Costs

- everyone says Passivhaus - “costs 5 – 10% more?”
- but how much does construction REALLY cost?
- the “Jono” rule of cost estimating……
  - “if you think it costs more, it will”
  - “price is a matter of priority”

Costs

- extra costs through: more insulation, higher performance windows and doors, achieving better airtightness, and installing MVHR

- reduced costs through: smaller heating system, eliminating underfloor heating, simpler controls, and reduced requirement for renewables

- nil costs through: construction of good design, thermal bridging, simple construction etc

Architype's Passivhaus schools

- Passivhaus was achieved within the standard schools budget available to the project

UK’s first Passivhaus archive and records centre

- Passivhaus came in 5% cheaper than conventional construction with a standard services solution

Costs

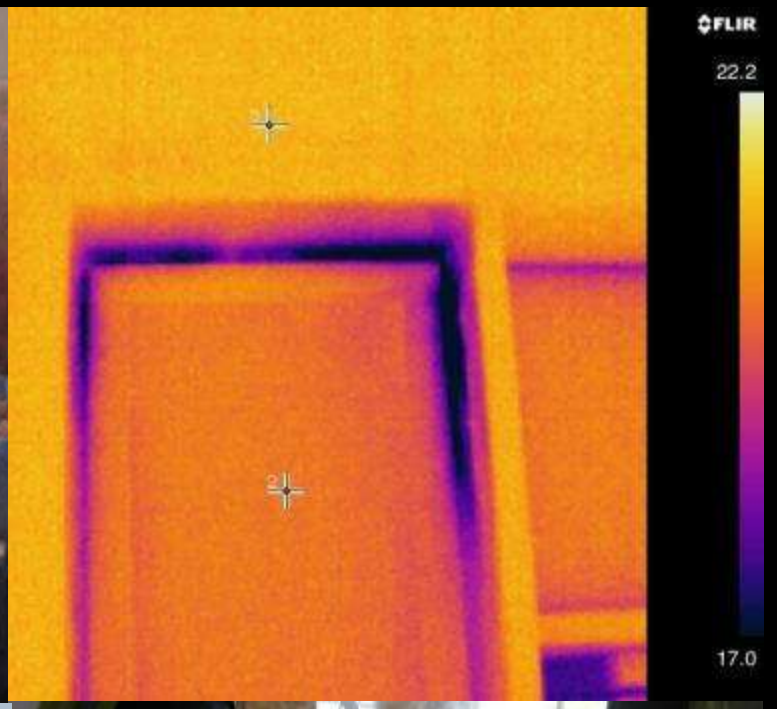
- think….price is a matter of priority

……and employ the right expertise

Procurement & construction

- conventional tendering
- contractor led design and build from outset
- client led design, then contractor design and build
- partnered contract, of various sorts

Collaboration across the entire team



Design team, client, contractor, and supply chain

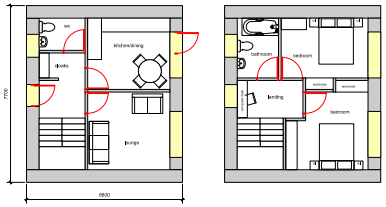
Collaboration at every level

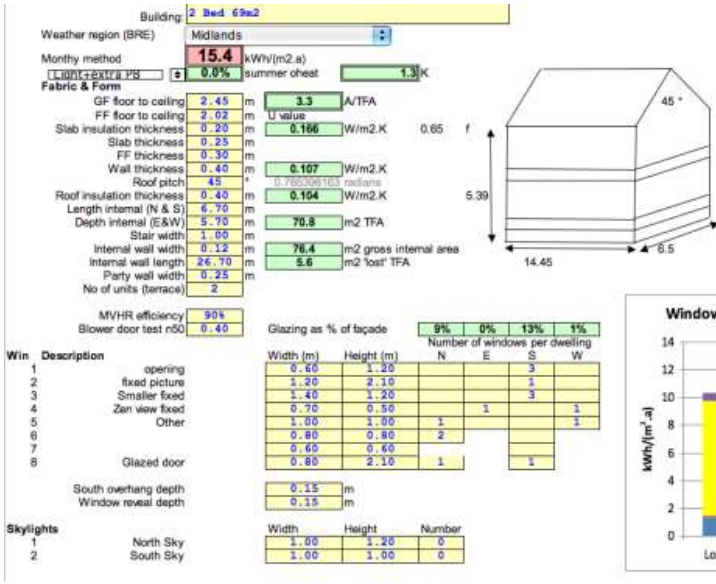
Rethink design from first principles

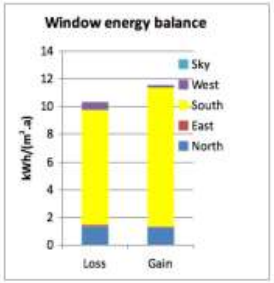
ArchiHaus House Types -
Early Stage PHPP Analysis

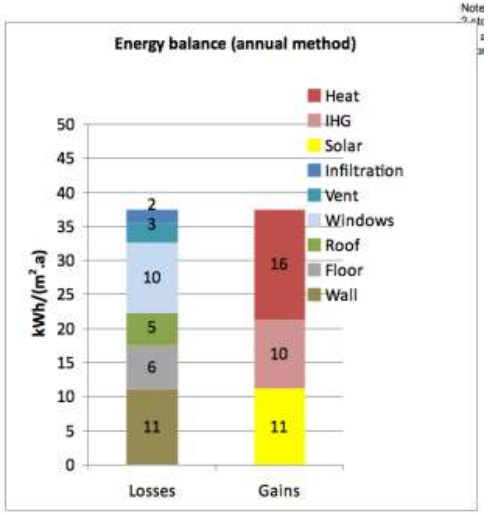
2 bed house type - 69m²

- smallest 2 bed house type chosen as it will be the hardest to meet PassivHaus standards.
- house type must be used at least as a semi-detatched house but would be much better as a terraced option



