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Net Zero BISF Project

Don’t Forget it’s Someone’s Home – Meeting Sustainability Objectives

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Presenters:

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Programme Manager

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Changeworks

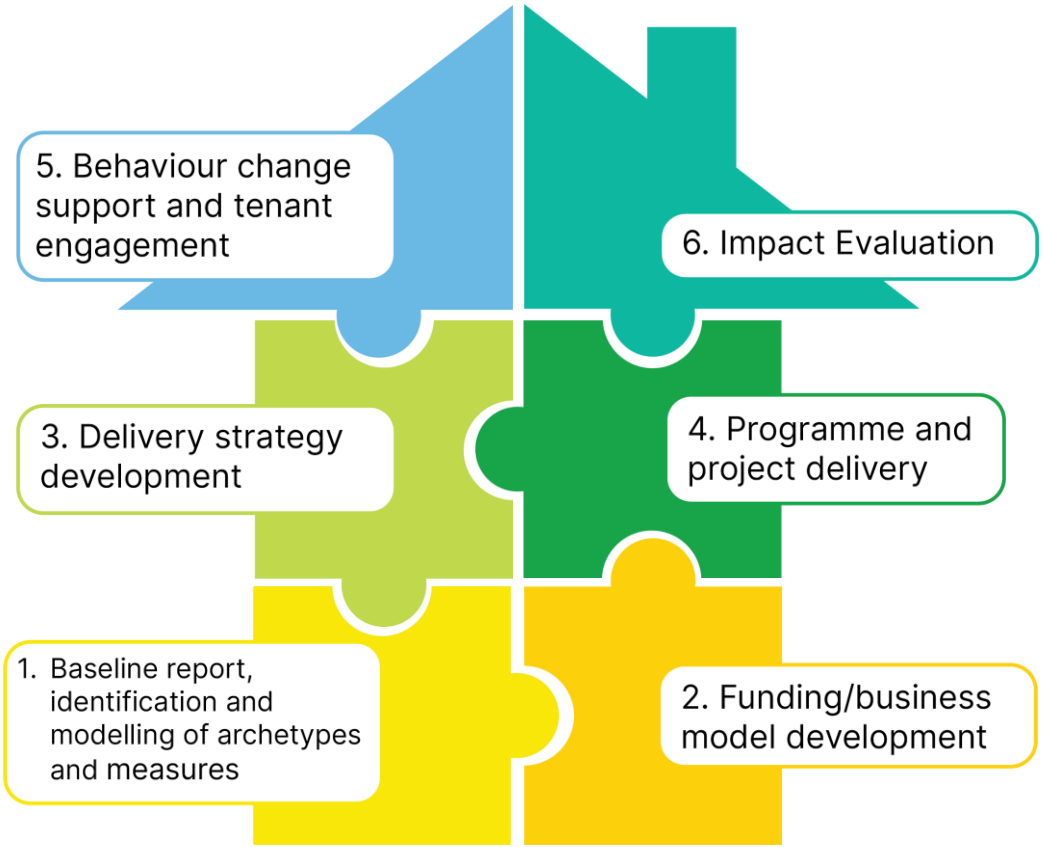
Our ambition is to drive the decarbonisation of homes in Scotland.

Scotland has some of the least energy-efficient homes in Europe. By focusing on decarbonising homes, we are maximising our contribution to tackling the climate emergency.

We do this through:

- innovative partnership working
- scaling up the range and reach of our services
- working with householders to improve the energy efficiency of their homes.

Net Zero Pathway Support



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Working in Partnership with Midlothian Council

- Longstanding delivery 10 years +
- Energy Efficient Scotland: Area Based Schemes, Social Housing Net Zero Heat Fund, Decarbonisation Fund.
- Unique understanding of requirements and understanding of the housing stock.
- BISF identified as a difficult construction type to retrofit. Successfully applied for EES ABS funding carry out a feasibility study.
- Tenant Energy Support Service

Completed works to 1335 properties

1925 completed measures

Properties owned by the Council, Housing Associations and privately were included to work at scale.

