LHC
PROCUREMENT GROUP

RETROFIT FOR A NET ZERO FUTURE

BIRMINGHAM, 28 FEBRUARY 2024

EVENT PARTNERS

BUILD TEST SOLUTIONS

ECD Architects
ENERGY CONSCIOUS DESIGN

Vaillant

VINCI FACILITIES

WARMWORKS

Introduction to the Conference

The conference will explore the urgent challenge of decarbonising the UK's built environment, and the practical ways that public sector organisations can improve their buildings, such as enhancing building insulation, optimising heating systems and integrating renewable energy solutions.

Participants can look forward to discussions facilitating broad industry perspectives on areas such as control and management systems, electrical servicing, and multi-disciplinary works among other measures aimed at resolving the challenges towards a net zero future.

Collaboration is paramount in meeting this challenge, and by exchanging data, sharing best practices, and fostering innovation, we can drive meaningful change and usher in a new era of sustainability in the construction sector.

Dean Fazackerley

Head of Technical Procurement, LHC PG

Our Retrofit and Decarbonisation (N9) Framework is set to be our most important framework since becoming a CLG and as we prepare to invite organisations to apply for it we felt it important to continue to engage with the market and reflect how our early market engagement has shaped it's design.

Our retrofit for a net zero future conference aims to explore the urgent challenge of decarbonising the UK's built environment and demonstrate how LHC PG is ready to support public sector organisations deliver a net zero future.

Jennifer Castle

Chief Operating Officer, LHC PG

Conference Agenda

Session 1

10:30 - 10:45
Dean Fazackerley
Head of Technical Procurement, LHC PG
Introduction to Retrofit for a Net Zero Future

10:45 - 11:00
Luke Smith
Managing Director, Build Test Solutions
Make no assumptions! The importance of measurement in achieving desired outcomes.

11:00 - 11:15
Karen Ashley-Seaman
Product Manager, Vaillant
The importance of collaboration with stakeholders

11:15 - 11:30
Matt Hickman
Bid Director, VINCI Facilities
The responsible main contractor perspective

11:30 - 11:45
Chris Ferguson
Group Technical Manager, LHC PG
Addressing the retrofit skills & knowledge gap

11:45 – 12:00 **Tea & coffee break**

Session 2

12:05 - 12:20
Euan Durston
Regional Director, ECD Architects
Retrofitting at scale for net zero- case studies

12:20 - 12:35
Simon Kemp
Growth and Innovation Director, Warmworks
Simplifying procurement of large scale retrofit projects.

12:35 - 1:00
Q & A panel

1:00 - 1:10
Dean Fazackerley
Head of Technical Procurement, LHC PG
Introduction to Retrofit and Decarbonisation (N9) Framework

1:10 - 1:30
Nick and Juliette
LHC Technical Procurement Office
An update on the development of LHC Retrofit and Decarbonisation (N9) Framework key dates, ITT and its role in responding to the challenges in the sector.

1:30 – 3:00 **Lunch and networking**

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Speakers and Topics

Luke Smith, Managing Director, Build Test Solutions

The importance of measurement in achieving desired outcomes.

Luke is an Architectural Technologist turned Director, passionate about improving the performance and quality of buildings through in-situ measurement and feedback mechanisms.

Karen Ashley-Seaman, Product Manager Vaillant

The importance of collaboration with stakeholders

Karen is a Product Manager, who has worked with market leading companies to deliver carbon saving products to the construction industry for the past 25 years. “Stakeholder engagement is key to project success – the Voice of the Customer is paramount!”

Matt Hickman, Bid Director, VINCI Facilities

The responsible main contractor perspective

Matt is passionate about creating a legacy for future generations and is a Net Zero champion at VINCI. His projects cover retrofit in social housing, EV charging infrastructure and delivering solutions that help to decarbonise the built environment for private and public sector clients. Matt represents an inaugural member of the National Home Decarbonisation Group and believes that decarbonisation can deliver significant social change.

Chris Ferguson, Technical Manager, LHC Procurement Group

Addressing the retrofit skills & knowledge gap

Chris recently joined LHC Procurement Group bringing with him over 14 years experience as a lecturer in the built environment. He is passionate about addressing the skills gap and in recent years the role education plays in delivering sustainability in construction and its contribution in delivering a net zero future.

Speakers and Topics

Euan Durston, Regional Director, ECD Architects

Retrofitting at scale for net zero - Case studies

Euan is Regional Director at ECD (Energy Conscious Design) Architects, founded in 1980 to deliver low-energy, low environmental impact design. The practice has extensive expertise in both new-build and retrofit work having delivered pioneering large-scale Retrofit projects to a range of performance standards including EnerPHit and Energiesprong.

Simon Kemp, Growth and Innovation Director, Warmworks

Simplifying procurement of large scale retrofit projects

Simon is responsible for the business development strategy at Warmworks. He most recently led Warmworks' contracts to deliver Sustainable Warmth in the SE of England and in Newcastle. He has more than 15 years' experience of the built environment and energy efficiency sectors, including time spent in the defence sector and leading the facilities management operation at the British Museum in London.

Nick Beard, Technical Manager, LHC Procurement Group

Nick is the Technical Lead for the N9: Retrofit and Decarbonisation initiative at LHC PG. With a qualification in quantity surveying, his career spans over nine years working within social housing on a broad range of minor and major works projects. Nick has a track record of incorporating renewable technologies into these projects, alongside facilitating access to grant funding to support sustainability initiatives.

Juliette Orsler, Procurement Manager, LHC Procurement Group

Juliette is a skilled procurement professional with a range of experience from within both private and public sector organisations. Juliette joined LHC PG in 2020 after previously working within the housing sector and has led the development and implementation of a number of construction and refurbishment frameworks at LHC. Juliette is the procurement lead for the (N9) Retrofit and Decarbonisation project.

Event Partners

Build Test Solutions are a technology business dedicated to driving innovation in building performance measurement and will be sharing their insights on the role of measurement and data in retrofit projects in the drive for a net zero future.
For more information: www.buildtestsolutions.com

ECD Architects are specialist in the design of low energy, low environmental impact buildings and will be sharing their perspective on the role of retrofit in decarbonising existing buildings in delivering net zero.
For more information: www.ecda.co.uk

Vaillant will be sharing their unique perspective on the latest innovations in energy efficient technologies and the role of renewable energy sources in delivering net zero.
For more information: www.vaillant.co.uk

Vinci Facilities will share their perspective on our journey towards a net zero, the creation of a greener built environment, changing behaviours, use of innovative technology and retrofit in delivering a net zero future.
For more information: www.vincifacilities.com

Warmworks will be sharing their unique insights in the end-to-end installation and quality inspection of heating, insulation and energy efficiency improvements in homes as a key part of our shared drive to reduce carbon emissions and the transition to a net zero future.
For more information: www.warmworks.co.uk

BUILD TEST SOLUTIONS

I will be speaking on:

Make no assumptions! The importance of measurement in achieving desired outcomes.

LUKE SMITH
MANAGING DIRECTOR

Why do we retrofit homes?

BUILD TEST SOLUTIONS

- To provide affordable warmth and healthy living environments
- To address fuel poverty – excess winter and summer deaths
- To reduce CO_2 emissions – mitigate climate change/support national objectives
- Natural order of updating and upgrading homes – old boilers, windows, roofs etc.
- For compliance – ever stringent regulation

- **How do we measure and verify our delivery efforts?**
- **And in a way that is SMART?**

OUTCOMES BASED RETROFIT

BUILD TEST SOLUTIONS

- Condition Surveys?
- Energy Performance Certificates?
- Smart Metering?
- IoT Monitoring?

- **What are your key metrics and why?**
- **Do you have an asset data strategy?**

OUTCOMES BASED RETROFIT

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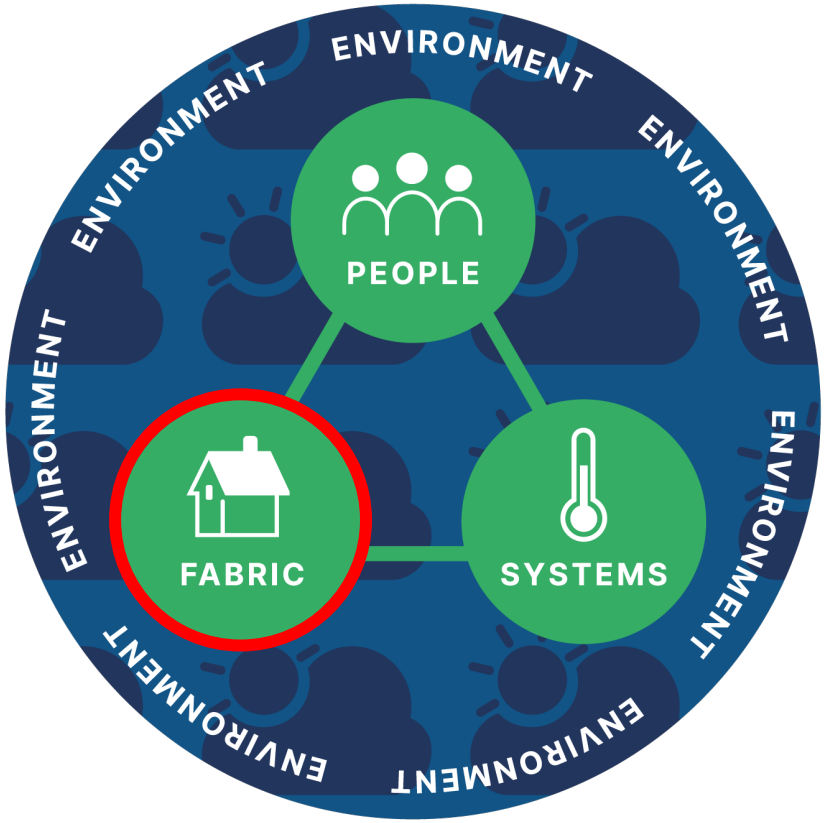
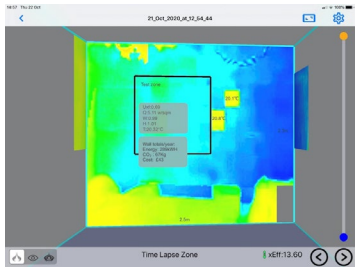


What's the performance of the physical asset?

- Whole Building Heat Loss (HTC)
- Airtightness (Pulse/Blower Door)
- U-values (Heat3D/Heat Flux)
- Ventilation flow rates
- Mould and overheating risk (temp/RH sensors)



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Why measure?

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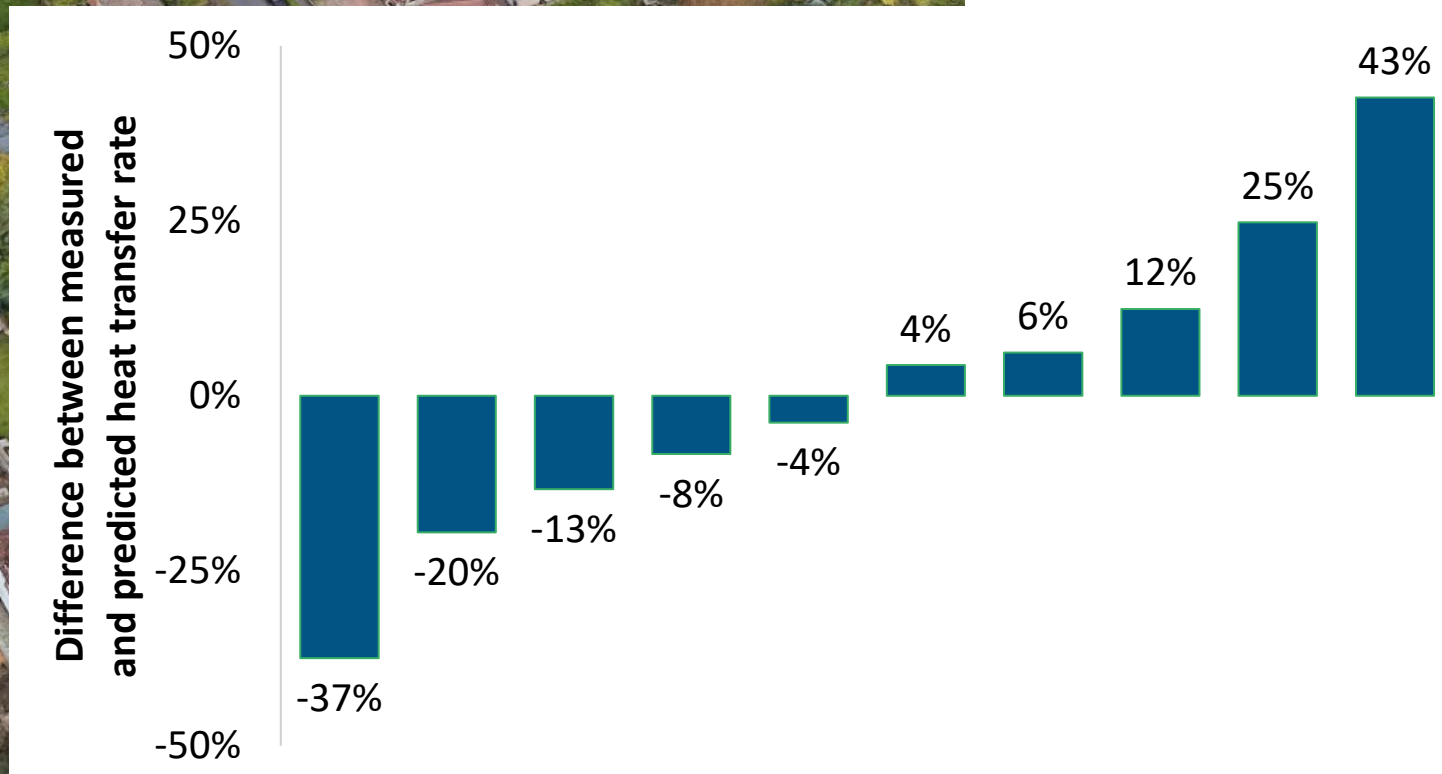
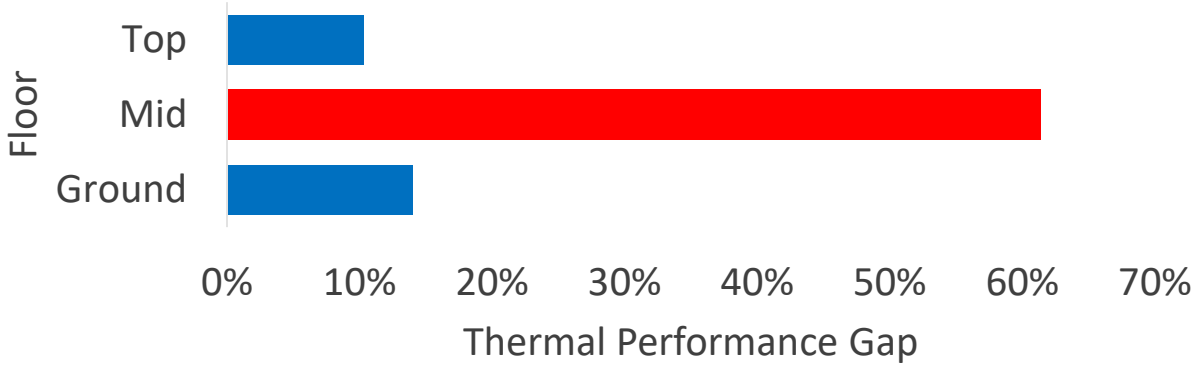


Why Measure?

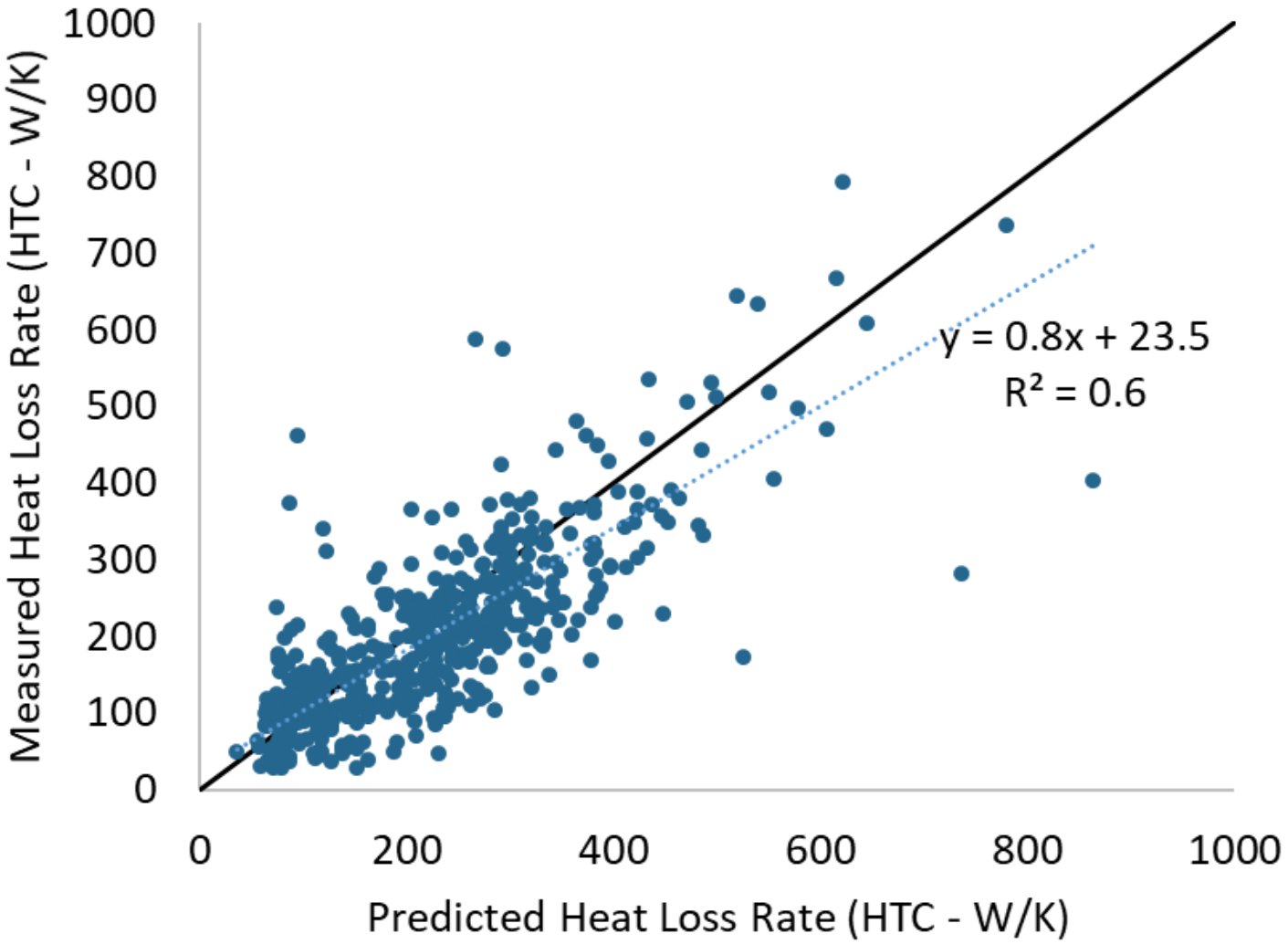


- SmartHTC highlights defect
- IR & U-value measurements confirm
- Targeted, informed retrofit design
- Evidence based decision making!

Why Measure?

- 80% less heat loss than predicted
- 1 fewer borehole
- 15% capital cost saving
- Efficient operation
- Evidence based decision making!

Why Measure?



Across 500+ homes:

- Heat loss predictions good… on average
- But only actually right for 42%!
- 72% of homes with unexpected performance had less heat loss than expected

OUTCOMES BASED RETROFIT

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Unexpected performance = unintended consequences

- Energy
- Thermal comfort
- Ventilation
- Damp and mould
- Quality control

You can't manage what you don't measure!

- Better target and prioritise retrofit activity
- Inform retrofit design and specifications
- Quality check and verify as-built performance
- Feedback and inform future projects

Summary

- We must remain resolutely focused on real world impacts, not predictions or models
- Things aren't always what they seem and we shouldn't target millions £££ of investment based on poor data and assumptions about assets
- In-situ measurements are a natural extension to existing surveying and assessments
- Don't undervalue detailed upfront assessment of properties when designing and delivering retrofit programmes!
- Control the controllables - understand the fabric performance of your assets and make them the best they can be.
- Lots of practical examples where measurement is shown to deliver meaningful project delivery benefits and long term cost savings

Vaillant

The importance of collaboration with stakeholders.

KAREN ASHLEY-SEAMAN,
PRODUCT MANAGER

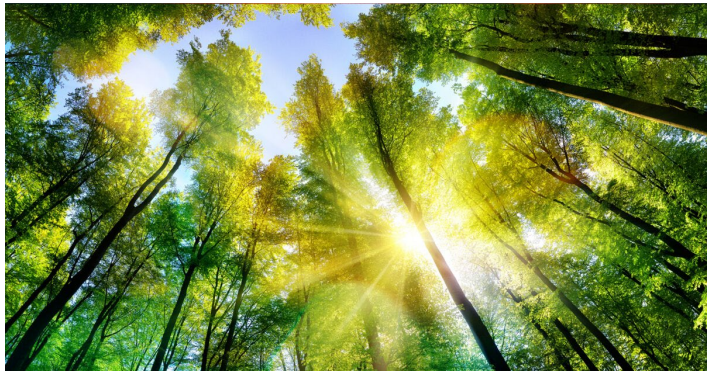
Agenda

- Determining Project KPIs
- Resident Impact Assessment
- Supply Chain – It is not all about the product!
- Maintenance Programming
- In the Know

Determining Project Key Performance Indicators

What is ultimately driving this project?

