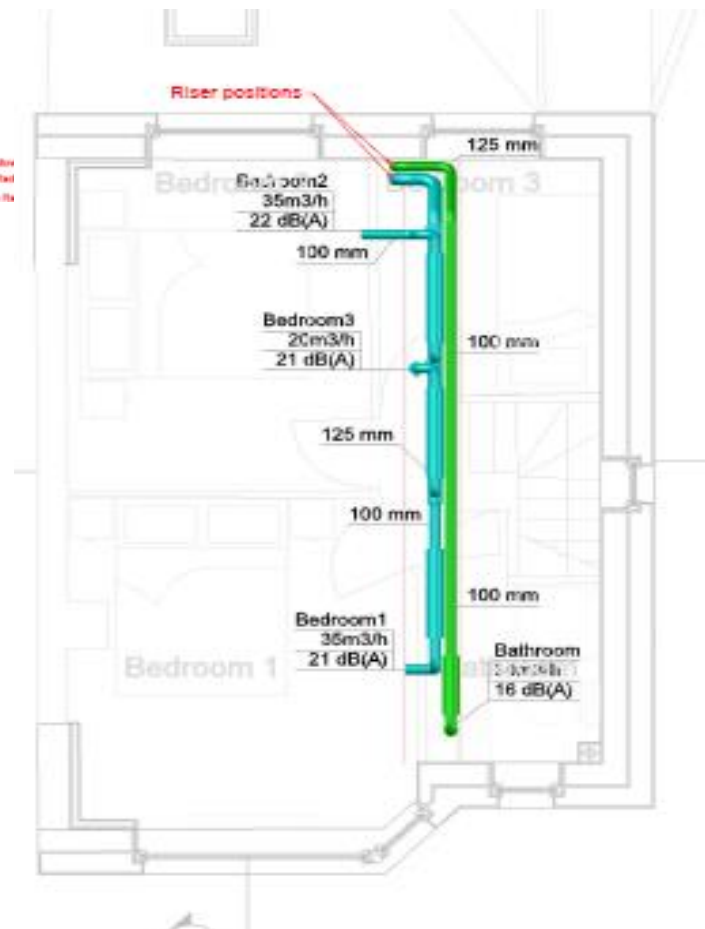
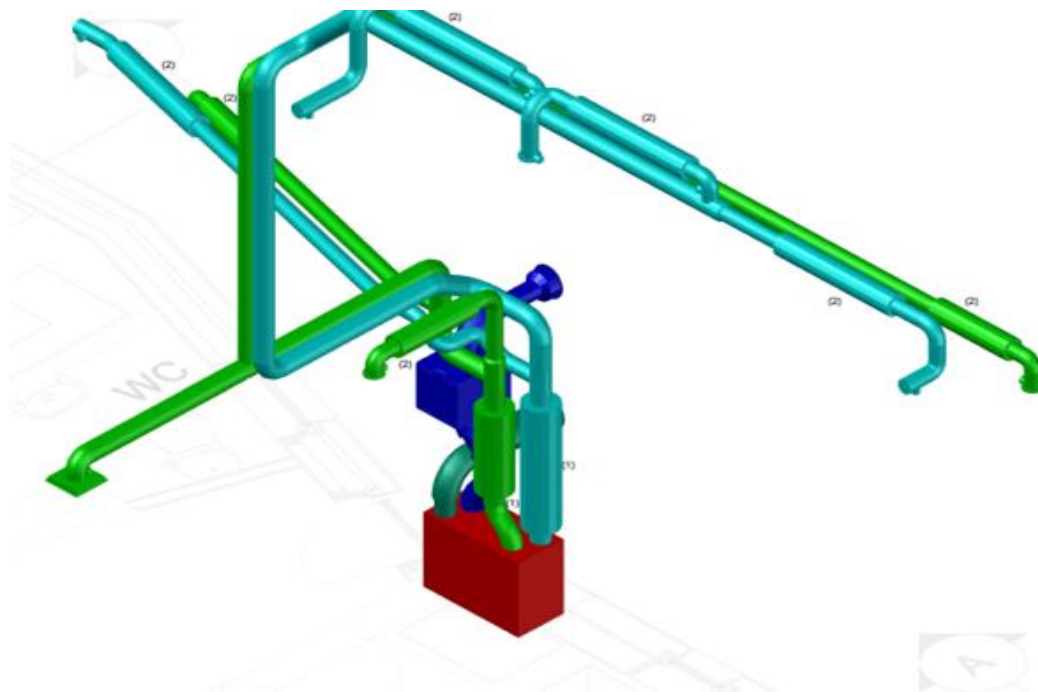
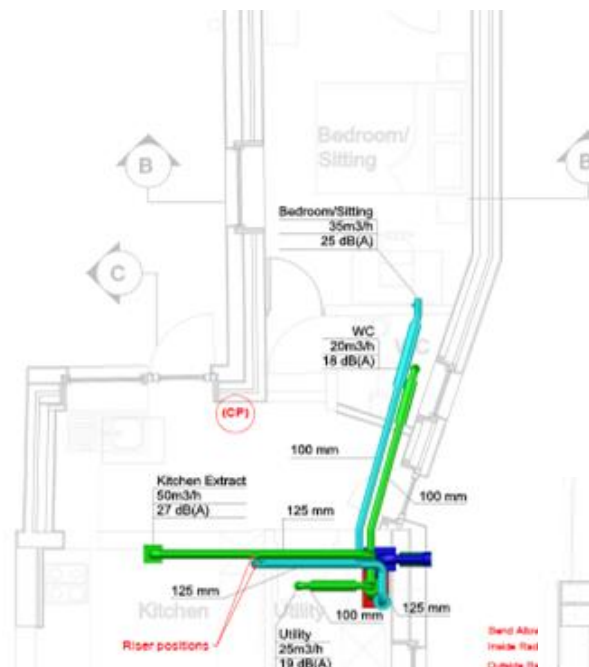
Loft, studwork, rafters etc
Mineral wool