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BISF Project for Midlothian Council

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Challenge – BISF Non-Traditional Properties

- British Iron & Steel Foundation (BISF) properties owned by councils and more than 100 within area
- Non-traditional properties mainly built in the post-WWII period – over 4,000 in Scotland
- By modern standards, BISF properties have very poor fabric efficiency
- Significant reductions in fabric heat loss required to enable cost effective operation of Zero Direct Emissions Heating System
- Tailored approach needed to consider BISF construction and condition of the specific properties

Steel Framed House, Newbottle, Houghton-le-Spring, Tyne and Wear | Educational Images | Historic England

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Opportunity – BISF Non-Traditional Properties

- From Council experience, popular properties with tenants
- Properties in the same geographical area which enables efficient works to be carried out
- Extent of BISF properties in Scotland and UK – feasibility report can be used to inform retrofit measures for other properties
- Retrofit and maintenance prolong the life of the BISF properties - more cost effective and lower embodied carbon than new-build

Photo - CSY Architects

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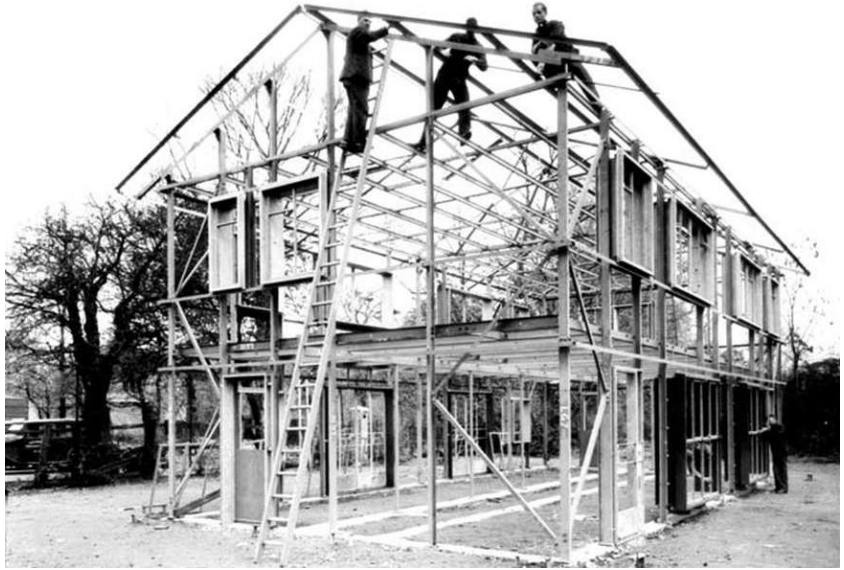
Project Aims & Objectives

- To determine most effective and economical route to install energy efficiency improvements
- On site assessments of council properties
- Develop a design which can be implemented and delivered on site as modelled
- Quantify impact to tenants and council in relation to running and maintenance costs
- Range of improvement options with costs



British Iron & Steel Foundation House, Northolt, London | Educational Images | Historic England

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Project Management & Process