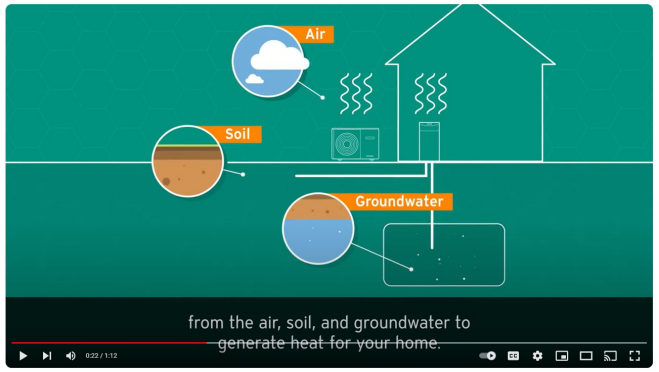
- Budget – aggregating spend, improving performance, futureproofing
- Environmental Impact – Carbon Footprint, UK sourcing/materials
- Energy Consumption – reduce tenants utility bills
- Sustainable Communities – upskill local workforce, apprenticeships
- Regeneration – creating desirability – reduce tenant turnover
- Accessibility – control remotely



Resident Impact Assessment

Use all resources across the supply chain

- Installation - scope of works involved, minimise disruption
- Documentation – promotes tenant comfort, ease of use = efficiency gains
- Comfort factors - time to fill baths, available hot water, living with a new system
- Controls – Ease of use, functionality, positioning, lifestyle data capture
- Maintenance – what is expected, when and for how long
- Samples – What the new system will look like
- Case studies – demonstrate this has been done successfully before

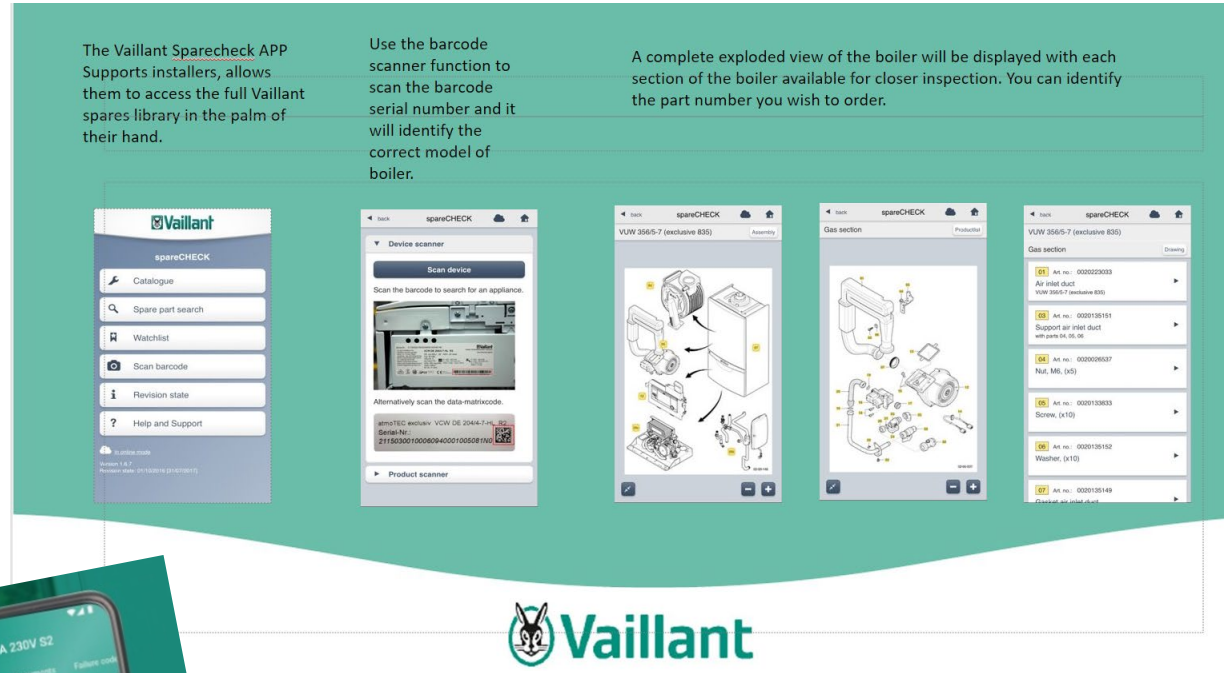


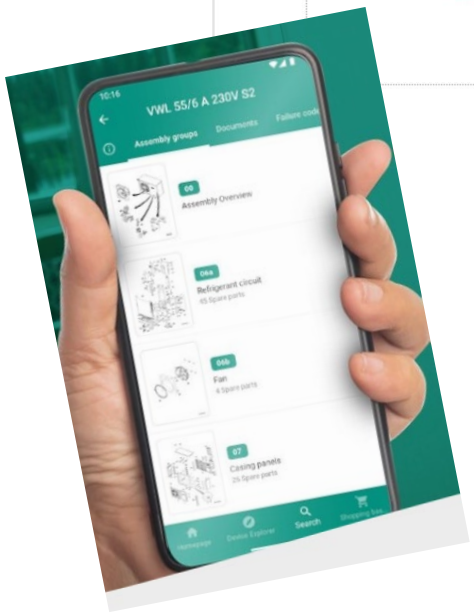
Supply Chain – It is not all about the product!

- Early collaboration is crucial
  - System schematic design - Legislation compliant
  - Performance data/USPs
  - Labour saving benefits – reduces time on site
  - Competitor Comparisons – known market
  - Cost modelling - Installation, maintenance scope of works
  - Third Party Testing/Certification –Quiet Mark, IP rating
  - Field Trials/Case Studies –product endorsement
  - Warranty expectations
  - Training offered across all disciplines
- Installation
  - Customer Service/Key Account Support
  - Field Service Support
  - Onsite Commissioning

Maintenance Programming

- Maintenance and Service planning
  - Who is responsible?
  - Scope of works – time v cost
- Spare Parts
  - Easily accessible – even on site!
  - Nationally/local merchant stock





PARTS ARENA

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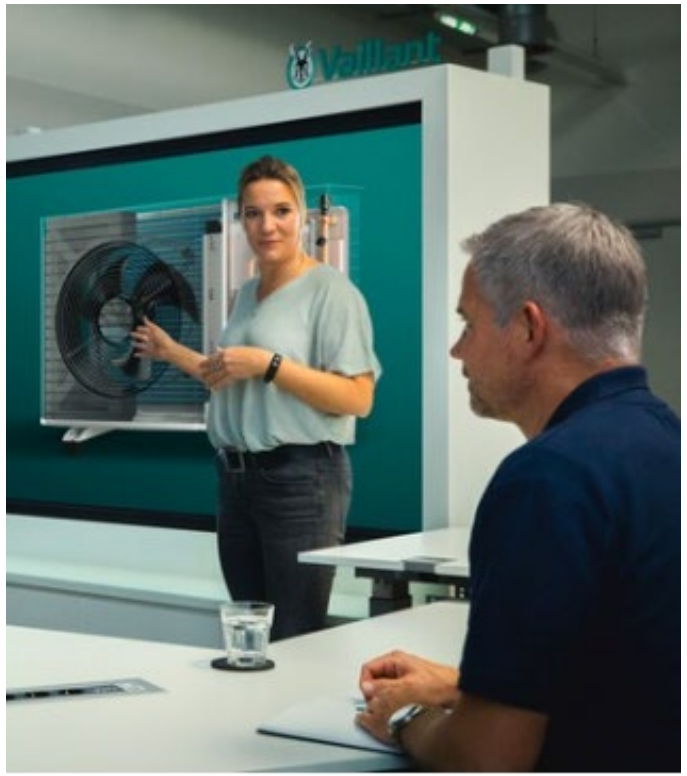
In the Know – Explore all opportunities

- Training
  - Supply chain
  - Qualifications needed
  - Timings – theory v practical
  - CPDs
- Tenant led communication
  - Hand Over Documentation
  - Videos/Product viewings
- Health and Safety Industry Requirements
  - Handling, Legionella/Purge testing



In summary

- Identify project KPIs
- Collaborate with all stakeholders
- Explore all opportunities with your supply chain

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The responsible main contractor perspective.

MATT HICKMAN
BID DIRECTOR

Delivering retrofit responsibly, sustainably, and at scale.

A main contractor perspective

Three questions:

1. A BIG number
2. A politician
3. The residents name

THE CHALLENGES

Challenges to delivering retrofit at scale

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Lack of new talent

Limited capacity in the market

Shortages of PAS 2030 supply chain

simply certification

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Challenges to delivering retrofit at scale

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Lack of long term pipeline

Absence of collaboration

Barriers for innovation

THE PROCUREMENT ACT 2023

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Challenges to delivering retrofit at scale

High demand for specialists:

- Retrofit Assessors
- Retrofit Coordinators
- Retrofit Designers
- Retrofit Evaluators

Needed by everyone at the same time!

Challenges to delivering retrofit at scale

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Competing priorities

Department for Levelling Up, Housing & Communities

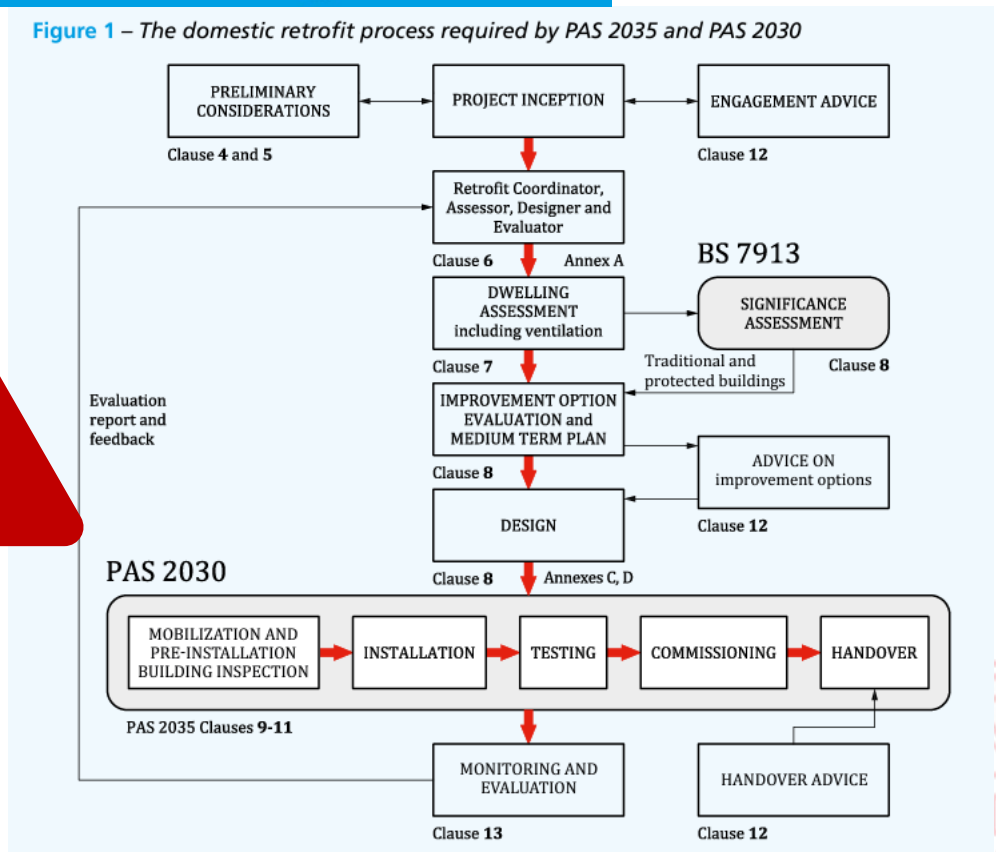
Innovation challenges

Procurement

- Framework procurement – prequalified contractors
- Early engagement with stakeholders
- The PAS2035:2023 process **THIS CAN BE TRICKY!**

PAS 2035:2023

Retrofitting dwellings for improved energy efficiency – Specification and guidance



Procurement

PPC2000 Standard Form of Contract for Project Partnering

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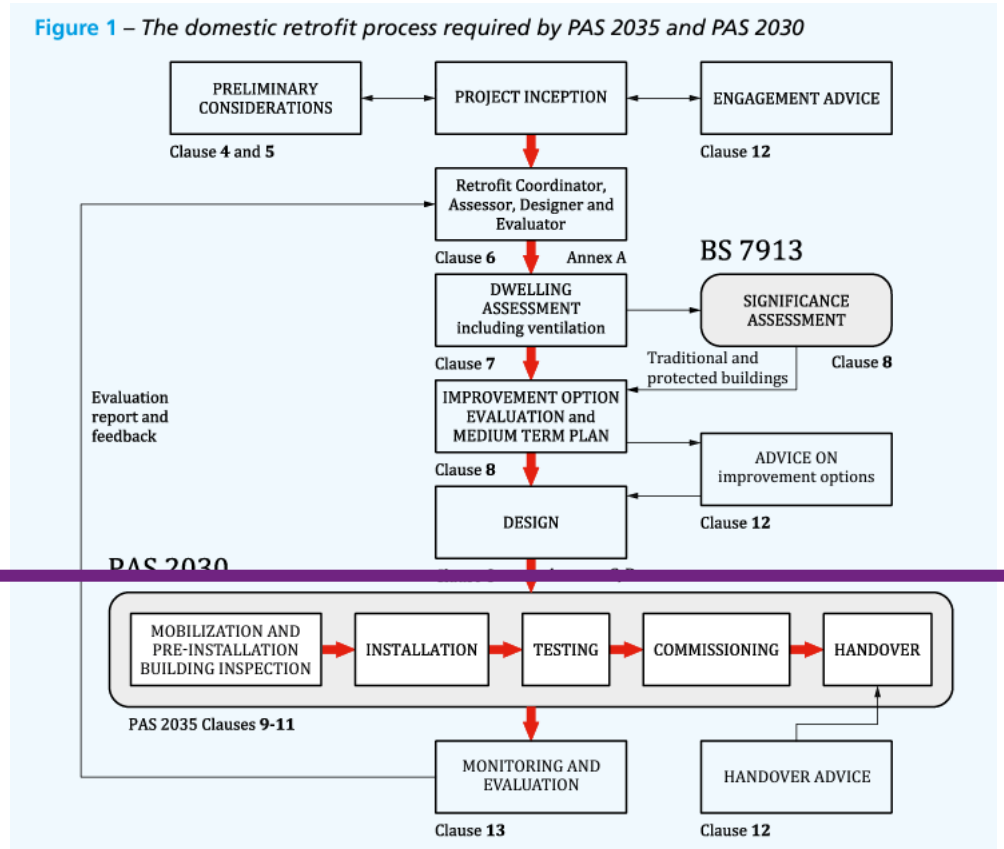

Pre-Construction

Early Engagement

Initial Project Proposal

Design Development

Cost Programme Quality

Market testing

Detailed Project Proposal

Mobilisation

Construction

Handover

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The Procurement Act 2023

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THE PROCUREMENT ACT 2023

Essential Guide

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The Procurement Act 2023

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THE PROCUREMENT ACT 2023
Essential Guide

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Live in October 2024

Pipelines

a central **digital** platform

commercial frameworks will be more **flexible**

prompt payment

embed **transparency**

help suppliers work more **collaboratively**

consider the barriers facing **smaller businesses**

‘needs to be broader **cultural and behavioural change** to make the biggest difference’

Training for procurers in contracting authorities

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‘needs to be broader **cultural and behavioural change** to make the biggest difference’

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Policy

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NHDG

National Home Decarbonisation Group

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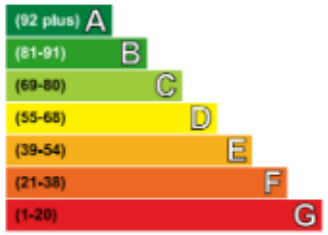
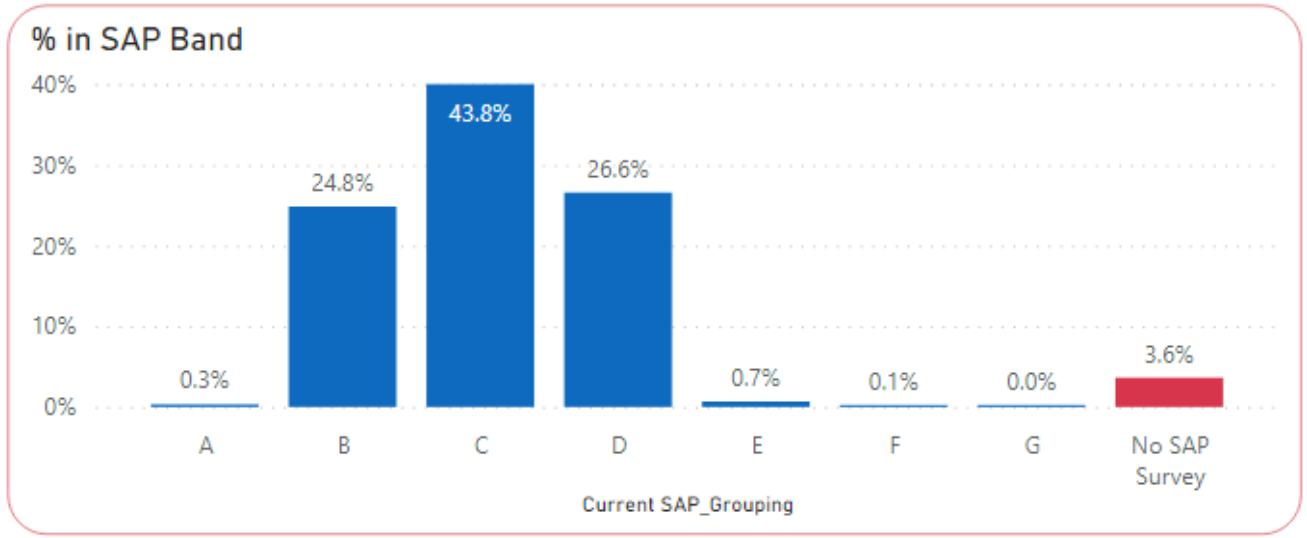
EPC RDSAP v SAP10

73.31

Average of Current SAP_Rating





EPC Band Number	
A	39
B	3066
C	5413
D	3280
E	83
F	13
G	3

EPC C or above	8,518	72%
EPC D-G	3,379	28%

Obviously, this has funding implications, but is the DATA accurate?