a
pod.
tract
e filter
thing

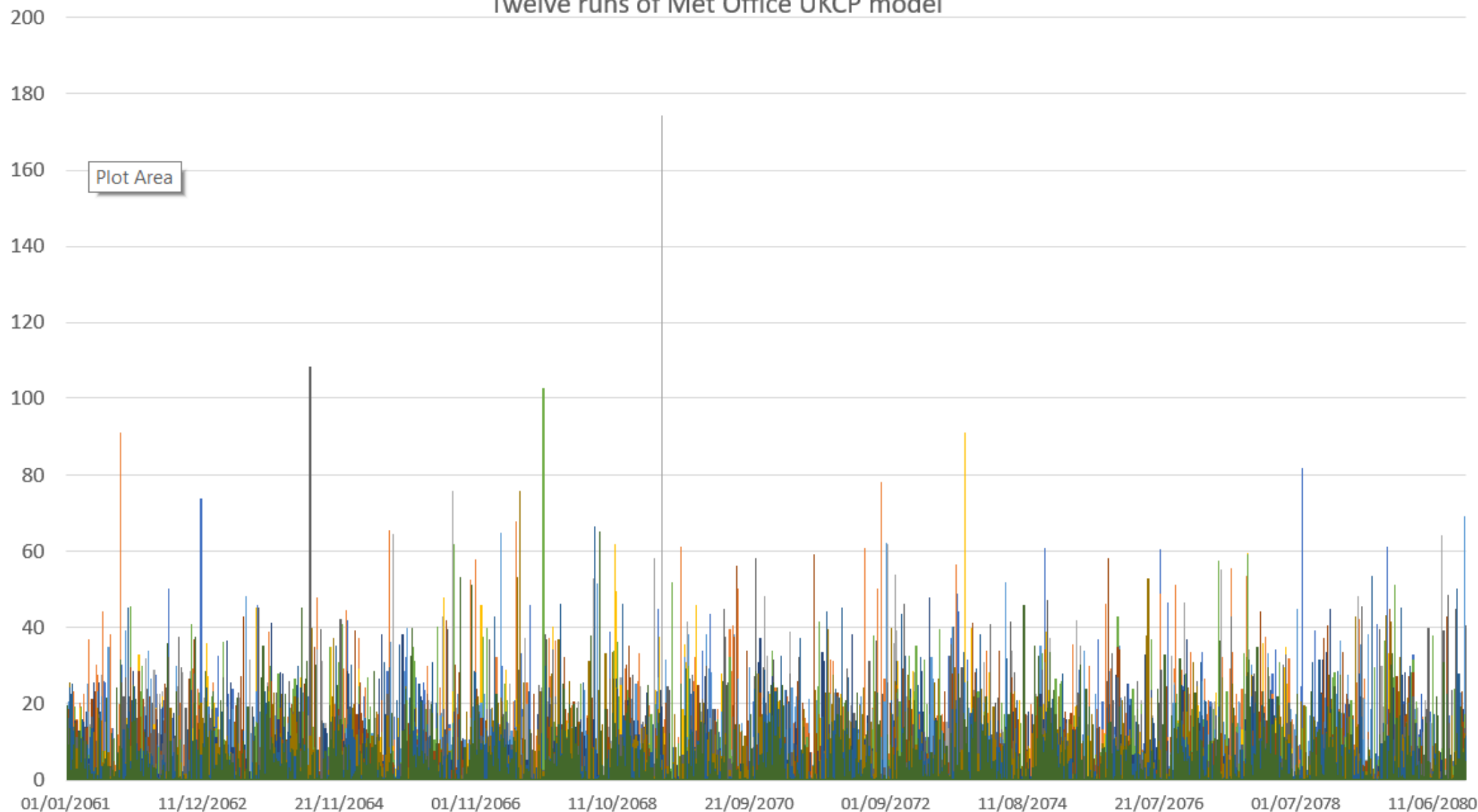




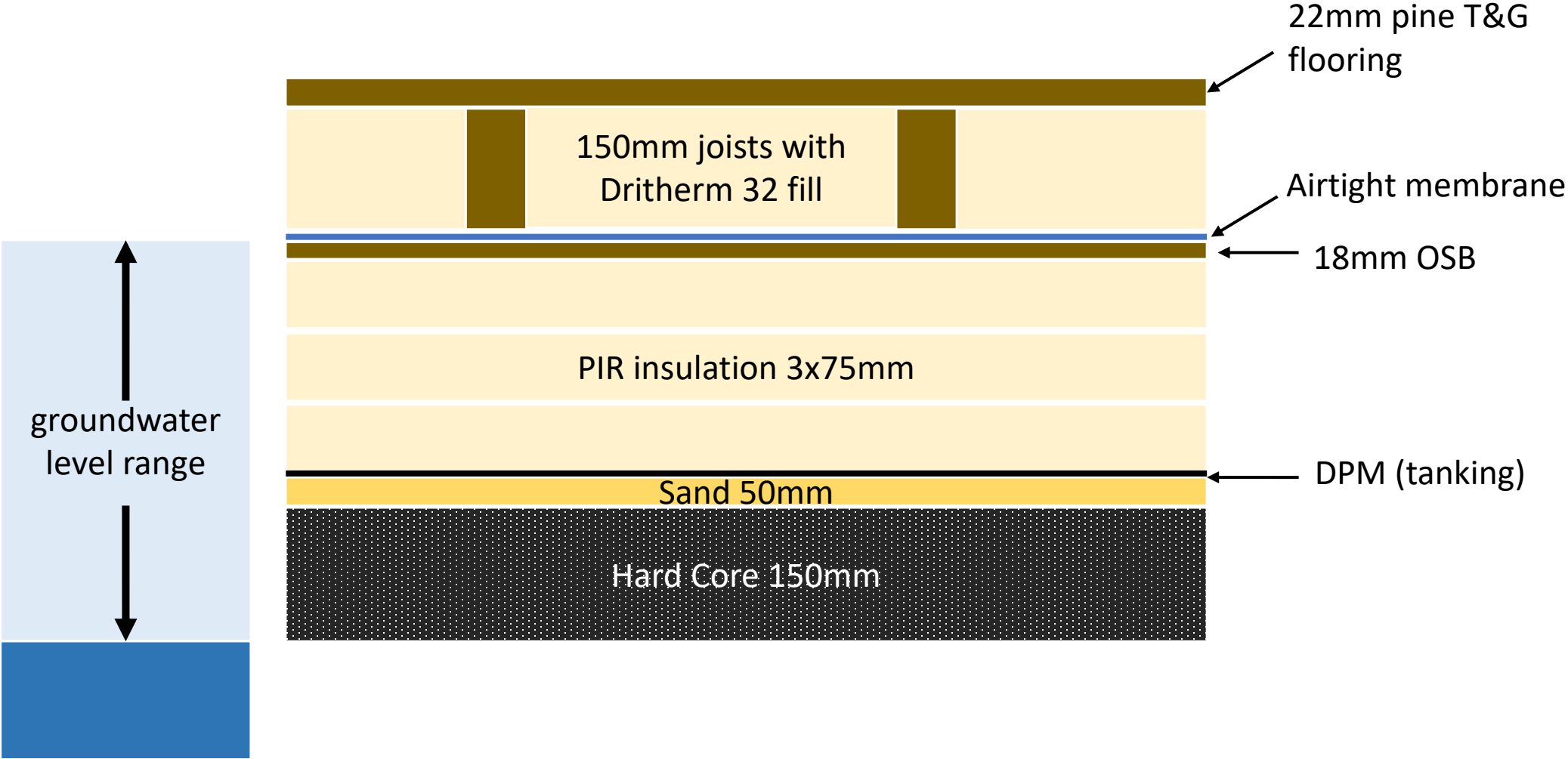




Daily Precipitation in mm, West Oxford, 2061-2080
IPCC RCP 8.5 (historic record is 88mm in 1968)
Twelve runs of Met Office UKCP model

