

Admirals Hard Passivhaus Retrofit (EnerPHit)



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- WARM: Low Energy Building Practice



rented ☹ cold/hot ☹ natural vent, badly ☹ glare ☹ dark ☹ noisy ☹ stinky ☹

= Embarrassing. Especially when you're trying to sell 'comfort'

(perfect for future retrofit though....)

- Create a new home for WARM
- Provide experience of being in a Passivhaus first hand
- Provide practical experience for our techy brains (so Dad can lie down)
- Walk our talk – make the experience personal

Started to look for a potential site...

Potential site – none as good as this!



200m = Dad's house

SEA!

300m = my house

Admirals Hard – our new office



Owned by M&D, currently corner shop with ~50m² flat above
EnerPHit ☹️

Water 😊

Design – some on this
Construction – lots on this
Occupy – some on this

Geeky bits:

Which bits to include?

Design based on office or resi?

Getting the most out of the 'experience'

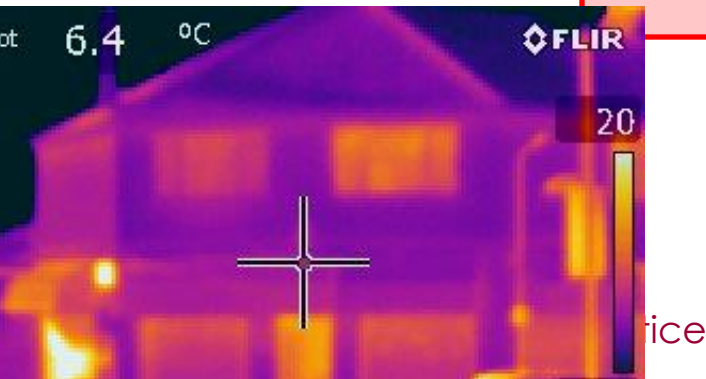
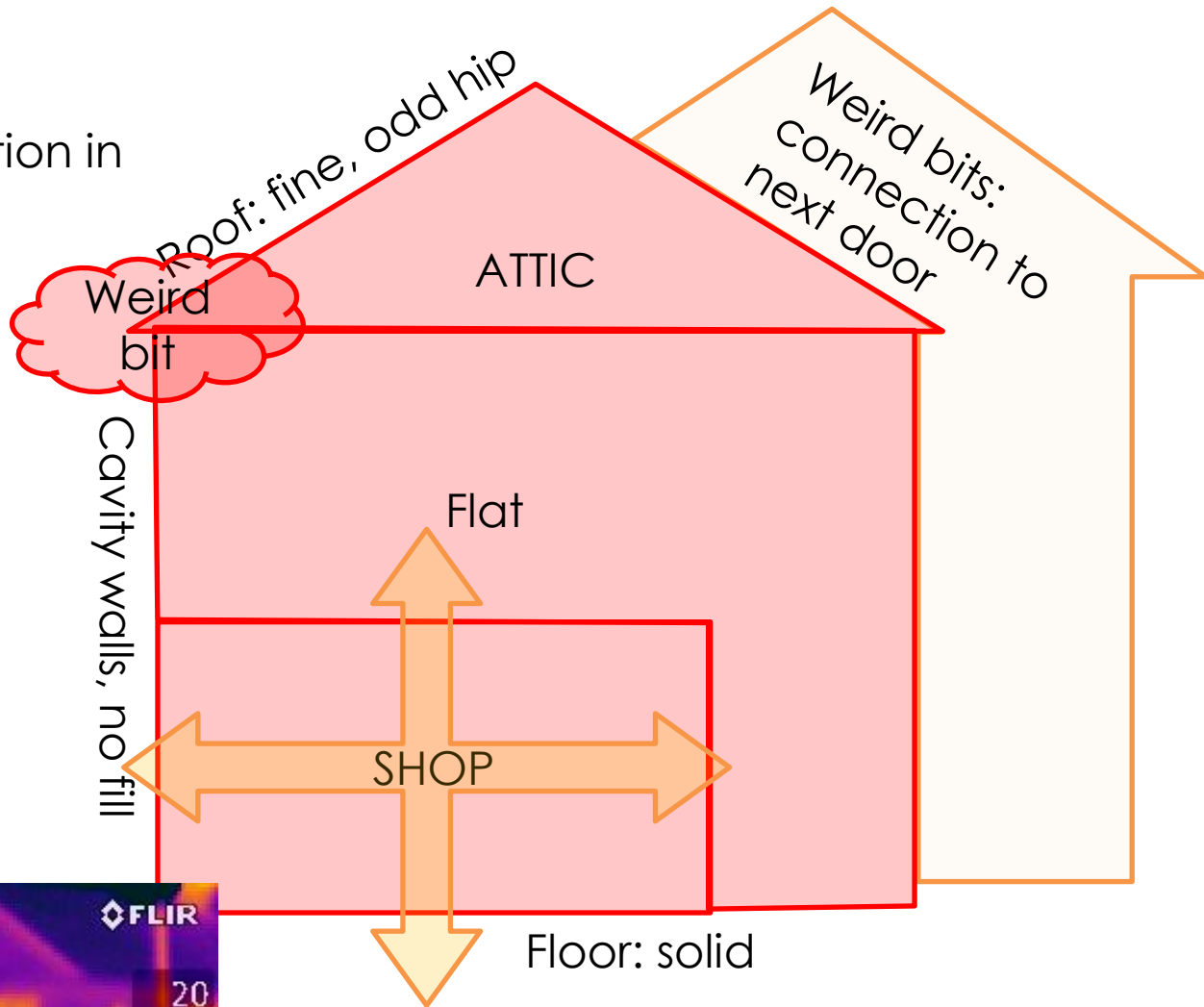
= having a go at designing details (actually we're not that bad)