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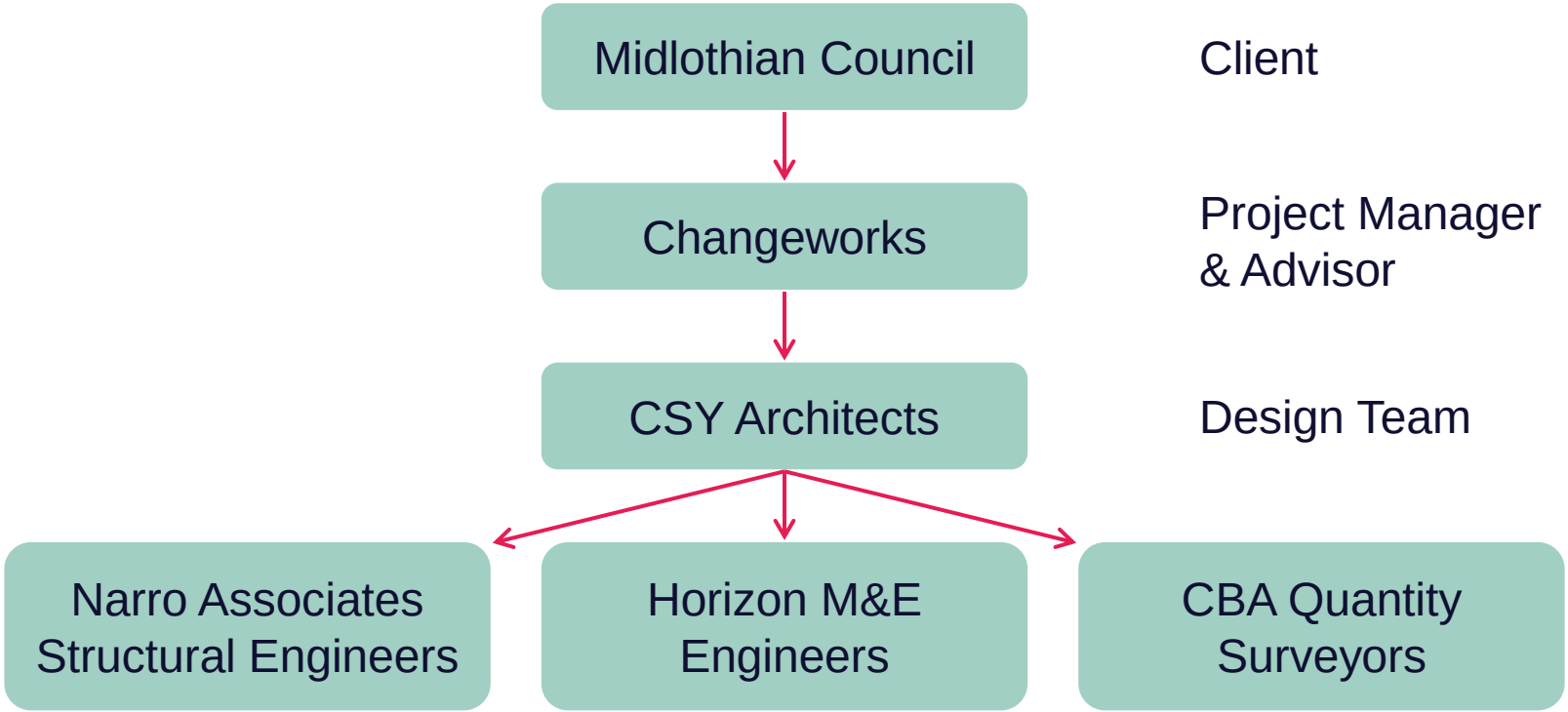
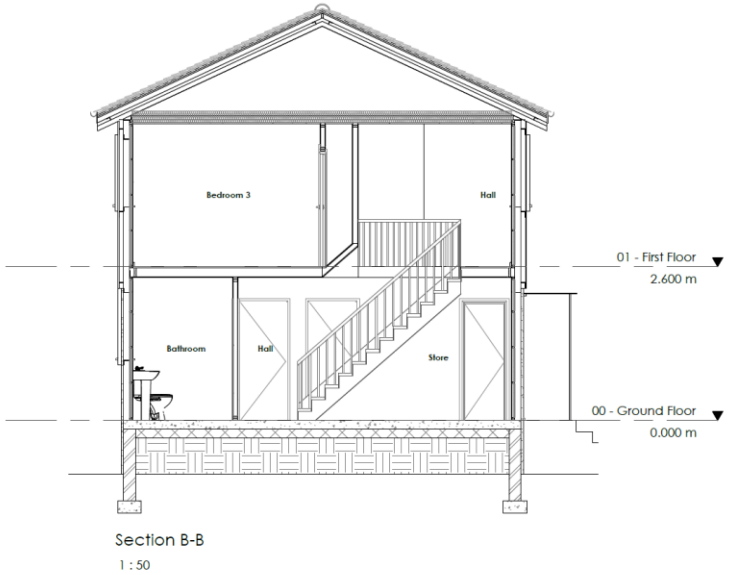
Project Organisation



Project Steps Overview – Existing Property Performance



Section B-B
1 : 50

Measured and conditions survey
Photos and drawing – CSY Architects

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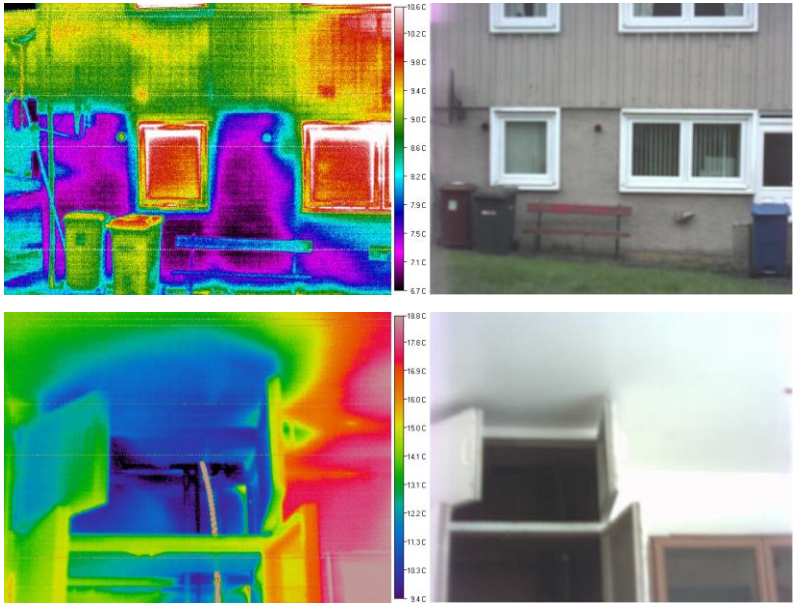
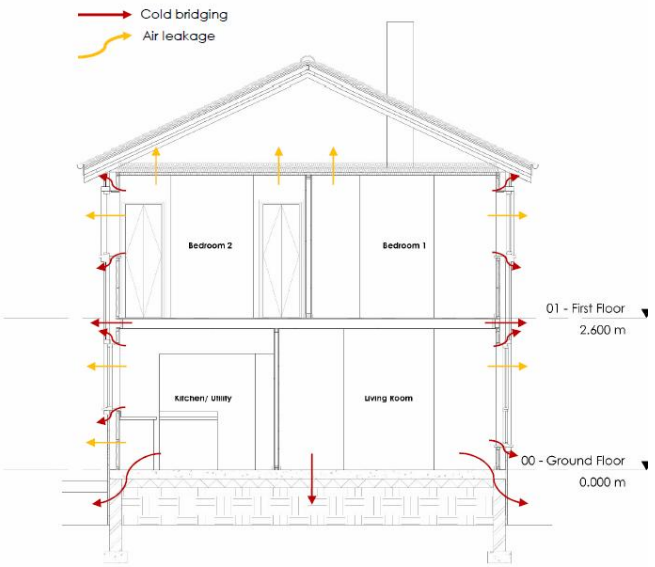
Project Steps Overview – Existing Property Performance