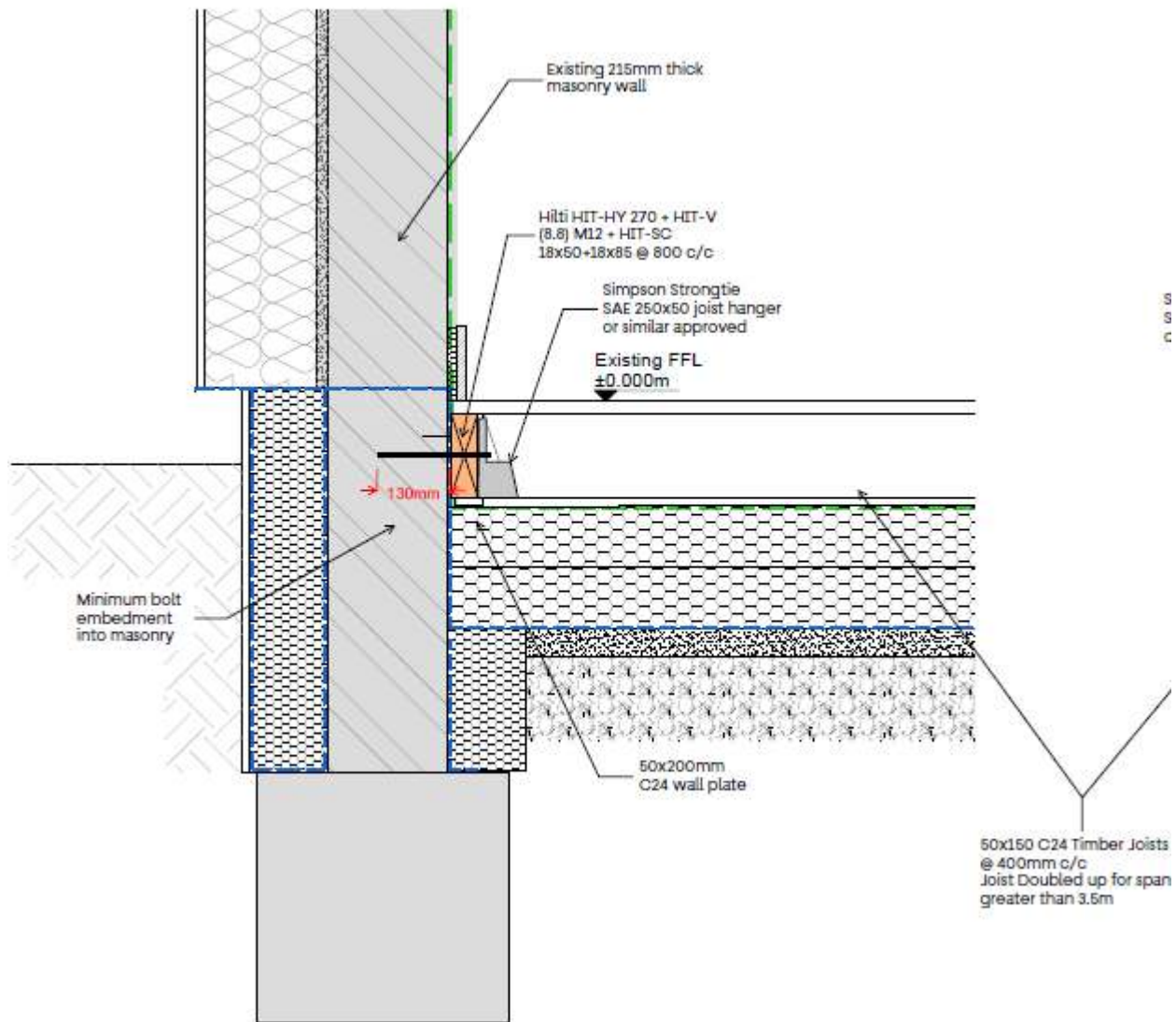


Floor design

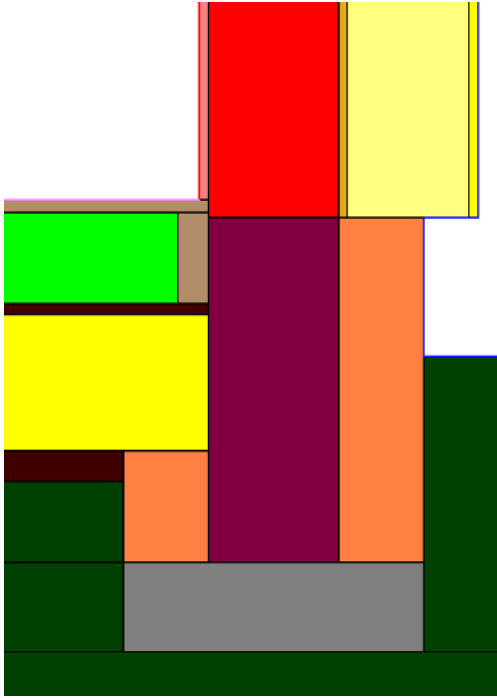




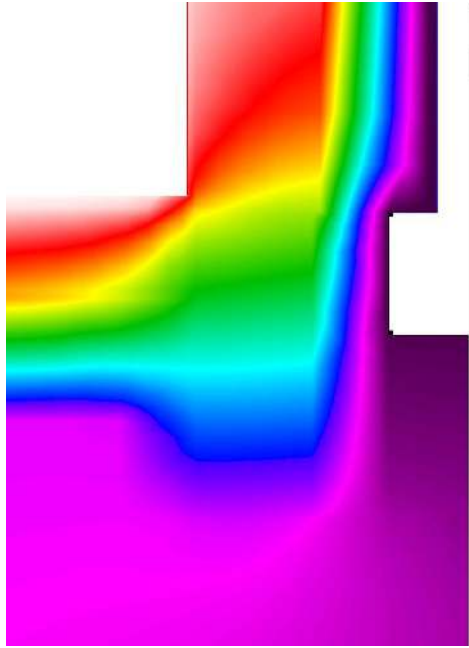




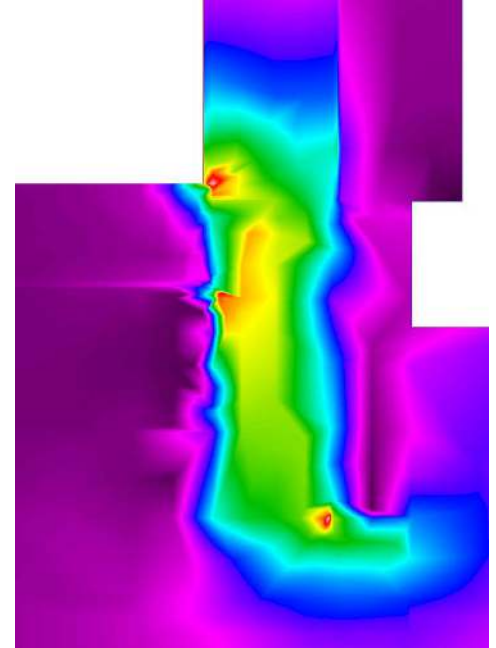
Modelling of thermal bridge to foundations