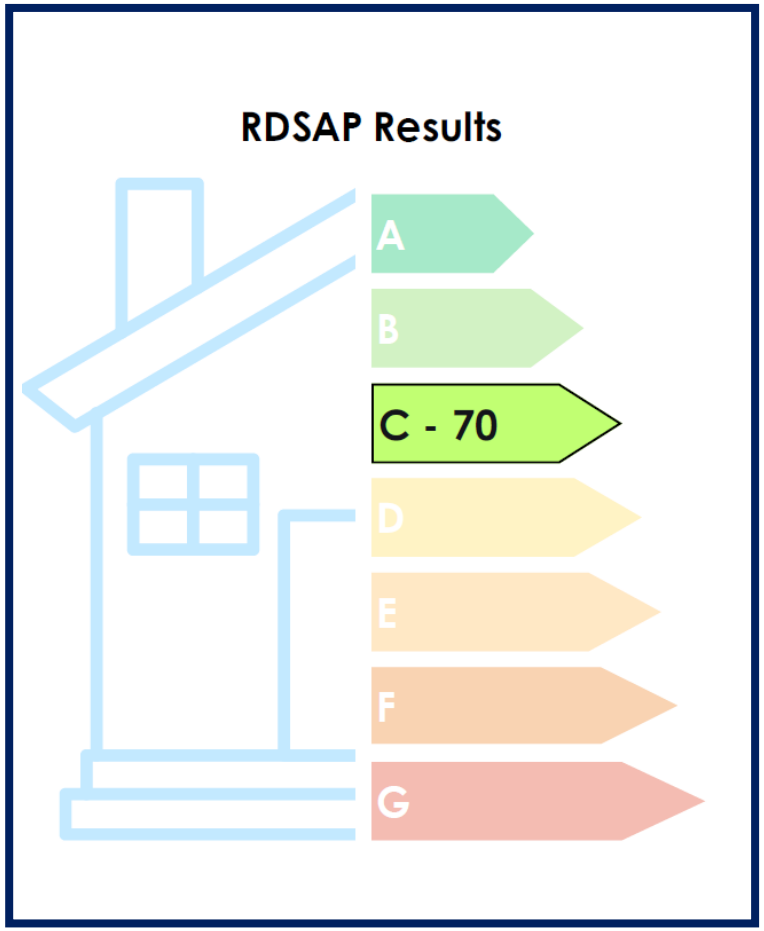
EPC RDSAP v SAP10

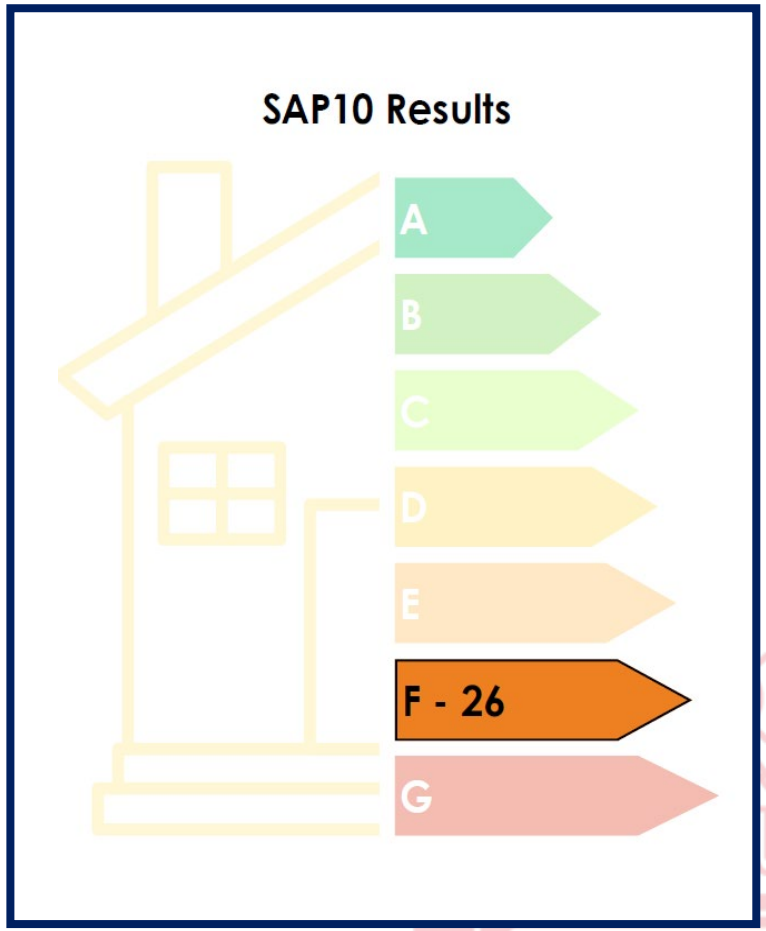
- The **same** ground floor flat – solid wall construction
- Two **very different** results

RDSAP – Assumed ratings

SAP10 – Calculated results

A more **accurate** and **insightful** assessment of the **Energy demands and CO2 emissions**





Digital modelling and asset strategy

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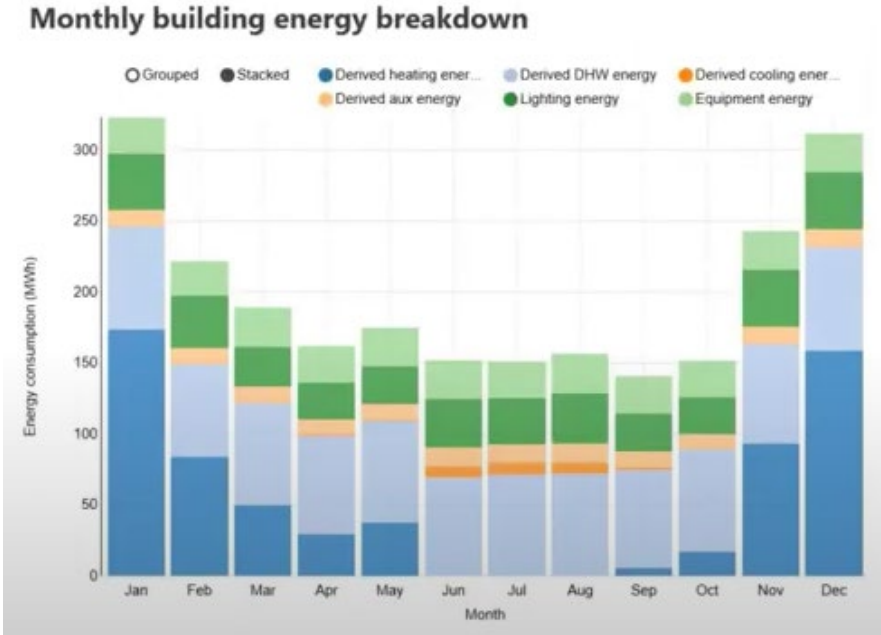
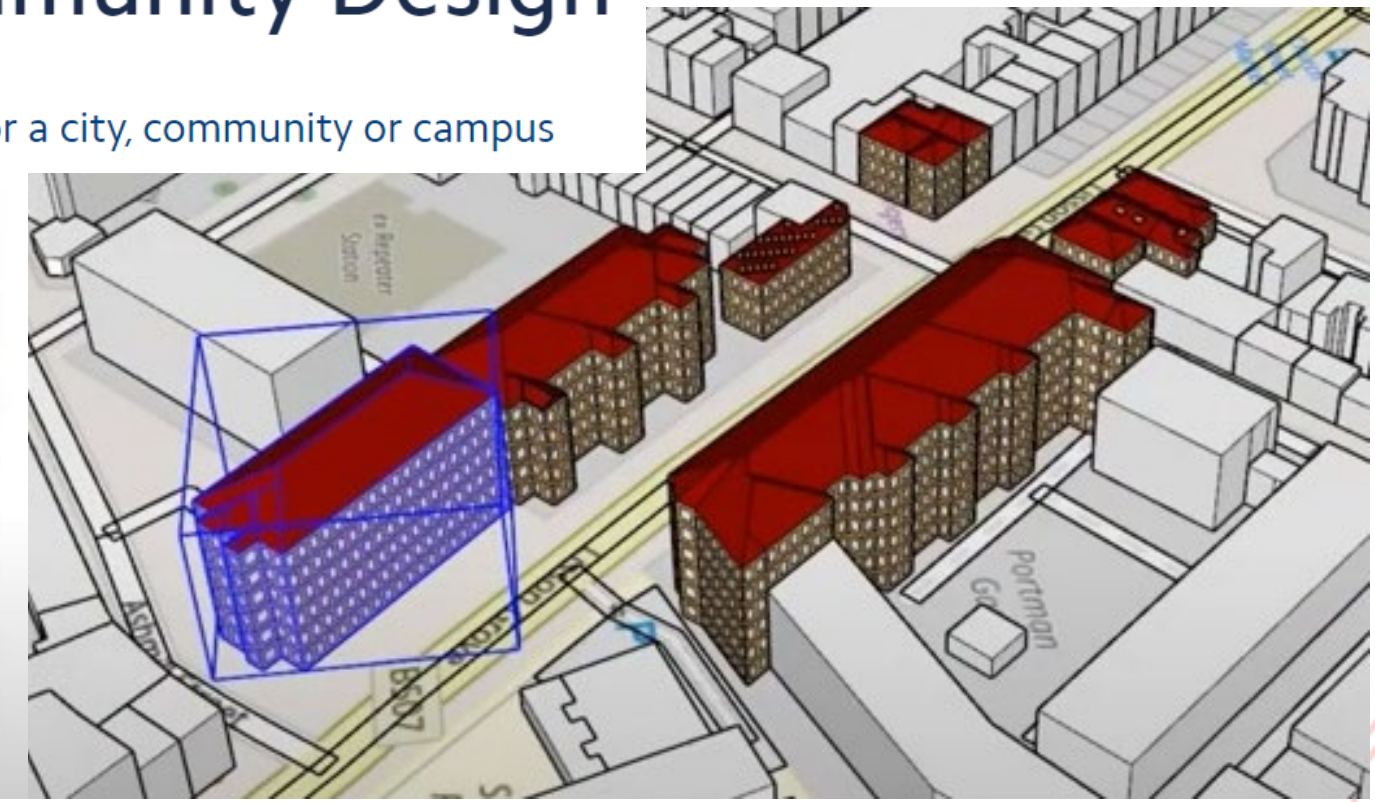
IES

iCD

Intelligent Community Design

Create a sustainable masterplan for a city, community or campus





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Lessons learned

Proposed

~~EWI with brick slip~~
New windows
Loft insulation
New warm roof communal area
Draught proofing
New doors
New ASHP
New ventilation fans

UNIT COST £57,541

EPC ‘E’ to low ‘C’

Alternative

PV panels
New windows
Loft insulation
New warm roof communal area
Draught proofing
New doors
New ASHP
New ventilation fans

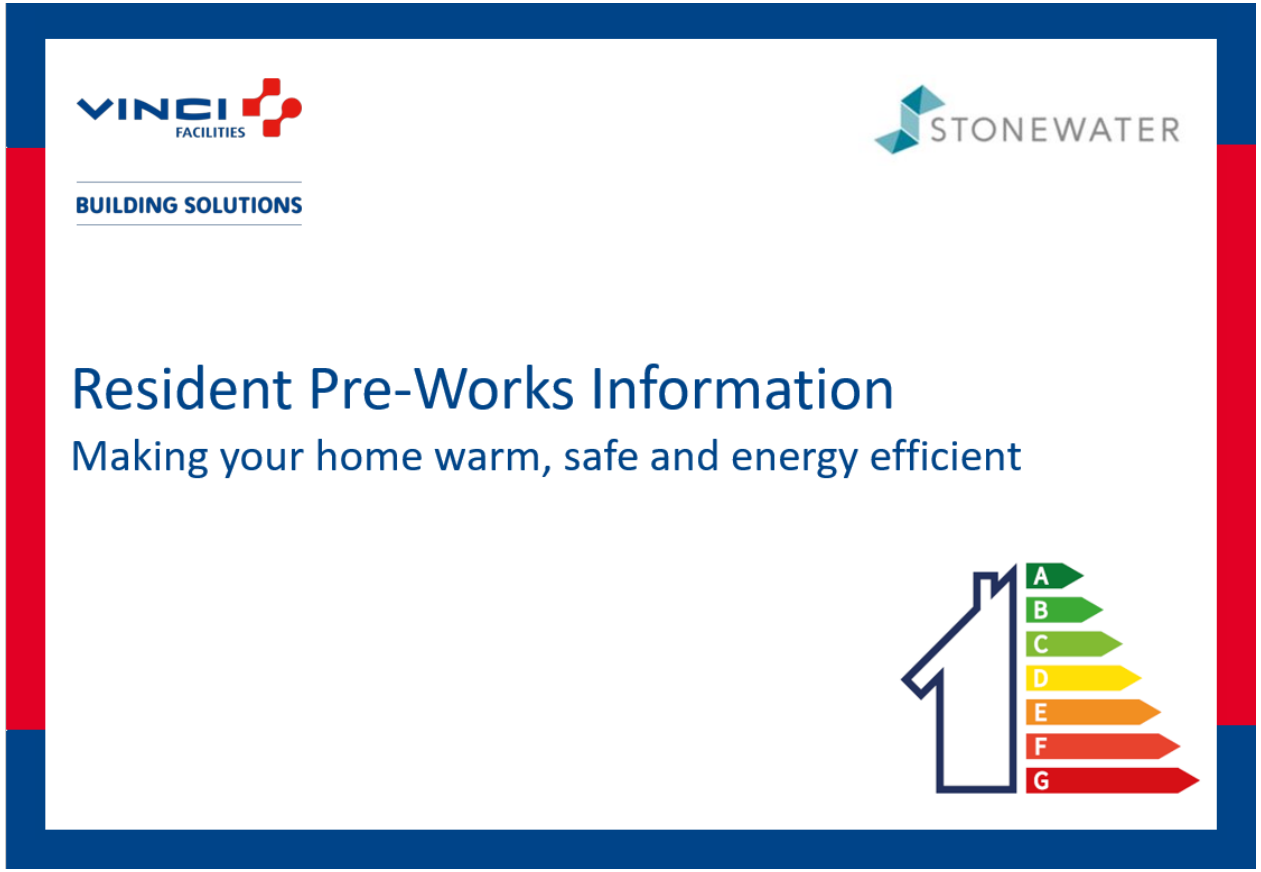
ECO Grant £9,400

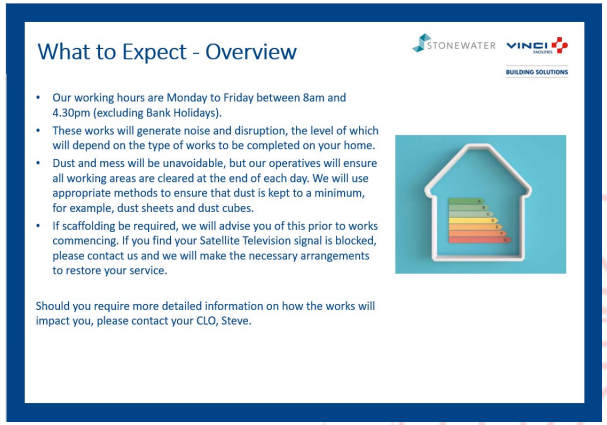
UNIT COST £35,464

EPC ‘E’ to low ‘B’

Resident engagement

- Resident liaison & Pre-works information pack
- Social Value Plan
- Dedicated RLO
- Soft landings
- Safeguarding - mould





Resident engagement

What to Expect – Cavity Wall Insulation

- The extent and type of insulation will be dependent on your property type, your CLO will provide information on the type of insulation and confirm whether it is required for your home.
- If your house was built post 1920 it is likely to have 'cavity walls'. The cavity wall is made of two walls (an internal and an external). The gap between these walls is known as the cavity.
- To insulate your cavity walls, we will drill small holes at regular intervals around the outside of your home. Using specialist equipment, we will blow insulation into the cavity and the holes will then be filled.
- Some noise and dust from brickwork should be expected.
- New cavity wall insulation usually takes around a day to complete, dependent on the size of your home. Should your home already have existing insulation which needs to be replaced this will take around 5 days to complete.

This process should cause minimal disruption and will make your home warmer and in turn reduce the need for heating.

Information

safe and energy efficient

What to Expect - Overview

- Our working hours are Monday to Friday between 8am and 4.30pm (excluding Bank Holidays).
- These works will generate noise and disruption, the level of which will depend on the type of works to be completed on your home.
- Dust and mess will be unavoidable, but our operatives will ensure all working areas are cleared at the end of each day. We will use appropriate methods to ensure that dust is kept to a minimum, for example, dust sheets and dust cubes.
- If scaffolding be required, we will advise you of this prior to works commencing. If you find your Satellite Television signal is blocked, please contact us and we will make the necessary arrangements to restore your service.

Should you require more detailed information on how the works will impact you, please contact your CLO, Steve.

Retrofit and social change

Remedial work to England's poorest housing could provide

£135,500,000,000

societal benefits over the next 30 years

NHS savings

Lower energy bills

Higher asset values

Improved economic opportunity

£9bn to improve 2.4m poorest homes in England would pay for itself within 9 years based **solely on NHS savings**

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Resident, Mrs Jones commented:

"I would like to personally thank all the people involved in the works on my home. I returned home after a 12-hour shift and sat in my car staring at my house. I couldn't believe it was my house – the work carried out is truly amazing! It's been completed to an exceptionally high standard, and ***the house is so much warmer****."*

Delivering retrofit responsibly, sustainably, and at scale.
A main contractor perspective.

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BUILDING SOLUTIONS

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Technical Procurement Office

Addressing the retrofit skills & knowledge gap.

CHRIS FERGUSON

GROUP TECHNICAL MANAGER

Current sector status and the challenges we face

- Buildings are responsible for **16 per cent of UK greenhouse gas emissions**.
- The sector currently **employs 1.3 million people** in the UK and most of these jobs are located in London (209,300), the Southeast (209,500) and the East of England (171,900).
- To meet the UK's climate target, **29 Million homes** (almost all the UK's current housing stock) needs to be retrofitted with energy efficiency measures and low carbon heating systems.
- UK government's target set to retrofit all homes to EPC band C energy rating and to phase out the sale of gas boilers and cut building emissions target of **68% by 2035.**
- Achieve net zero carbon emissions by **2045 in Scotland and 2050 in England and Wales** in line with government policy.
- Quality control within the **energy efficient measures** installed and the quality of the relevant qualifications to carry out the installations and consult on them.
- Urban myths and **misconceptions.**

What skills do we currently have and where is the shortfall?

The skills challenge

- Analysis indicates that 750,000 construction workers could retire or be on the verge of retirement by 2035 leaving a growing hole in the labour market.
- Approximately 300,000 more skilled workers are required, which can only come from a mix of new entrants and upskilling existing workers.

What's required?

- In 2020, there were an estimated 1,800 heat pump installers, compared to 130,000 boiler installers. Whilst this is improving this still leaves a significant gap in heat pump installation capacity, given that over 16,000 heat pump installers will be required on average each year.
- 35,800 specialists who could install energy efficient products, including insulation and glazing.
- 2,900 specialists in the solar PV installation sector.
- 6,700 specialists in renewable energy installation.

The impact

- We simply don't have enough qualified specialists and general trades people who can deliver the 500,000 retrofits and 600,000 heat pump installations required each year until 2025 and 2035 respectively to meet Net Zero goals.
- Skills shortage have contributed to the delay of the Future Homes Standard to 2025, with developers claiming they do not have the staff or skills to meet it earlier.

Barriers to upskilling our existing workforce

- One of the greatest barriers to labour force engagement with upskilling is encouraging existing workers (most are SMEs) to stop work, and therefore earnings potential, for a period of training.
- Despite increased government funding relatively low uptake has been seen from the sector outside of main contractors.
- Showing the long term benefit of upskilling is a challenge when changing government commitments, milestones, and previous failed schemes have eroded confidence in SMEs that additional training is worth the investment.
- With the shortage of skilled workers there has been enough work available in the building industry without the need to upskill to be a skilled retrofitter.
- Education institutions struggle to attract experienced trade professionals to enter teaching as it is far more lucrative to continue working in the sector.
- Short term funding schemes creates a ‘chase the money’ reaction rather than a more strategic approach

How a quality approach is needed to bridge the gap

- The defined roles under PAS 2035 and 2038 are in increasing demand but there are too few people trained
- Retrofit Assessor, Coordinator, Designer, Evaluator and Advisor are all essential to PAS 2035 standards to ensure the work of retrofit installers meet the required standards to avoid poorly executed work, which is costly to rectify and fuel a lack of trust in the public.

Addressing this challenge requires a quality led approach to training our people

- These PAS courses are readily available, but there is rising concern that low entry requirements and online only study options can lead to individuals gaining important retrofit qualifications with little to none previous industry experience.
- Example – the prerequisite of the Retrofit Coordinators role is to be a Domestic Energy Assessor (DEA), this is available online with no prerequisites, meaning after a 5-day online course the DEA could be making live assessments as a part qualified Retrofit Coordinator.
- Consider the qualification route for your own staff, and how this can be enhanced with practical on-site experience to ensure the sector produces well trained and experienced retrofit specialists.

How can Government help bridge the gap?

- Government needs to create clear market signals, clear policies and offer meaningful funding so that the private sector can invest in new skills to deliver on the retrofit challenge.
- SMEs require stronger incentives to invest in re-training and upskilling their workforce.
- Long term funding pots are needed that focus government money on value for money energy efficient measures.
- Introduce multiyear funding allocations for further education so that curriculum can be set for more than the current academic year, thus promoting more confidence that the courses will not get pulled because of lack of funding in subsequent years.
- Ensure a quality standard is in place for retrofit training courses to ensure qualification AND wider competence

How collaboration with education can help bridge the gap

- Local Skills Improvement Fund (LSIF) has provided the Education sector with funding to address the skills shortage until 2022
- HOWEVER, Construction sector collaboration with the education sector is crucial to both bringing the next generation and upskilling the existing workforce.
- Through Collaboration between education, local businesses, councils, homeowners, awarding bodies and most importantly the learner - academies and Institutes can design and implement courses that truly tackle the green agenda and supporting the drive to Net Zero.
- By ensuring the whole supply chain is represented in the design of the course content and that the outcomes allow the learner (whether upskilled or apprentice) to be employable in the green market immediately.

Understanding your learner audience

- It is essential to engage learners at a young age e.g. by inviting secondary schools onto site where real world installations are carried out or by enabling visits from industry to peak early interest.
- Consider that our today's young people have varying needs when it comes to learning, the care should be taken to identify and accommodate these needs to ensure the learner flourishes and succeeds.
- Addressing these learning barriers early will be pivotal in engaging these learners in later career choices.
- This also applies to older learners and again, once their assisted learning needs are success will be seen.

Education and industry retrofit collaboration in practice

Retrofit collaboration in practice

- East Sussex College's Green Training Hub in partnership with OHM Energy has officially launched at Hampden Retail Park in Eastbourne, East Sussex.
- The Training Hub base is home to some of the College's adult upskilling provision and will also be utilised by 16-19 learners.
- The Centre will support Local Authorities, construction employers, homeowners and businesses to improve insulation and install green energy products in commercial properties and housing.
- East Sussex College is in an alliance with Hastings, Brighton, Worthing, Crawley College's and the supply chain, contractors and installers to initiate the Hub.

EAST SUSSEX COLLEGE
TRAINING HUB

Working towards a carbon neutral future.

OHM energy.co.uk

Other local initiatives.

- Allied to many college collaborations all over the UK are many localised collaborations which have a significant part to play in bridging the gap.

Some examples are signposted below; but engage with local colleges and universities to see what can be achieved!

- https://www.neynetzerohub.com/about/what-is-the-energy-hub/
- https://www.zerocarbonharrogate.org.uk/retrofit-resources-and-links
- https://www.weymouth.ac.uk/subjects/green-skills/
- https://www.gsenetzerohub.org.uk/

Greater South East Net Zero Hub

WEYMOUTH COLLEGE

north east & yorkshire NET ZERO HUB

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How will LHC help bridge the gap?

