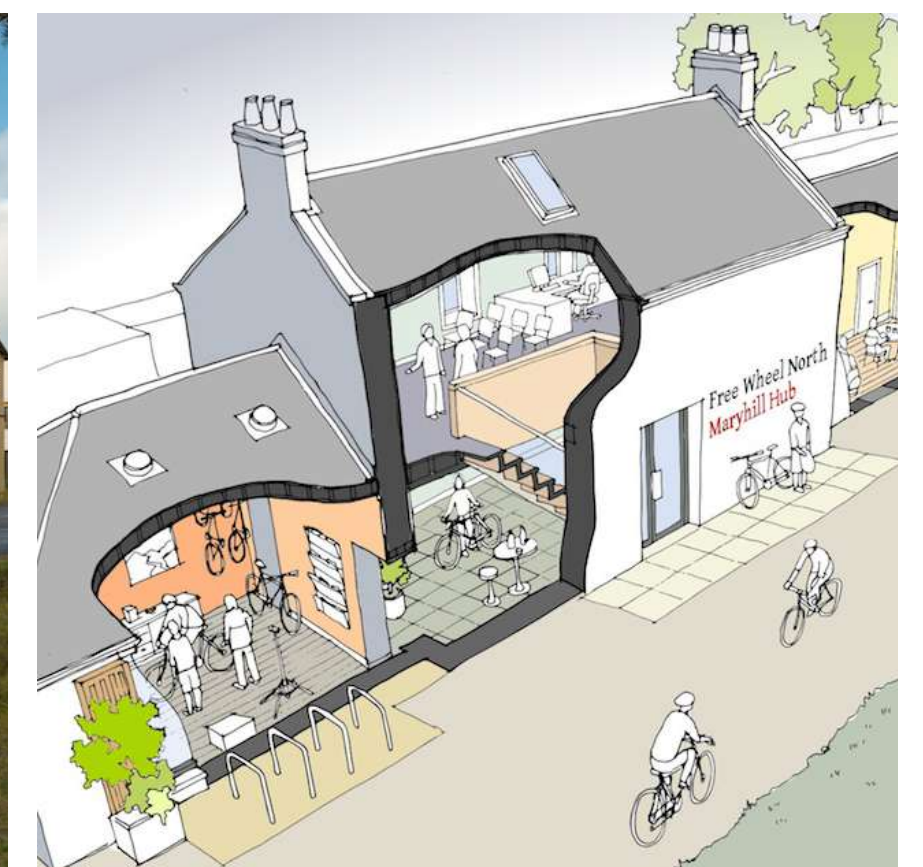
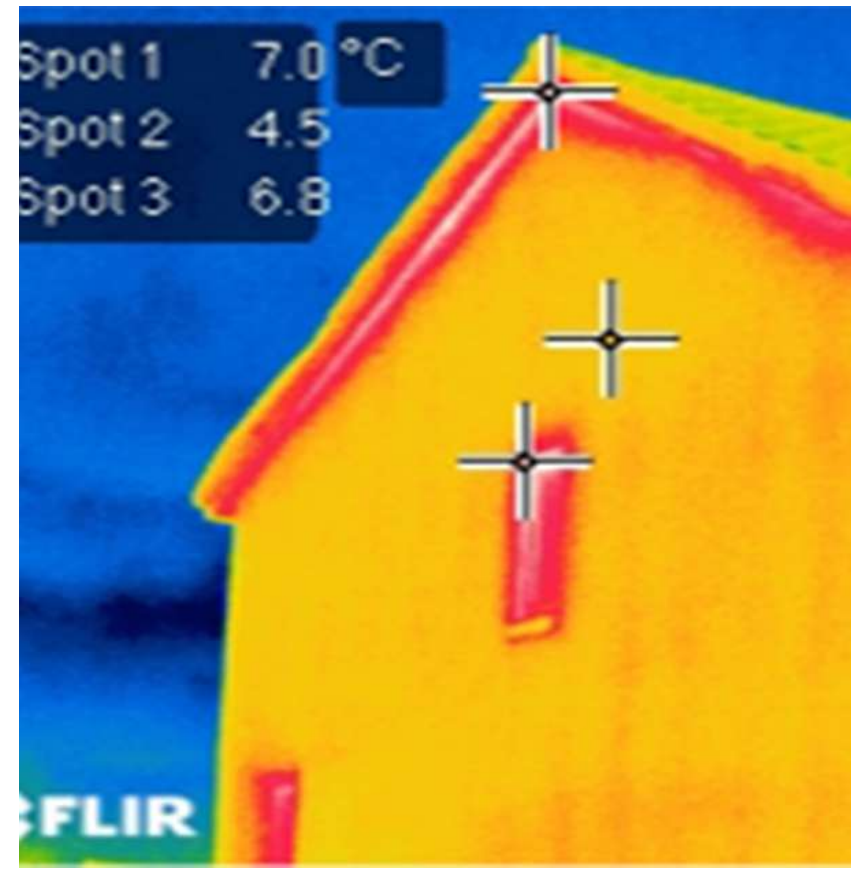