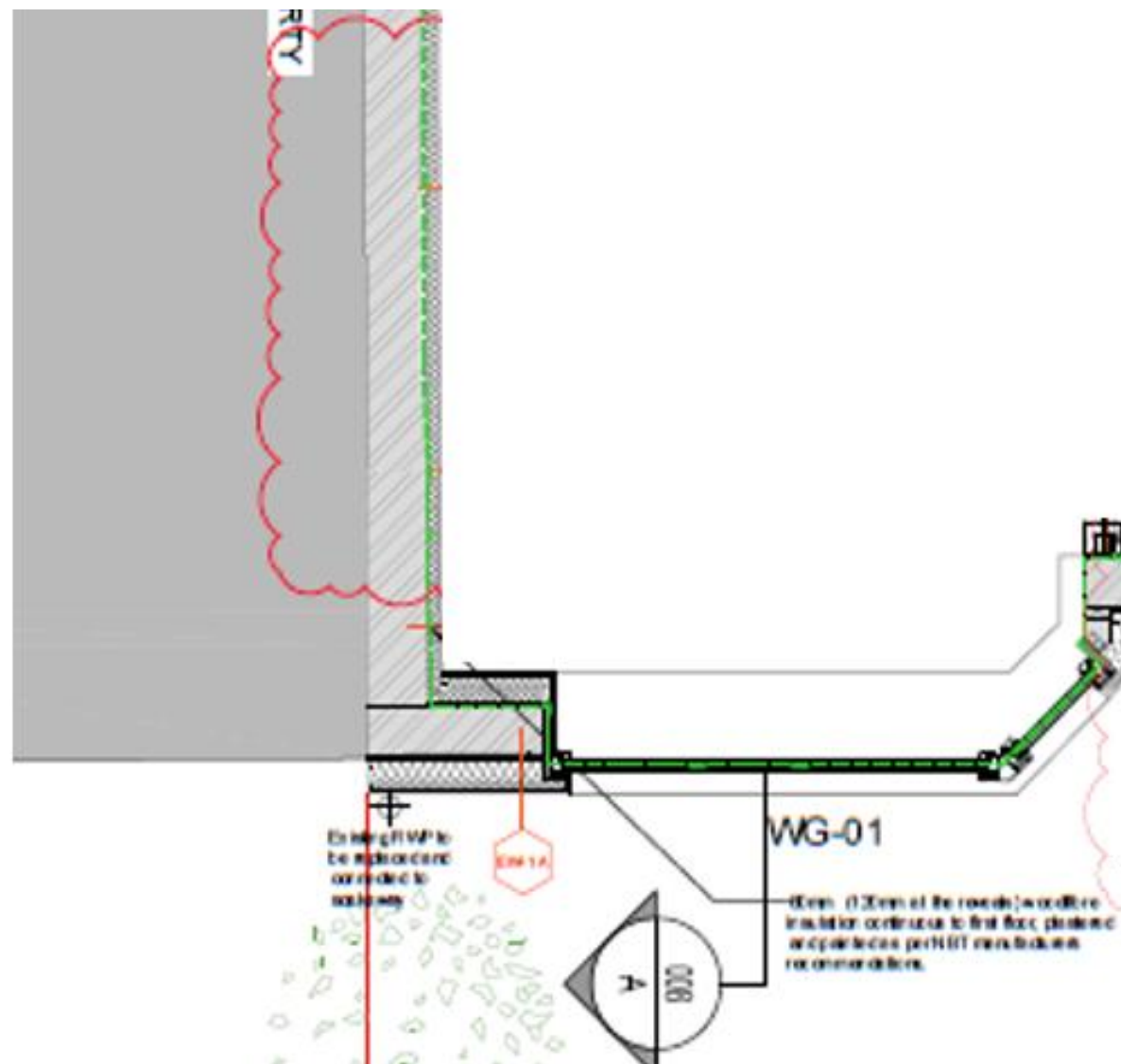
Main
components

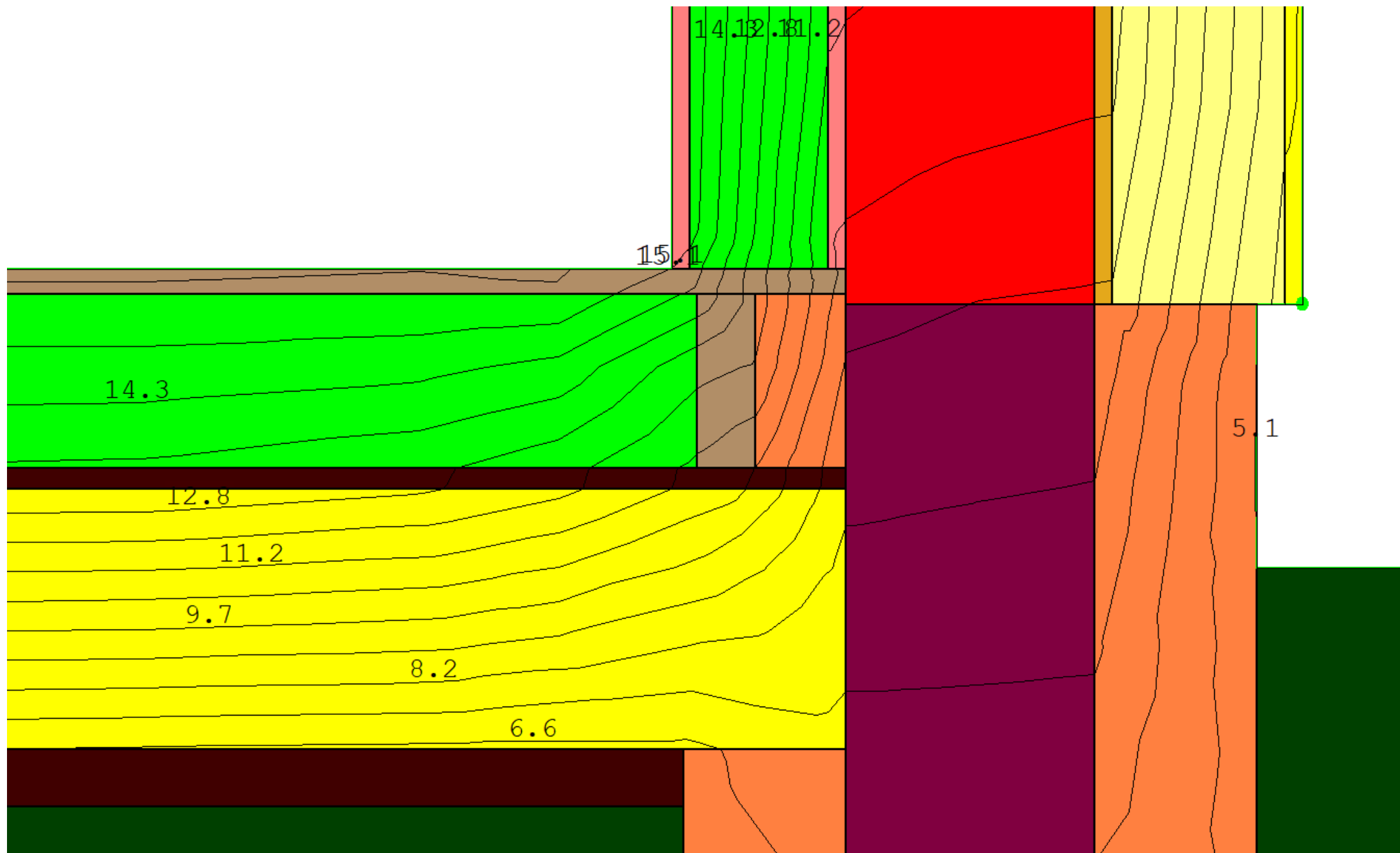