- LHC recognise that the support we can bring doesn't stop with making the framework!
- For those companies working towards PAS 2030 Certification, we will support your journey to achieve this.
- We will monitor existing and upcoming funding streams and advise and keep companies informed of key dates and changes.
- We will have regular webinars and networking events where best practice can be shared, networking and quality conversations can be had.
- We will assist in signposting any relevant updated technologies throughout this framework and where training is needed assist with signposting.

Retrofit and Decarbonisation (N9) is a platform for our long-term collaboration where your success is our success.

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Retrofitting at scale for net zero: case studies.

EUAN DURSTON
REGIONAL DIRECTOR

Retrofit at Scale for Net Zero
A Case Study

Euan Durston BSc March ARB RIBA CEPHD - Regional Director

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AN INTRODUCTION TO ECD ARCHITECTS

Our Team

We are specialists in the design of low-energy, low environmental impact buildings - cost effectively and to the highest quality standards. Our diverse team includes Architects, Technologists, Passivhaus Designers and specialist Retrofit Designers.

Retrofit Design at Scale – Large Scale Individual Buildings and High-Rise

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Wilmcote House, Portsmouth

James Riley Point, LB Newham

AN INTRODUCTION TO ECD ARCHITECTS

Our Experience

EnerPHit/Passivhaus Retrofit Projects…

ECO/LAD Projects…

SHDF Projects…

Energiesprong Retrofit Projects…

ECD are currently involved in the Retrofit of approx. 15,000 homes across the UK

Retrofit Design at Scale – Estates

Netherfields Estate, Milton Keynes

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Retrofit Design at Scale – Street-based Properties

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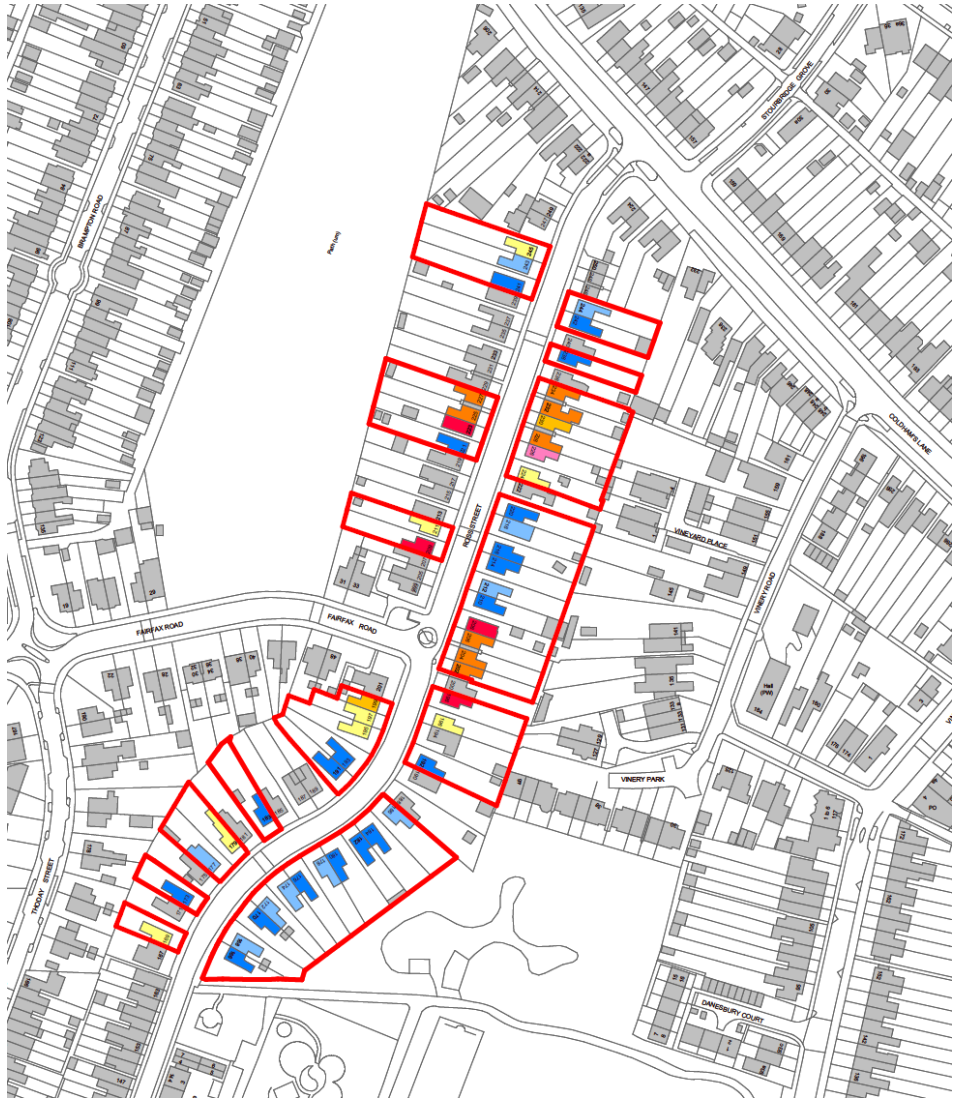
Ross Street and Coldhams Grove, Cambridge



AN INTRODUCTION TO ECD ARCHITECTS

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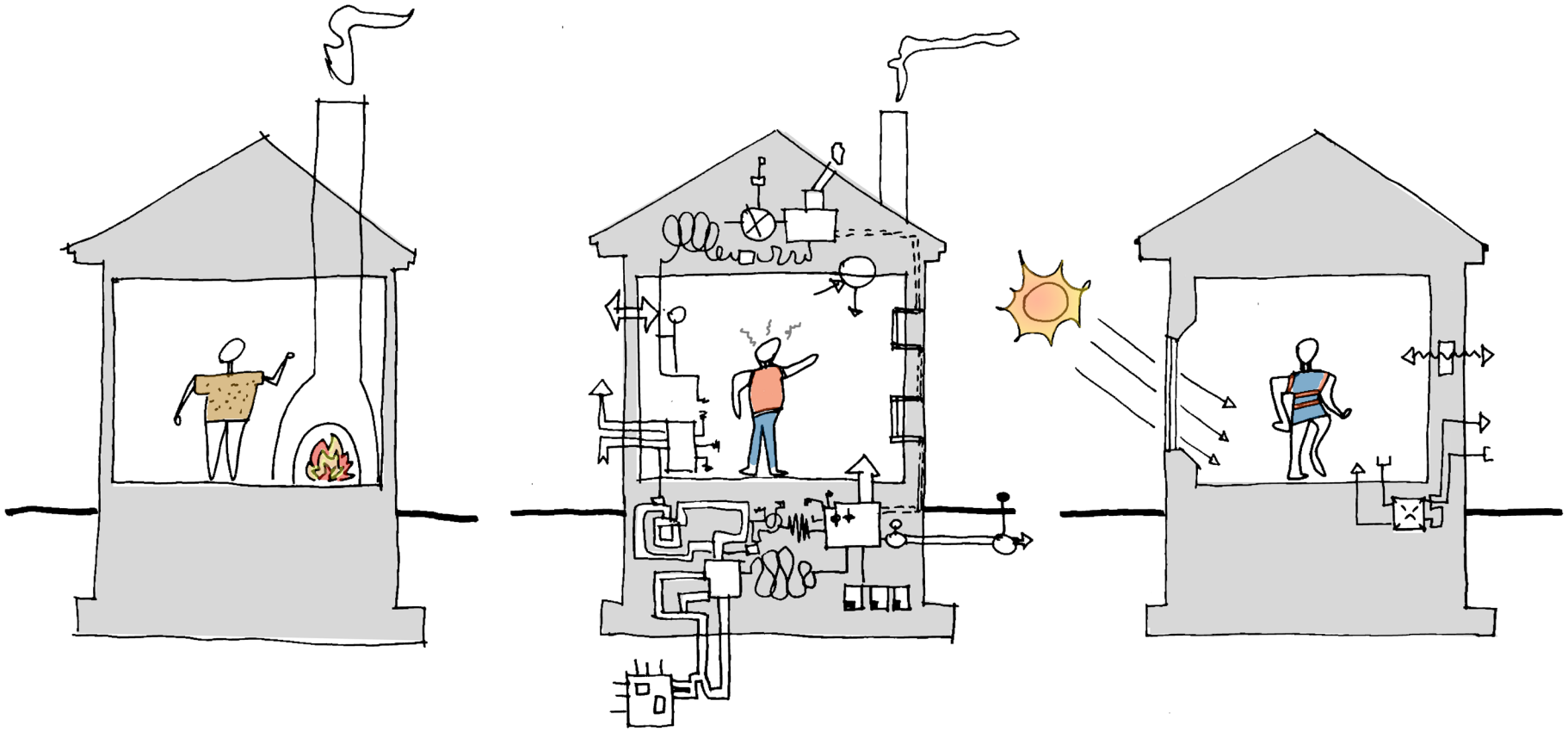

19th Century

20th Century

21st Century

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AN INTRODUCTION TO ECD ARCHITECTS

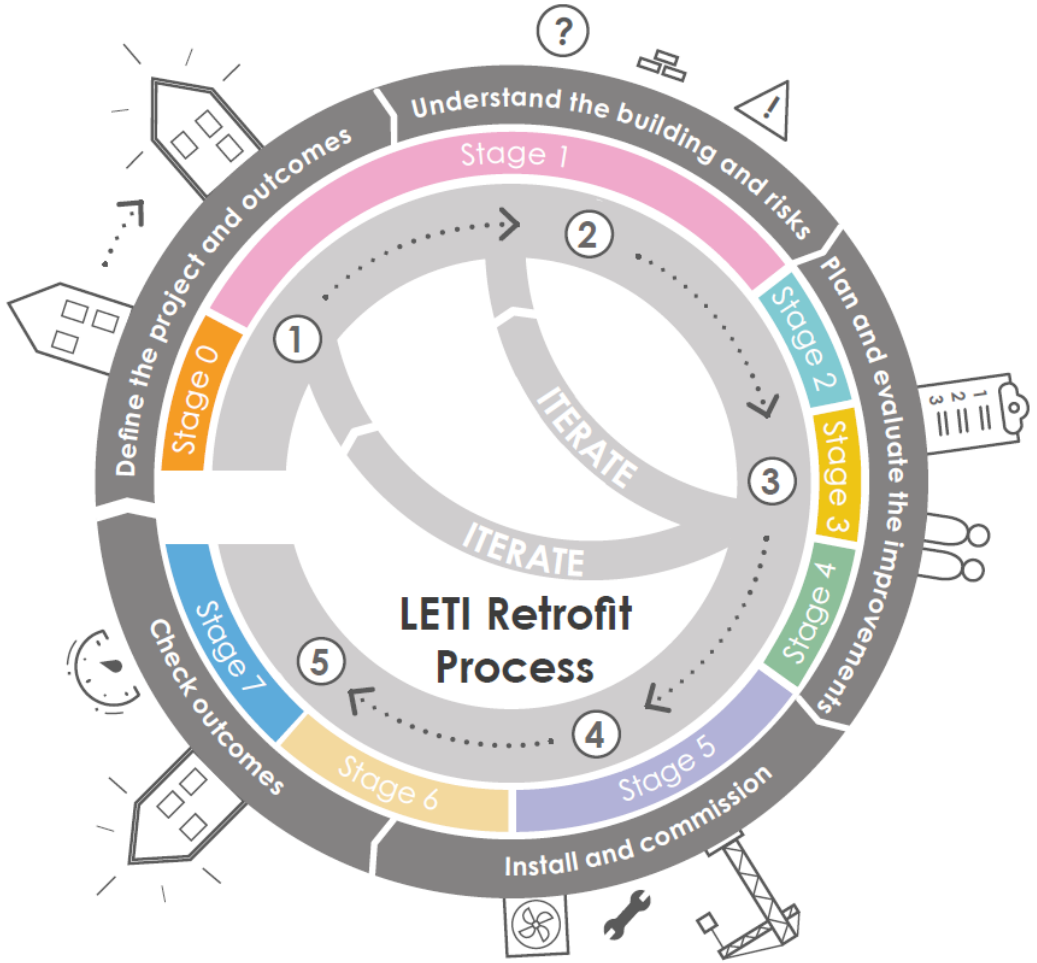
Our Approach

Keep it Simple!

Our Mission is to make a positive difference to people's lives – by creating sustainable buildings and places that work, endure and inspire.

The whole house Retrofit Plan must:

- → Set out key building information, constraints, risks, and opportunities.
- → Set out the key works proposed along with related strategies and details.
- → Set out the sequence of work.
- → Be appropriate in its level of detail and intervention for the project.
- → Include a plan for monitoring and reporting energy consumption.
- → Stay with the building.



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AN INTRODUCTION TO RETROFIT

Retrofit – Avoiding Risks and Unintended Consequences

Whole House Retrofit Plan

- **Principle 1:** Reduce energy consumption
- **Principle 2:** Prioritise occupant and building health
- **Principle 3:** Have a whole building Retrofit Plan
- **Principle 4:** Measure the performance
- **Principle 5:** Think big!
- **Principle 6:** Consider impact on embodied carbon

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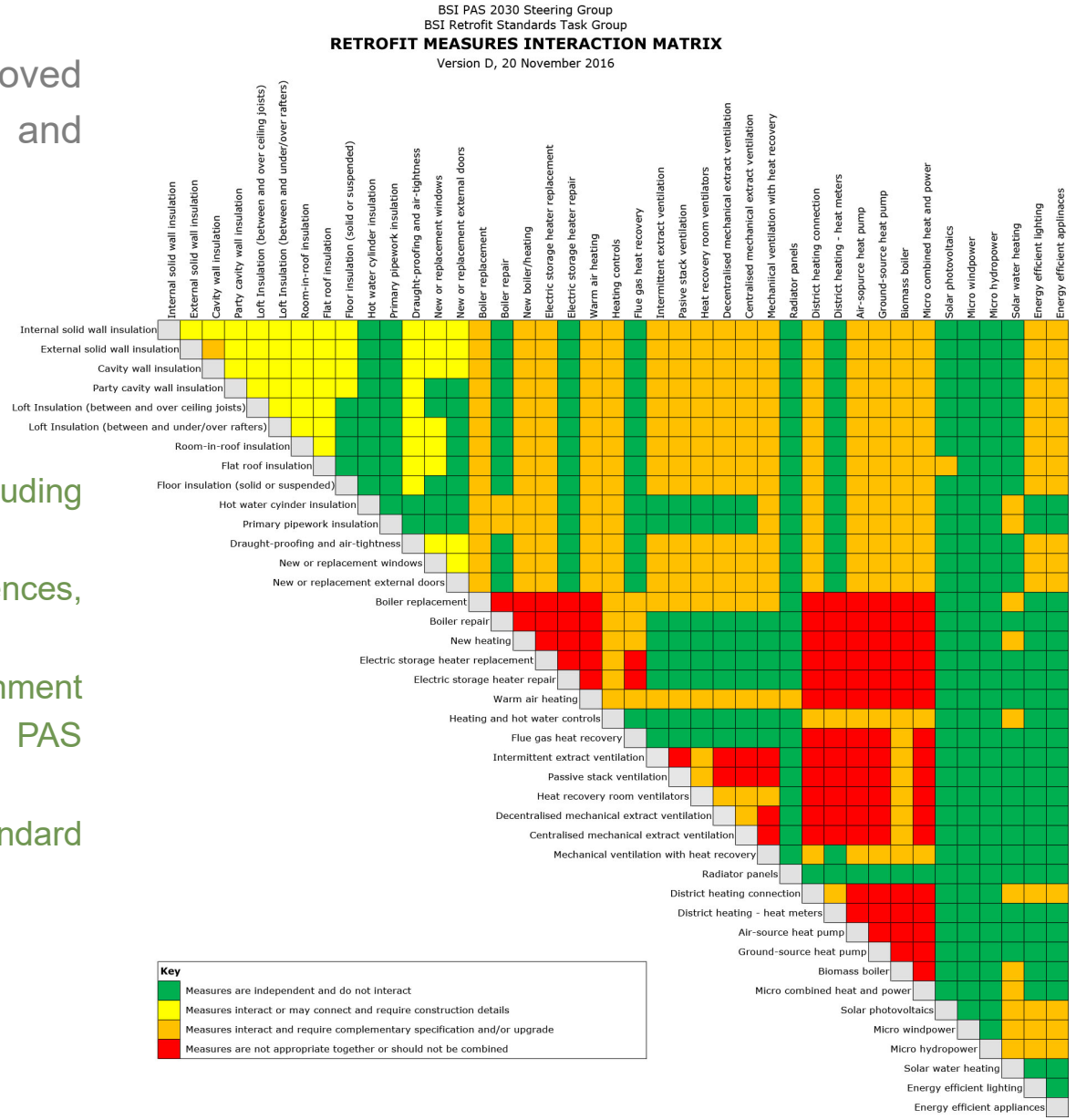
PAS 2035 – Managing the Risks

'Retrofitting dwellings for improved energy efficiency – Specifications and Guidance':

Key features:

- Fabric first
- Whole-house approach
- Quality assurance
- Accredited professionals (including Retrofit Coordinator)
- Aims to avoid unintended consequences, defects and performance gaps
- All projects receiving central government funding (SHDF) are required to be PAS 2035 compliant
- PAS 2030 is the corresponding standard for installers and contractors



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AN INTRODUCTION TO RETROFIT

Domestic Retrofit and PAS 2035

Understanding the interaction of different Retrofit measures

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PAS 2035 is a Process Guide – it is not a Performance Standard.

It can be used alongside other Retrofit Standards such as

Passivhaus/EnerPHit
- Standard

AECB Retrofit
- Standard

LETI
- guidance

Criteria	Passivhaus Classic new build	EnerPHit	AECB Retrofit	LETI Retrofit (Guidance)*
Space heating demand	≤ **15** kWh/m².year	≤ **20**, **25** or **30** kWh/m².year *or circa 20-60 for component approach*	≤ **50** kWh/m².year *with exemption up to 100*	≤ **50** kWh/m².year *exemption up to 60 with an exemplar target of* ***≤ 25***
Primary energy renewable (PER) / energy use intensity (EUI)	PER: ≤ **60** kWh/m².year	PER: ≤ **71** kWh/m².year *(Cool Temperate)* PER: ≤ **65.5** kWh/m².year *(Warm Temperate)*	*Not specified – fabric only*	EUI: ≤ **50** kWh/m².year *exemption up to 60 with an exemplar target of* ***≤ 40****. With grid storage losses included these become ≤ 65 with exemption up to 70***
Primary energy demand	≤ **135** kWh/m².year	≤ **135** kWh/m².year + (QH – 15) * 1.2	*Not specified, but direct electric & new gas boilers are only allowed by exception*	*Not specified*
Airtightness n50	≤ **0.6** ach @ 50Pa	≤ **1.0** ach @ 50Pa	≤ **2.0** ach @ 50Pa	≤ **2.0** ach @ 50Pa *exemption up to 3 with an exemplar target of* ***≤ 1.0*** *ach @50pa*
Summer overheating	Max **10%** > 25°C	Max **10%** > 25°C	Max **10%** > 25°C	*Not specified*
Surface temperature (inc. windows)	> **17°C**	> **17°C**	> **17°C**	*Not specified*
Surface temperature coefficient	Cool-temperate: **0.7** fRsi*** Cold: **0.75** fRsi Warm: **0.65** fRsi	Cool-temperate: **0.7** fRsi Cold: **0.75** fRsi Warm: **0.65** fRsi	>**0.75** fRsi	*Not specified*
Ventilation	**30** m³/hr.person	**30** m³/hr.person	**30** m³/hr.person	*MVHR specified, rate m³/hr.person not specified*
How is this standard demonstrated?	**PHPP**	**PHPP**	**PHPP**	**PHPP** or simplified elemental approach

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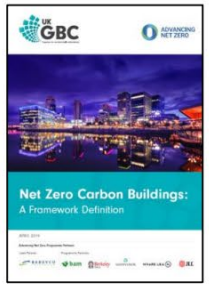
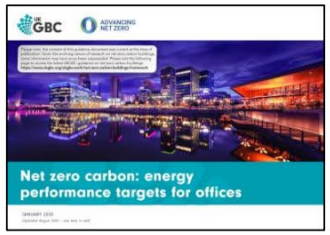
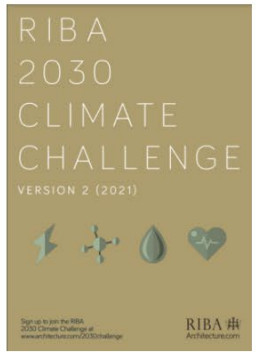
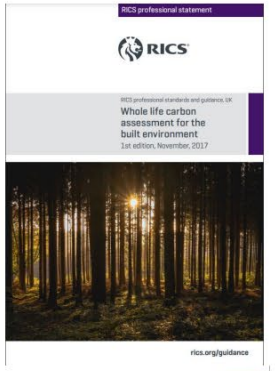
Domestic Retrofit and PAS 2035

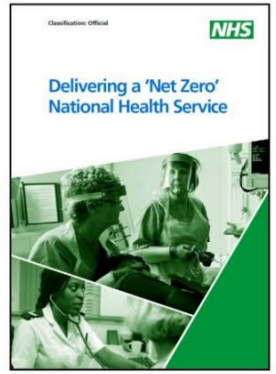
Standards are subject to independent Quality Assurance and rely on measurement of real-world 'as-built' building performance to close the performance gap

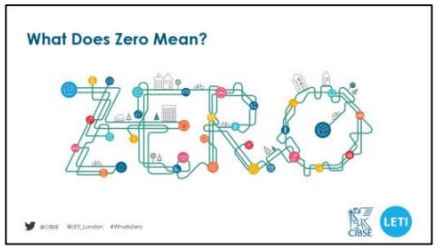






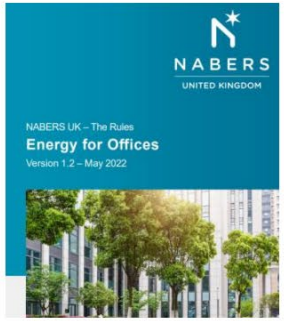


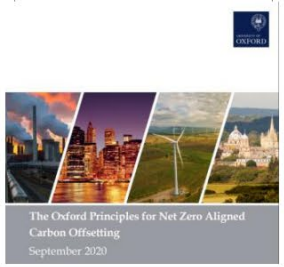




Upfront Carbon, A1-5 (exc. sequestration)

	Band	Office	Residential	Education	Retail
LETI 2030 Design Target	A++	<100	<100	<100	<100
	A+	<225	<200	<200	<200
	A	<350	<300	<300	<300
LETI 2020 Design Target	B	<475	<400	<400	<425
	C	<600	<500	<500	<550
	D	<775	<675	<625	<700
	E	<950	<850	<750	<850
	F	<1100	<1000	<875	<1000
	G	<1300	<1200	<1100	<1200





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AN INTRODUCTION TO NET ZERO STANDARDS

Industry Response to Net Zero

In the absence of clear UK regulations there is a bewildering array of ever evolving standards, benchmarks, tools and methodologies available which vary across UK nations, regions and cities...