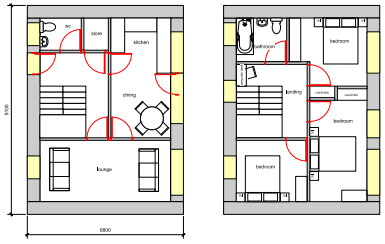


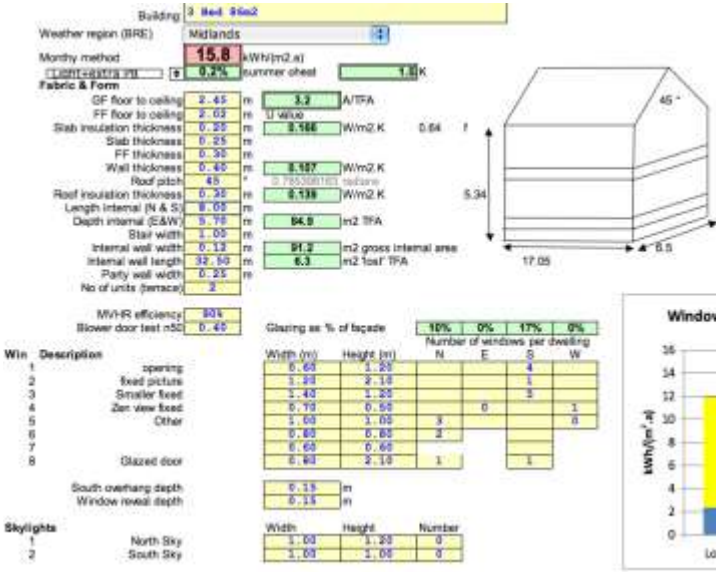


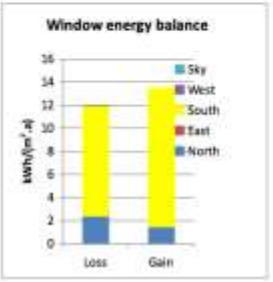


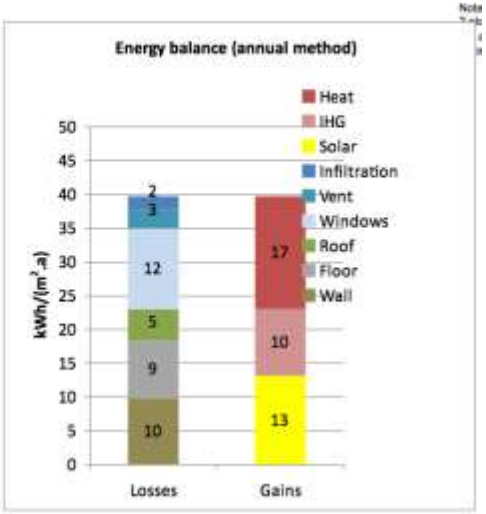
3 bed house type - 86m²

- smallest 3 bed house type chosen as it will be the hardest to meet PassivHaus standards.
- house type must be used at least as a semi-detatched house.