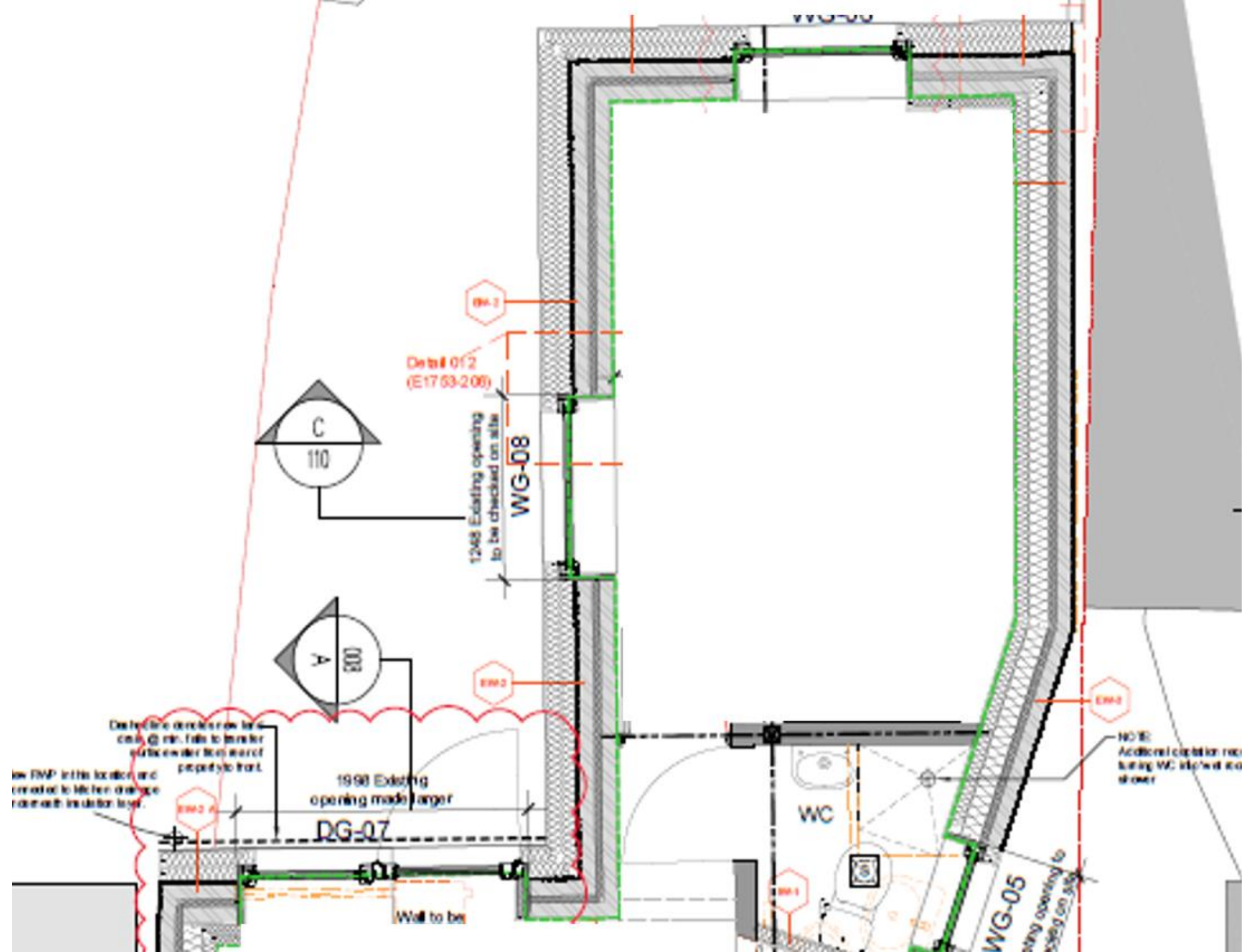
Isotherms
(temperature)