Using them to optimise junctions, a lot.

Although not necessary for PH can be incredibly cost effective for small buildings

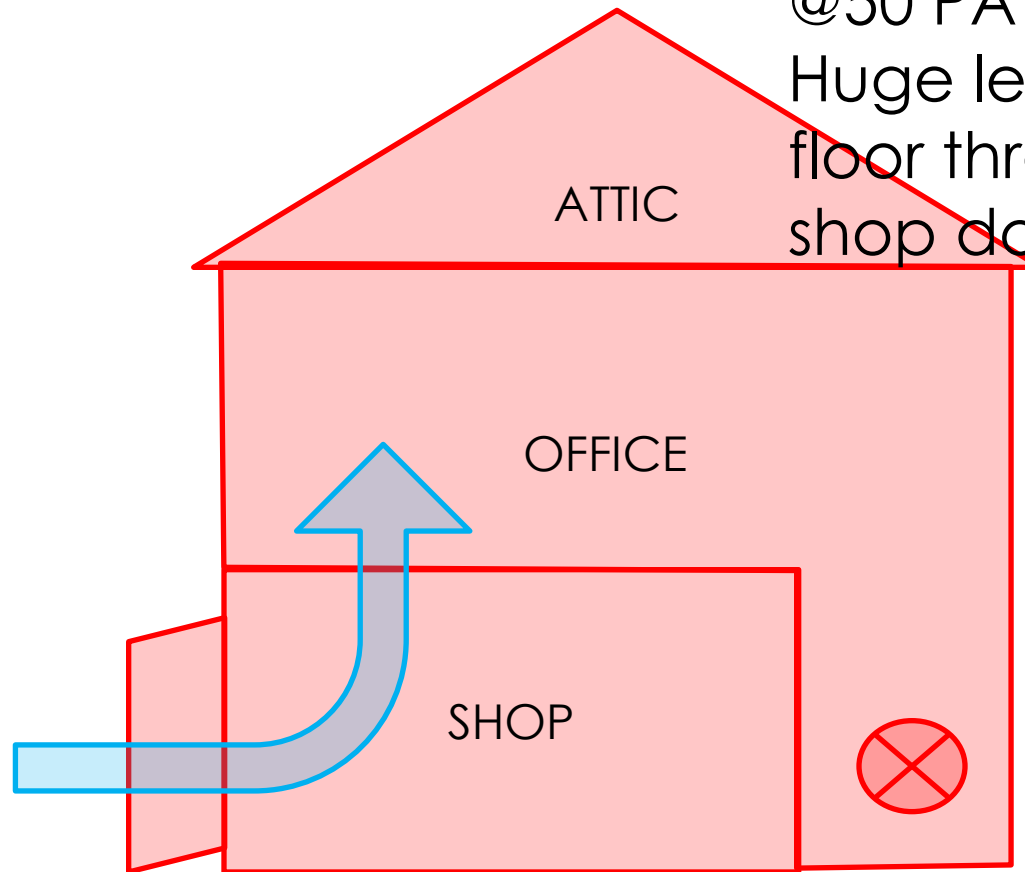
Design: building properties

Some insulation in attic floor



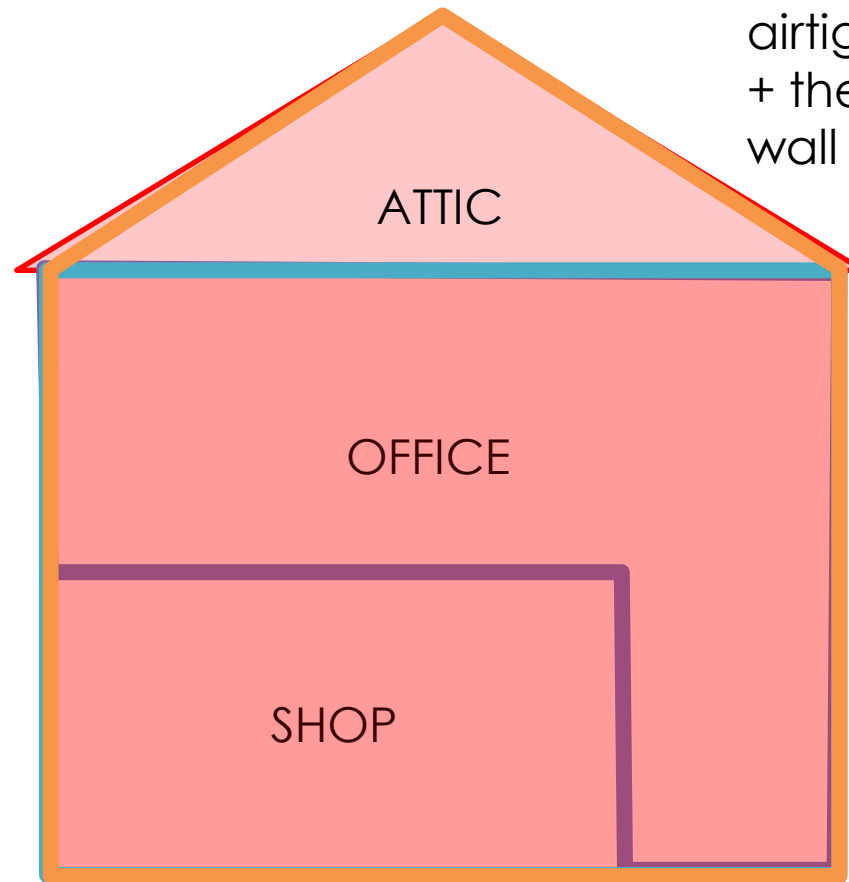
Airtightness Strategy 1

Test 1: off the scale,
estimated 30+ achr
@50 PA
Huge leaks through
floor through to open
shop door



Design: what to include?