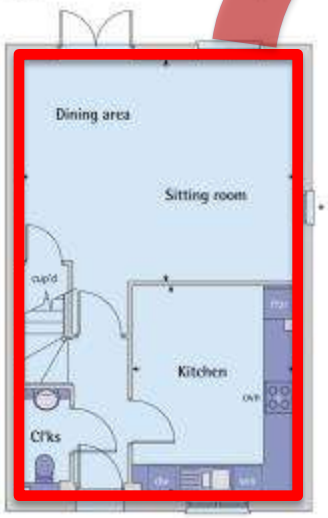




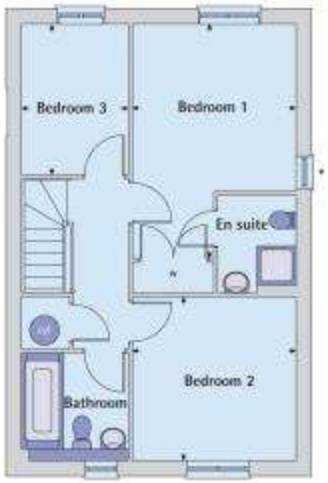
Rethink design from first principles

N

typical developer 3 bed house type

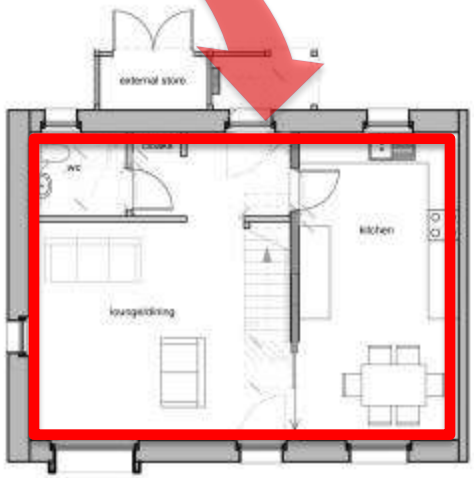


ground floor plan



first floor plan

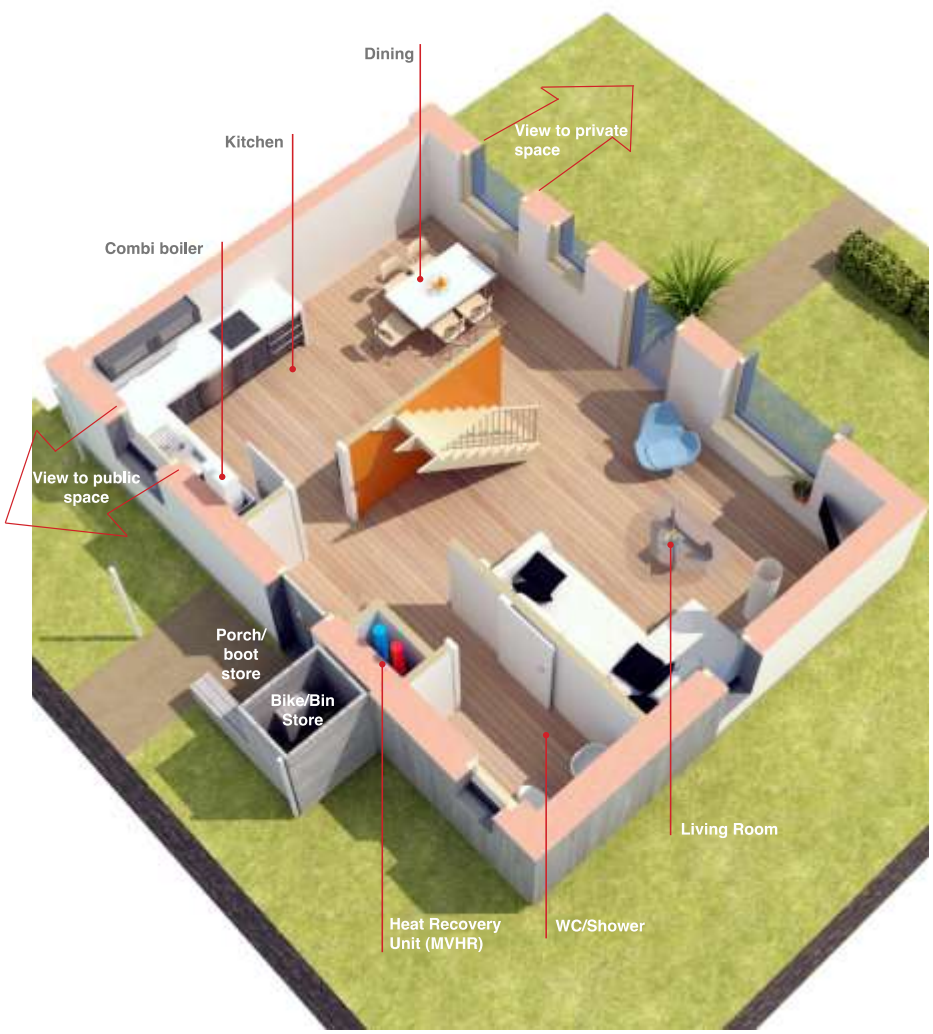
Archihaus 3 bed house type

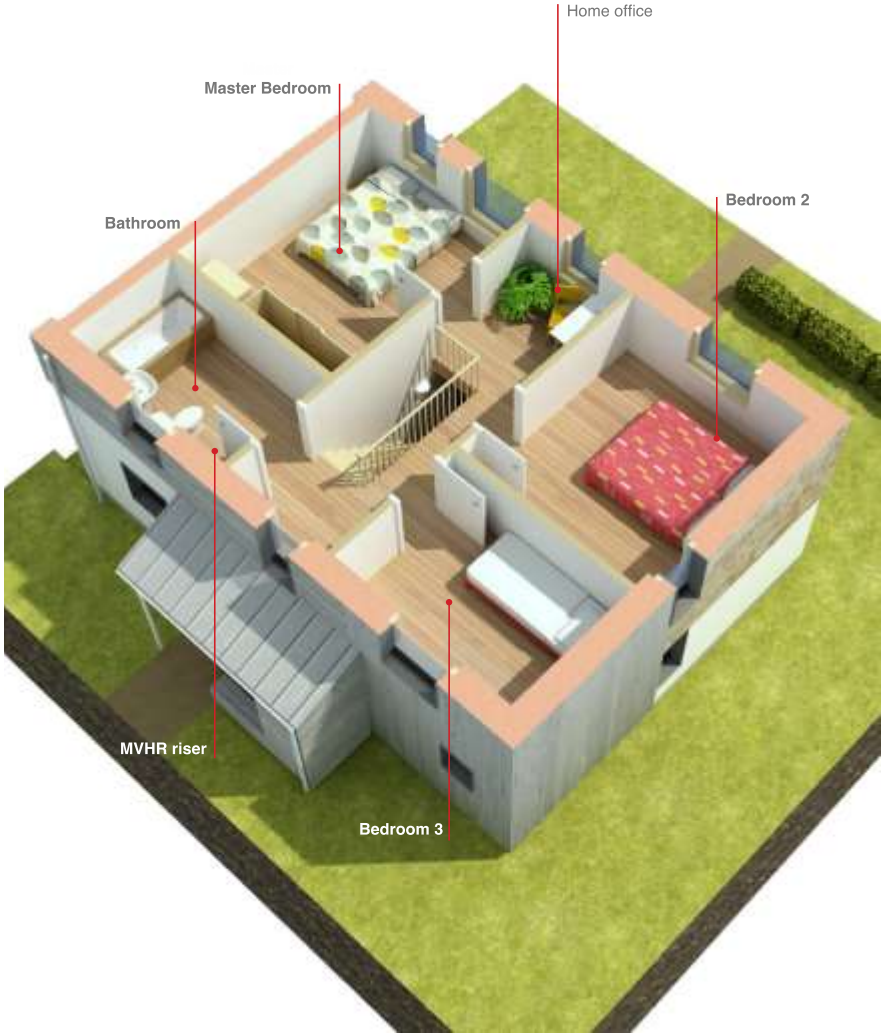


ground floor plan

first floor plan

Rethink design from first principles

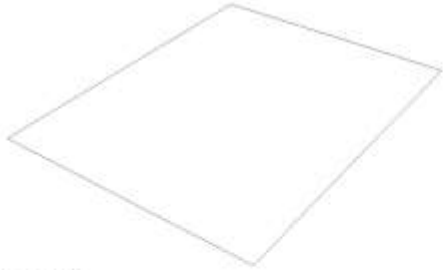




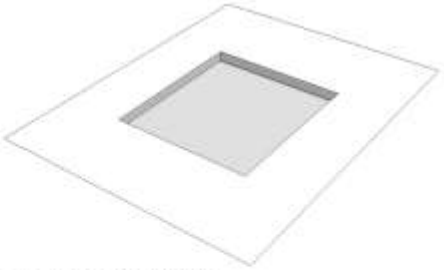
Rethin design from first principles

Rethink design from first principles

Rethink construction from first principles

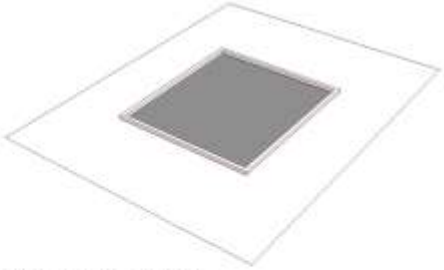


01 site

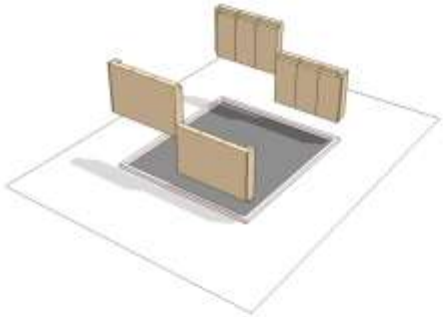


02 site excavation

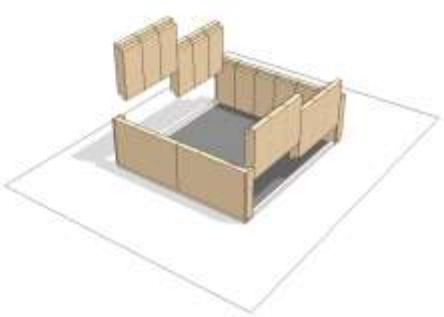
03 below slab insulation formwork



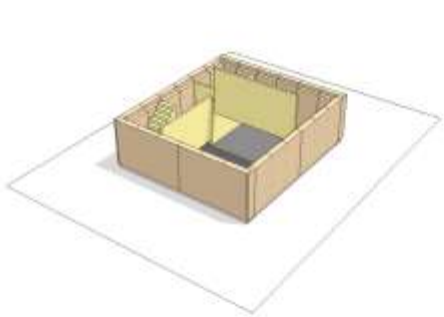
04 raft foundation