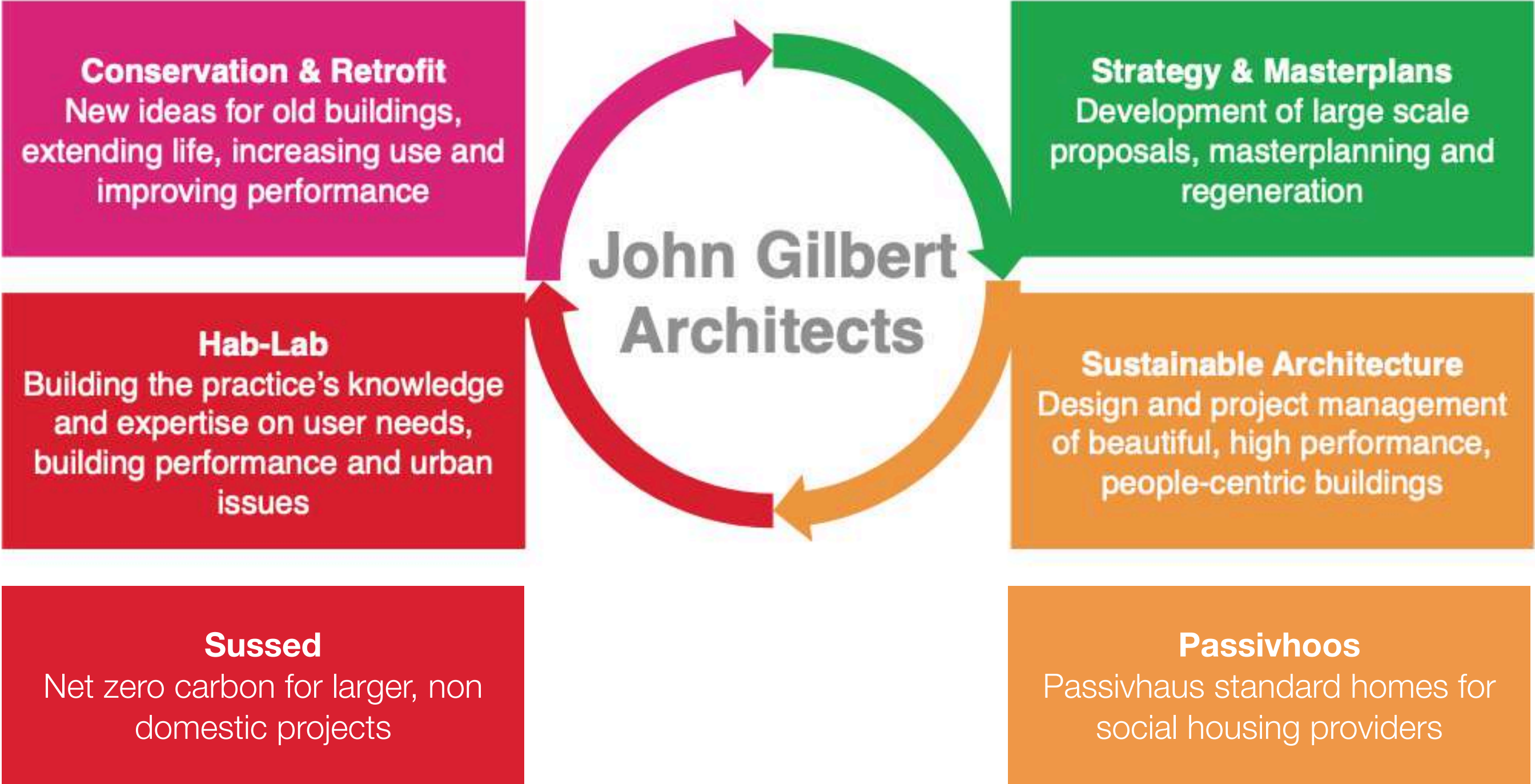
CIBSE Passivhaus Lessons

Matt Bridgestock, Director

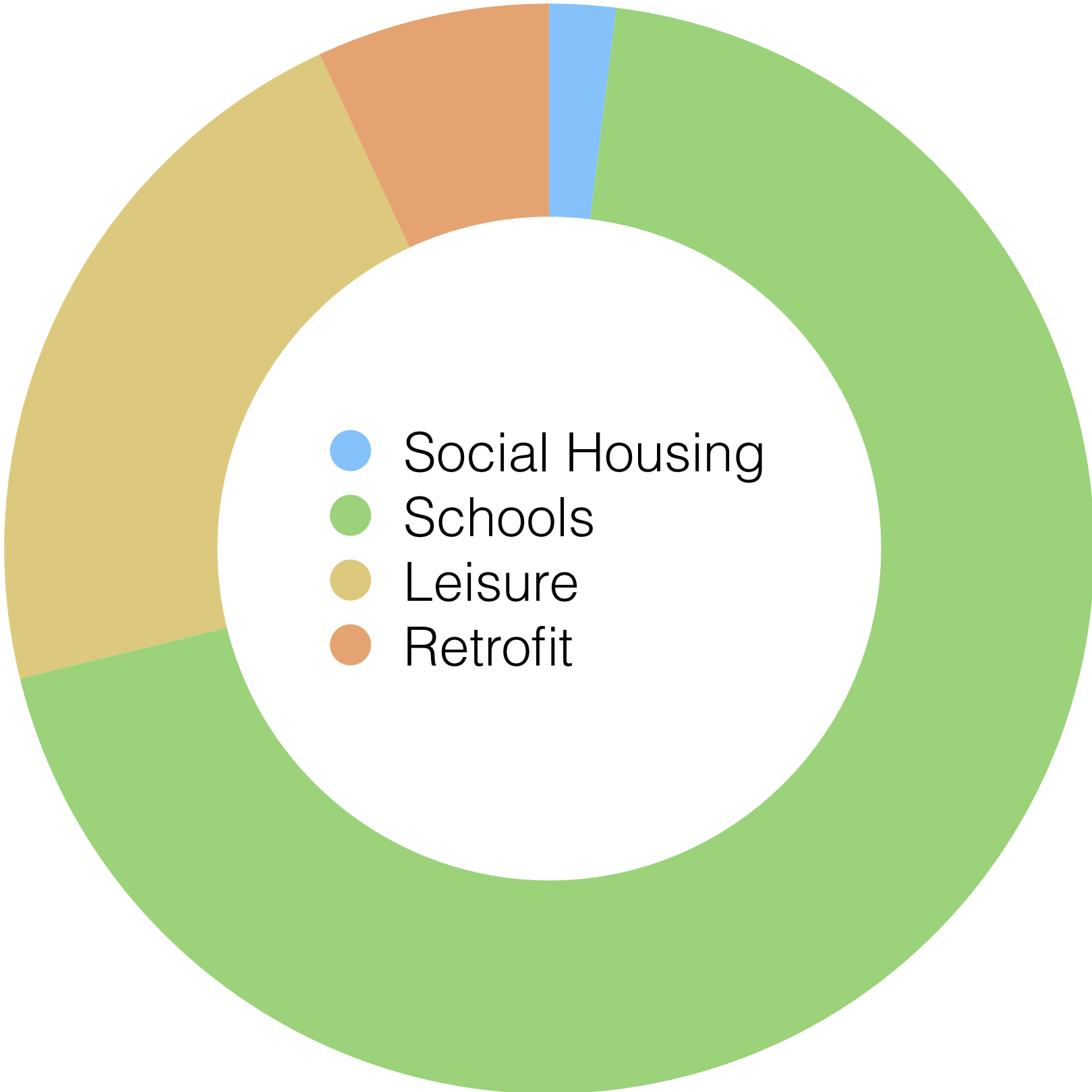
John Gilbert
ARCHITECTS



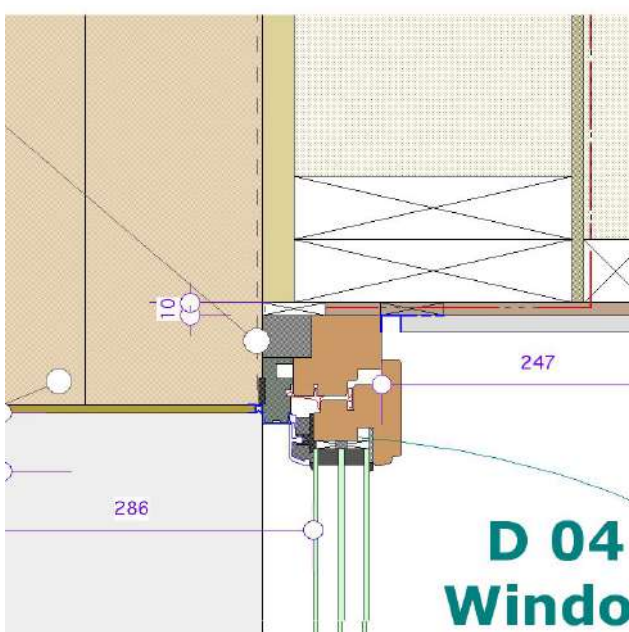
Evidence based design



Passivhaus at JGA



+£400m project work



Passivhoos

- D&B initiative to build Passivhaus homes for social housing providers.
- 5 completed projects
- 150+ new homes completed or in design

Sussed Sustainability

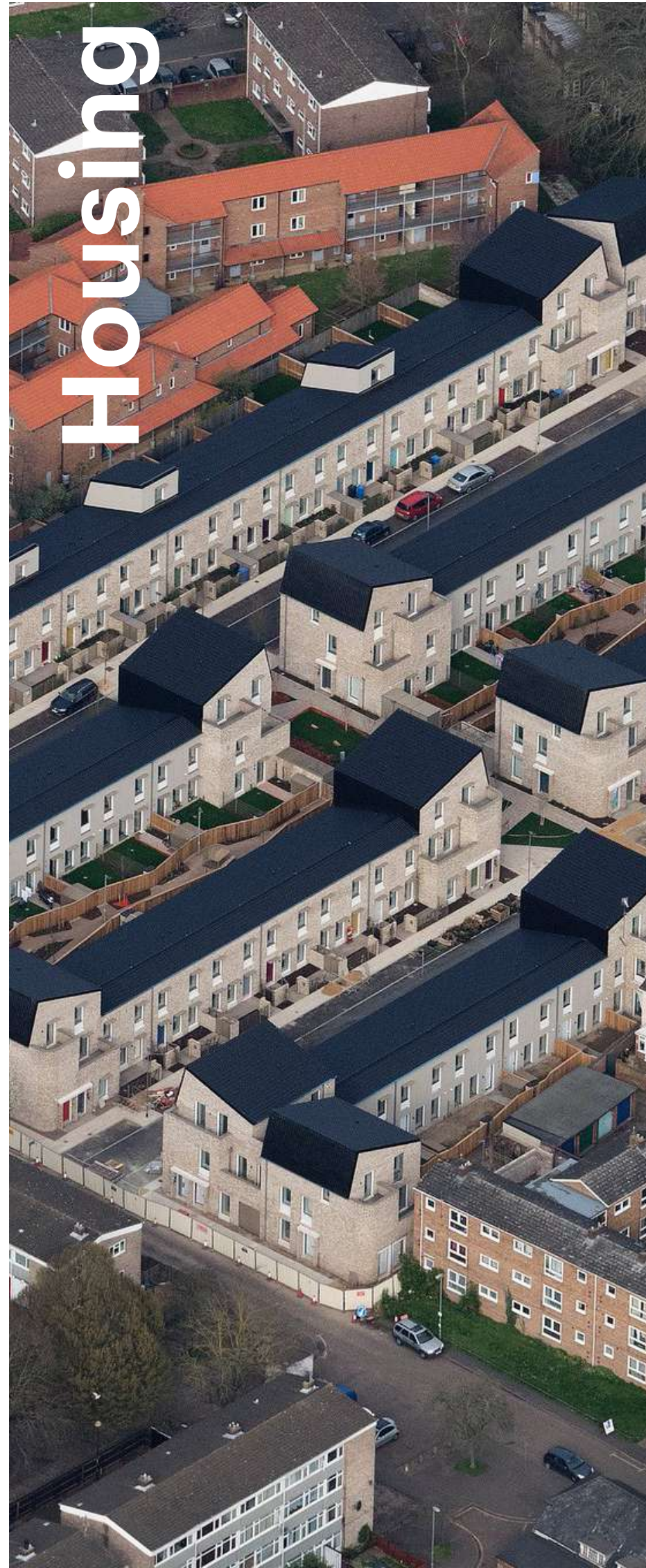
- A consultancy service to enable large non-domestic projects reach net zero carbon.
- 15x schools to Passivhaus
- 3x leisure centres
- Retrofit & Decarbonisation



Passivhaus Regs?