Air tightness test and thermal images
Photos – Thermal Image UK



Cold bridging and Air leakage diagram of surveyed property
Drawing – CSY Architects

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Project Steps Overview – Existing Performance Energy Modelling

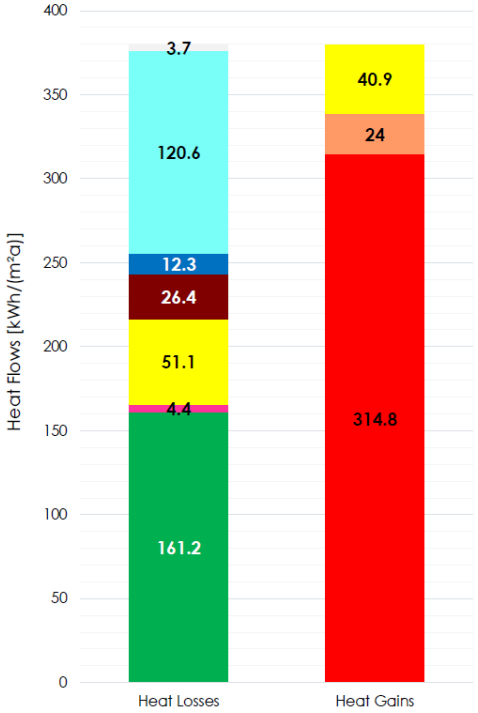

Fig. 21 Heat flows chart of existing dwelling at No. 72

	Losses	Gains
Ventilation	161.2	
Thermal Bridge Loss	4.4	
Windows	51.1	
Floor Slab	26.4	
Roof/Ceiling	12.3	
External Wall	120.6	
Non-useful Heat Gain	3.7	
Heating Demand		314.8
Internal Gains		24.0
Solar Gains		40.9
TOTAL kWh/(m²a)	379.7	379.7

- Modelling with Passive House Planning Package – PHPP
- Shows the break-down of main areas of heat loss

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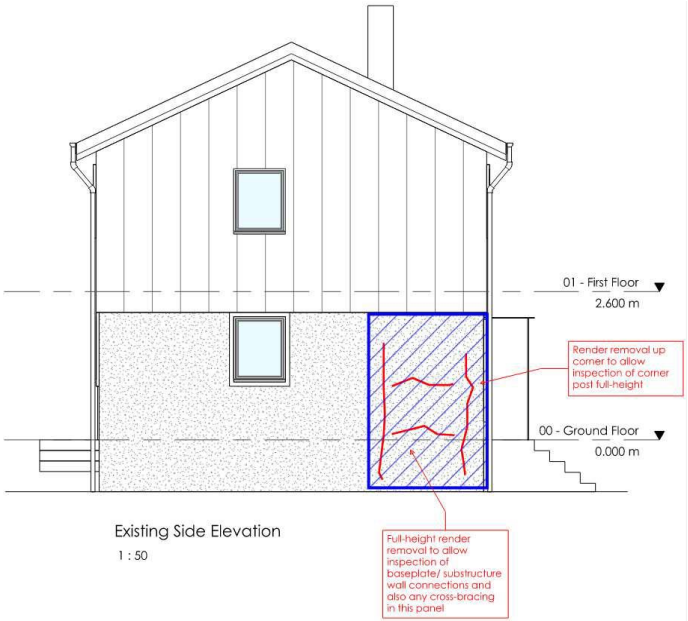
Project Steps Overview – Existing Property Condition