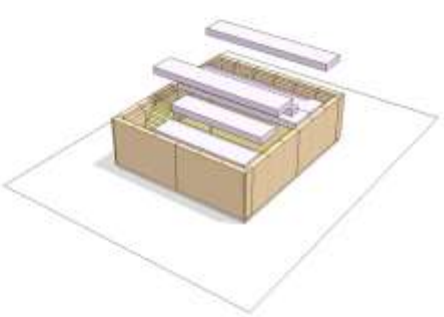
05 ground floor gable walls



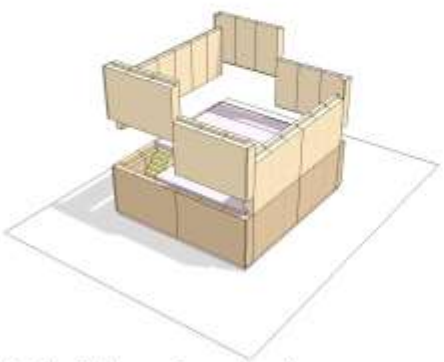
06 ground floor external walls



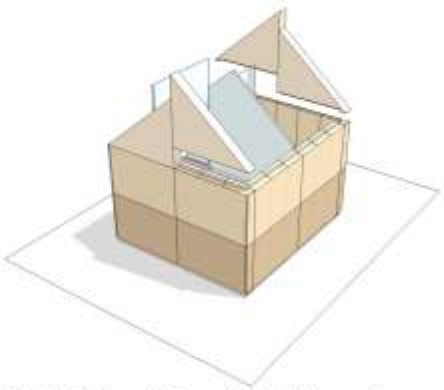
07 ground floor internal elements



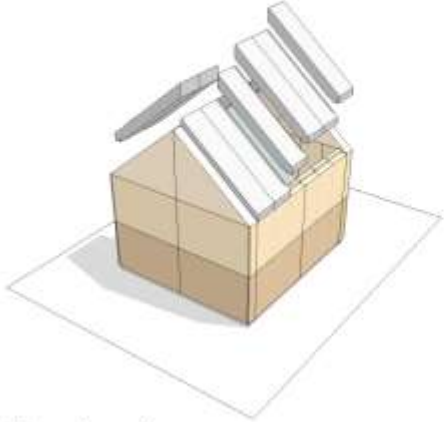
08 first floor construction



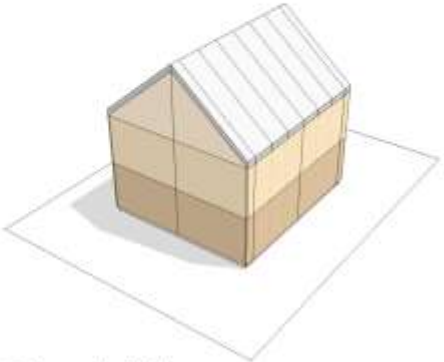
09 first floor external walls



10 first floor internal & gable walls



11 roof panels



12 completed house

Procurement & construction

- think….any procurement ***can*** work

……but ensure collaboration across the team

……and employ the right expertise

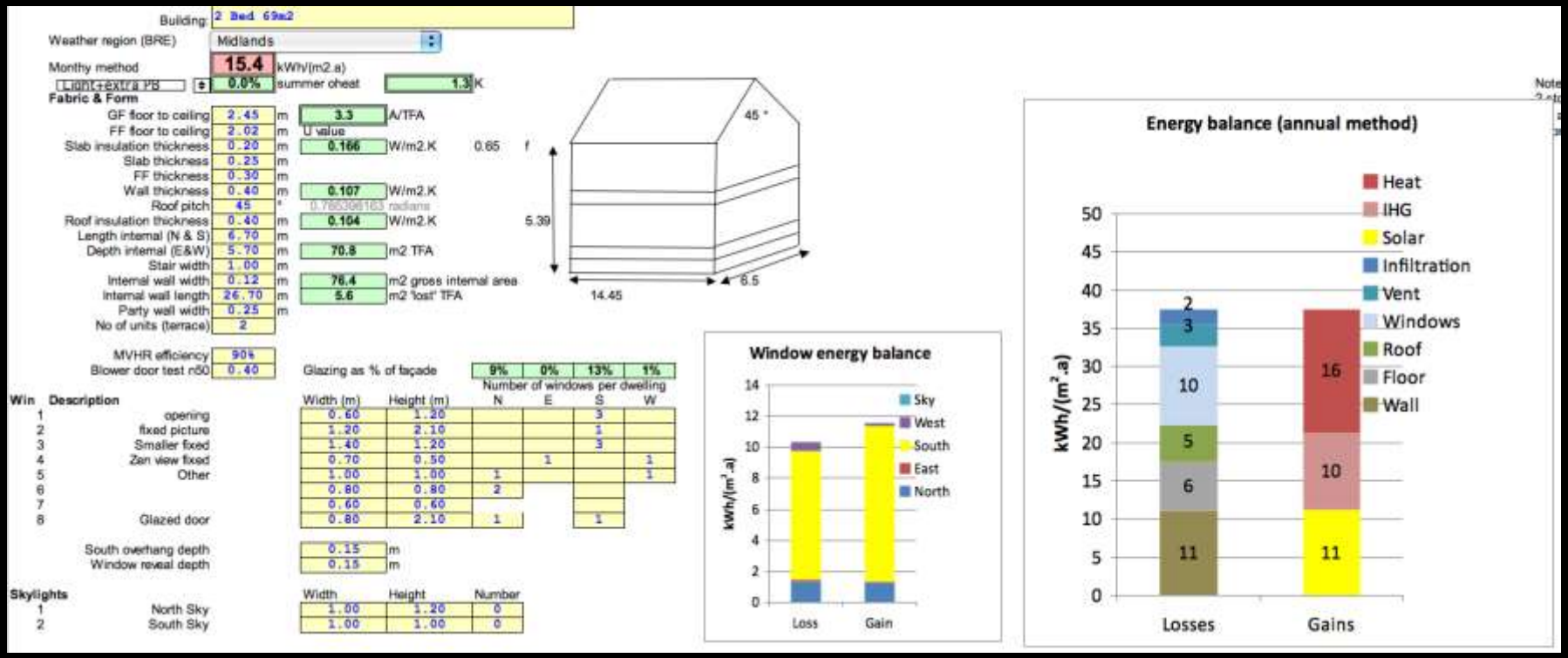
Certification

- designing to Passivhaus “principles”

- it either ***IS*** or it ***ISN’T*** Passivhaus!

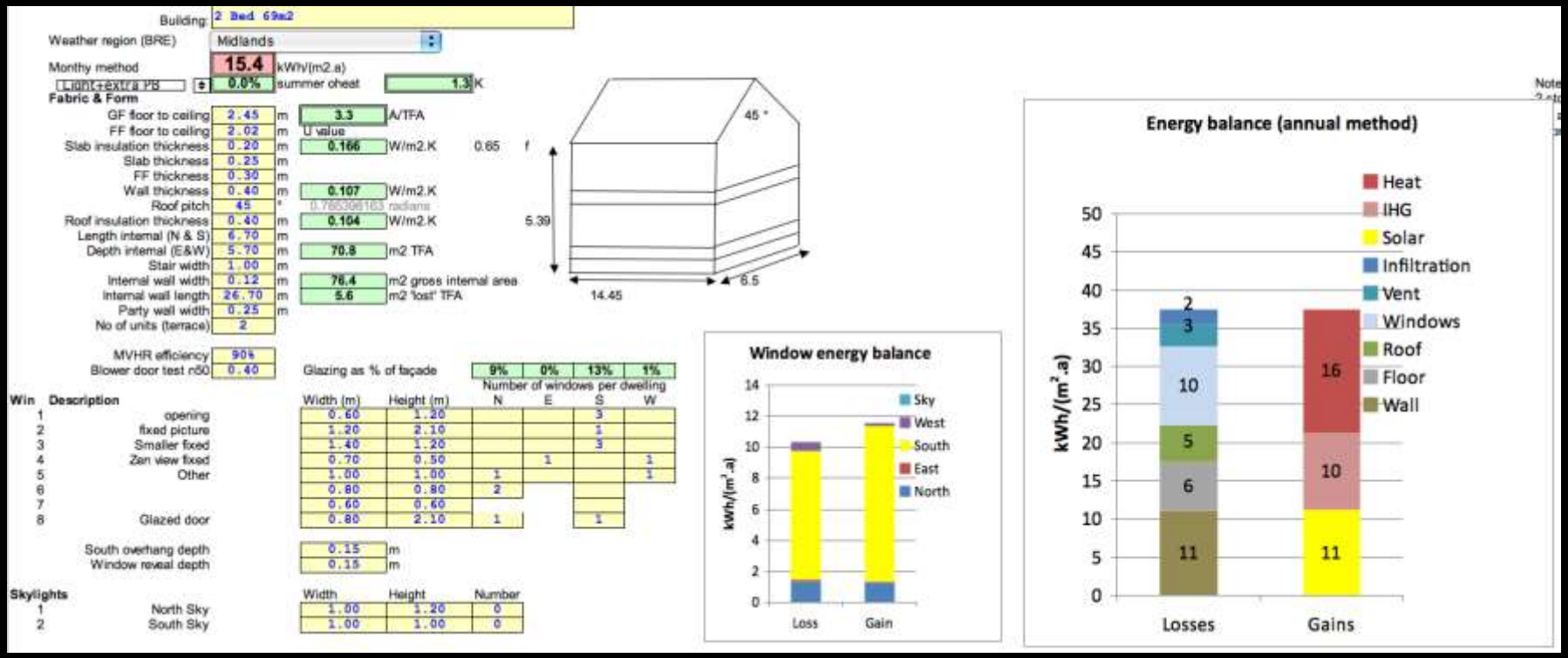
Certification

- Use PHPP as a design tool



Certification

- involve the certifier EARLY on !