- Ministers confirm 'Passivhaus or equivalent' will be adopted into Scottish Technical Standards.
- Proposals to be approved by November 2024, adoption in 2028
- Passivhaus deemed to satisfy
- Use of PHPP and new metrics in Building regs
- Additional compliance at completion





1 Form Factor

Target 1 - 2

Considerations:

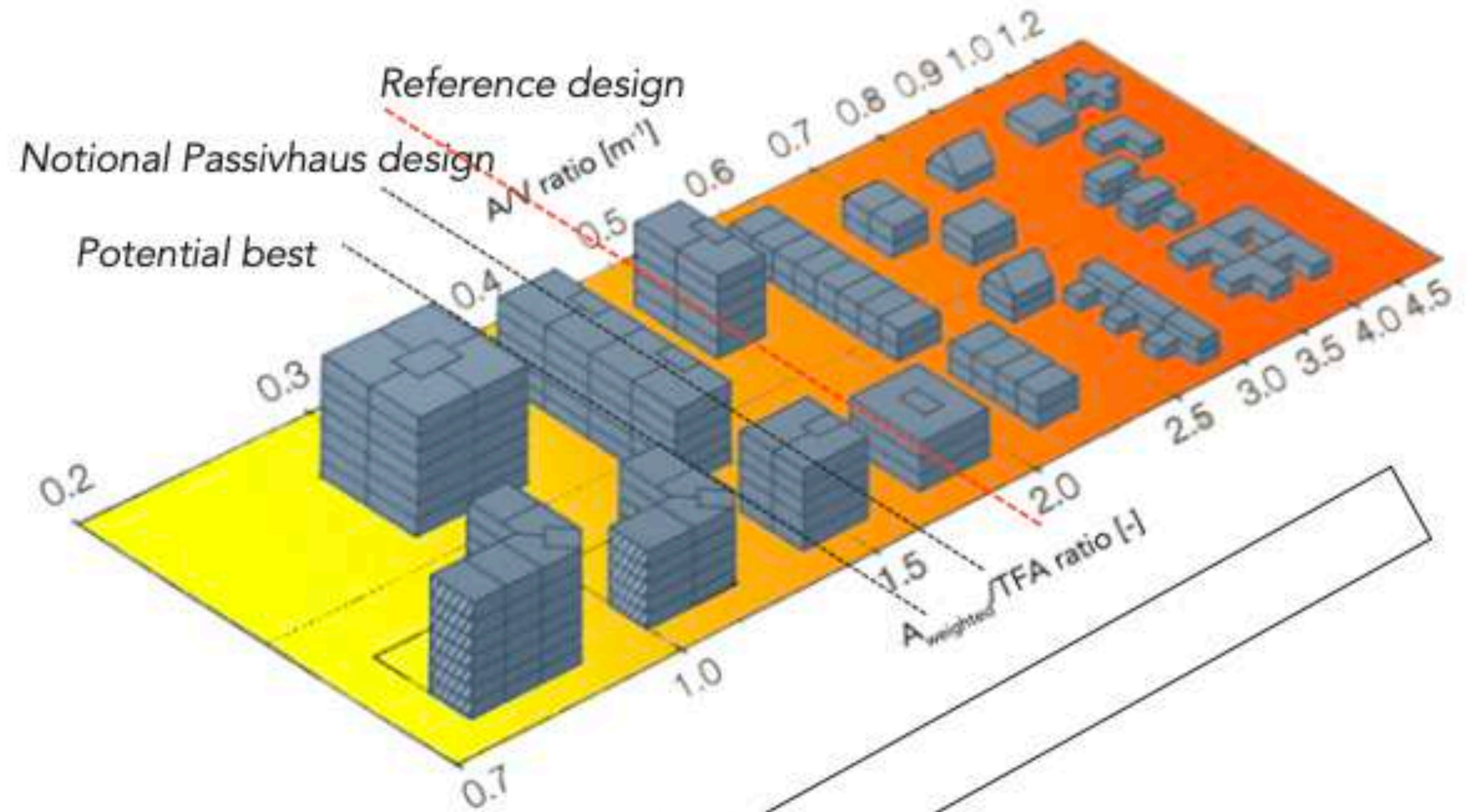
Form factor

Orientation

Overshading

↓ Form Factor

↓ Cost



Cunningham House

Shettleston, Glasgow

5 flats for older people for social rent. 5 storey new build tower adjacent to 14 retrofit properties. Designed with Page\Park.

Housing Association Grant / Town Centre Living Fund

Monitoring ongoing

Steel / Timber frame / 0.5ACH

Passivhoos Collaboration



2

Insulation

Target 0.15 to 0.10Wm²/K

Considerations:

Thermal bridge free

Ease of install

Continuity at steps

Junctions

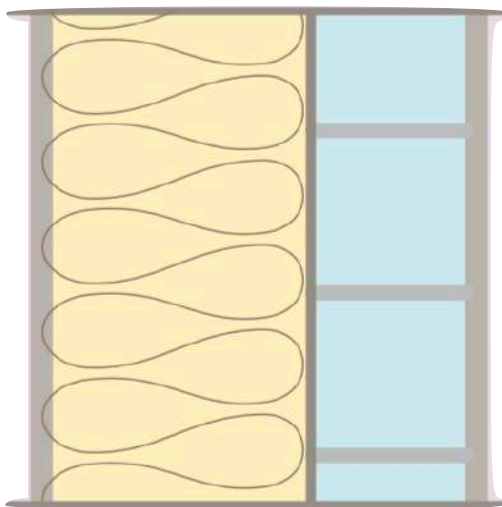
Avoid spandrel panels

On site

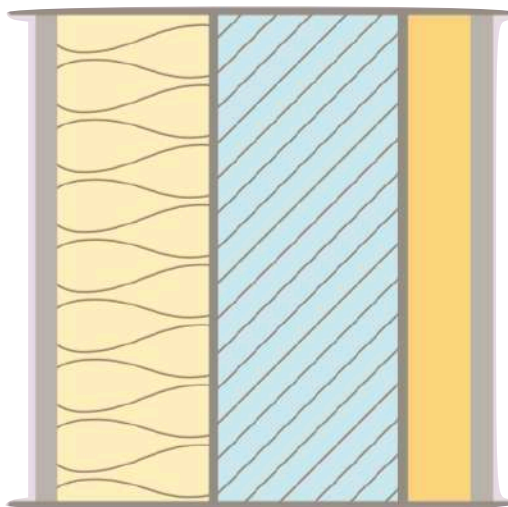
Installation process

Inspection

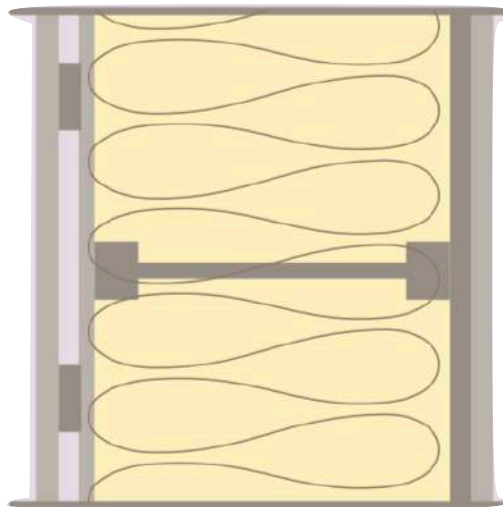
Record Photos



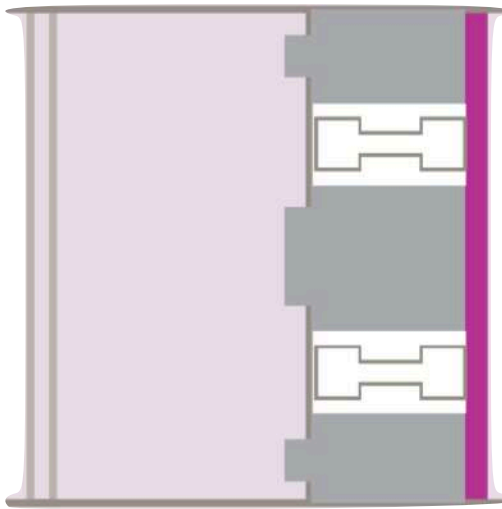
Masonry with EIFS



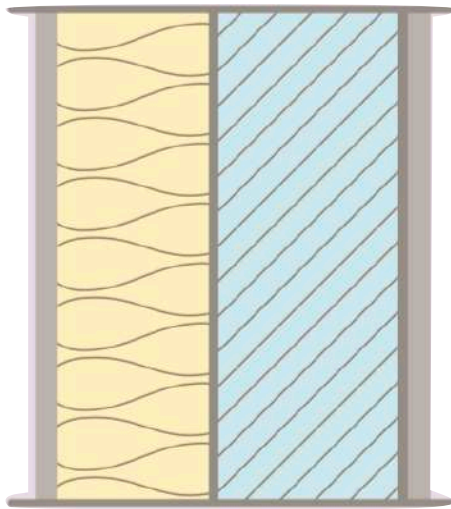
Polystyrol rigid foam ICF



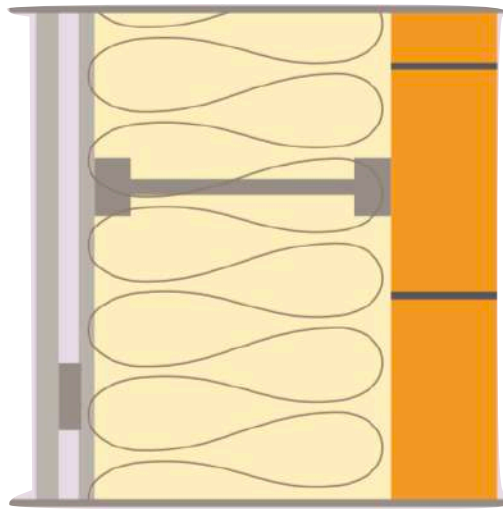
Lightweight element wooden structural insulated panel or fully insulated I-beam



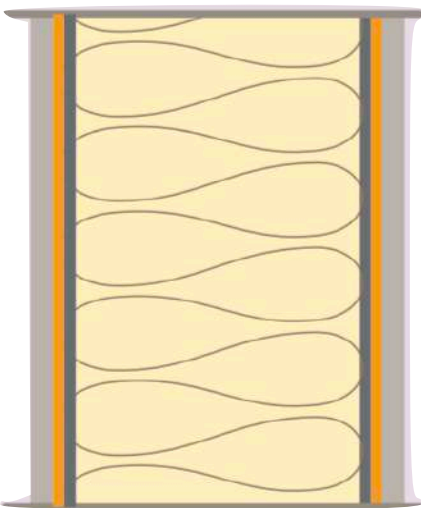
ICF based on expanded concrete



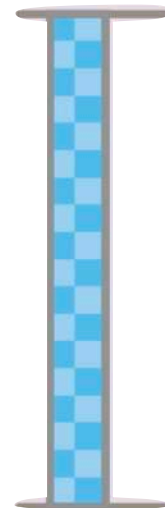
Prefabricated lightweight concrete element



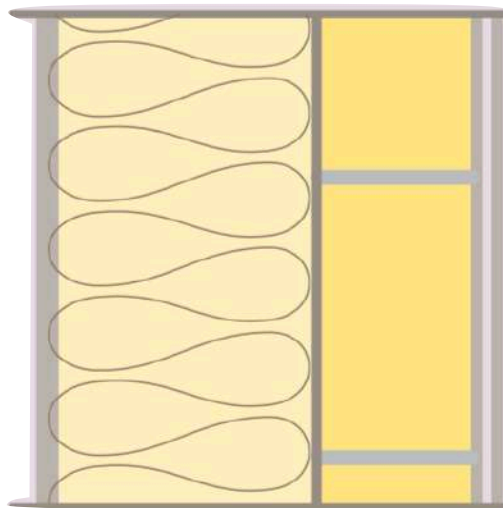
Block plank wall



Prefabricated polyurethane sandwich elements



High-tech vacuum insulation panel



Lightweight concrete masonry with mineral wool insulation

Wick

Highlands

2 post war houses retrofit to
Passivhaus EnerPHit standards.

Cairn Housing Association

Completion 2023

External Wall Insulation / 1.0ACH



107 Niddrie Road Glasgow

Tenement EnerPHit Passivhaus Retrofit

1. Top up insulation up to 450mm thick

2. Lower area of slates removed to check for timber decay and ensure insulation wraps over wall head to meet EWI

3. Two smaller windows knocked into one larger window for more light and heat gain into living areas

4. New high performance triple glazed windows and doors

5. External wall insulation to rear and gable walls, extended below floors, into window reveals, all downpipes replaced

6. Mechanical ventilation with heat recovery unit in bathroom ceiling removes almost all outgoing heat keeping flats warm with lots of fresh air

7. Wastewater heat recovery from baths and showers

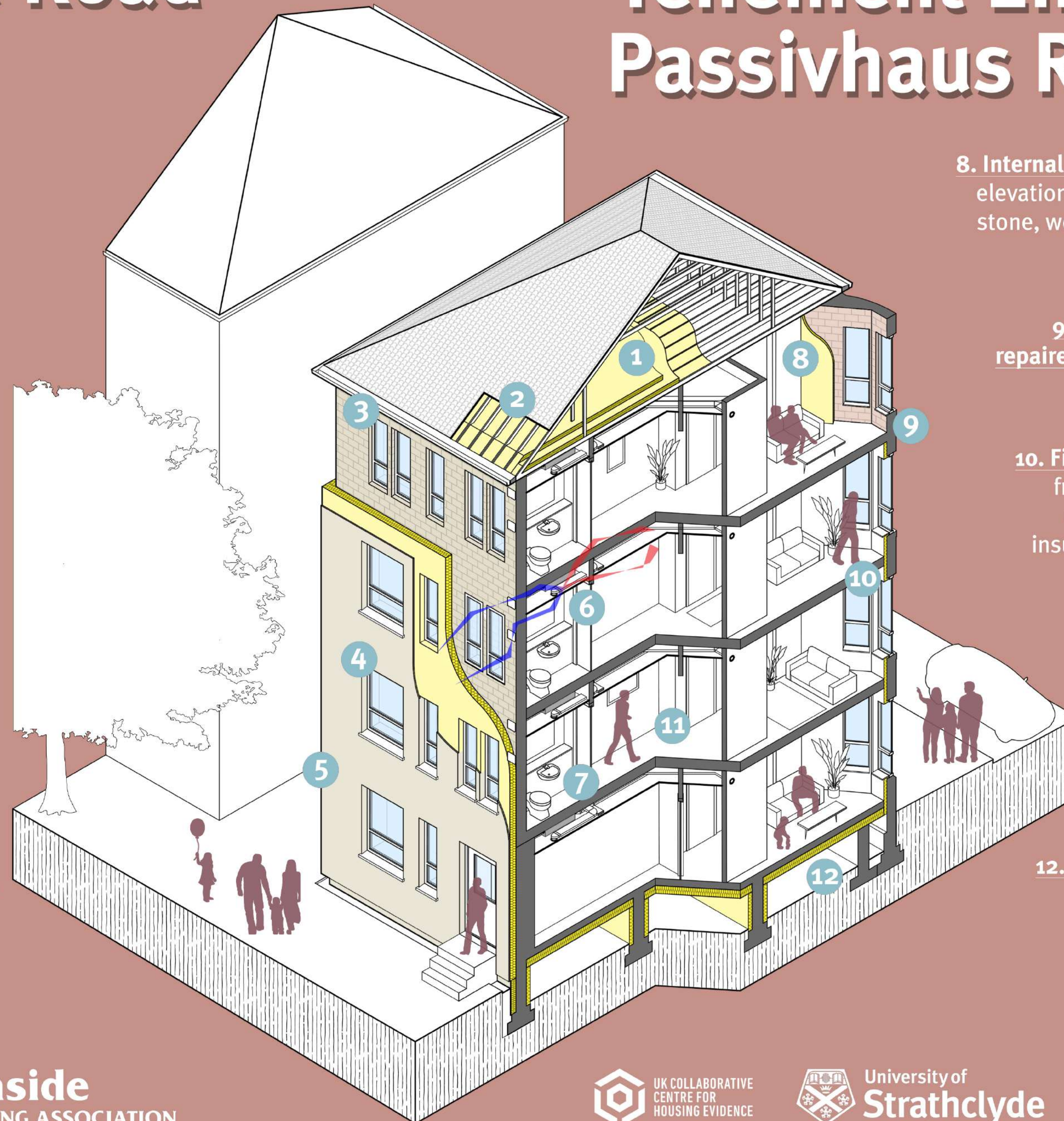
8. Internal wall insulation to front elevation, walls stripped back to stone, wood fibre insulation and lime plaster added