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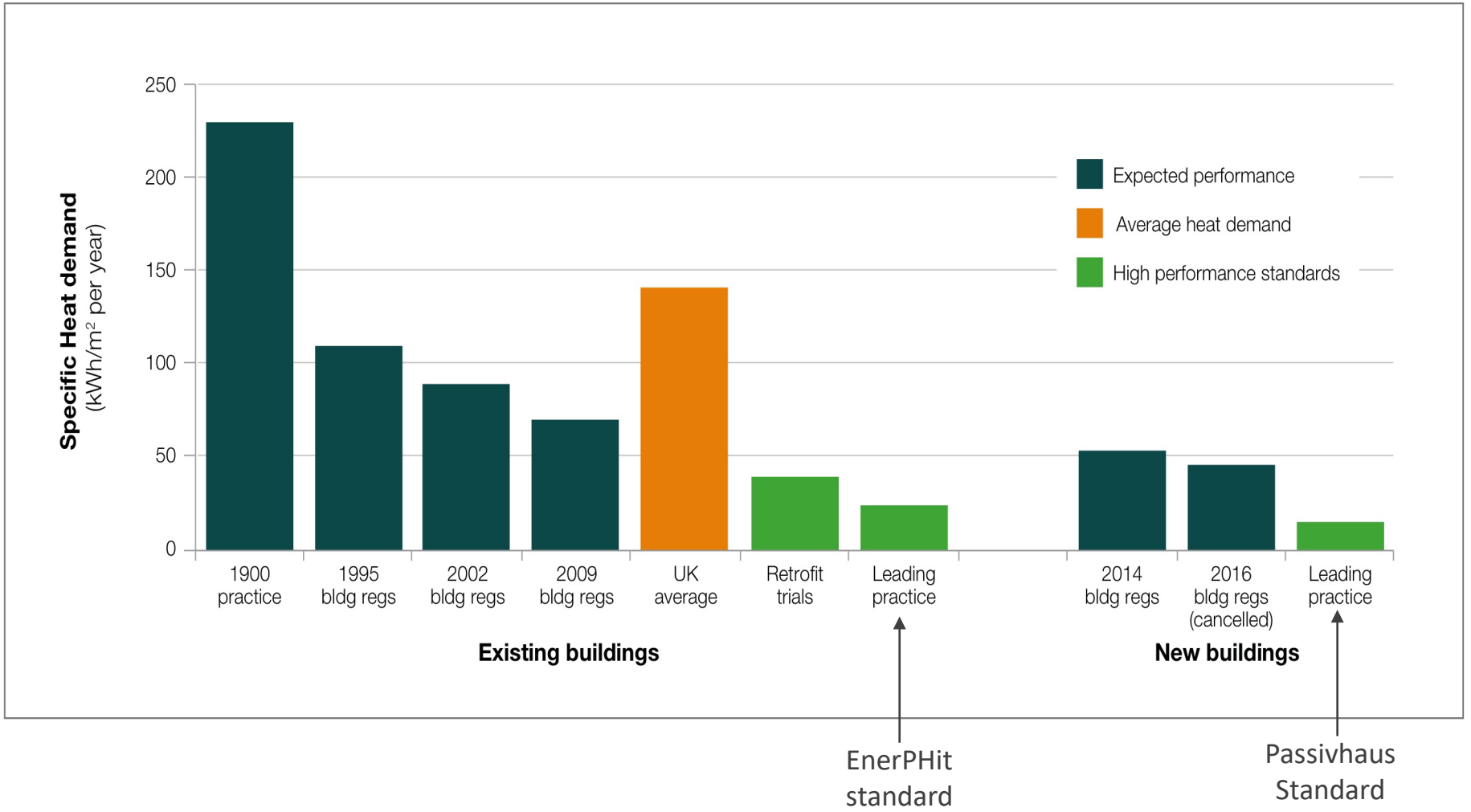
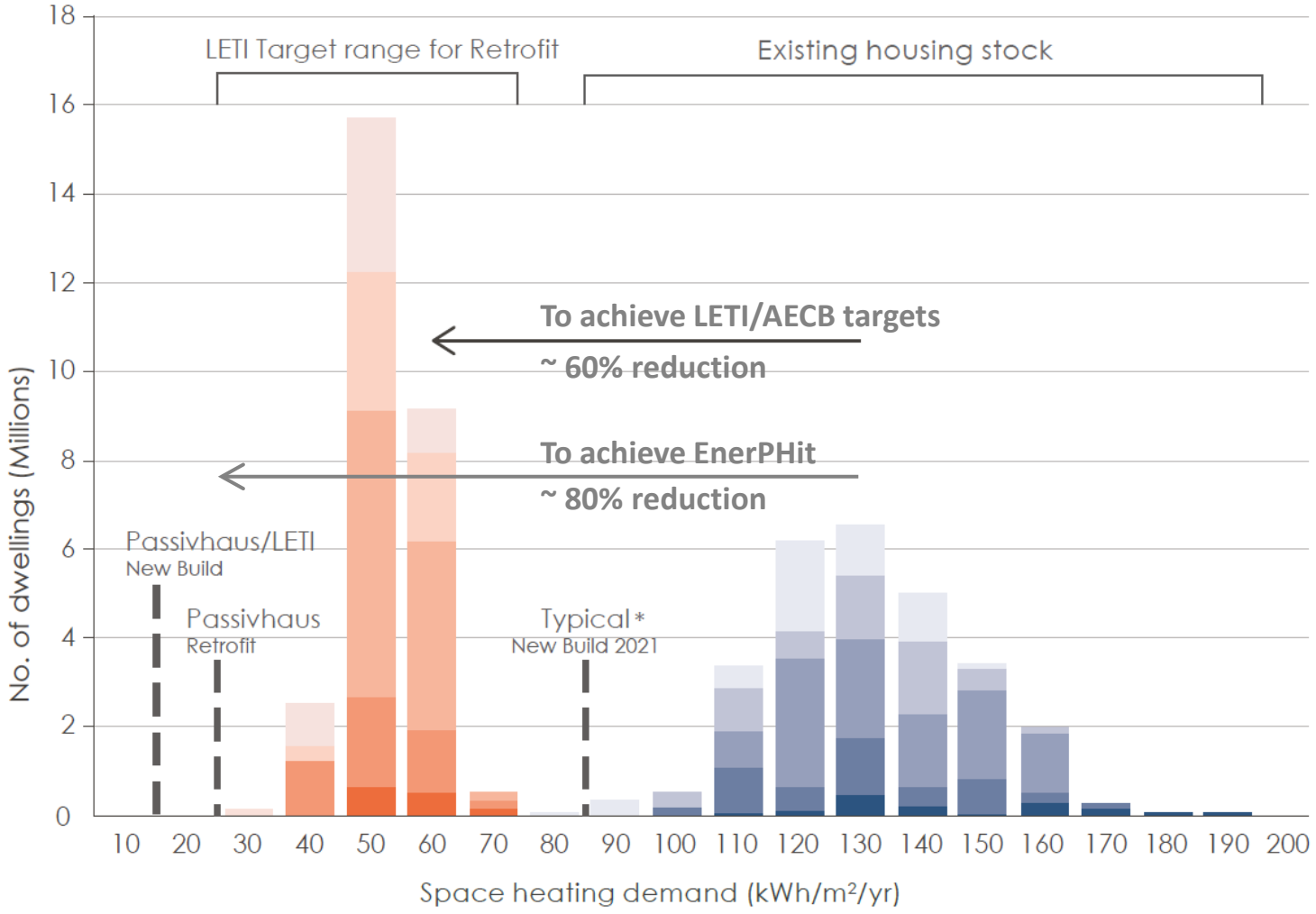
AN INTRODUCTION TO NET ZERO STANDARDS

Defining Net Zero

RETROFIT – Where are we starting from?





* Includes for an assumed performance gap

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Defining Net Zero

RETROFIT – Where are we starting from?

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Energy efficient

Best practice retrofit will reduce peak heat demand, enabling homes to shift to zero carbon electric heating.

£££ **Improving energy efficiency is key to reducing bills, especially as electricity is more expensive then gas.**

Our peak gas demand for heating and hot water is currently 170GW on the coldest day. However, our electricity grid can only provide 60GW now and perhaps 95GW in 2050. We need to reduce demand significantly to achieve the shift to clean electricity.

Over **3.3M** UK households live in fuel poverty, that's **11%** of all homes.

	Energy consumption	Emissions	Energy bills
Average UK home	214 kWh/m²/yr	2,035 $tCO_{2\,eq}$	£1,156 £/ yr *(typically with gas boiler)*
Retrofitted home that meets LETI spec	50 kWh/m²/yr	160 $tCO_{2\,eq}$	£829 £/ yr

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AN INTRODUCTION TO NET ZERO STANDARDS

Defining Net Zero

Why is it necessary when we can decarbonize the grid?

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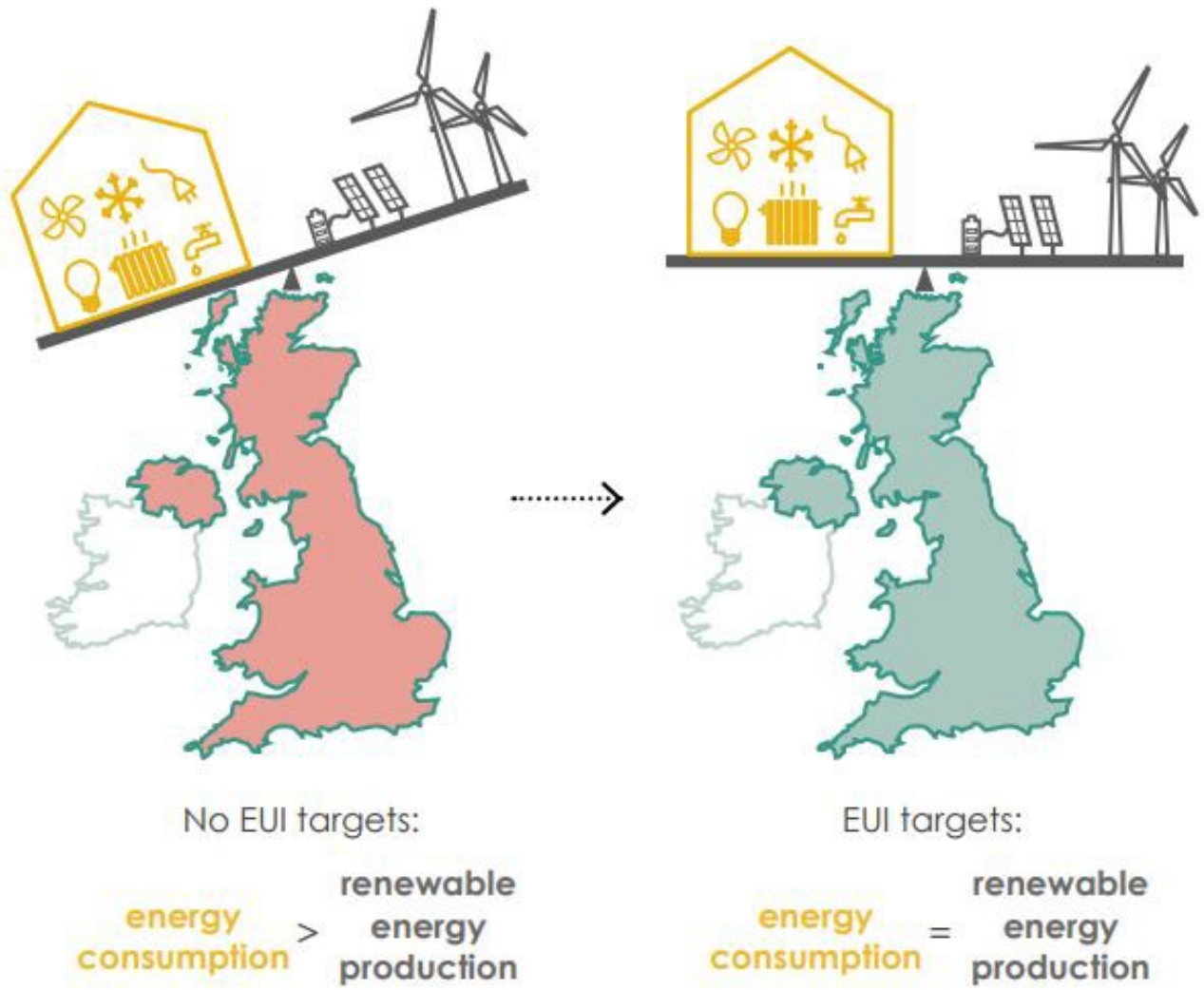
AN INTRODUCTION TO NET ZERO STANDARDS

Defining Net Zero

Approach:

1. Reduce the space heating demand and Energy Use Intensity as far as practicable.
2. Remove fossil fuel heating sources and replace with low carbon alternatives (eg. Heat pumps).
3. Generate renewable energy on site where feasible.



Measurement – Heat Losses vs. Heat Gains

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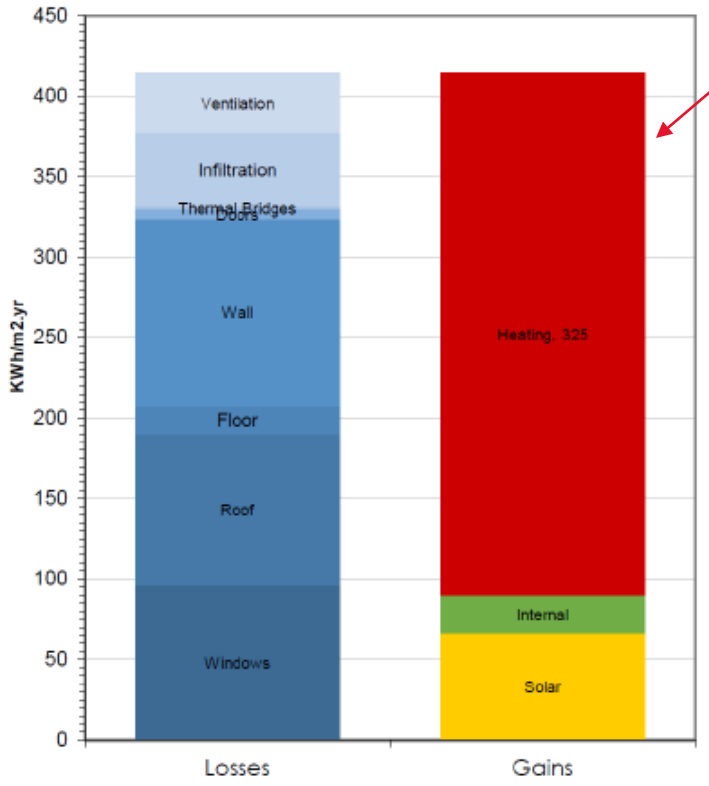
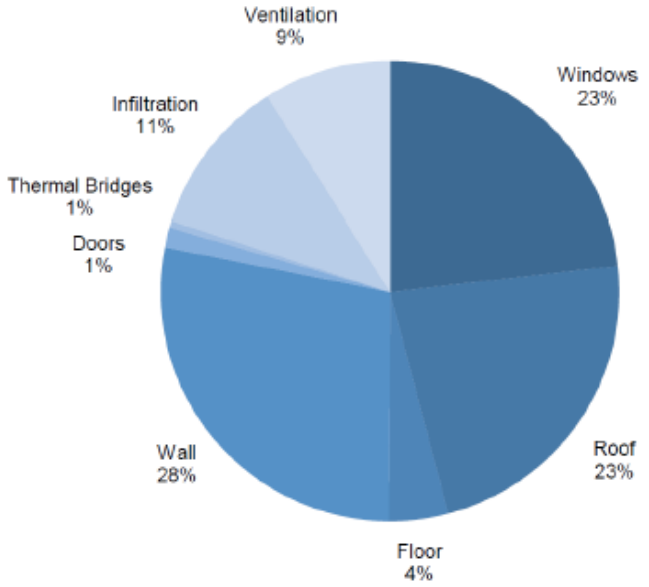
Retrofit Scenarios modelled in PHPP

This is the Space Heating Demand



Baseline (current) – heat losses and heat gains



Make-up of heat losses and heat gains

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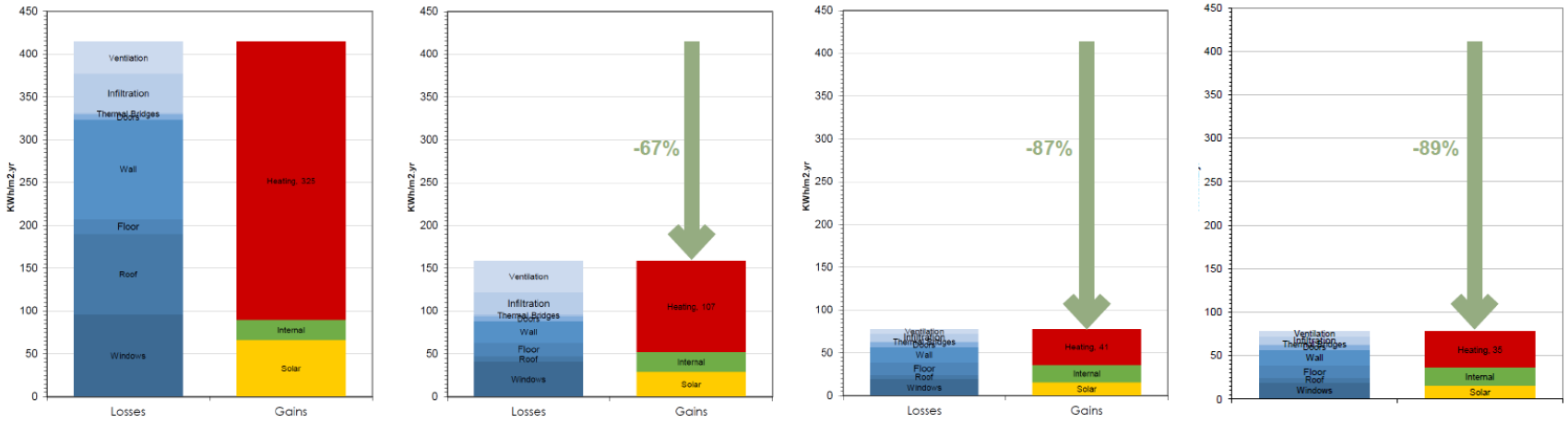
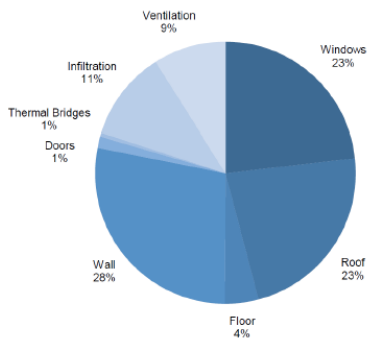
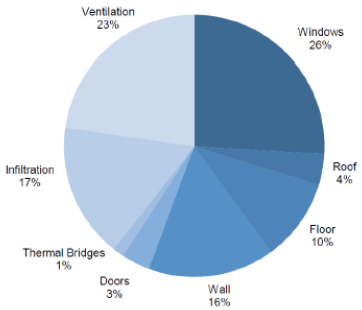
Setting the right targets for the project



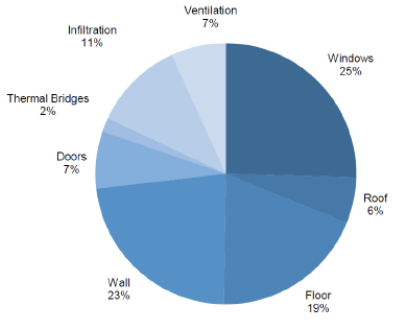
Baseline (current) | Building Regs Part L | AECB Retrofit Standard | EnerPHit Standard[PHit]