Certification

- think….quality assurance of PHPP and certification

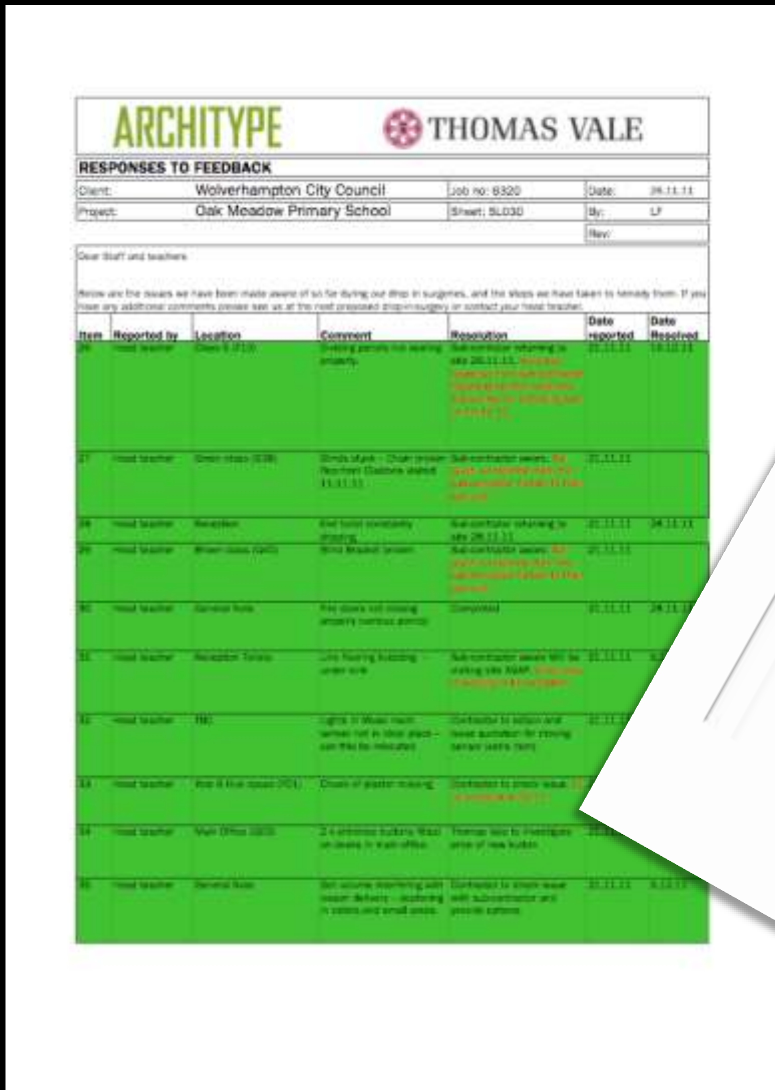
……engage the certifier early

……and employ the right expertise

Occupation

- fundamental fault with the UK building industry

Soft Landings



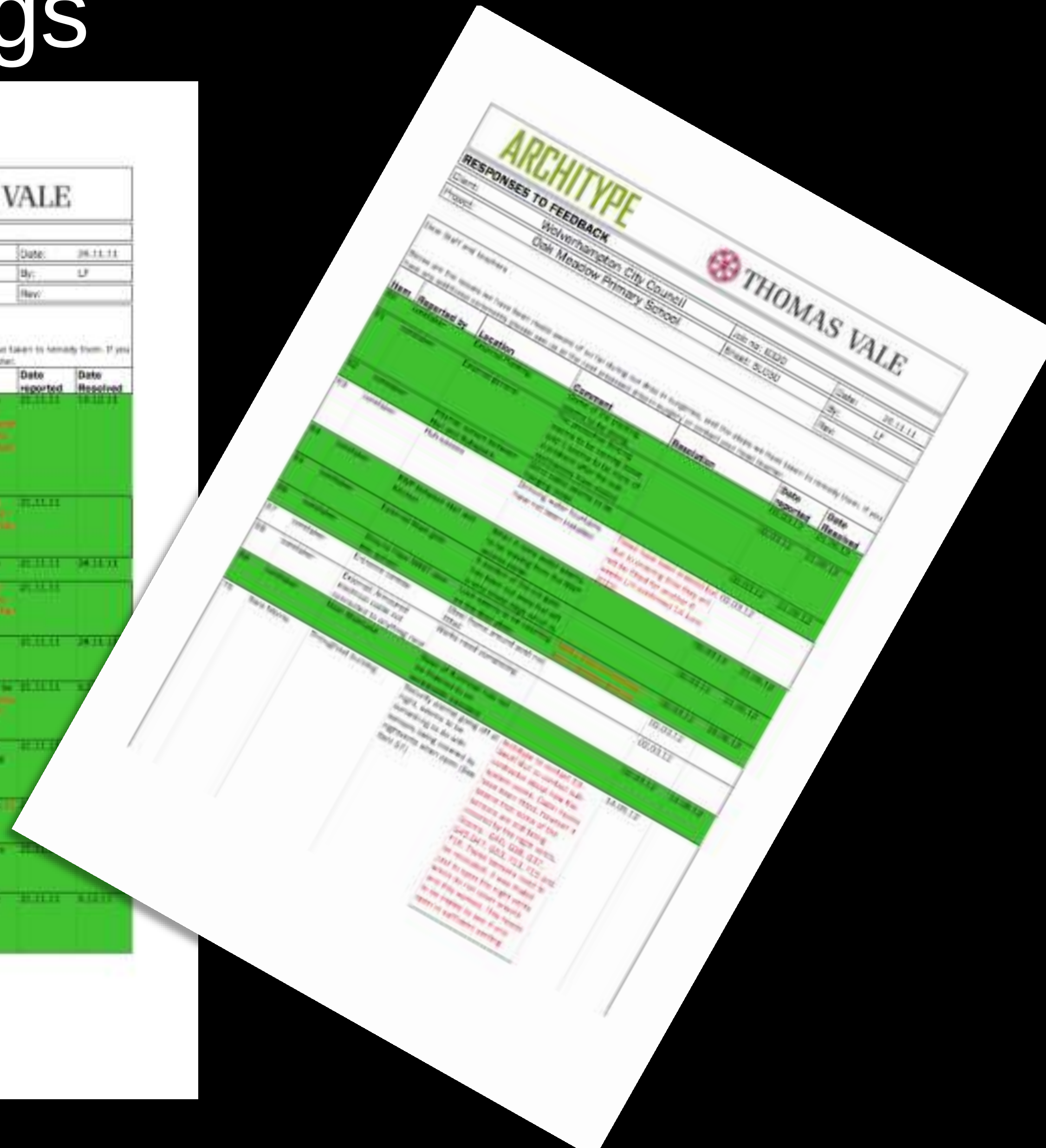
ARCHITYPE THOMAS VALE

RESPONSES TO FEEDBACK

Client: Wolverhampton City Council	Job no: 8320	Date:	
Project: Oak Meadow Primary School	Sheet: SL030	By:	LF
		Rev:	