Invasive structural survey
Photos and mark-up – Narro Associates



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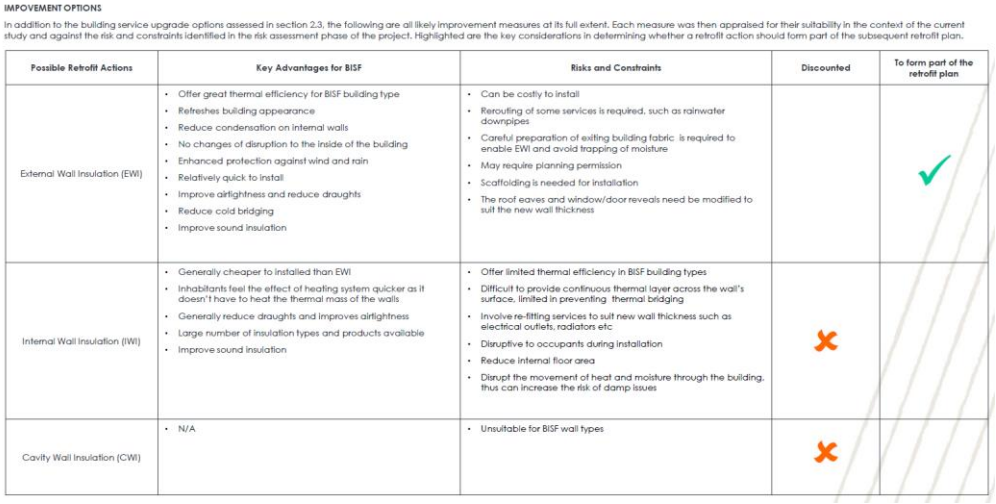
Assessment of Measures and Options



IMPOVEMENT OPTIONS

In addition to the building service upgrade options assessed in section 2.3, the following are all likely improvement measures at its full extent. Each measure was then appraised for their suitability in the context of the current study and against the risk and constraints identified in the risk assessment phase of the project. Highlighted are the key considerations in determining whether a retrofit action should form part of the subsequent retrofit plan.

Possible Retrofit Actions	Key Advantages for BISF	Risks and Constraints	Discounted	To form part of the retrofit plan
External Wall Insulation (EWI)	• Offer great thermal efficiency for BISF building type • Refreshes building appearance • Reduce condensation on internal walls • No changes of disruption to the inside of the building • Enhanced protection against wind and rain • Relatively quick to install • Improve airtightness and reduce draughts • Reduce cold bridging • Improve sound insulation	• Can be costly to install • Rerouting of some services is required, such as rainwater downpipes • Careful preparation of exiting building fabric is required to enable EWI and avoid trapping of moisture • May require planning permission • Scaffolding is needed for installation • The roof eaves and window/door reveals need be modified to suit the new wall thickness		✓
Internal Wall Insulation (IWI)	• Generally cheaper to installed than EWI • Inhabitants feel the effect of heating system quicker as it doesn't have to heat the thermal mass of the walls • Generally reduce draughts and improves airtightness • Large number of insulation types and products available • Improve sound insulation	• Offer limited thermal efficiency in BISF building types • Difficult to provide continuous thermal layer across the wall's surface, limited in preventing thermal bridging • Involve re-fitting services to suit new wall thickness such as electrical outlets, radiators etc • Disruptive to occupants during installation • Reduce internal floor area • Disrupt the movement of heat and moisture through the building, thus can increase the risk of damp issues	✗	
Cavity Wall Insulation (CWI)	• N/A	• Unsuitable for BISF wall types	✗	

Assessment of measures
Options development
CSY Architects

Clean Heating System			
Option 3a	**Option 3b**	**Option 4**	**Option 4a**
• Fabric Improvements • Triple-glazed windows • Doors • Panel heaters • dMEV	• Fabric Improvements • Triple-glazed windows • Doors • Storage heaters • dMEV	• Fabric Improvements • Triple-glazed windows • Doors • ASHP • MVHR • PV panels with battery storage	• Fabric Improvements • Triple-glazed windows • Doors • ASHP • dMEV • PV panels with battery storage