Option 2
+ simple shape
+ long term best
solution



Option 3
+ better chance at
airtightness
+ thermal continuity with
wall

Option 1
+ In our control
+ small HLA
- Difficult

Windows

Analysed in PHPP as costly (£, energy). Every window has to justify itself:

- Shop – 4 large windows, mostly painted over => get rid of 2
- Office entrance – lots of glazing, get rid of half
- Office upstairs – reduce number of panes



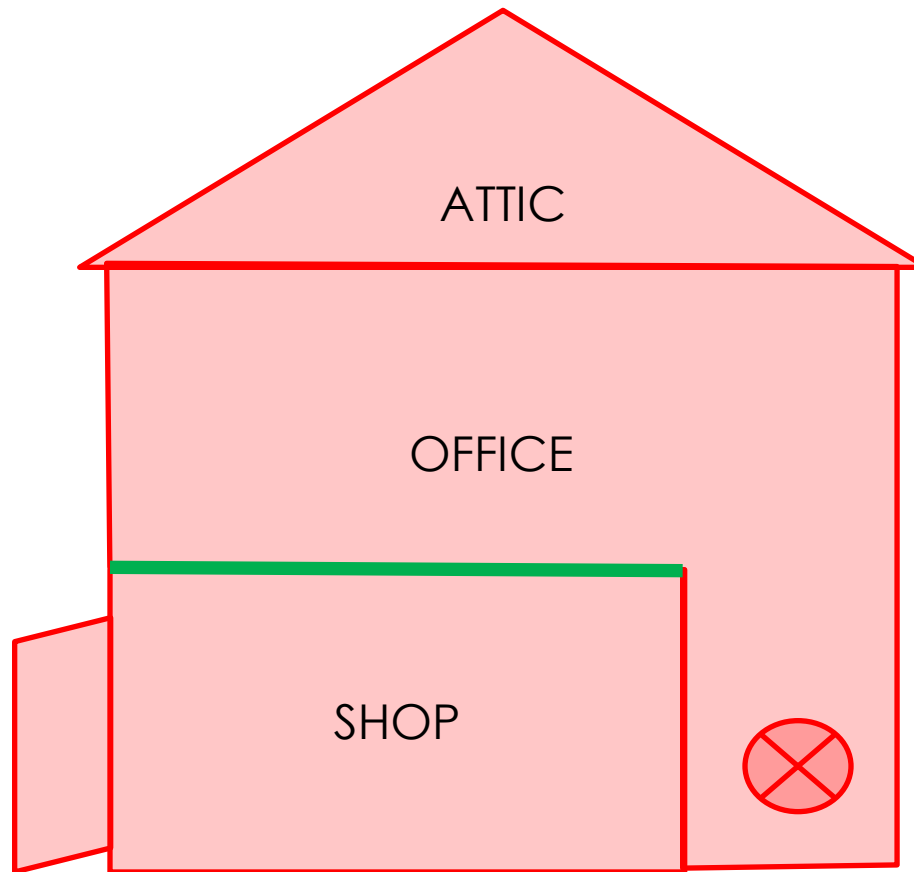
	Air barrier	Insulation
Wall	Existing render	External insulation where poss
Roof	OSB & tape on existing trusses	I-beams with insulation rolls between
Floor	Existing slab	Min. internal insulation

Plus lots of THERM modelling to optimise junctions

In the short term important to separate the shop & office thermally; first job insulate the office floor & make relatively airtight.

Strategy:

- Budget: would like to spend £50k, could spend up to £90k
- Use skilled workforce:
 - 2 carpenters full time, committed.
 - Dad on site 2/3 of time, on the phone all the time.
- Airtightness risk: make decisions on how far to go as the construction progresses. To do this need very regular pressure tests.



Test 2: 6.4 achr @50 PA
Biggest leaks through roof

Roof construction

Existing roof wobbly.