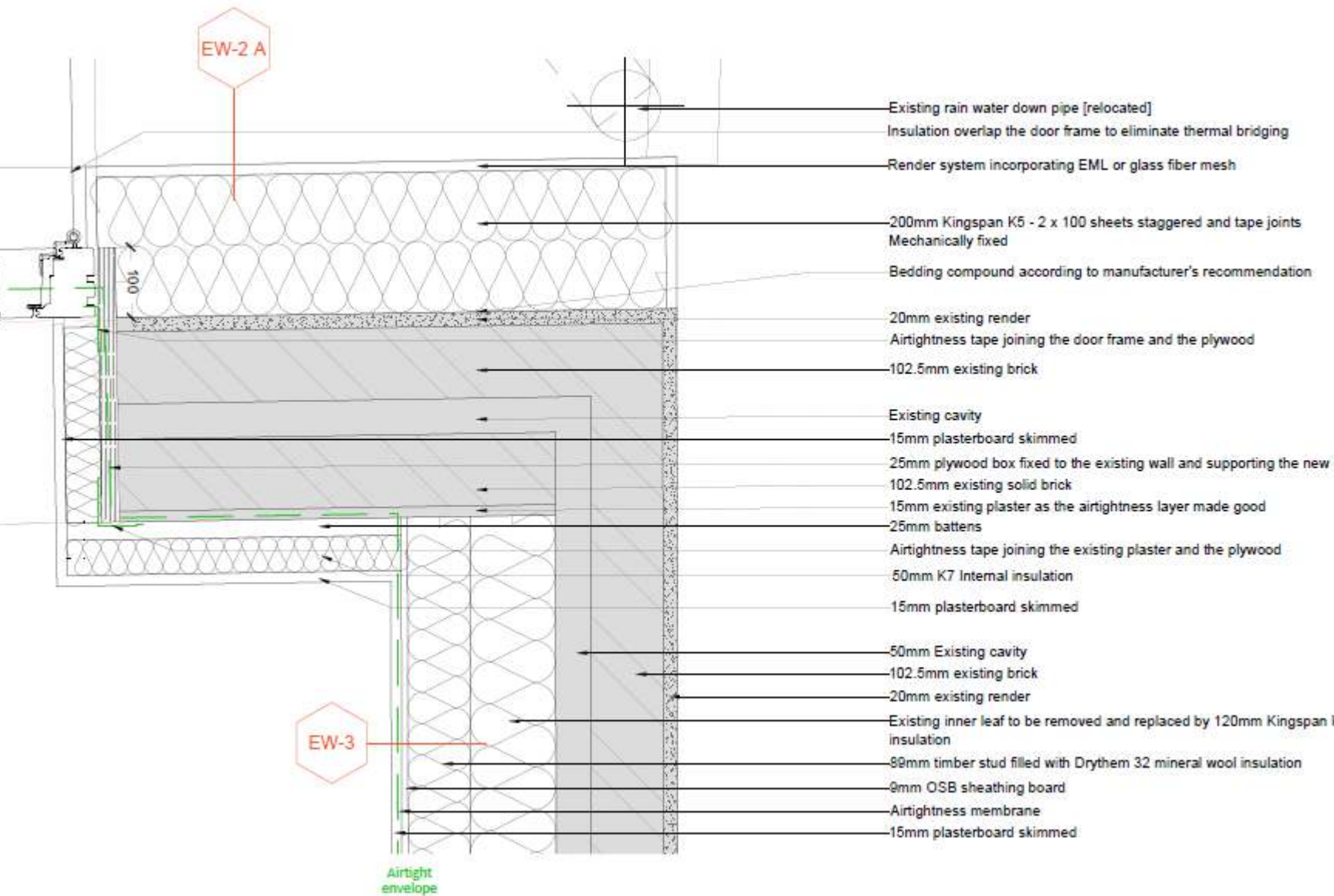


Heat flow

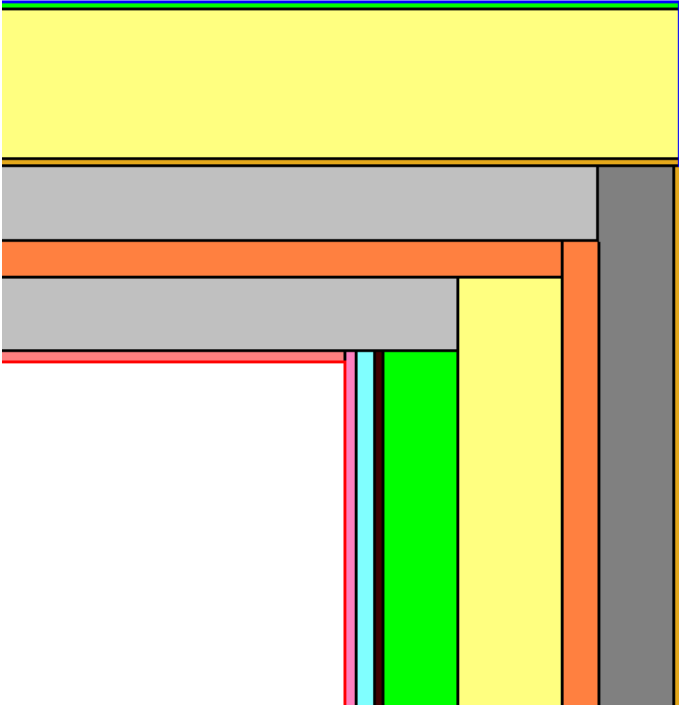




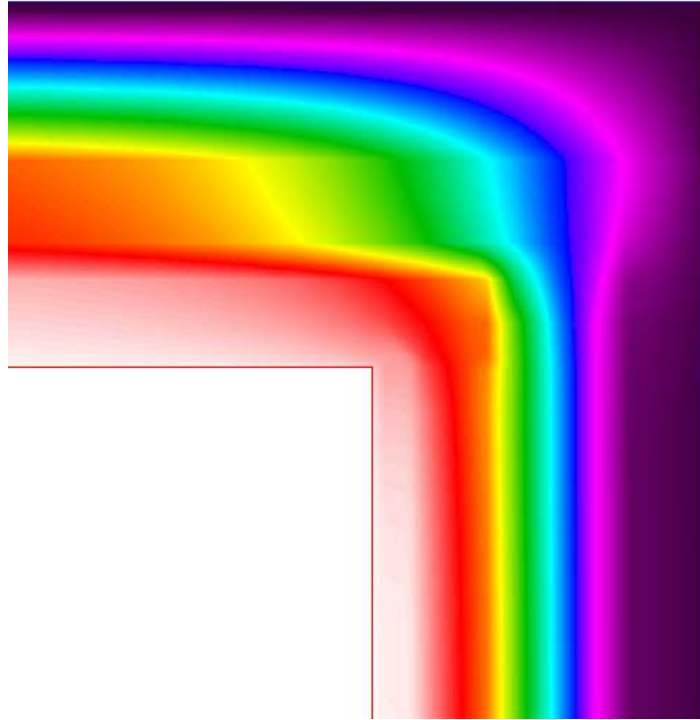




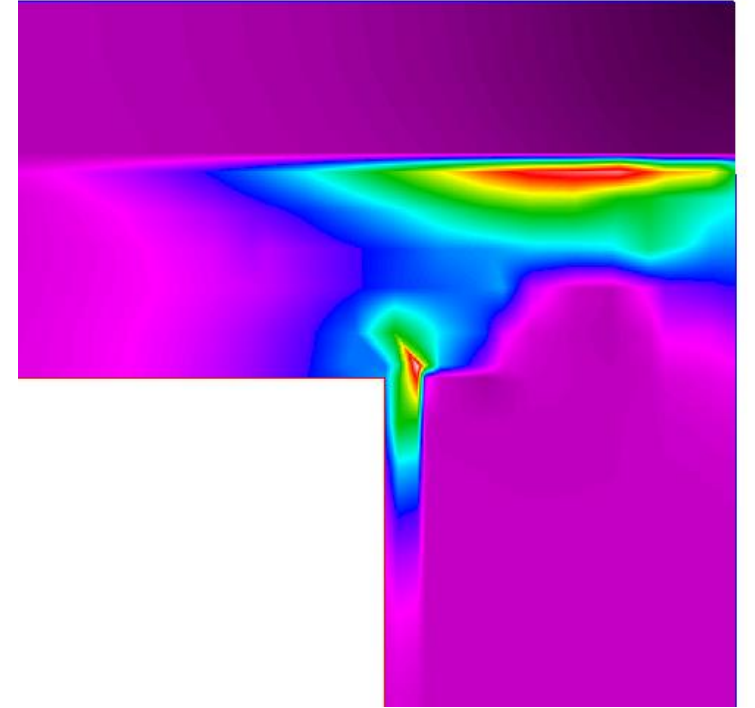
Thermal modelling of transition from EWI to IWI