9. Street side stone wall repaired with stone repair and repointed using lime

10. First floor joists removed from wall to avoid decay, allowing for continuous insulation and airtightness

11. Layout altered for better space planning

12. Ground floor insulated along with careful airtightness measures



Faifley Campus

Clydebank

Primary School Campus LEIP /
NZPSBS / PH certified. With
Holmes Miller Architects.

Budget: £35m

Floor area: 4,500m²

Operational carbon: Passivhaus

Embodied Carbon: 600kgCO₂e/
m²

West Dumbartonshire Council
and HubWest

Completed 2025

Steel frame / 0.4ACH

Sussed Collaboration

Sussed
sustainability simplified



Dundee East End

Dundee

Secondary School Campus LEIP / NZPSBS / PH certified. With Holmes Miller Architects.

Budget: £100m

Floor area: 18,000m²

Operational carbon: Passivhaus

Embodied Carbon: 600kgCO₂e/m²

Dundee City Council

Completed 2025

Steel & Concrete frame / 0.4ACH

Sussed Collaboration

Sussed
sustainability simplified



3

Airtightness

Target 0.6ACH to 0.3ACH at 50 Pascals



Site concrete



Airtight board



Airtight membrane



Plaster



Airtight tape

Considerations:

Strategy at feasibility

Ease of build

Single, robust line

Right materials

On site

Process & control

Airtightness champion

Permit to work

Testing strategy

Closeburn

Dumfries & Galloway

3 houses built by Nith Valley LEAF Trust, for affordable rent.

Scottish Land Fund / Scottish Rural Housing Fund / Wind Farm money

Monitoring ongoing

Timber frame / 0.3ACH

Passivhoos Collaboration



4

Daylight & Overheating

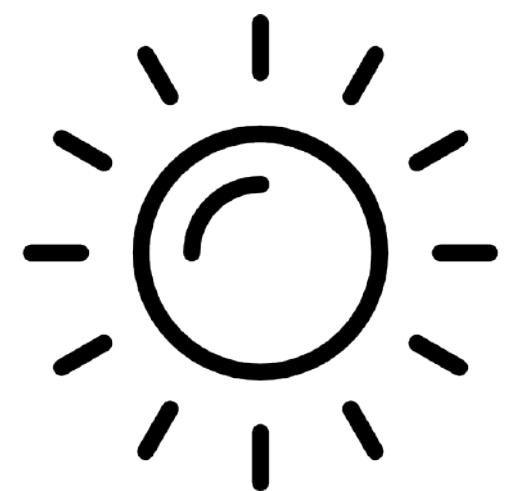
Target <10% overheating

Considerations:

Strategy at Feasibility

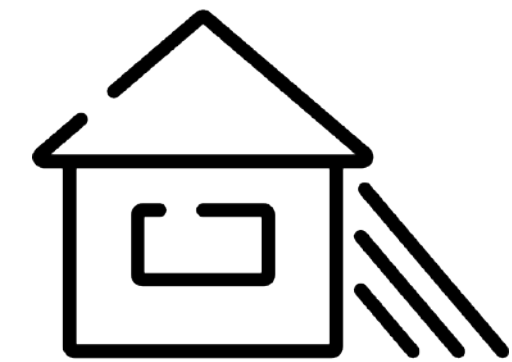
Orientation

External shading



Daylight into rooms
Passive solar gain

Overheating
Heat loss



Sciennes Primary

Edinburgh City

Primary school extension to Passivhaus standard. With Holmes Miller Architects.

Budget: £2.5m

Floor area: 400m²

Operational carbon: Passivhaus

Edinburgh City Council

Completed 2023

Cross Laminated Timber / 0.3ACH

Sussed Collaboration

Sussed
sustainability simplified



Mill Lane

Lancaster

20 houses and flats to be built in partnership between South Lakes Housing Association and Lune Valley Community Land Trust. Mixture of social rent and shared ownership.

Housing & Communities Grant /
Lancaster Council

Completed 2023

Timber frame / 0.5ACH



5

Ventilation

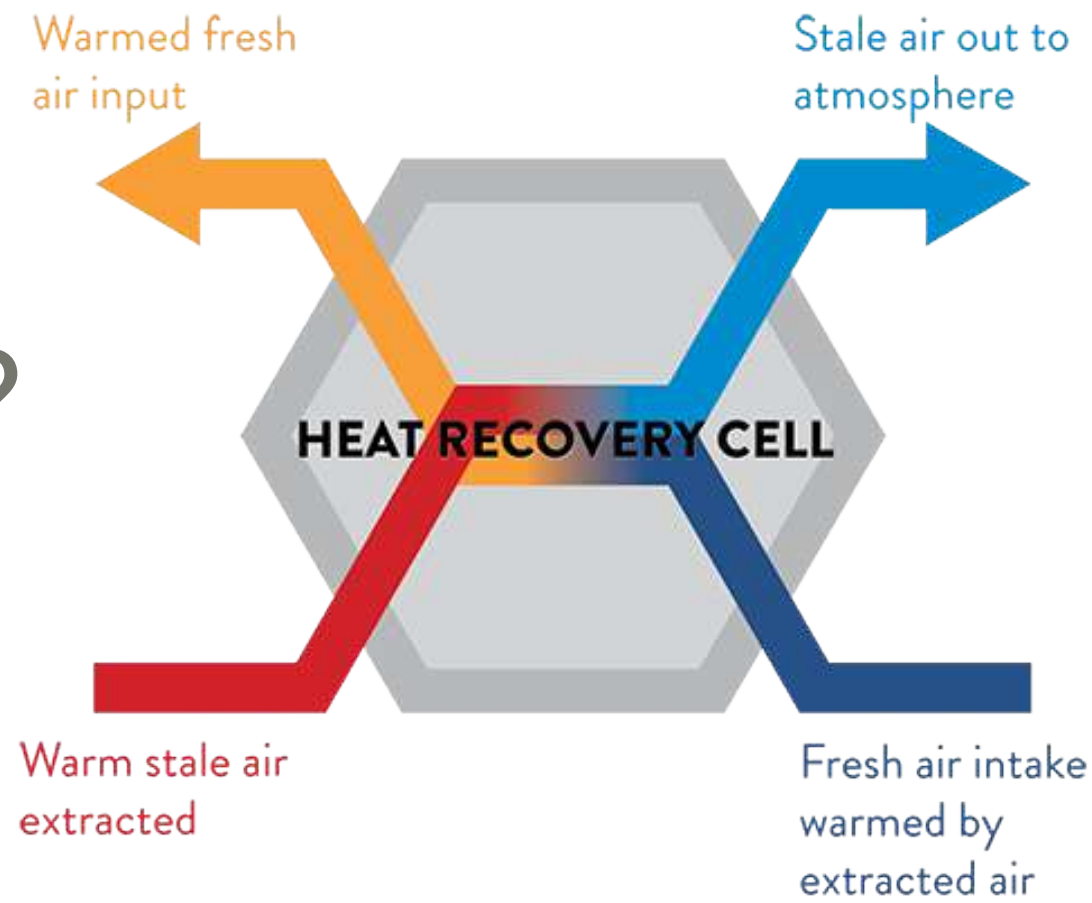
Target 90% Efficiency

Considerations:

- Strategy at Feasibility
- Passivhaus certified unit?
- Duct routes
- Location & servicing

On site

- Careful installation
- Commissioning



Blairgowrie Recreation

School pool and recreation centre to bespoke Passivhaus standard. With Holmes Miller Architects.