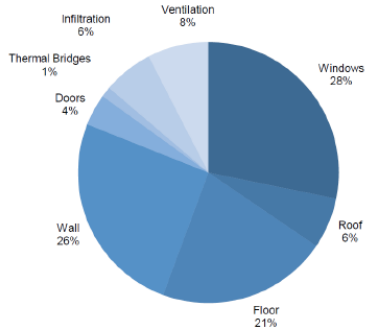
Baseline Model - current situation
Heat losses by component type



Retrofit Scenario 1 - Building Regulations
Heat losses by component type



Retrofit Scenario 2 - AECB Standard
Heat losses by component type



Retrofit Scenario 3 - EnerPHit -
Heat losses by component type

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Retrofit Scenarios modelled in PHPP

Here we are comparing space heating demand reductions to achieve Building Regulations Part L, AECB Retrofit Standards and EnerPHit Standard

Case Study: Wilmcote House

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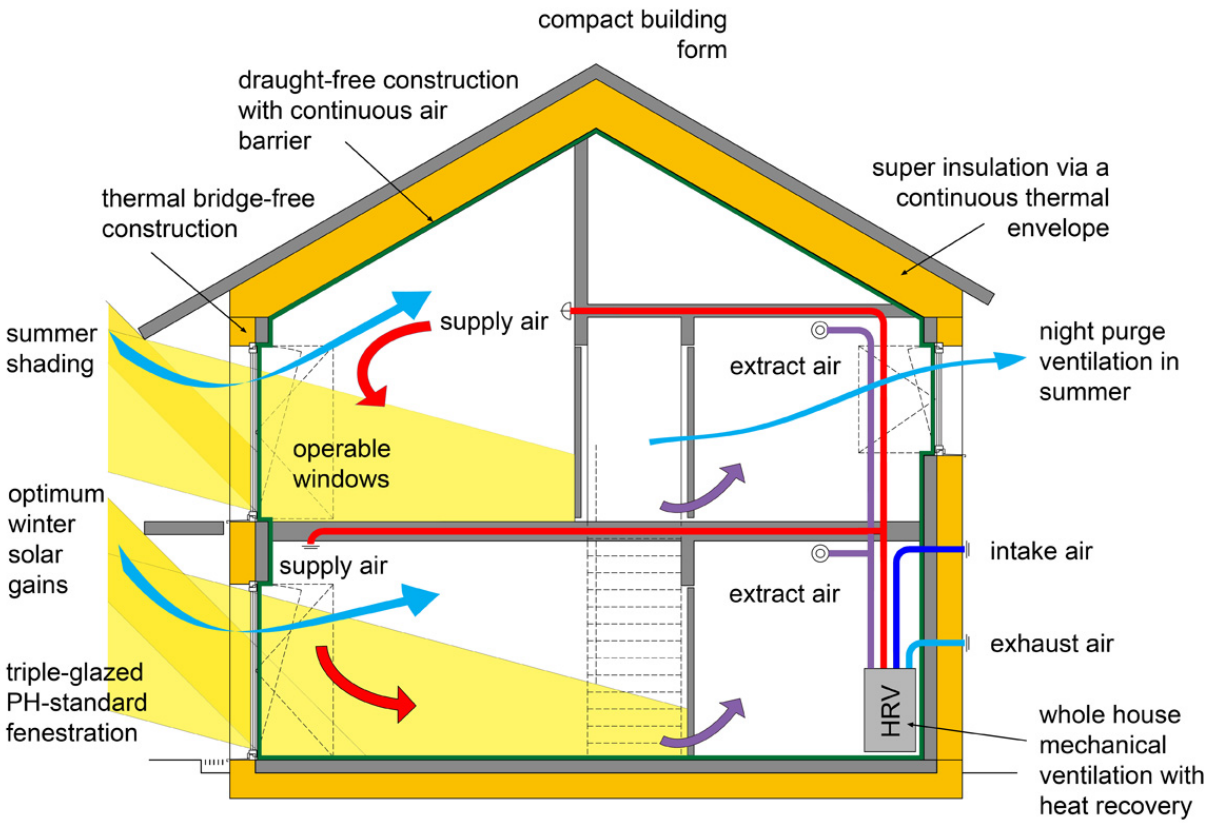
EnerPHit/Passivhaus Retrofit Standards

EnerPHit is the Passivhaus equivalent for Retrofit



Certified Passive House
Passive House Institute

EnerPHit
Certified Retrofit
Passive House Institute

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AN INTRODUCTION TO NET ZERO STANDARDS

Defining Net Zero

- Fabric First Approach
- Performance Gap
- Quality assurance
- User comfort
- Improved air quality

In practice:

- Continuity of insulation
- Good quality components
- Adequate ventilation
- Good airtightness
- No thermal bridges

EnerPHit – Space Heating Method

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AN INTRODUCTION TO NET ZERO STANDARDS

Defining Net Zero

Criteria	Passivhaus classic new build	EnerPHit
Space Heating Demand	≤ **15** kWh/m².a	≤ **20** / ≤ **25** / ≤ **30** kWh/m².a *
Primary Energy Demand	≤ **135** kWh/m².a	≤ **135** +(QH – 15) **
Primary Energy Renewable[15]	≤ **60**	≤ **71** (Cool temperate) / ≤ **65.5** (Warm temperate)
Airtightness n50	≤ **0.6** ach @ 50Pa	≤ **1** ach @ 50Pa
Summer overheating	Max 10% at > 25°C	Max 10% at > 25°C
Surface temperature	> 17°C	> 17°C
Ventilation	30 m³/hr.person	30 m³/hr.person

**Depending on climate zone*

*** Where QH is the achieved space heating demand*

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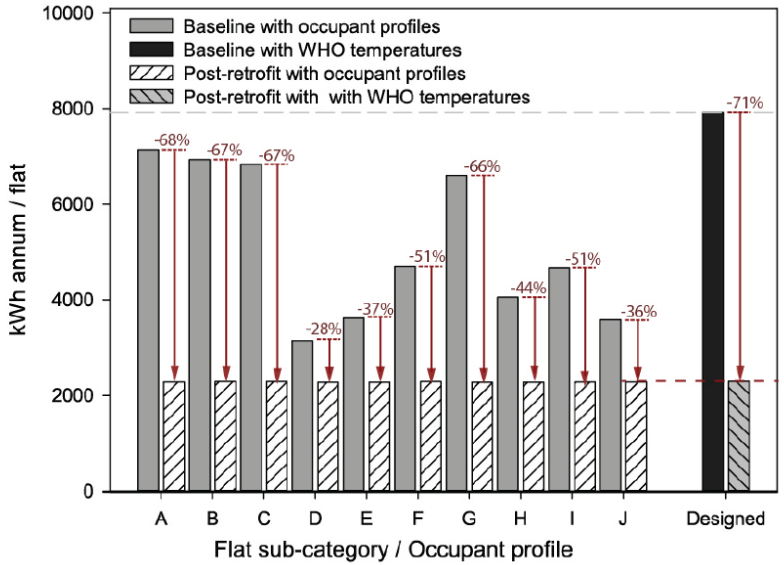
- Many residents could not afford to heat their homes
- They had little control over the internal temperatures
- Windows and roof at end of serviceable life
- Concrete repairs required to maintain life of structure
- Condensation reported by 1/3 of residents
- Mould issues in several properties
- Window repairs reported by 80% of residents over a 2-year period
- Decorations to communal and external areas failing
- Security to communal areas ineffective
- No gas allowed, only expensive electric storage heaters



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Why Retrofit?

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Challenges to Retrofit

The Scale

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Challenges to Retrofit

Working with
Residents in situ

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Challenges to Retrofit

Structural Implications

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Challenges to Retrofit

Supply Chain Management, Coordination and Skillsets

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Challenges to Retrofit

Upskilling (Consultants and Contractor)

Resident Energy Education

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Challenges to Retrofit

Technical Challenges

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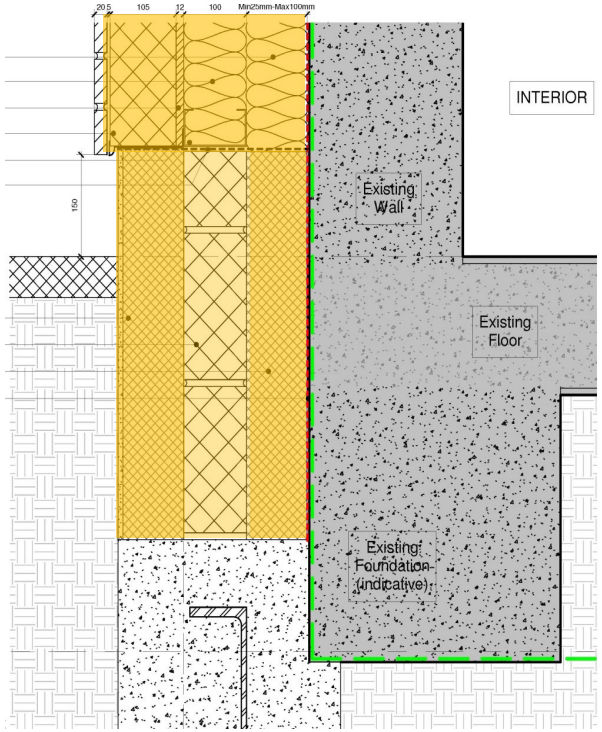
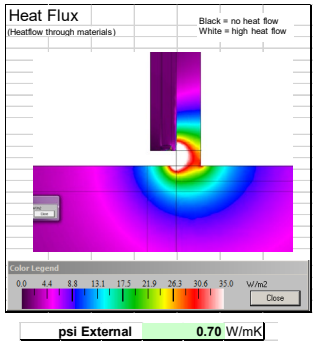
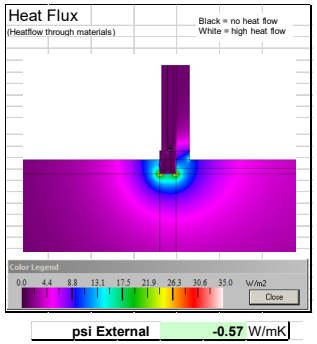
Part L 2010* equivalent



Passivhaus/EnerPHit

*BC submission was to comply with the 2010 regulations





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Challenges to Retrofit

Additional Cost

All 'additional' works to achieve EnerPHit have some additional cost:

- MVHR systems
- Airtightness
- Quality control
- Additional insulation
- Triple glazed windows
- Thermal break pads
- Below DPC insulation

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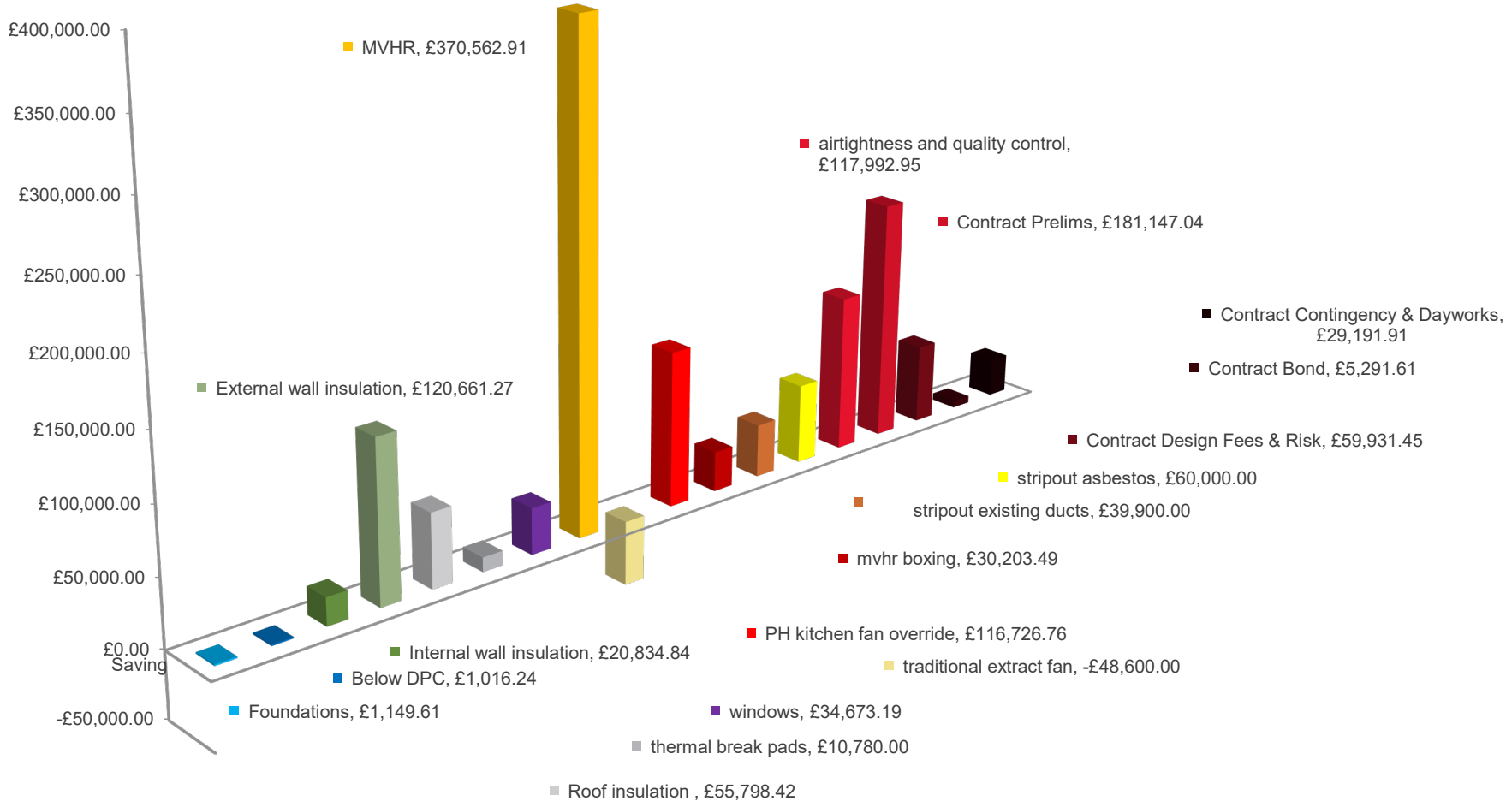
Challenges to Retrofit



Additional Cost

EnerPHit Contract Sum
£897/m2

Building Regulations
£814/m2

Difference
£83/m2

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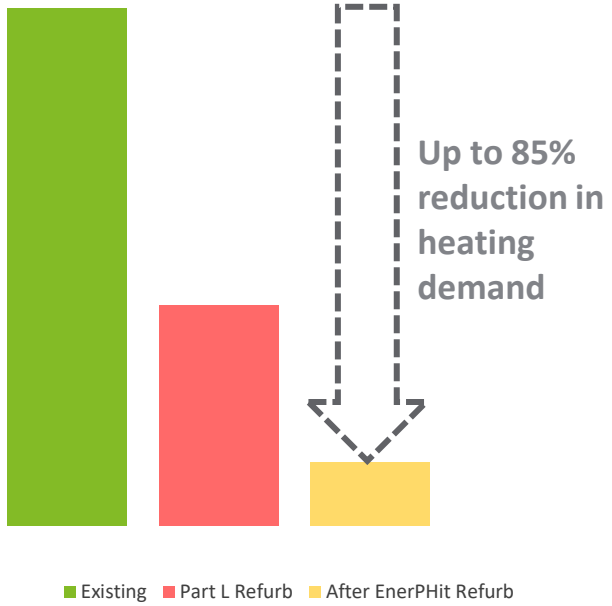
Existing 188

Specific building characteristics with reference to the treated floor area		
	Treated floor area m²	3119.6
Space heating	Heating demand kWh/(m²a)	80
	Heating load W/m²	47.6
Space cooling	Cooling & dehum. demand kWh/(m²a)	-
	Cooling load W/m²	-
	Frequency of overheating (> 25 °C) %	0
	Frequency excessively high humidity (> 12 g/kg) %	0
Airtightness	Pressurization test result n_{50} 1/h	10.0
Non-renewable Primary Energy (PE)	PE demand kWh/(m²a)	324
Primary Energy Renewable (PER)	PER demand kWh/(m²a)	175
	Generation of renewable energy (in relation to projected building kWh/(m²a)	0

Part L 2010* equivalent

Specific building characteristics with reference to the treated floor area		
	Treated floor area m²	3119.6
Space heating	Heating demand kWh/(m²a)	23
	Heating load W/m²	9.7
Space cooling	Cooling & dehum. demand kWh/(m²a)	-
	Cooling load W/m²	-
	Frequency of overheating (> 25 °C) %	3
	Frequency excessively high humidity (> 12 g/kg) %	0
Airtightness	Pressurization test result n_{50} 1/h	1.0
Non-renewable Primary Energy (PE)	PE demand kWh/(m²a)	151
Primary Energy Renewable (PER)	PER demand kWh/(m²a)	70
	Generation of renewable energy (in relation to projected building kWh/(m²a)	0

Passivhaus/EnerPHit



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Challenges to Retrofit

Additional Cost

Payback period from Energy Savings = 19 years (at 2015 electricity costs)

Reduced Space Heating Demand results in up to 85% savings over existing heating bills before the works

Communal areas

External walkways

Living room and door to balcony

Open balcony

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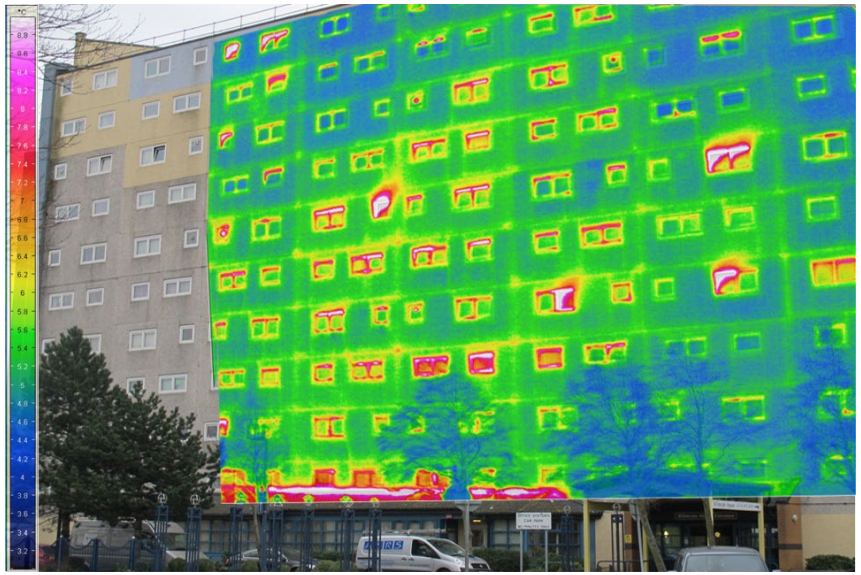
Why Retrofit?