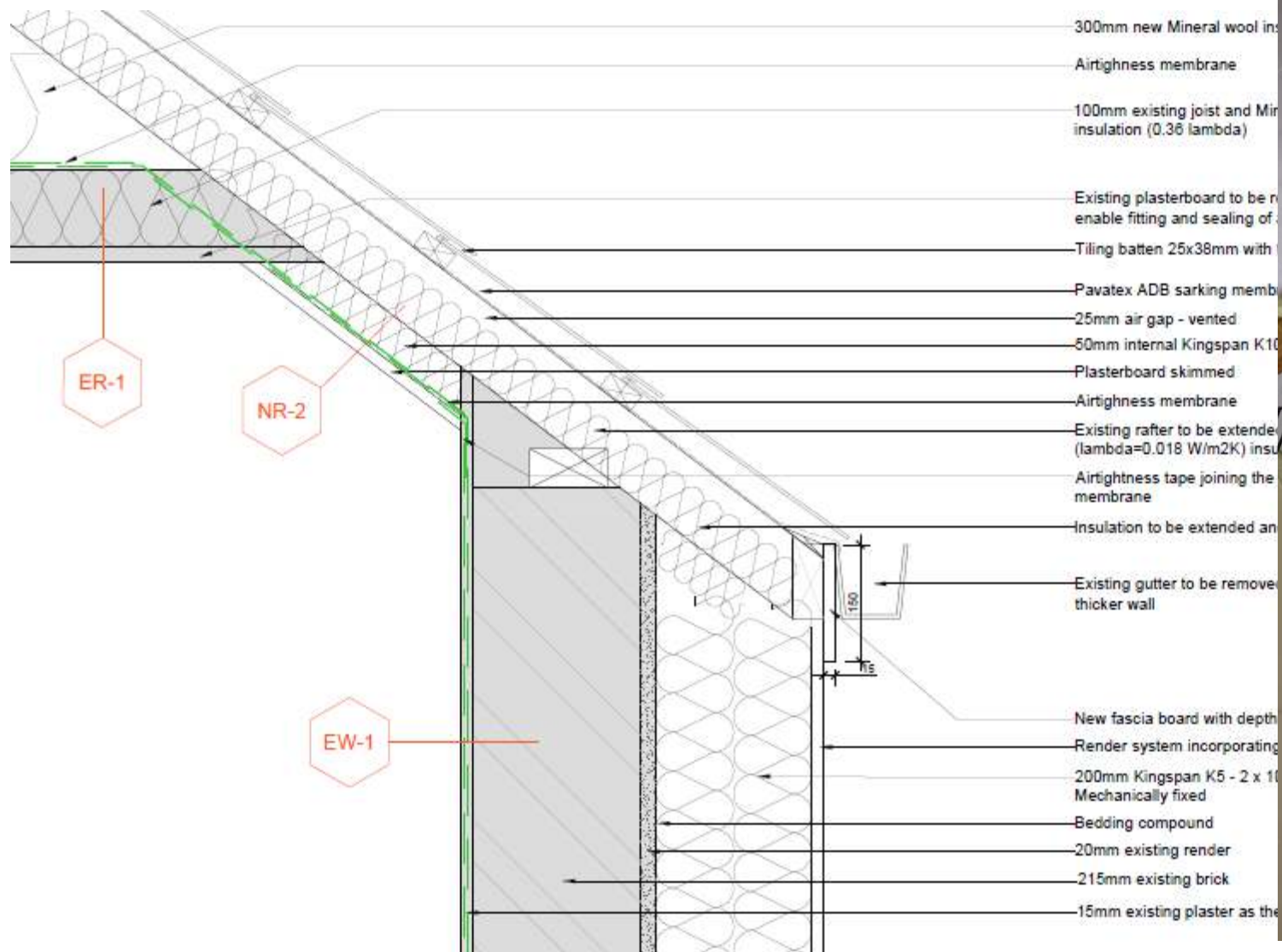
Main
components



Isotherms
(temperature)



Heat flow



300mm new Mineral wool insulation

Airtightness membrane

100mm existing joist and Mineral wool insulation (0.36 lambda)

Existing plasterboard to be removed and enable fitting and sealing of

Tiling batten 25x38mm with

Pavatex ADB sarking membrane

25mm air gap - vented

50mm internal Kingspan K10

Plasterboard skimmed

Airtightness membrane

Existing rafter to be extended (lambda=0.018 W/m2K) insulation

Airtightness tape joining the membrane

Insulation to be extended and

Existing gutter to be removed and replaced with thicker wall

New fascia board with depth

Render system incorporating

200mm Kingspan K5 - 2 x 10

Mechanically fixed

Bedding compound

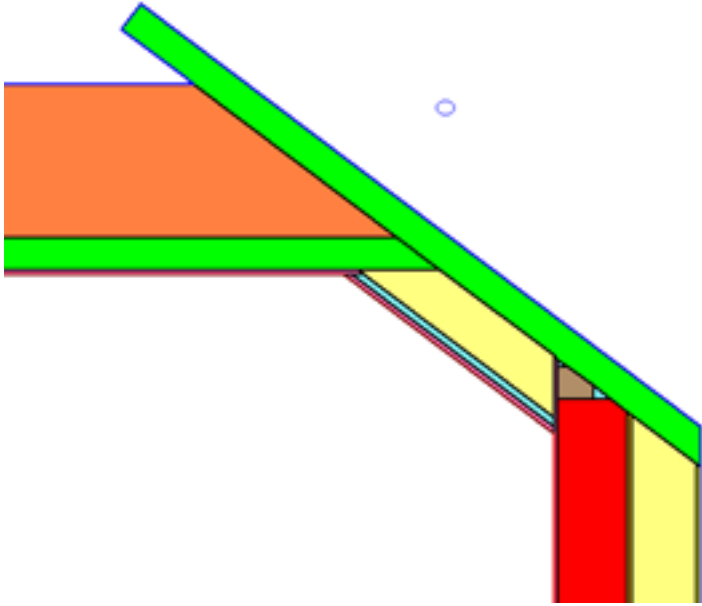
20mm existing render

215mm existing brick

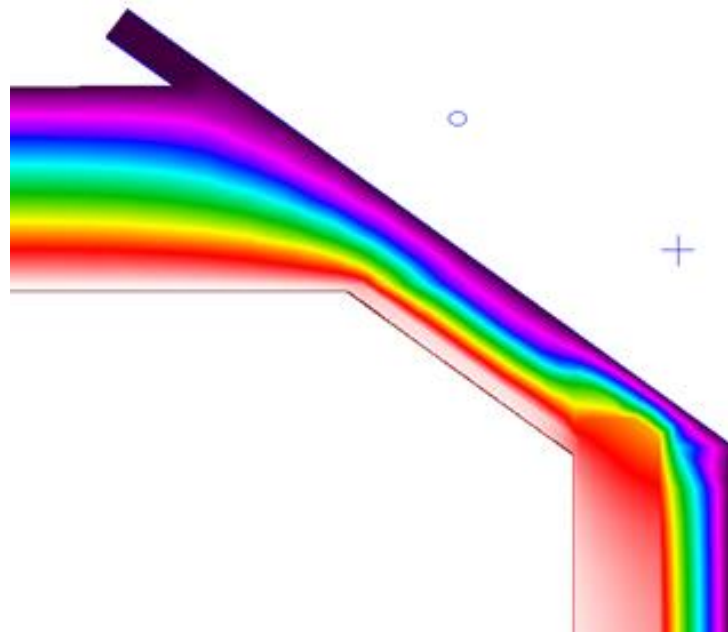
15mm existing plaster as the



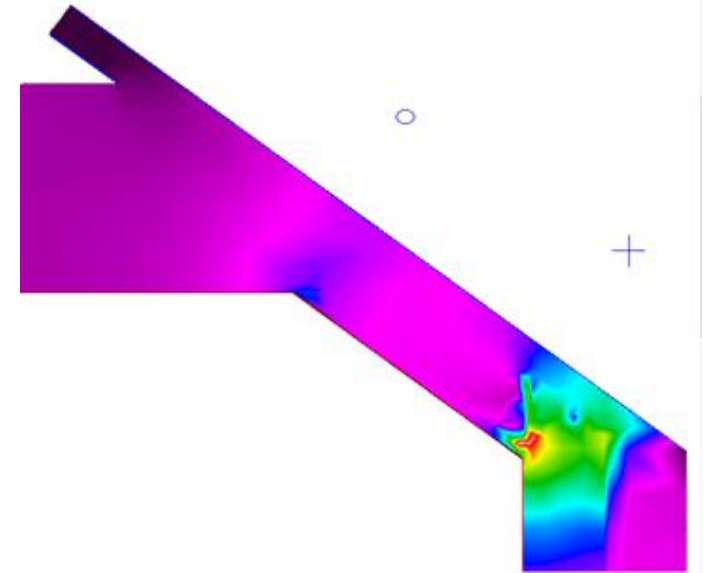
Thermal modelling of skeeling



Main
components



Isotherms
(temperature)