Budget: £36m

Floor area: 4,500m²

Operational carbon: Passivhaus using multizone PHPP

Embodied Carbon: not measured

Perth & Kinross Council

Completed 2025

Cross Laminated Timber / 0.16ACH

Sussed Collaboration

Sussed
sustainability simplified



Enniskillen Forum

Northern Ireland

Sport & Wellbeing centre

Bespoke Passivhaus criteria with
Space & Place Architects and
MacAdam Design

Budget: £70m

Floor area: 6,150m²

Operational carbon: Passivhaus

Embodied Carbon: Not measured

Fermanagh and Omagh District
Council with UK levelling up funding

On site to 2028

Steel / Concrete frame / 0.2ACH



Enniskillen Forum

Northern Ireland

Sport & Wellbeing centre

Bespoke Passivhaus criteria with
Space & Place Architects and
MacAdam Design

Budget: £70m

Floor area: 6,150m²

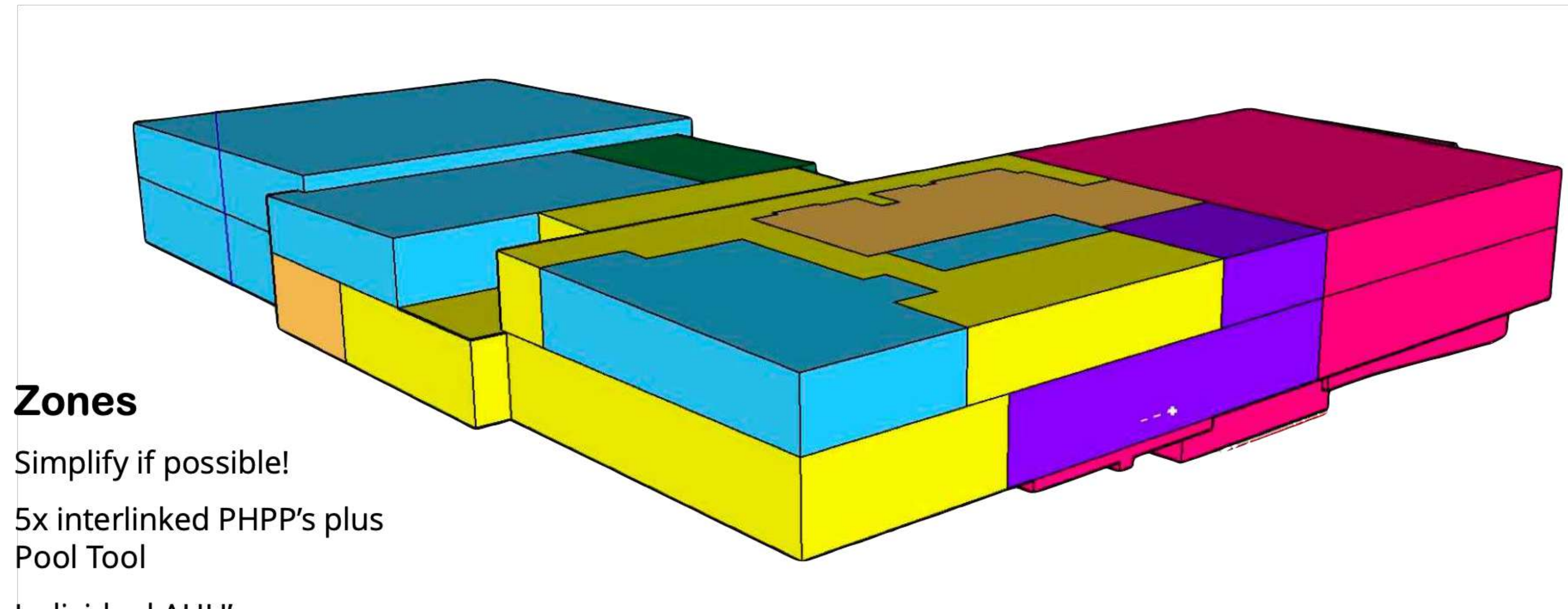
Operational carbon: Passivhaus

Embodied Carbon: Not measured

Fermanagh and Omagh District
Council with UK levelling up funding

On site to 2028

Steel / Concrete frame / 0.2ACH



Zones

Simplify if possible!

5x interlinked PHPP's plus
Pool Tool

Individual AHU's per zone

Internal Insulation / heat loss
between zones

Blairgowrie



Enniskillen



Larkhall



Hot Water

Affects energy & overheating

Minimise consumption

Minimise distribution

Appoint designer early

On site

Careful installation

Commissioning

Lighting

Maximise daylight

LED lighting

On site

Careful installation

Commissioning

Heating

Small radiators

Towel rails

Heat pumps are good

On site

Careful installation

Commissioning

Buntingford Primary

Hertfordshire

Primary school to HCC net zero carbon standard. With Holmes Miller Architects.

Budget: £7m

Floor area: 1,500m²

Operational carbon: Passivhaus & Renewables.

Embodied Carbon:

LETI 292kgCO₂e/m²

HCC 625kgCO₂e/m² & Offset

DfE / Hertfordshire County Council

Completed 2023

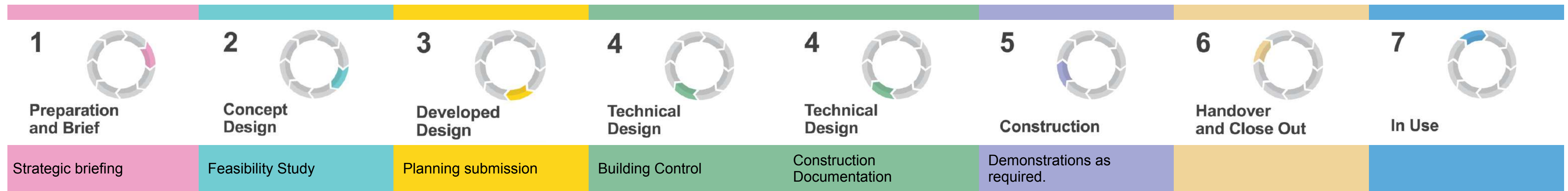
Cross Laminated Timber / 0.5ACH

Sussed Collaboration



7

Embed in Plan of Work



Design Advice		<ul style="list-style-type: none"> Design review PD / Sussed 	<ul style="list-style-type: none"> Design review Spec Review Liaison with Certifier 	<ul style="list-style-type: none"> Design review Spec Review Liaison with Certifier 	<ul style="list-style-type: none"> Spec Review Liaison with Certifier 	<ul style="list-style-type: none"> Liaison with Certifier Trouble shooting and advice 	Optional - Monitoring
Passivhaus Checks	Get written confirmation of Passivhaus intention, sign-off etc from client, agree targets	Initial design check based on: <ul style="list-style-type: none"> Site layout / Orientation Form Factor Target U-values Indicative M&E Ventilation strategy Building services strategy incl renewables Backstop values 	Update design check based on emerging design and specification. Review on materials proposed by design team. PHPP Concept check	Full Design Assessment based on evidence supplied on drawings: <ul style="list-style-type: none"> All building fabric components Specification Wall Build ups Target airtightness Detailed ventilation design Building services design Renewables Detailed PHPP 	<ul style="list-style-type: none"> Regular inspections of Passivhaus elements. Toolbox talks to site staff Trouble shooting Arranging of external suppliers toolbox talks Gathering and recording evidence for compliance Arranging testing 	Present information for compliance to certifier	
Analysis Tools		<ul style="list-style-type: none"> PHPP Calculator U-Value calculator 	<ul style="list-style-type: none"> PHPP Calculator U-Value calculator SAP Calc (to check S6 compliance) 	<ul style="list-style-type: none"> PHPP Calculator Evidence register (Certifier) Thermal Bridge Analysis U-Value calculator Manufacturer advice Liaison with BSC on spec. WUFI / Moisture risk calculations (If required) 	<ul style="list-style-type: none"> Evidence register (Certifier) Airtightness Testing Thermal Imaging Record Photographs Site inspection reports Ventilation system testing & commissioning 		BPE kit inc indoor air quality, energy and performance tools.
Output	Client commitment, quote and timescale.	Feasibility report outlining targets for the building based on initial design. Building services strategy including renewables	<ul style="list-style-type: none"> Initial design check compliance document with confidence of meeting PH standard and any risk areas to address Passivhaus certification initial check by Certifier 	Design Compliance report suitable for certification. Detailing confidence in achieving the standard including any risk areas or any certification criteria not being met.	Compliance evidence	Review construction evidence and processing of certification documents. ie Fully completed evidence register for site works Certificate and plaque	Quick Start Guide In use performance report and advice