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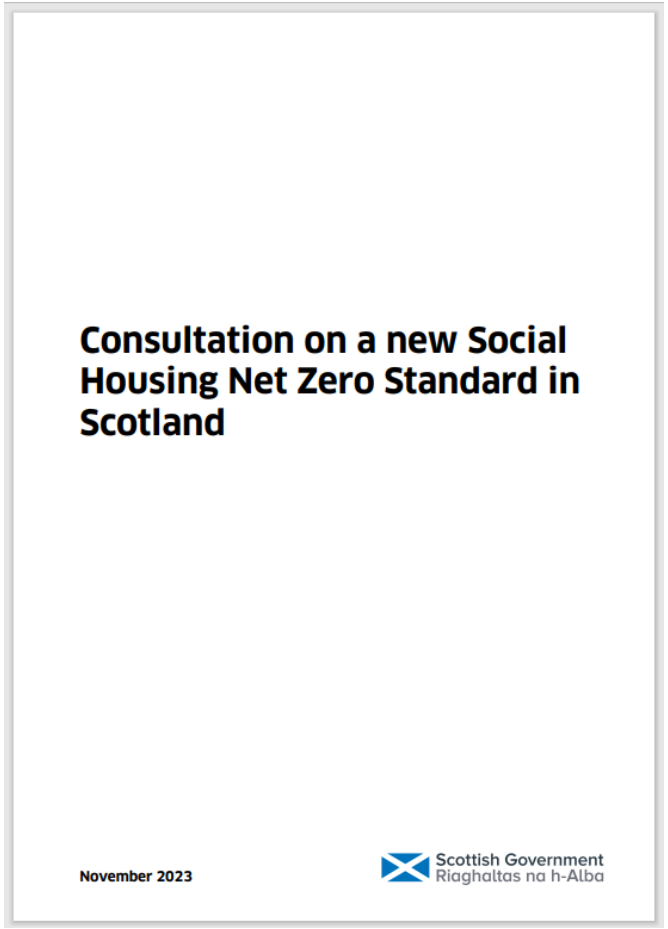
Assessment of Future Standard

- The key metrics proposed:
- Fabric efficiency rating - Based on either space heating demand or space heating with Domestic Hot Water (DHW) demand
- Replacement of polluting heating system
- Air quality – Property either has an MVHR or mechanical ventilation system, or ventilation and monitoring strategy in place if a measure installed

Metric		Pass	Fail
Fabric Efficiency Rating - Space heating and DHW demand	Maximum in range	≤ 162 kWh/m²/year	> 162 kWh/m²/year
	Minimum in range	≤ 112 kWh/m²/year	> 112 kWh/m²/year
Fabric Efficiency Rating - Space heating demand	Maximum in range	≤ 120 kWh/m²/year	> 120 kWh/m²/year
	Minimum in range	≤ 71 kWh/m²/year	> 71 kWh/m²/year
Heating system		Not polluting	Polluting
Ventilation		MVHR system or mechanical ventilation system (DMEV, PIV), or ventilation and monitoring strategy	No mechanical ventilation system and no strategy



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Assessment of Measures and Options