The Business Case

Demolition was rejected because:

- Long timeframe to decant, demolish and rebuild
- Families to be relocated in temporary accommodation
- Lack of 3-bedroom family units
- Rebuild costs prohibitive
- Difficulty of re-building at the same density
- Embodied carbon considerations



PCC Report from Nov 2012 confirmed that a deep high-quality refurbishment was cheaper over a 30-year plan than demolition and replacement

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Design Approach

Site Investigations

- Structural Investigations, pull-out tests, concrete analysis, carbonation, depth of cover etc
- Airtightness testing (blower door test)
- MEP condition surveys
- Asbestos surveys

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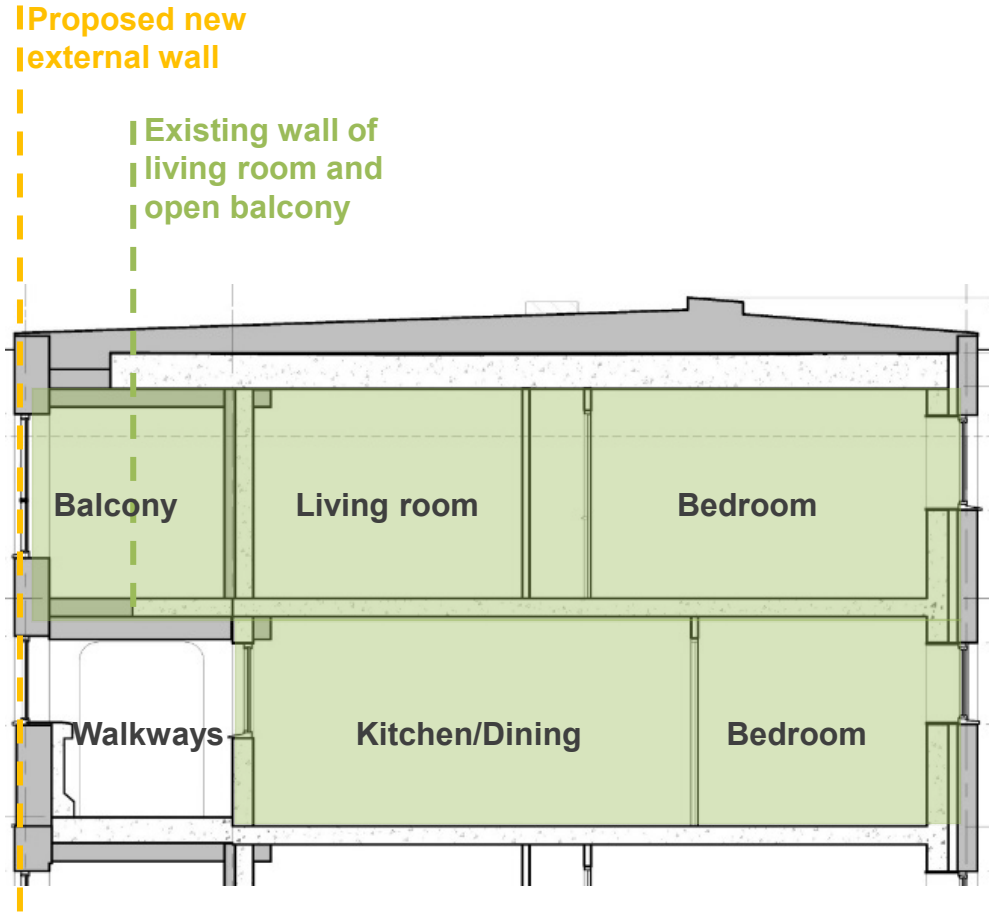
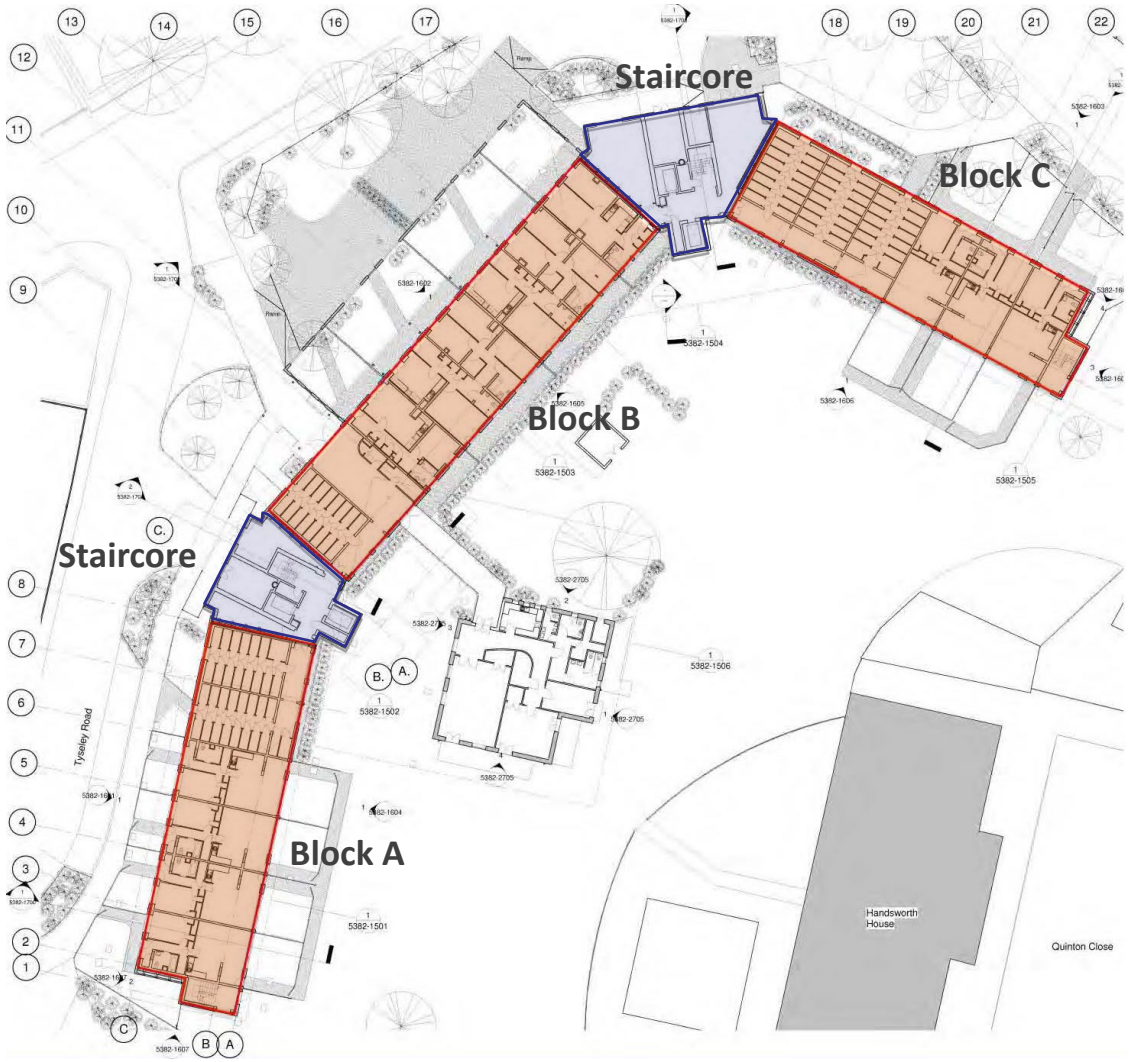
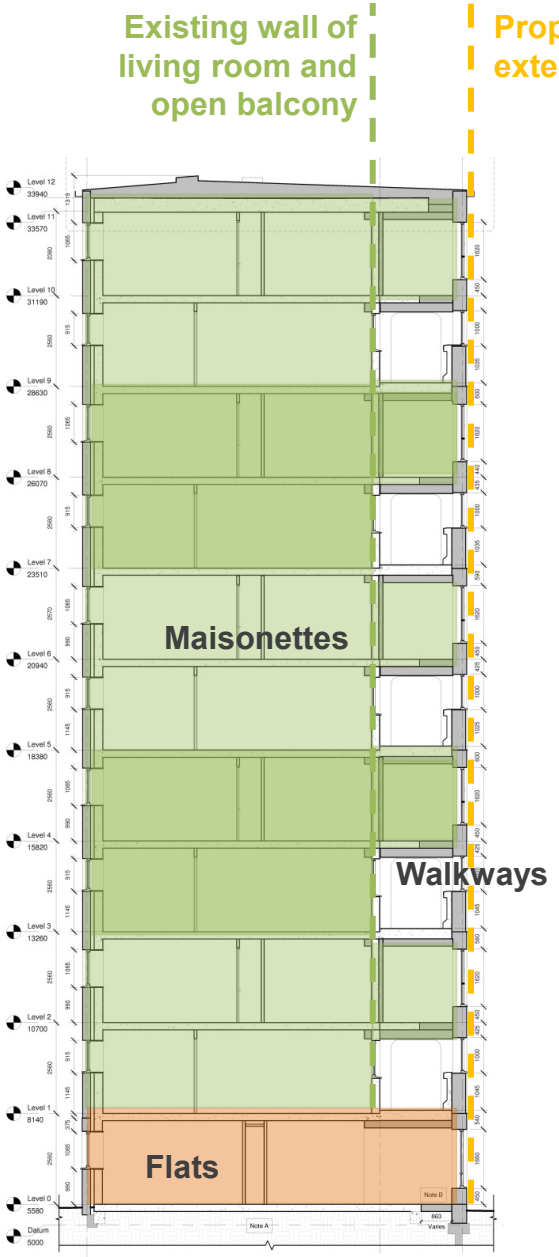
Design Approach

Complex Building Envelope to insulate, overclad and achieve airtightness







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Design Approach

Simplified External Envelope

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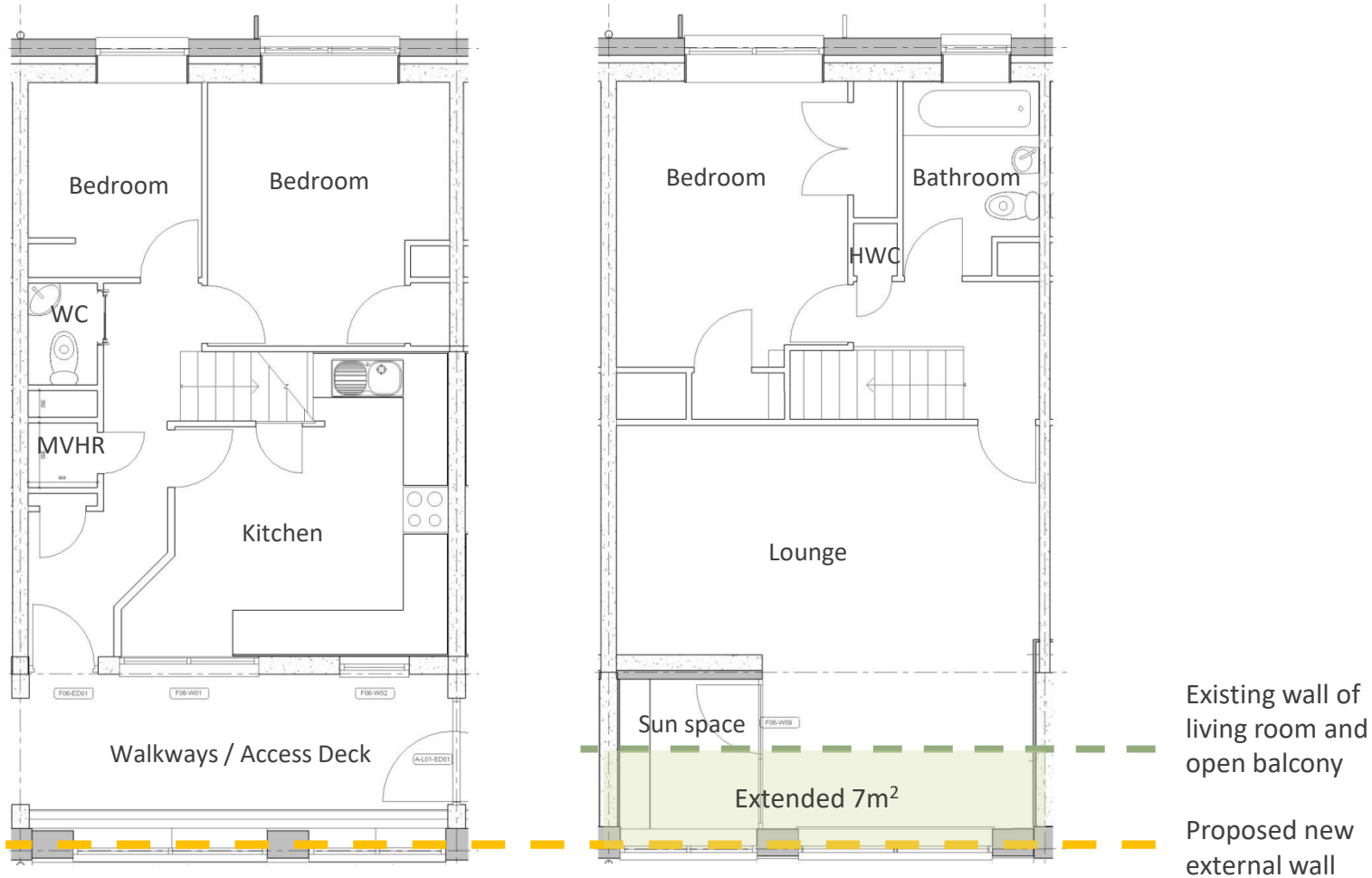
Design Approach

Maisonette Layouts



Ground Floor

First Floor

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Construction

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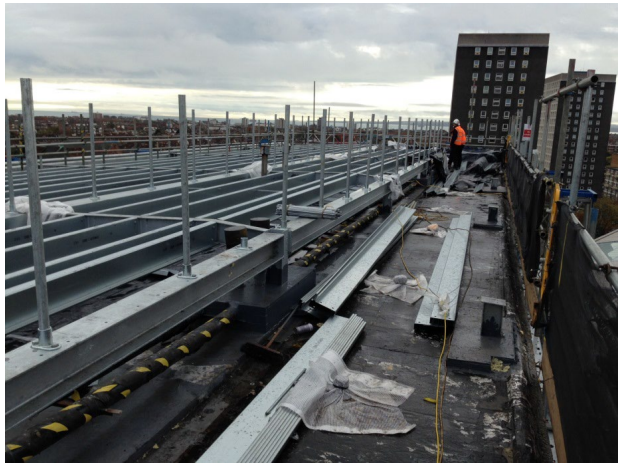

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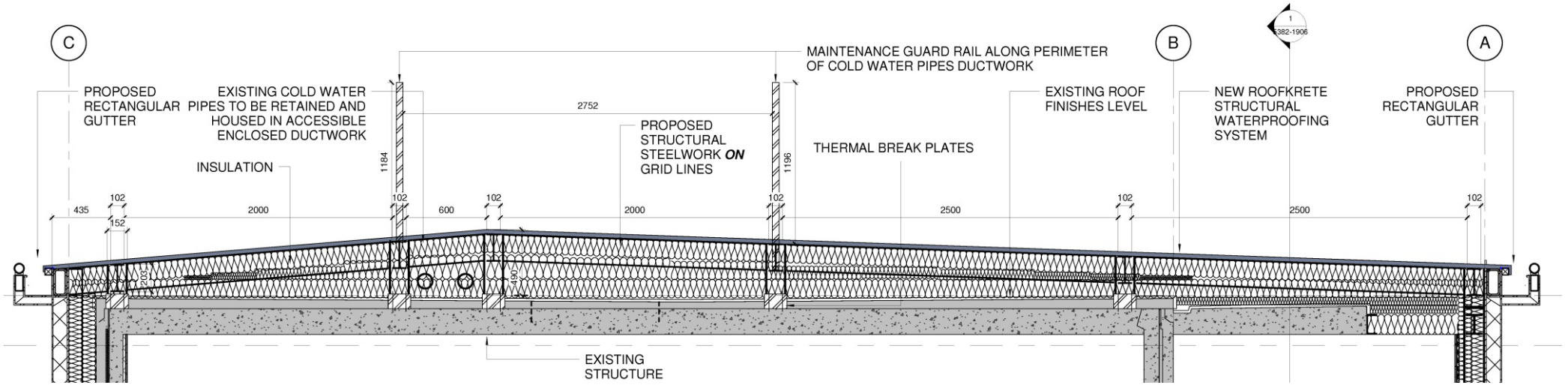

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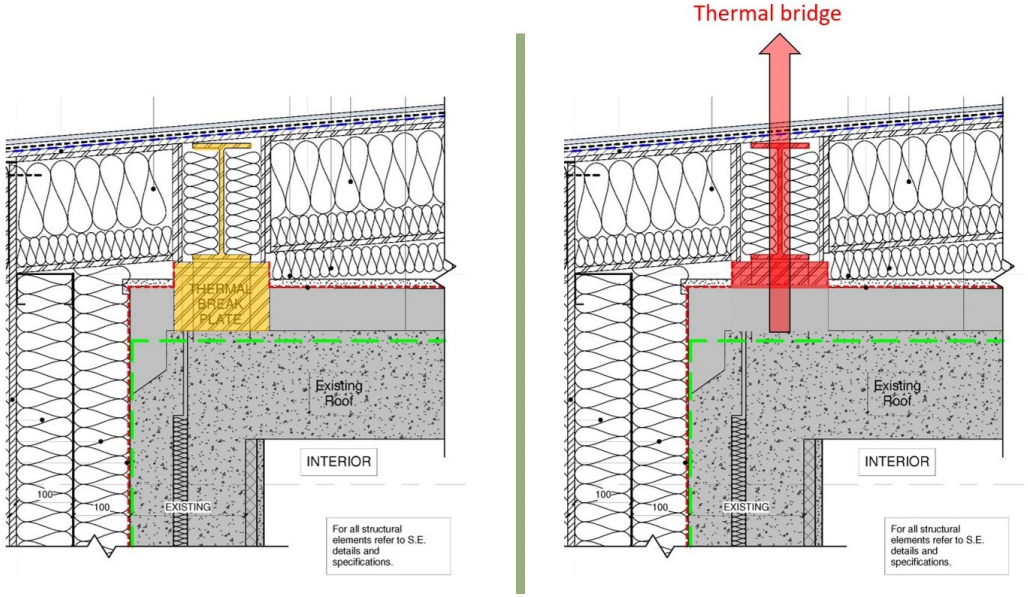

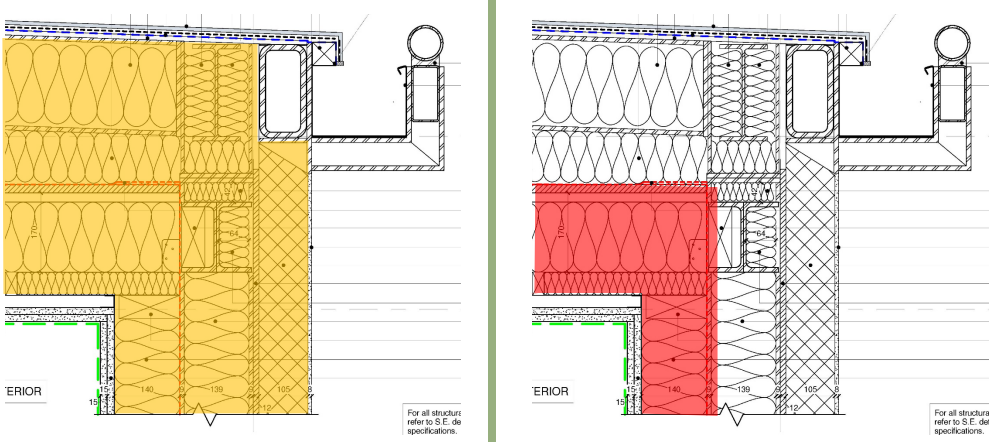

Passivhaus requirements

Part L 2010 equivalent

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Garden Side

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Road Side

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Windows

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Construction

Windows

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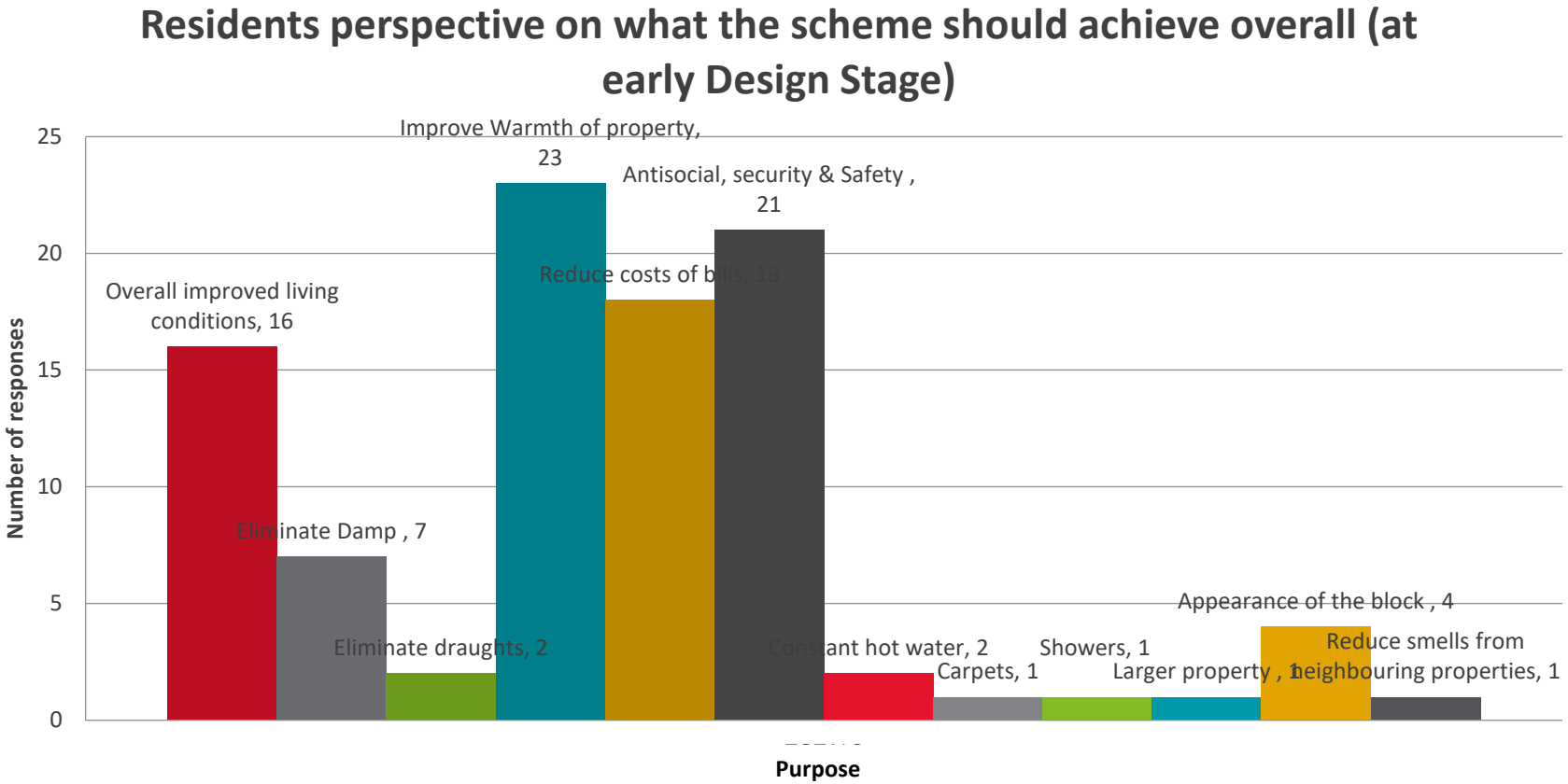

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Benefits of Retrofit

Community Engagement

- Residents had their voices heard and acted upon
- The community was retained and strengthened

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Benefits of Retrofit

Carbon Emissions Reductions

- Existing concrete structure retained (high in embodied carbon)
- Operational carbon emissions reduced (minimal heating demand in use)

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Benefits of Retrofit

Reduced maintenance cost for council

Reduced energy bills for residents

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Benefits of Retrofit

Aesthetics and Perception

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Benefits of Retrofit

Energy Efficient

Reduce peak heat demand, carbon emissions & improve energy efficiency, reducing fuel poverty

Over 3.3m UK households live in fuel poverty, 11 % of all homes.