Time spent on OSB installation =

Time spent on Ibeam installation =

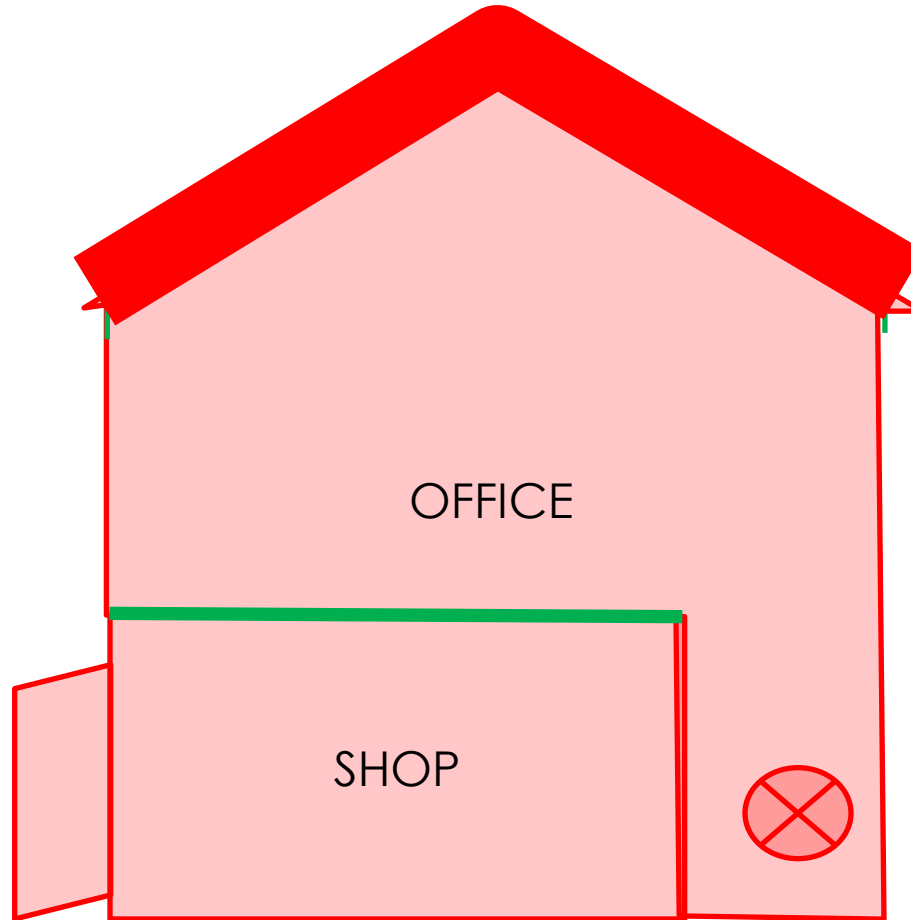
Time spent on insulation =

Some pics of wobbly roof etc.

Roof stripped, airtight layer on OSB deck, I beams going on



Airtightness Strategy 3



Test 3: 5.3 achr @50 PA
Leaks through cavity

Therm of detail:

Window reveals are deep, head and jamb slightly splayed to max daylight.

Boxes built around the frame, then inserted into hole.