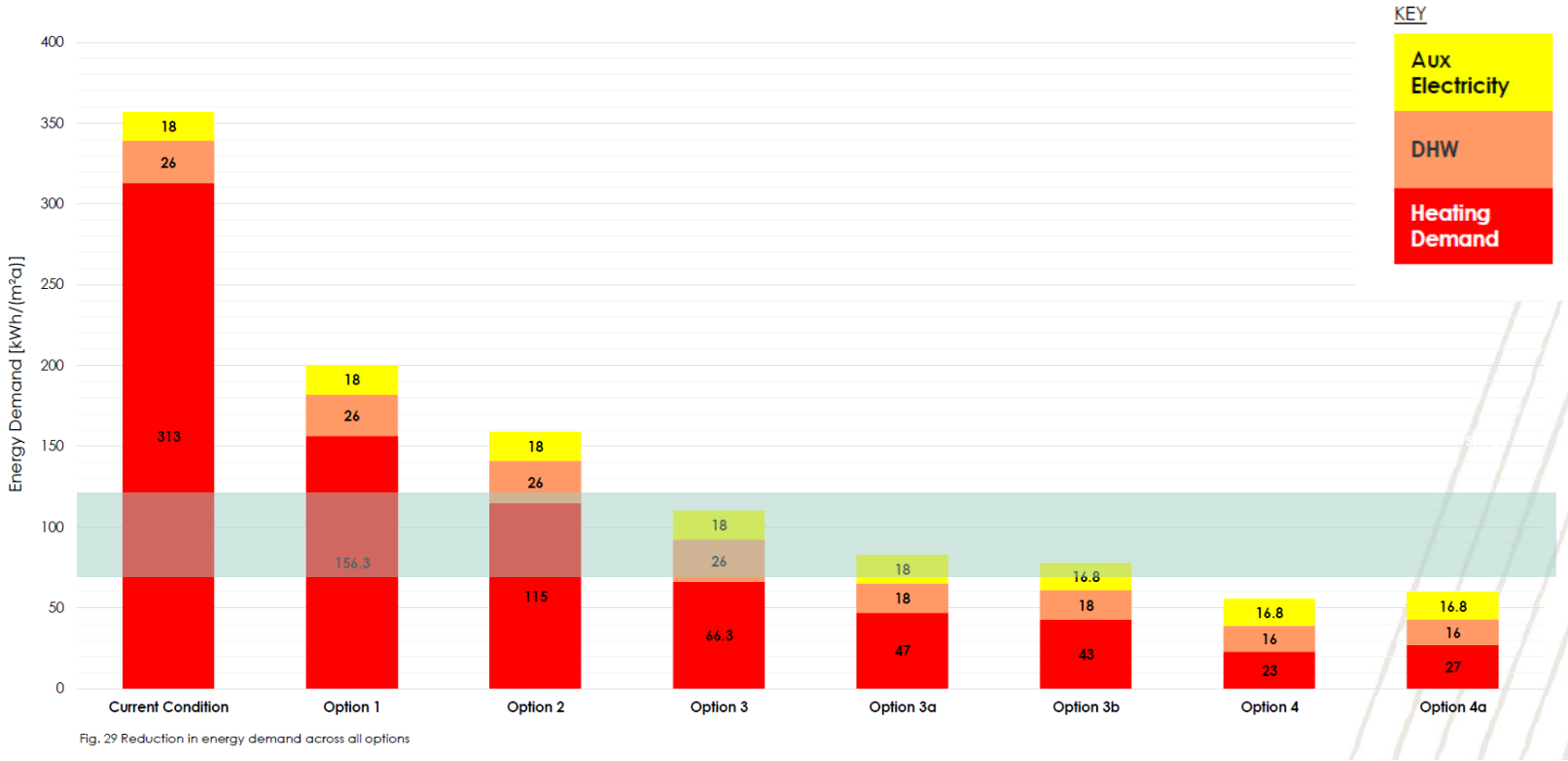

Fig. 29 Reduction in energy demand across all options

Reduction in energy demand
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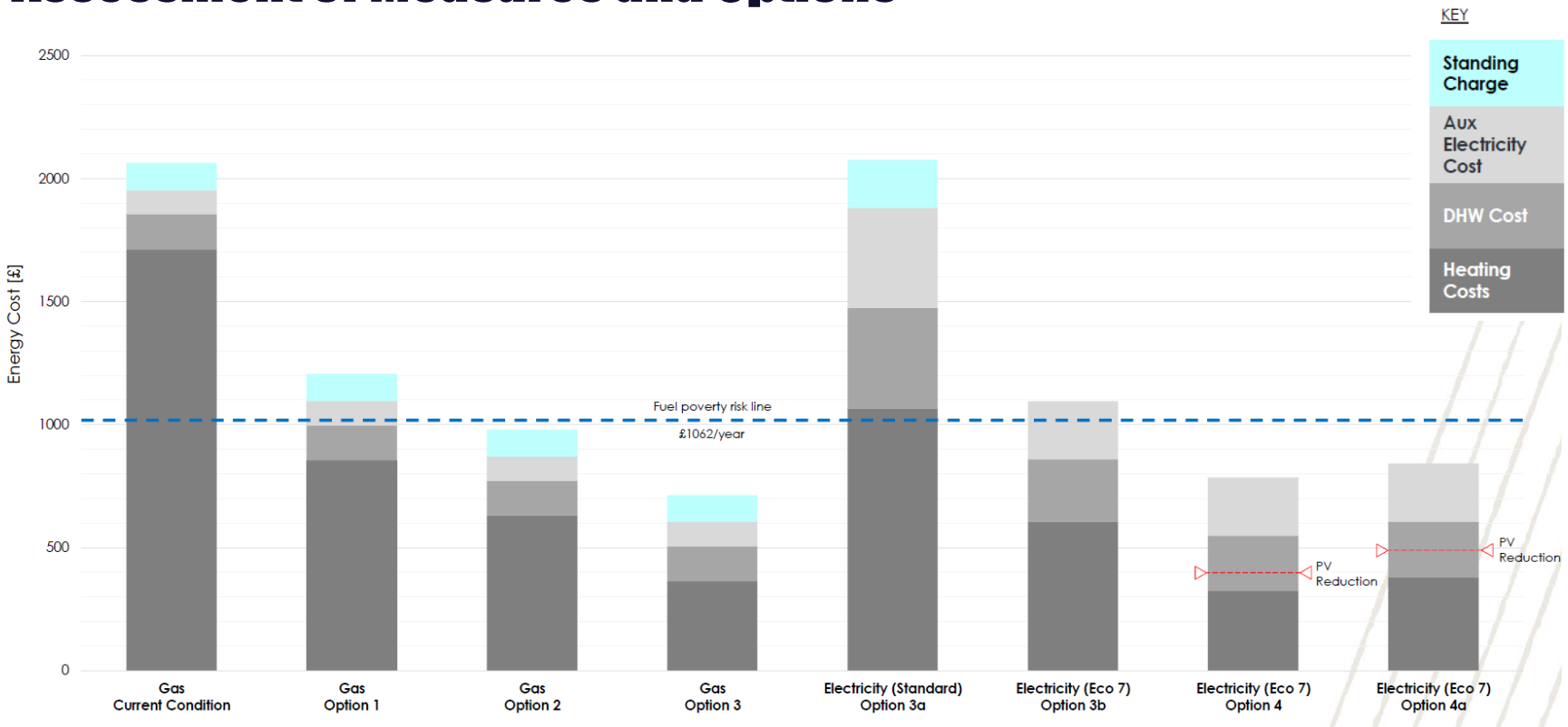
Assessment of Measures and Options