Dear Staff and teachers

Item	Reported by	Location	Comment	Resolution	Date reported	Date Resolved



ARCHITYPE THOMAS VALE

RESPONSES TO FEEDBACK

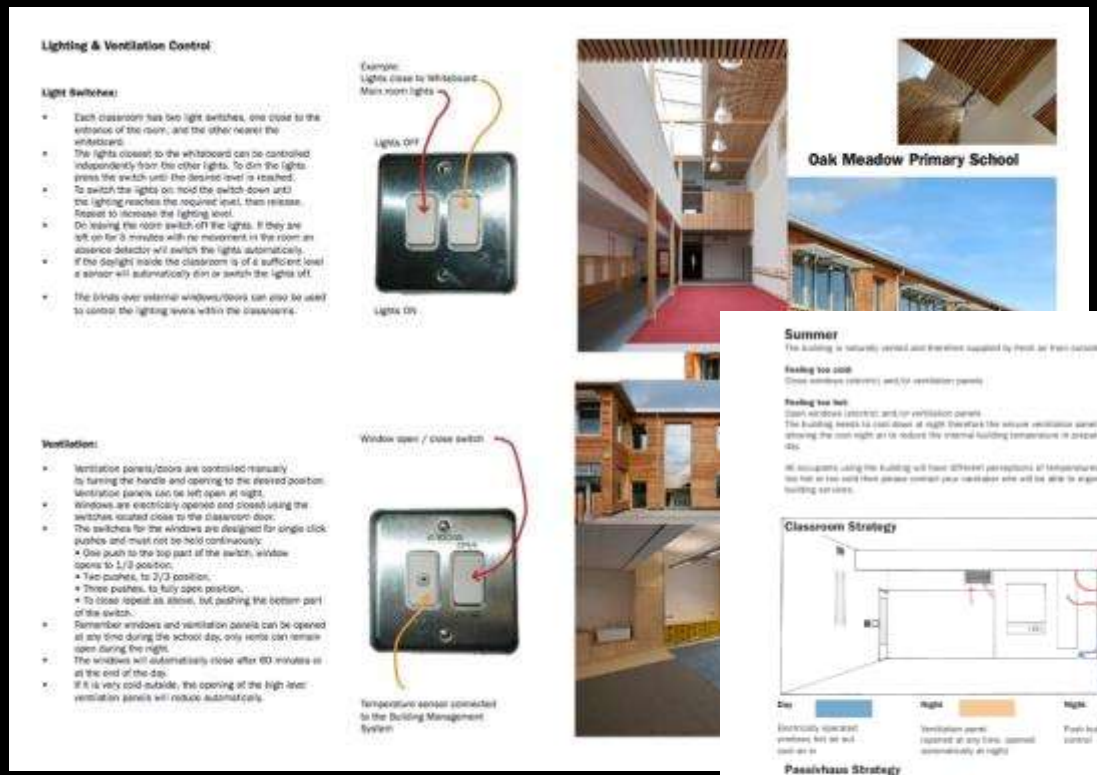
Wolverhampton City Council

Oak Meadow Primary School

Item	Reported by	Location	Comment	Resolution	Date reported	Date Resolved

Engaging with users and facilities managers on operational issues

Soft Landings



Lighting & Ventilation Control

Light Switches:

- Each classroom has two light switches, one close to the entrance of the room, and the other nearer the whiteboard.
- The lights closest to the whiteboard can be controlled independently from the other lights. To dim the lights press the switch until the desired level is reached.
- To switch the lights on: hold the switch down until the lighting reaches the required level, then release. Repeat to increase the lighting level.
- On leaving the room switch off the lights. If they are left on for 5 minutes with no movement in the room an absence detector will switch the lights automatically.
- If the daylight inside the classroom is of a sufficient level a sensor will automatically dim or switch the lights off.
- The blinds over external windows/doors can also be used to control the lighting levels within the classrooms.

Example:
Lights close to Whiteboard
Main room lights

Lights OFF

Lights ON

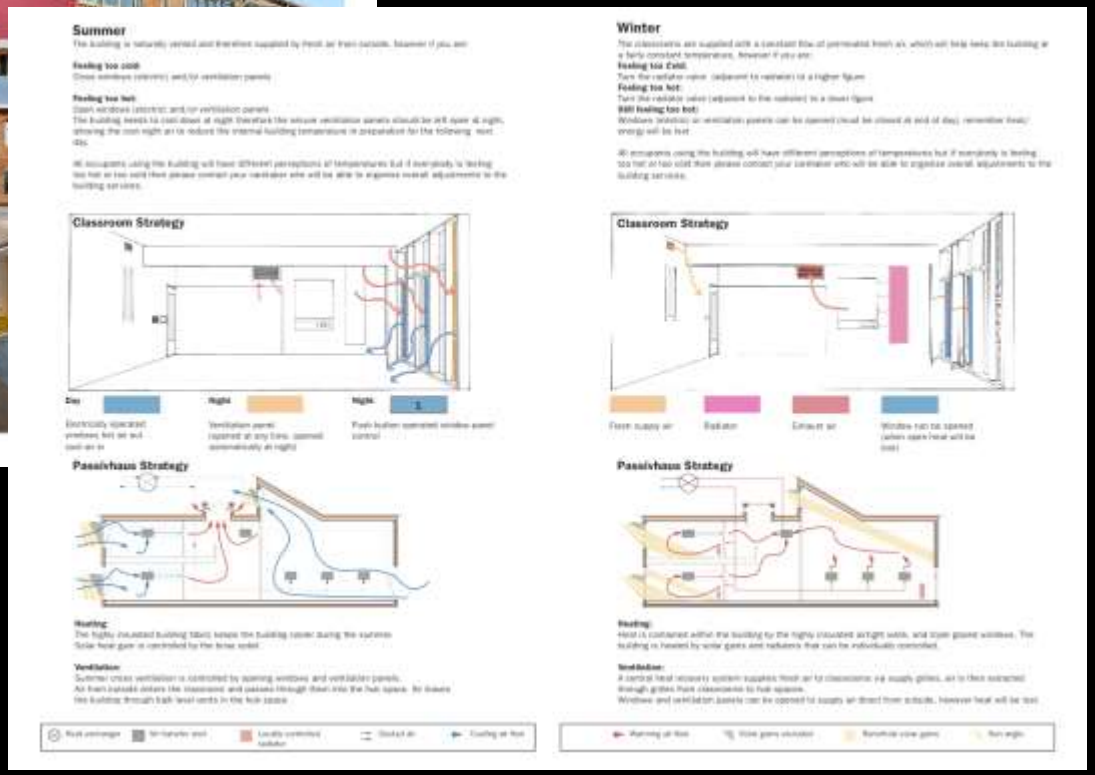
Ventilation:

- Ventilation panels/doors are controlled manually by turning the handle and opening to the desired position. Ventilation panels can be left open at night.
- Windows are electrically opened and closed using the switches located close to the classroom door.
- The switches for the windows are designed for single click pushes and must not be held continuously:
  - One push to the top part of the switch, window opens to 1/3 position.
  - Two pushes, to 2/3 position.
  - Three pushes, to fully open position.
  - To close repeat as above, but pushing the bottom part of the switch.
- Remember windows and ventilation panels can be opened at any time during the school day, only vents can remain open during the night.
- The windows will automatically close after 60 minutes or at the end of the day.
- If it is very cold outside, the opening of the high level ventilation panels will reduce automatically.