Windows installation



Windows air sealed to wall externally

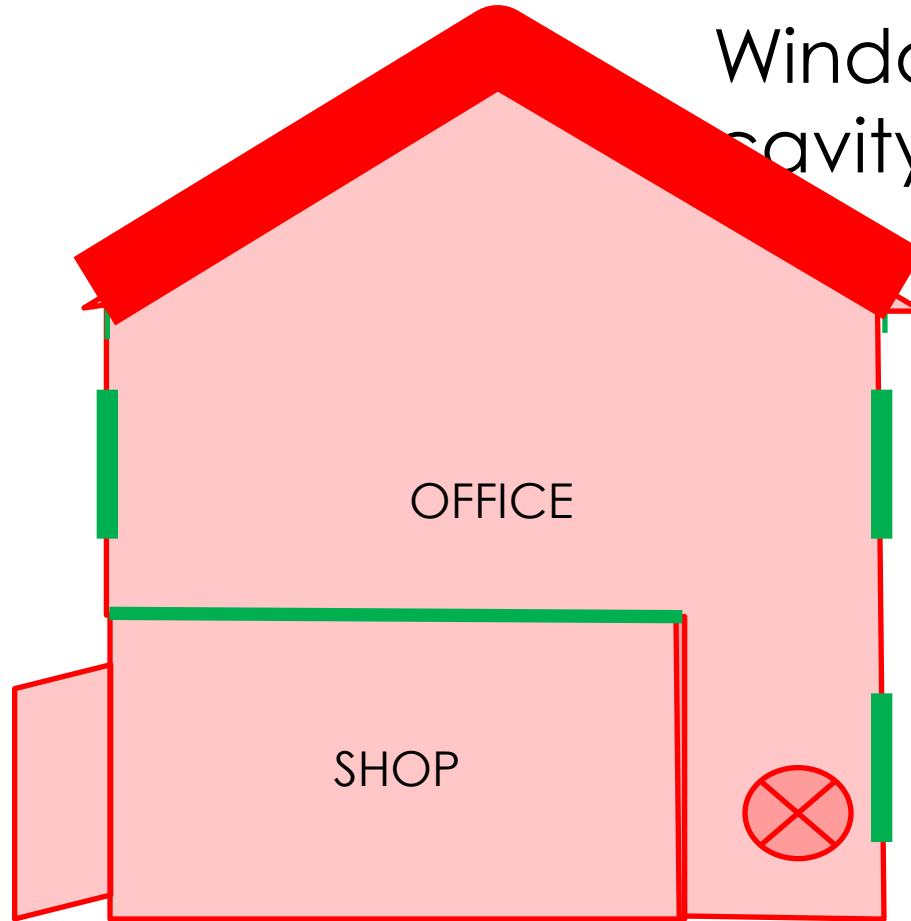


Finally decide to use foam to block up air paths through cavity (2k extra).

Long term robustness questionable...