Projected energy costs across all options
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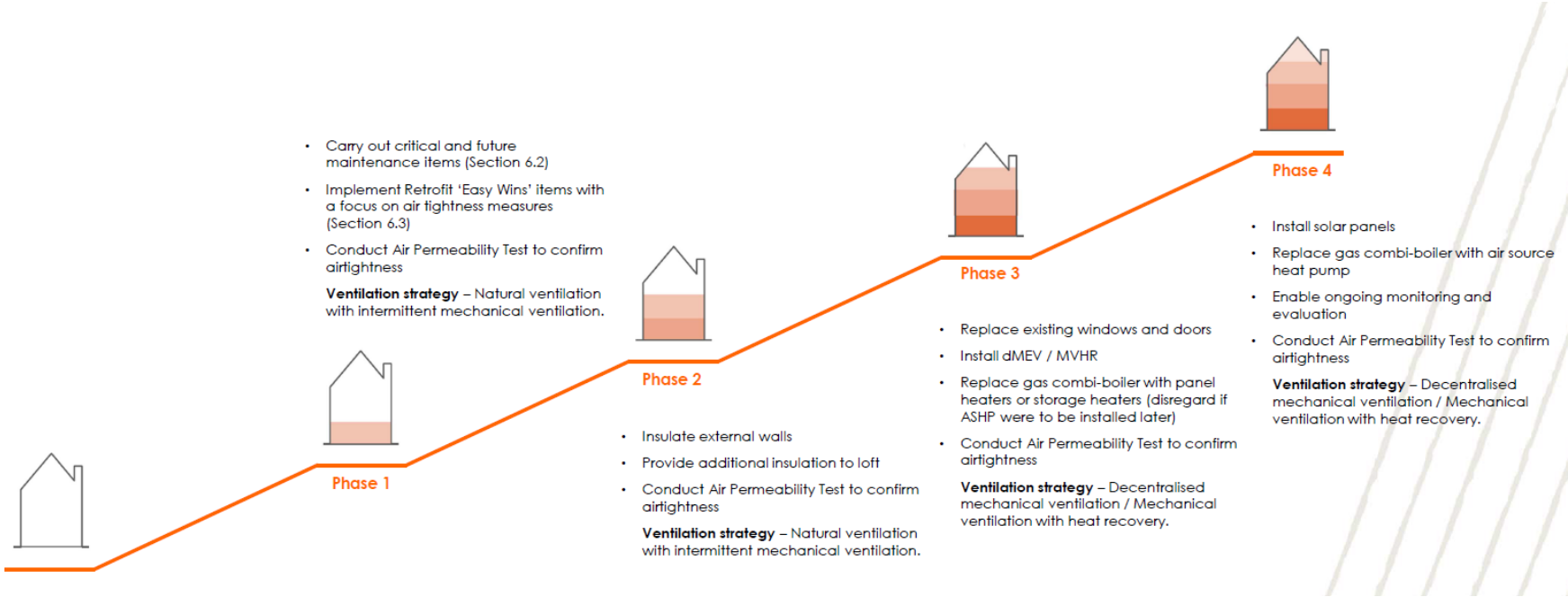
Retrofit Plan



Map for property to reach Net-zero as a whole house retrofit
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Feasibility to Project

- Special Project funding from EES ABS to deliver multi measures to council and privately owned properties a pilot project with a view to further phases of work.
- Building Warrant preparation
- Procurement
- Project Delivery
- Engagement
    - Began at feasibility stage
    - Enhanced programme planned
    - Optional for intrusive measures
    - Support for whole journey

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Enhanced Installation Support and Evaluation| Overview

- Enhanced Installation Support service throughout journey
- **Early and preventative** householder engagement end to end
- Timely advice and support to **help tenants benefit** from energy efficiency improvements and ensure not worse off - Just Transition
- **Reduces risk** of increased energy costs or mounting fuel debt
- **Home Energy Scotland**
- Series of **face to face events** and **focus group**
- **From before works start ,** right through **to post installation stage**

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THANK YOU

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