Heat flow





kWh

Electricity balance

Joju PV forecast

PV forecast corrected for # days
sun

PV actual output

Home use

Winter 2000/2021
approx. 225 kWh
to heat to 16-17°C

600

500

400

300

200

100

0

1

2

3

4

5

6

7

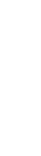
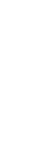
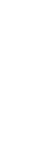
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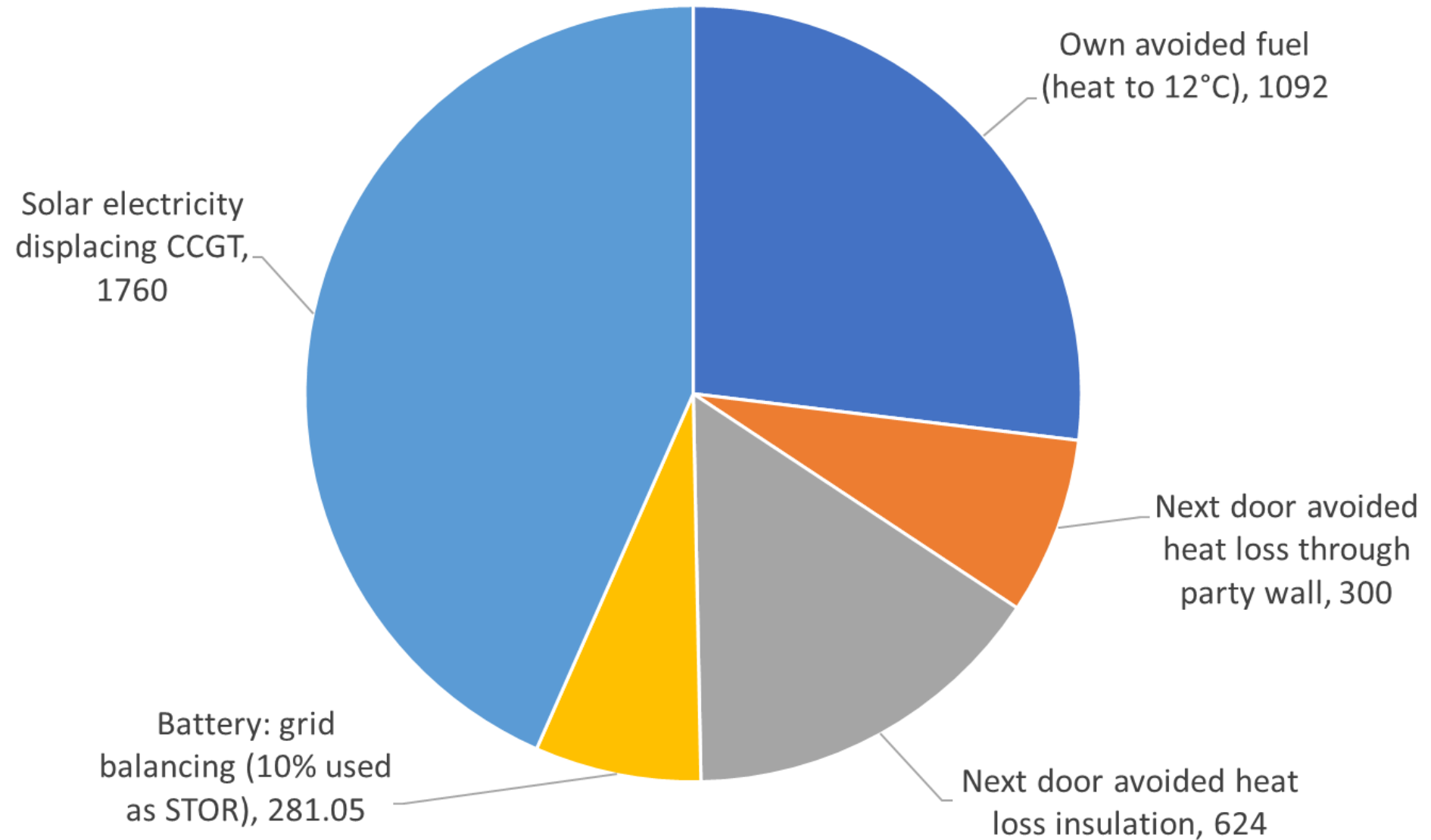
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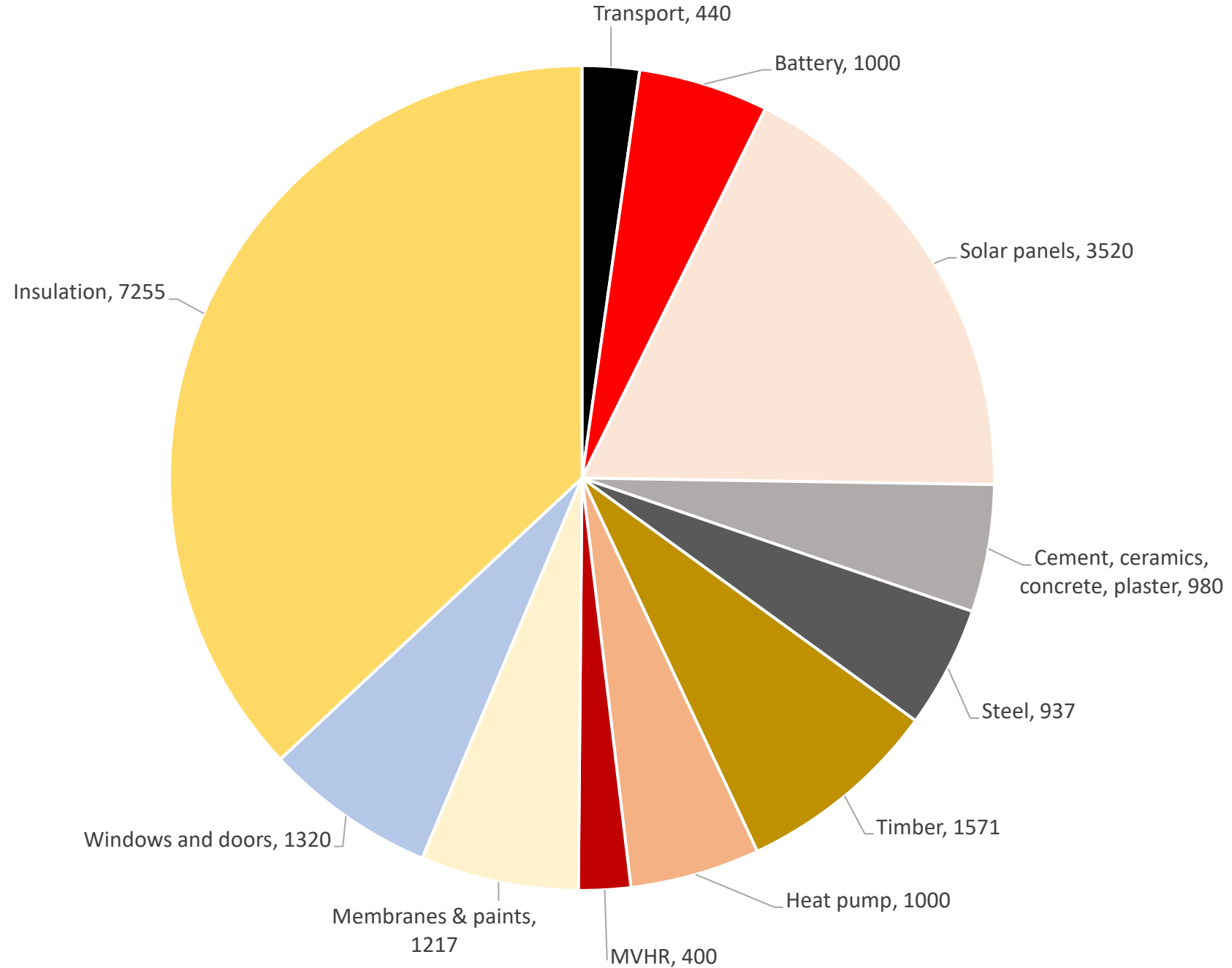
12



Annual avoided emissions, kg CO₂e
total 4057kg/yr CO₂e



Embodied kg CO2e. Total 19,640kg



kg CO2e

25000

20000

15000

10000

5000

0

-5000

-10000

Construction
emissions

2020
emissions
avoided

2021

2022

2023

2024

2025

Stored