Improved Placemaking

Spaces in-between housing, improve streets as places

Reduce child poverty & provide safe environments for children to play.

Reduce Maintenance

Protect our building stock

Consider maintenance within design from the outset to reduce future costs

benefits

Comfortable

Warm homes more affordable whilst addressing risk of overheating

Over 28,000 excess winter UK deaths per year, of which up to **10,000** are due to cold homes

Healthy

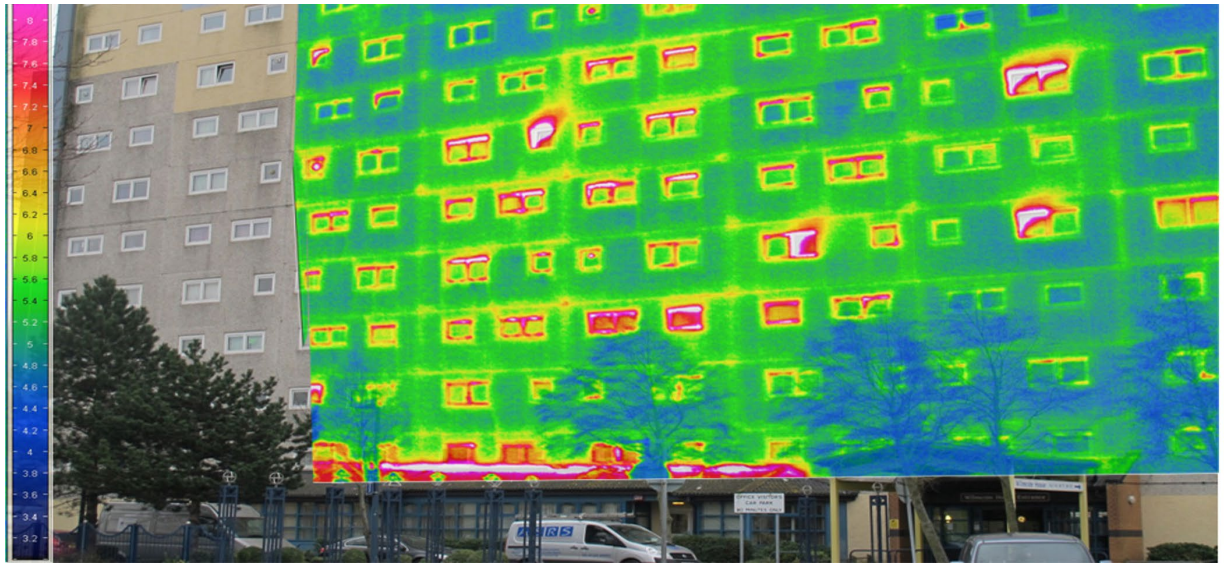
Reduce NO2 emissions, improve air quality by filtering incoming air & tackling damp

Almost **1 million** UK homes suffer from serious damp, indoor mould & excess humidity. **1 in 5** children carry inhalers for asthma.

Resilient

Address overheating & become more resilient to extreme hot and cold weather

Excess summer deaths estimated to be **2000** per year. **20%** of homes already suffer from overheating.



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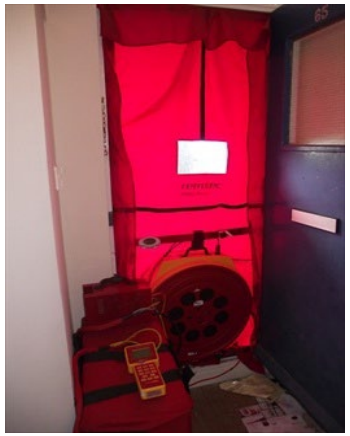
Lessons Learned

Importance of gathering data – before and after



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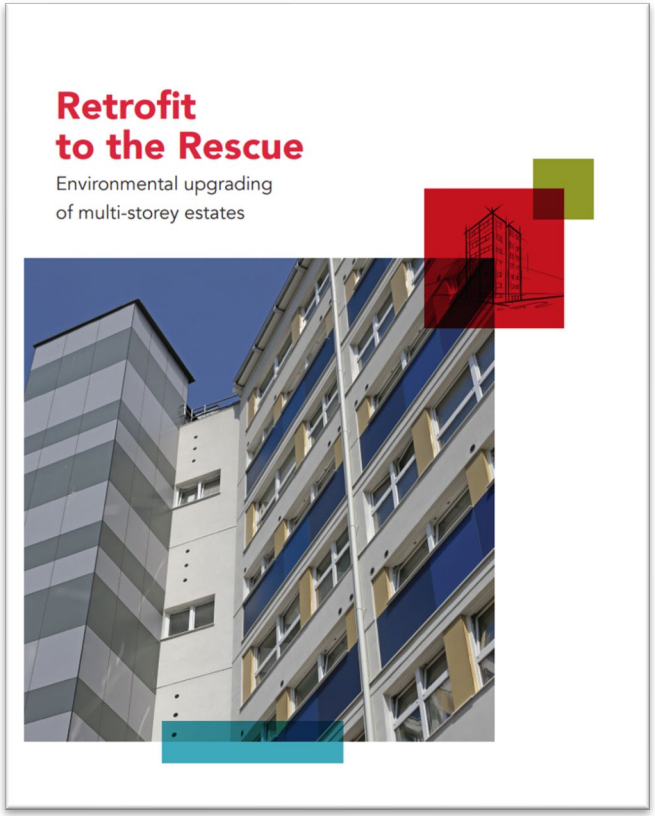

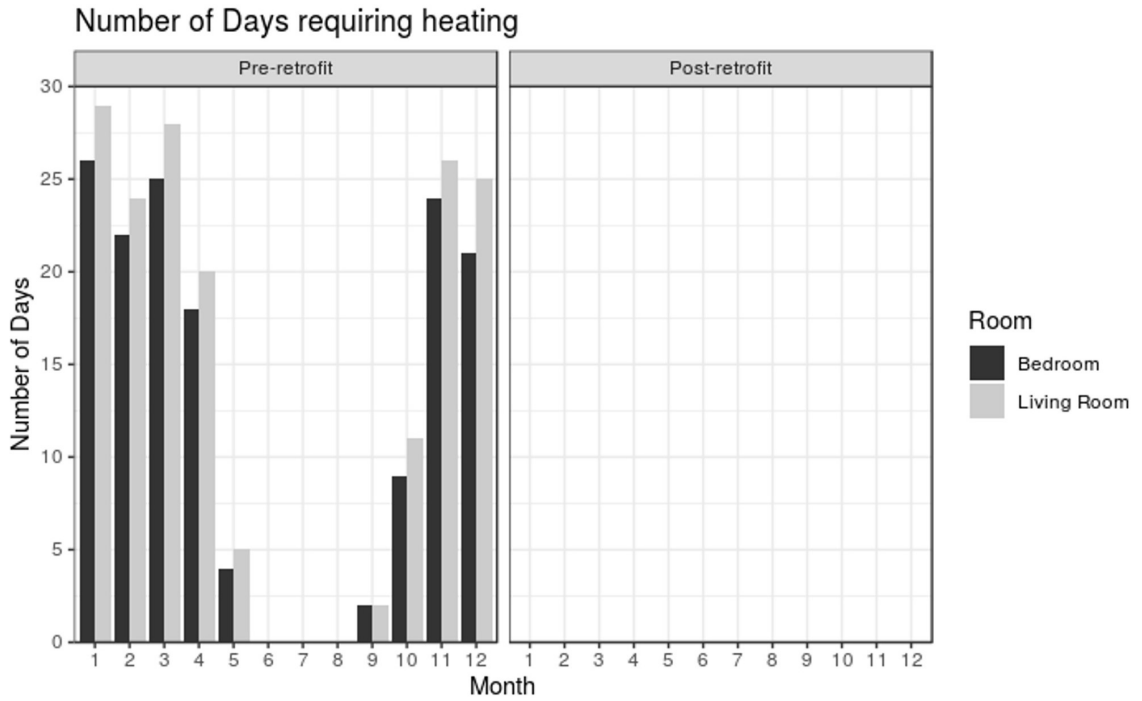

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Lessons Learned

Research – Post Occupancy Evalution and Monitoring

London School of Economics: Social aspects before, during and after the retrofit

University of Southampton: temperature and humidity monitoring including overheating analysis

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Completed Retrofit

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WARMWORKS

Simplifying procurement of large scale retrofit projects..

SIMON KEMP

GROWTH AND INNOVATION DIRECTOR

Our background

Founded in 2015 to deliver Warmer Homes Scotland contract – Scottish Government's £224m flagship retrofit scheme delivering grant-funded work to fuel poor households

Through WHS and wider social housing and local authority projects, we have now helped more than 40,000 households across the UK to save energy and stay warm

We have achieved record quality scores on Government contracts, outperforming KPIs and setting new standards for safety, compliance and customer care

Led the introduction of new technologies such as Q-Bot and Airex to Scottish market

We have expanded our footprint to England and Wales, with almost 200 people based in offices in Edinburgh, London, Newcastle, Kirkwall and Stornoway

Warmworks is a registered Carbon Neutral business, a Living Wage Employer, a Platinum level Investor in People and a signatory to the UN Science-Based Targets Initiative

Our work

Warmer Homes Scotland

- First phase saw £230m delivered from 2015 - 2023
- Current phase will be up to £728m from 2023 - 2030

Sustainable Warmth / HUG / LAD

- £80m scheme across South East England from 2021 - 2025
- Strategic delivery partner of Newcastle City Council from 2022 - 2027

Energy Efficient Scotland: Area Based Schemes (EES:ABS)

- Orkney Islands Council, appointed in 2020
- Western Isles Council, appointed in 2023

Net Zero Heat – working with Social Landlords to plan and scope projects and secure funding to install insulation, heat pumps, batteries and PV in more than 500 properties to date

H100 – Installation of hydrogen boilers in 300 homes in Fife

BEIS – Electrification of Heat Demonstration Project

Green Economy Fund – pioneering battery storage pilot project delivered in 2019

Our range of measures

Warmworks is independent of installers and system designers, so can offer the widest possible range of energy efficiency improvements. Examples of the types of energy saving measures that we have worked with are shown below:

Fabric

- Loft insulation
- Cavity wall insulation
- External wall insulation
- Internal wall insulation
- Room in roof insulation
- Flat roof insulation
- Underfloor insulation
- Draught proofing
- Double glazing
- Park homes insulation

Clean Heat

- Air source heat pumps
- Ground source heat pumps
- High retention storage heaters
- Biomass heating systems

Other

- Solar PV
- Battery storage
- Heating controls

Conventional Heat

- Gas boilers
- Oil fired boilers
- LPG boilers

Innovations

- Connected Response
- Hydrogen boilers
- Q-Bot
- Airex smart air bricks

Our clients

Three primary sectors

1. National and devolved Governments
2. Local Authorities
3. Social Housing

Relationships are key to success, and most smaller projects we do are directly awarded to us either because we have created the project and taken it to the client, or we have supported them in scope a project out with them and they are looking for someone to deliver it.

Procurement often seen by clients as a barrier to engaging, but using frameworks in this way it neatly gets us over that barrier and into delivery much more quickly.

Our approach

Project development

- Stock analysis
- Programme initiation
- Funding application support
- Easy route to appointment

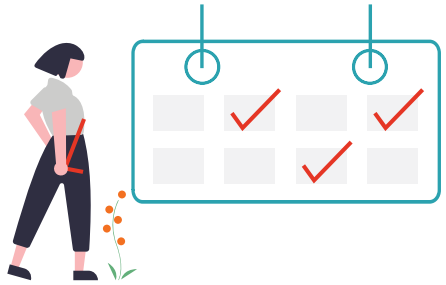
Managing the customer journey

- Engaging with householders, tenants (and landlords)
- Managing Retrofit Assessments or surveys
- Appointing Retrofit Co-Ordinator where required
- Appointing and managing installers
- Monitoring the progress of works
- Lodging with Trustmark where required
- Invoicing works and paying installers

Quality assurance

- Procurement of certified installers
- Auditing of installer documentation and accreditations
- Work-in-progress visits and post-completion inspections
- Installer performance management

Project governance



- Project board
- Progress reporting
- Monitoring and evaluation
- Planning consents where required
- Ensuring engagement with local DNO

Case Study 1 – Dumfries and Galloway Housing Partnership

SPEN Green Economy Fund Project: domestic battery storage to reduce energy bills using smart time of use tariffs

Project value – £1.25m

Fitted over 140 Tesla Powerwall batteries in homes that were in or at risk of falling into fuel poverty

Warmworks created the project from scratch and pitched it to the client, so no traditional procurement route

Used Scottish Procurement Alliance (LHC in Scotland) framework to overcome client's concerns about procurement and value for money, even though the project cost them nothing

Further Net Zero Heat projects to fit heat pumps, batteries, PV and insulation established on an annual basis following this

Each project scoped and funding applied for by Warmworks and let via the framework.

Three further years, worth ~£12m

https://www.warmworks.co.uk/2021/08/24/domestic-battery-storage-project-in-dumfries-and-galloway/

Case Study 2 – Waverley Housing Association

Long term partnership – terms of reference established by MoU, projects directly awarded via Framework

12 year agreement – 2020-2032 – to support WHA to decarbonise and insulate its housing stock

Projects started with a multi-housing association project in the Borders to fit heat pumps and Q-Bot underfloor insulation

Next project was to include their properties in BEIS's Electrification of Heat project, installing and monitoring heat pumps (fully funded for the client)

Then two phases of Net Zero Heat projects installing heat pumps, batteries and PV, with some insulation where needed

Third phase of Net Zero Heat has just been submitted, which will include heat pumps, insulation, PV and batteries, as well as introducing Connected Response

Total value of projects so far ~ £5m

Conclusion

Framework approach is useful for both contractor and client to achieve fast appointments through direct award

Takes away client nervousness around an open market tender

Facilitates non-traditional project proposals

Fosters long-term trusted relationships without the need for cycles of full procurement exercises

Is a quick and cost-effective way to get things done

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Technical Procurement Office

Upcoming Retrofit and Decarbonisation (N9) Framework

JULIETTE ORSLER
PROCUREMENT MANAGER

NICK BEARD
TECHNICAL MANAGER

LHC PROCUREMENT GROUP

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Retrofit and Decarbonisation Framework

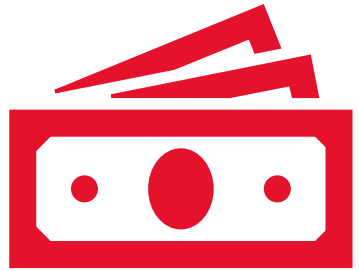
Aims and objectives

Fabric first approach

greater importance of multi-disciplinary workstream

Future proofing to allow for emerging technologies

Enhanced consultancy workstream to provide clients with a complete solution to their decarbonisation journey



Support grant funding procedures through scope of enhanced consultancy lots, flexible scope and direct award procedures

Retrofit and Decarbonisation Framework

Pre-tender engagement

- 12 in person market engagement events across our LHC regions
- Carried out 2 central webinars
- Gathered feedback from our regional client committees
- 1st event 23rd February 2023

Lessons Learnt During PTE - Bridging the Gap

- **Easing Funding Access for Clients:** Facilitating smoother pathways for clients to secure funding, overcoming navigation challenges in the funding landscape.

- **Assisting Contractors with Compliance:** Assisting contractors in achieving essential qualifications (PAS, MCS, etc.) to meet funding criteria, ensuring project eligibility and success.

- **Commitment to Long-Term Maintenance:** Addressing the need for sustained maintenance of renewable technologies, ensuring durability and performance post-installation.

- **LHC's Commitment:** Welcoming our new Group Technical Manager, Chris Ferguson, dedicated to N9's success - your support bridge throughout the framework lifecycle.

Retrofit and Decarbonisation Framework

Strategic priorities for the retrofit & decarbonisation project

- Provide LHCPG clients with access to **high quality Contractors** with built in flexibility to deliver their retrofit projects how they need to
- Provide **flexibility** for clients with both fabric first and individual measure options
- Provide specific grant funding **direct award options**
- Support the driving of high standards within the industry ensuring **high quality delivery of retrofit works**
- Create opportunities for collaboration, partnerships and sharing of **best practice** to enable better delivery of retrofit projects
- Provide LHCPG clients exposure to **innovative technologies and solutions** for effective and efficient delivery of retrofit projects
- Help to address green skills, knowledge and training gaps and **support supplier development**
- Provide a solution for the servicing and ongoing maintenance of renewable systems

Retrofit and Decarbonisation Framework

Key changes following pre-tender engagement:

PAS 2030 Certification Requirement: Mandatory for all installation workstream bidders within the framework to commit to.

- Includes a 2-year grace period for obtaining accreditation post-framework go-live if not held on day one
- Client ability to shortlist at mini competition stage based on PAS 2030 requirement

Targeted Opportunities for Small Businesses: Specific lots and mechanisms identified for small organisations.

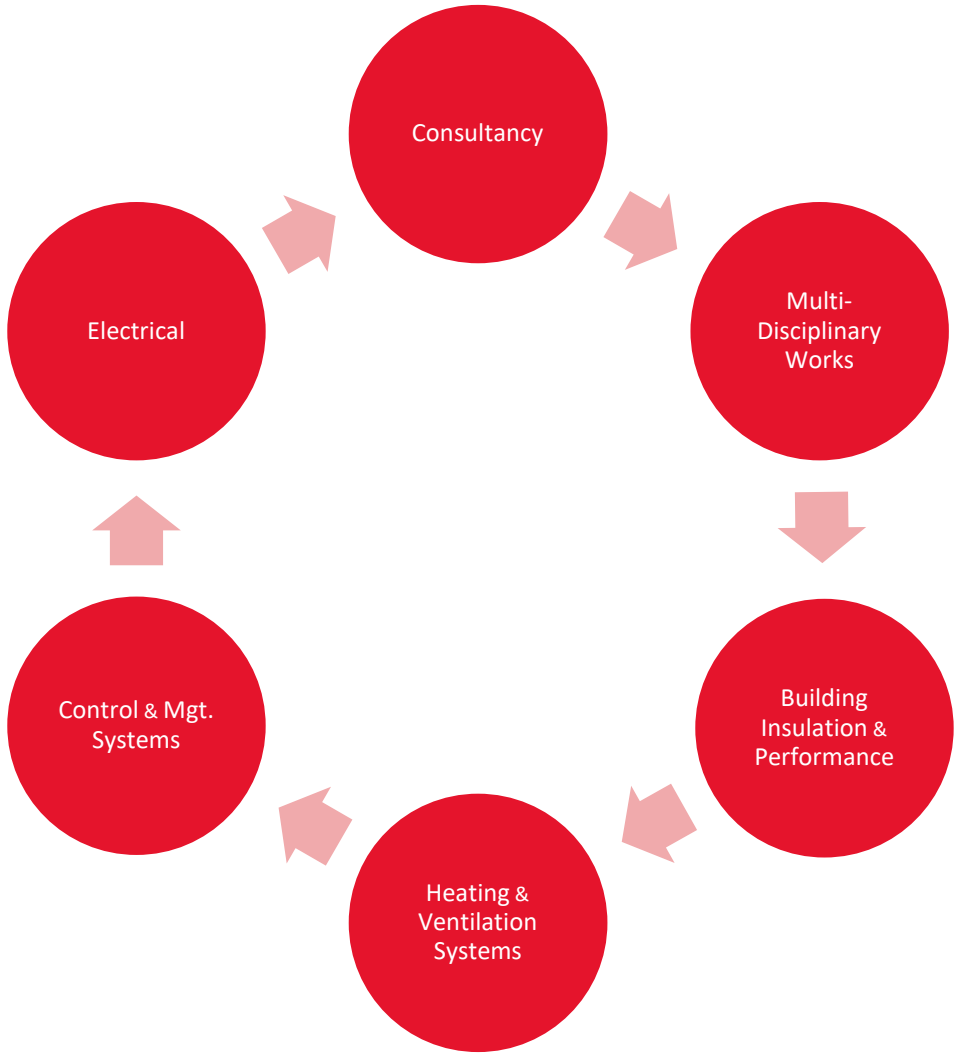
- Aimed at promoting local contractor engagement and diversifying the competitive landscape

Servicing and Maintenance Workstream Update: Introduction of a Dynamic Purchasing System (DPS) for Servicing & Maintenance due to current market challenges and the need for sector-specific flexibility and growth. Scheduled to launch alongside N9. DPS will include four specific lots:

- Servicing & Maintenance of Air Source Heat Pumps
- Servicing & Maintenance of Ground Source Heat Pumps
- Servicing & Maintenance of Ventilation Systems
- Servicing & Maintenance of Solar PV and Related Technologies

Retrofit and Decarbonisation Framework

- Scope



Retrofit and Decarbonisation Framework

70% Quality

- Previous Experience
- Knowledge & Innovation
- Scenarios
- Regional Capability

30% Price

- Schedule of Rates
- OHP
- Day Rate

Retrofit and Decarbonisation Framework

Key dates

ITT Published	Late April 2024
Tender Submission	End May 2024
Framework Live	Oct/Nov 2024

LHC PROCUREMENT GROUP

RETROFIT FOR A NET ZERO FUTURE
BIRMINGHAM, 28 FEBRUARY 2024

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