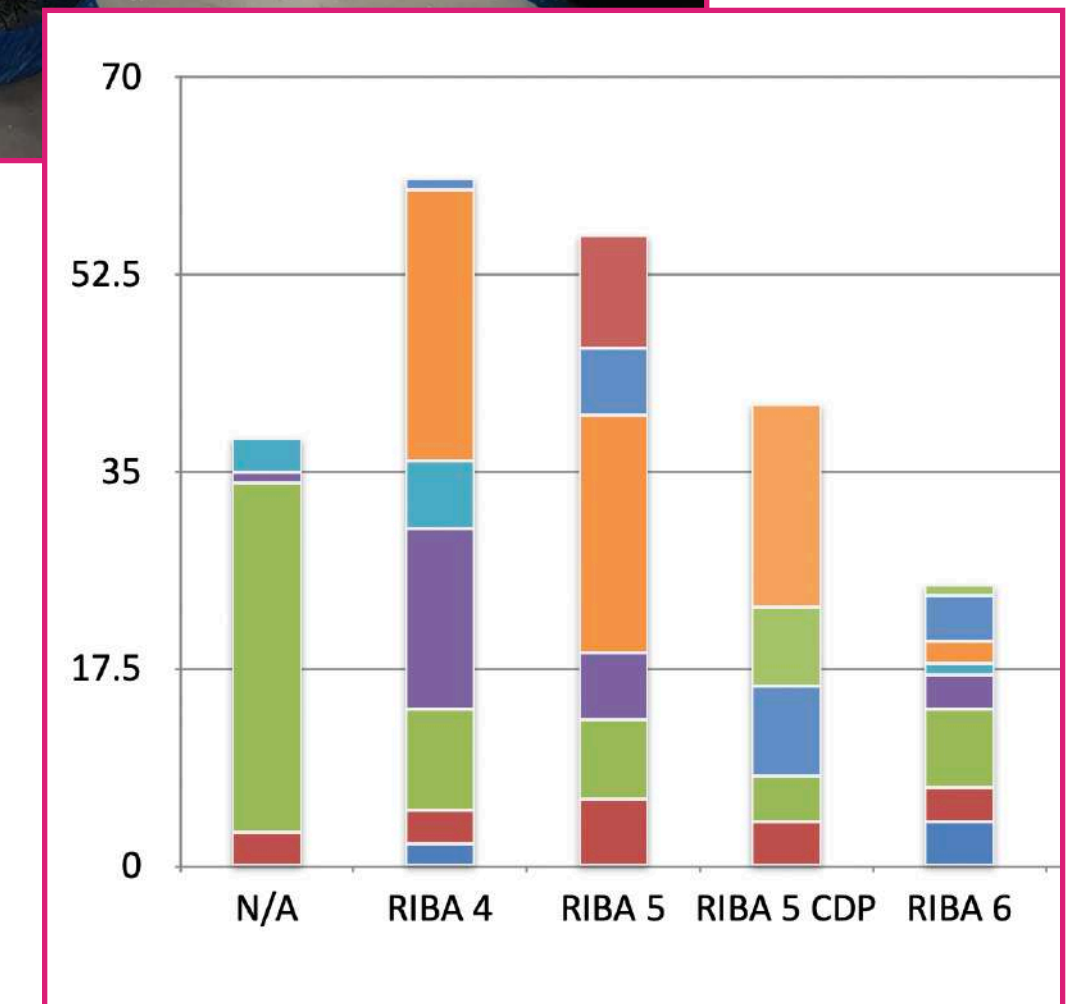
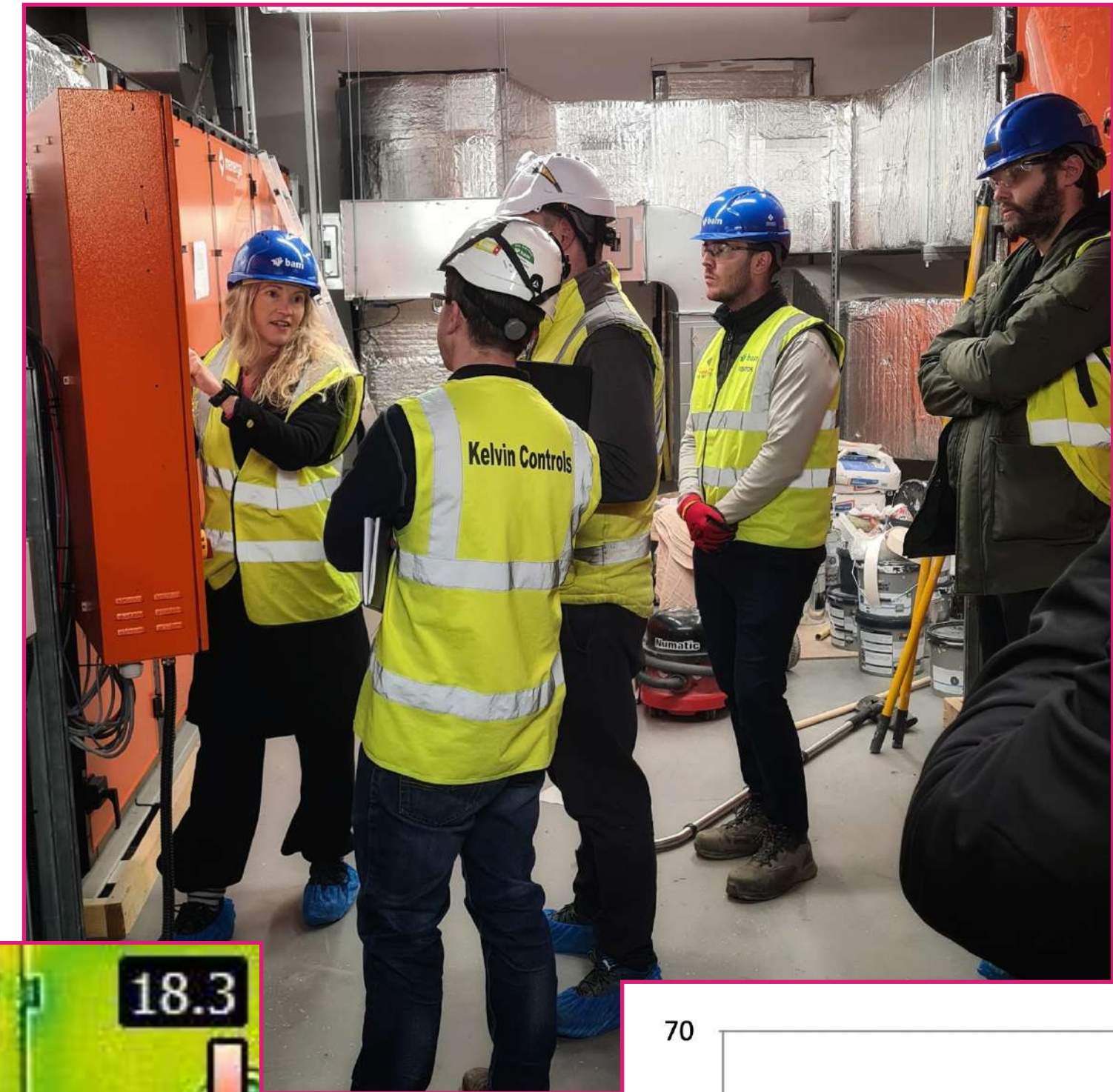
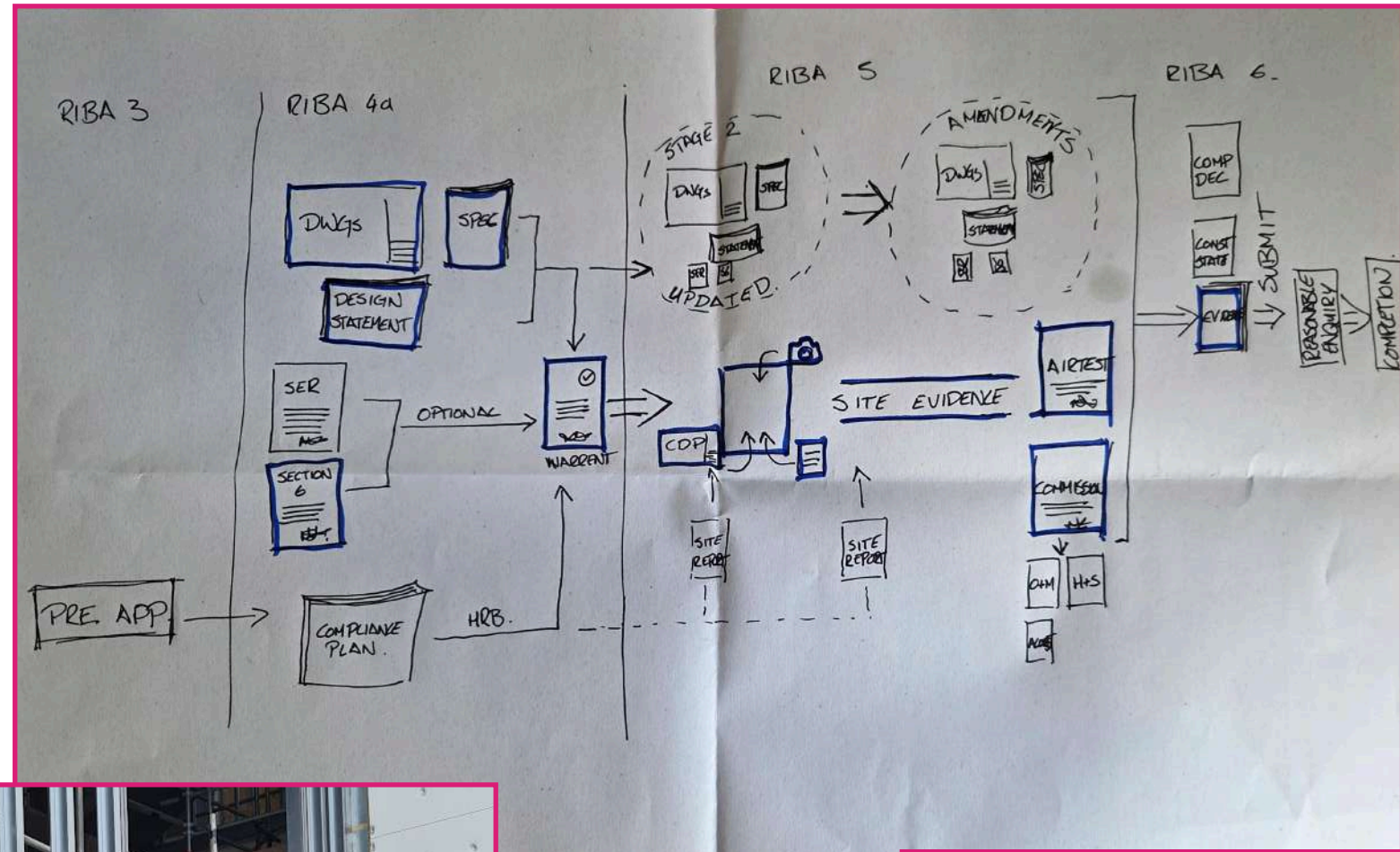
7