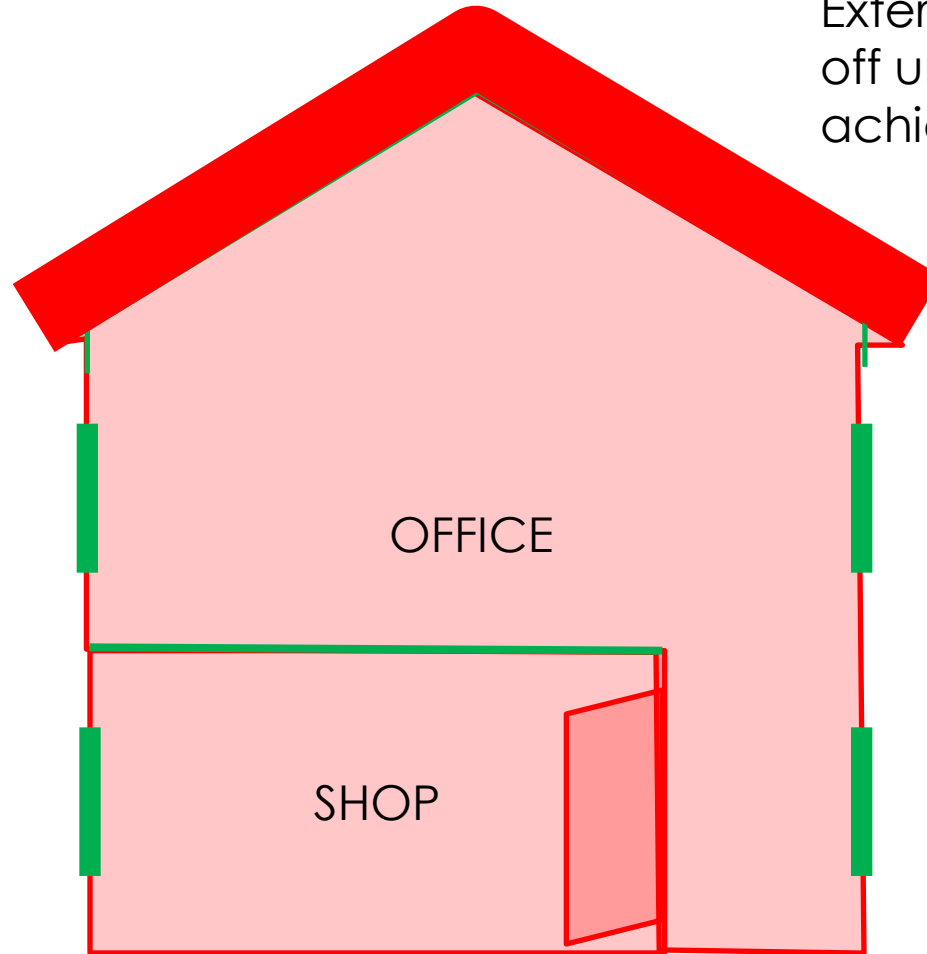
Airtightness strategy slightly warped

Test 4: 1.4 achr
@50 PA
Windows and
cavity fill



Airtightness Strategy 5

External insulation held off until airtightness achieved.