Window open / close switch

Temperature sensor connected to the Building Management System

Oak Meadow Primary School



Summer

Winter

Classroom Strategy

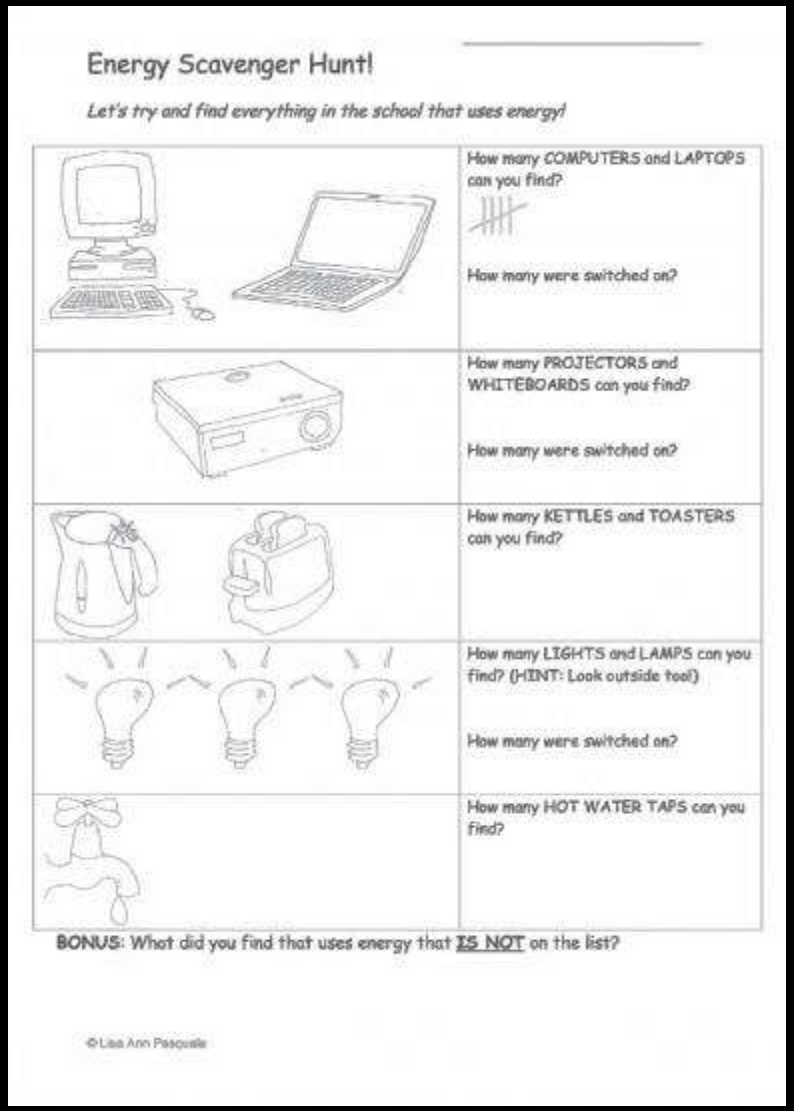
Classroom Strategy

Passivhaus Strategy

Passivhaus Strategy

Explaining how to operate a Passivhaus classroom using presentations and user guides

Soft Landings



Energy Scavenger Hunt!

Let's try and find everything in the school that uses energy!

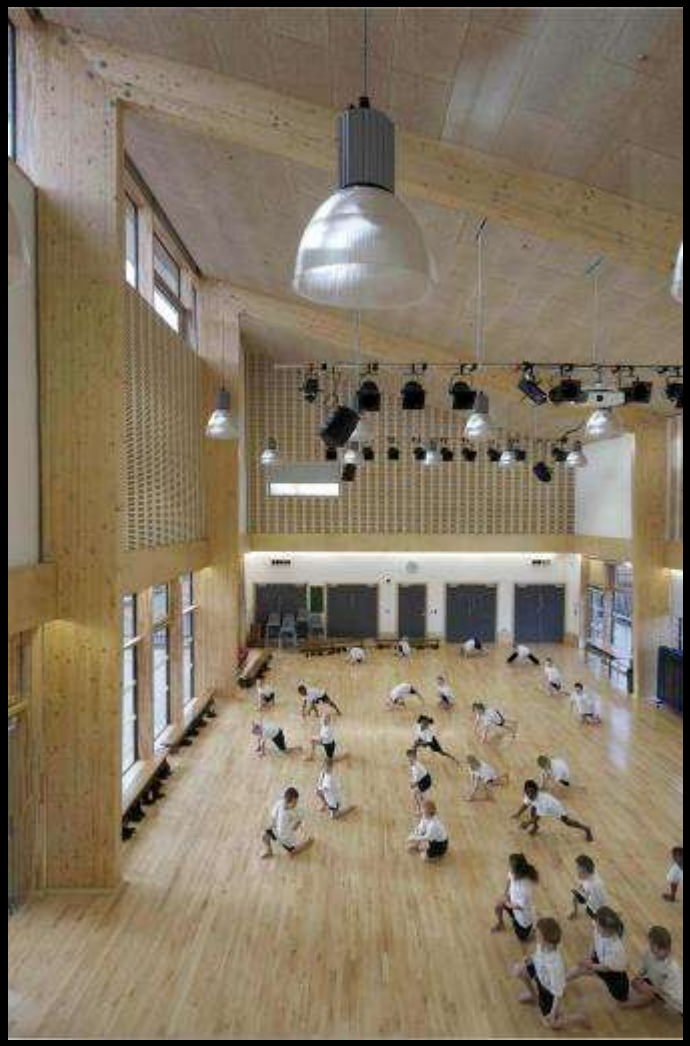
	How many COMPUTERS and LAPTOPS can you find? How many were switched on?
	How many PROJECTORS and WHITEBOARDS can you find? How many were switched on?
	How many KETTLES and TOASTERS can you find?
	How many LIGHTS and LAMPS can you find? (HINT: Look outside too!) How many were switched on?
	How many HOT WATER TAPS can you find?

BONUS: What did you find that uses energy that **IS NOT** on the list?