Embed in Plan of Work



8

Evidence and Commissioning



Closeburn

Dumfries & Galloway

3 houses built by Nith Valley LEAF Trust, for affordable rent.

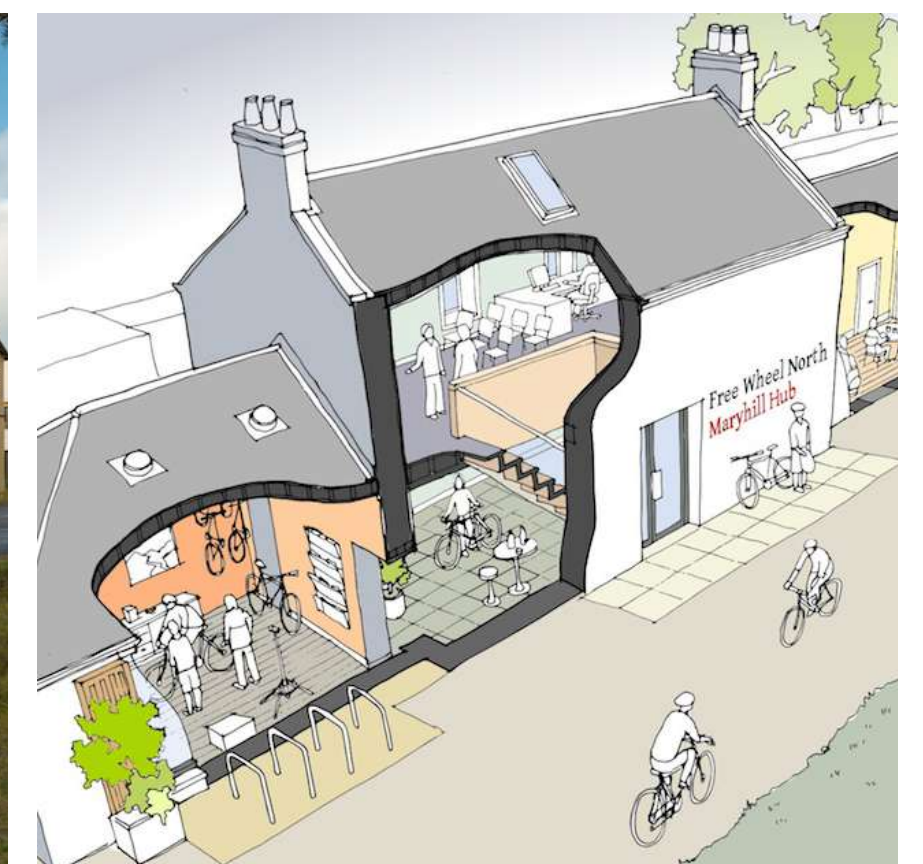
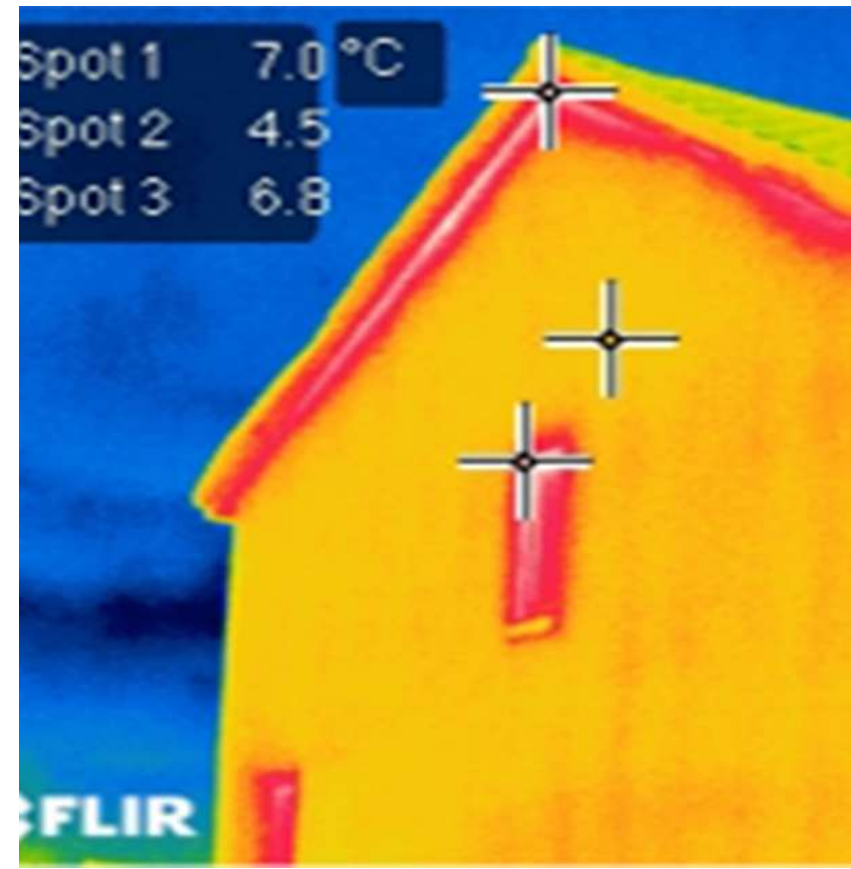
Scottish Land Fund / Scottish Rural Housing Fund / Wind Farm money

Monitoring ongoing

Timber frame / 0.3ACH

Passivhoos Collaboration





Thank you

Matt Bridgestock, Director

John Gilbert
ARCHITECTS