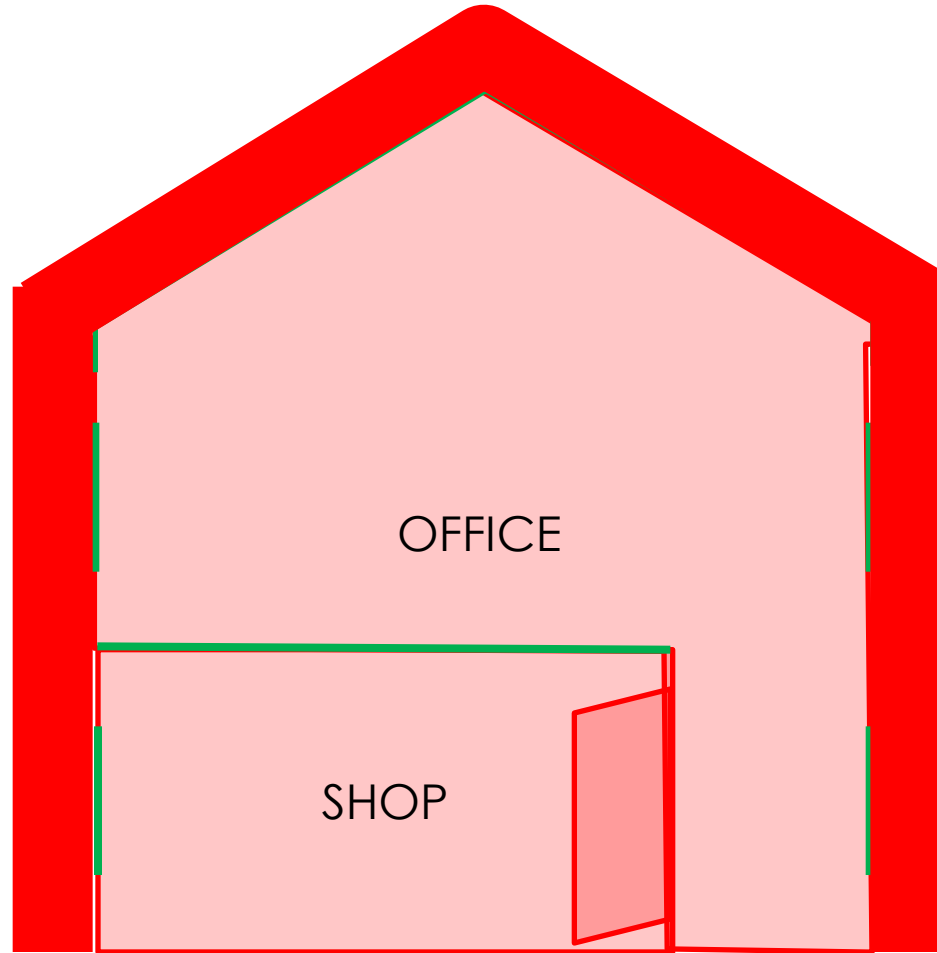
Much resealing, test with shop
0.7 achr @50 Pa Phew!

External insulation



Lots of insulation, all the wrong stuff, ugh.