©Lisa Ann Pasquale

Engaging the pupil council in energy issues

Lessons learnt: lighting



Both schools deliver great day lighting, however with over complicated controls and user intervention this benefit has been compromised

Lessons learnt: ventilation & controls

“We feel that our children are more alert and attentive in lessons due to the amount of daylight in classrooms and the constant fresh air”

Sara Morris, Head teacher Oak Meadow School

Good quality MVHR units provide excellent air quality, however filters need to be changed or their operation is compromised

Lessons learnt: operation & maintenance

Supporting users and maintenance teams is vital

Lessons learnt: heating

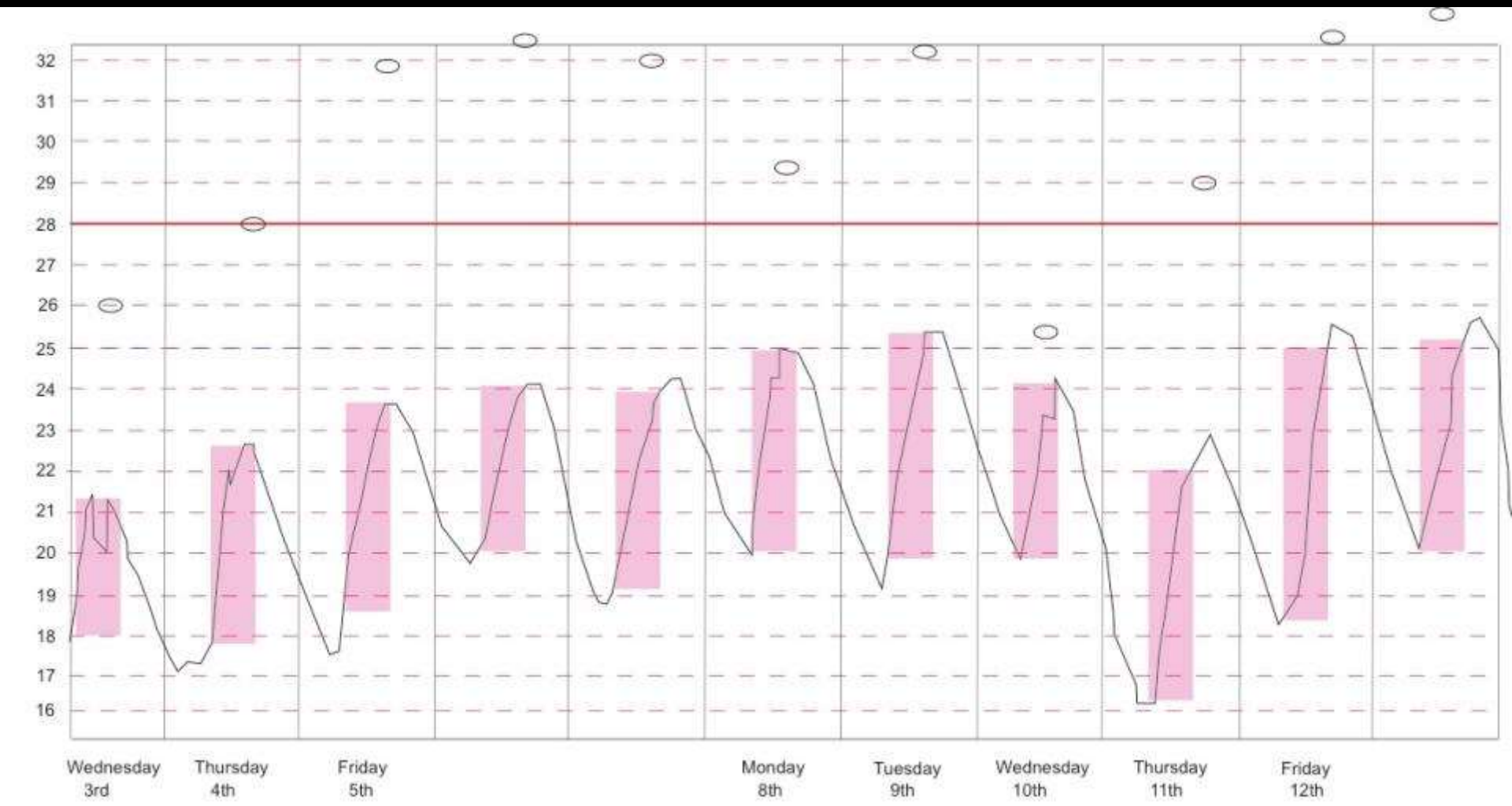
2 x 65kW boilers 25kW peak heat demand 5x oversized!

One gas boiler is more than enough

Lessons learnt: school kitchens

Use of induction hobs and low energy appliances to reduce surplus heat and primary energy

Lessons learnt: monitoring



Monitoring is essential to know how things are working – or not!

Lessons learnt: monitoring

Bushbury Primary School

Figures are based first year readings.

Gas(x 1.1 for PE):

Space heating*: 14kWh/(m^2.a)

Hot water*: 7kWh/(m^2.a)

Electric (x 2.7 for PE):

Lighting: 12kWh/(m^2.a)

Power & plant: 22kWh/(m^2.a)

Kitchen: 7kWh/(m^2.a)

Sprinklers: 14kWh/(m^2.a)

Comment:

Primary energy is higher than the target 120 kWh/(m^2.a)

Sprinklers = 38kWh/(m^2.a) PE

Main success:

Kitchen energy & comfort

Main lessons:

Issues with automatic lighting controls and sprinkler systems.

Occupation

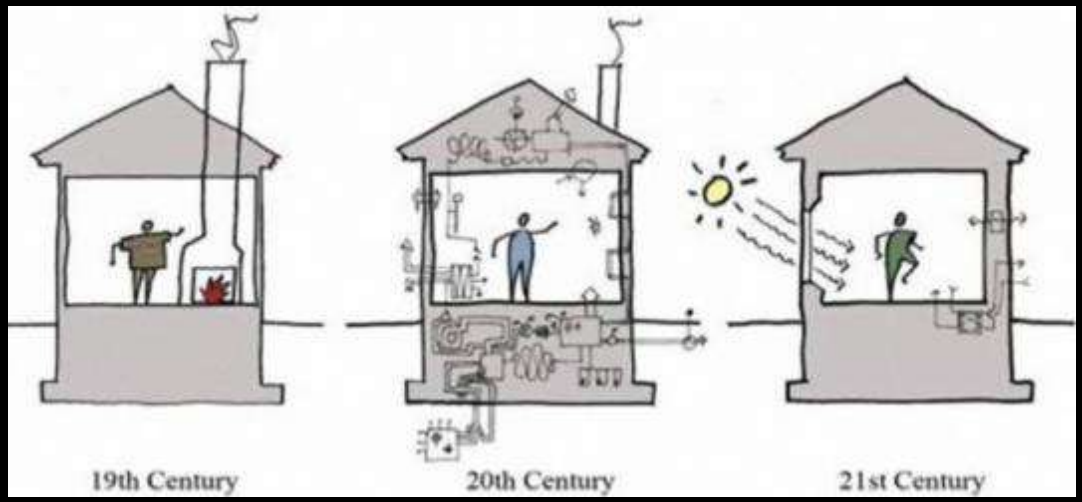
- think….provide full Soft Landings support

……monitor and work with the users

……and employ the right expertise

Successful delivery of Passivhaus

- strive for simplicity of design – more for less
- base design on the evidence of what actually works
- engage with, and support the users, in occupation




“Making the simple complicated is commonplace, making the complicated simple – that’s creativity” Charlie Mingus

…employ the right expertise