Generally easy to use, major issue was preventing gaps between the boards and the wall structure



Now Airtightness achieved,
can do external Insulation

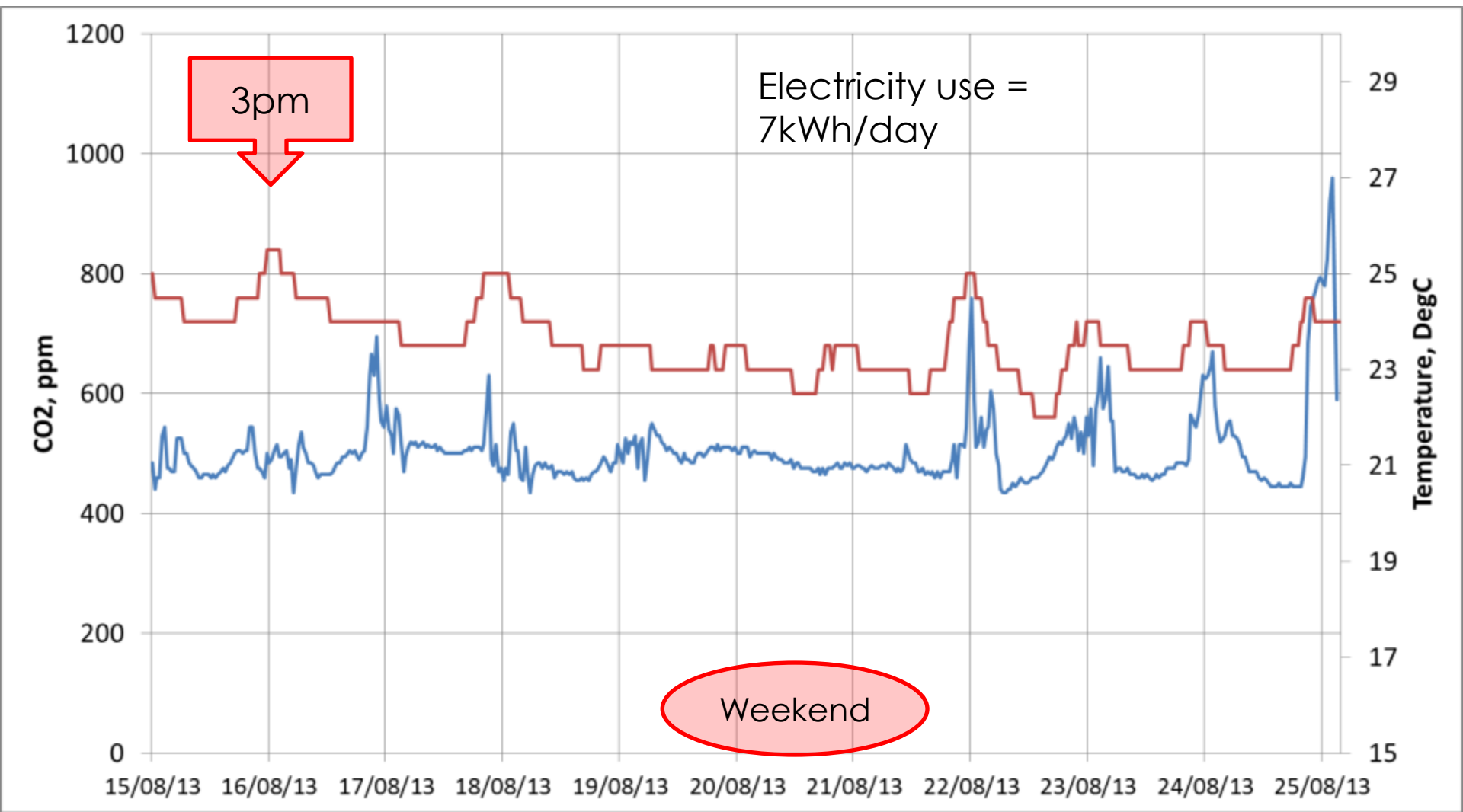
Managing ourselves expensive (lots of lessons learnt, not anywhere to put them)

Cost:

Key lessons learnt on site:

- ROOF!
 - Might have been worth doing a cold roof, though rafters make too tricky on this one
 - Definitely worth getting a flat surface beforehand
 - Definitely worth using blown insulation with I-beams

Occupied



Need energy consumption, could do with updating to latest results....

Natural vent annoying – particularly with informed occupants.

Glare from south window a problem

Daylight generally very good, windows, splayed reveals & blinds out of way all good.