



MAST  
ARCHITECTS



BLAH BLAH BLAH BLAH

~~FEELS LIKE~~

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THE PROBLEM....

The climate crisis is here,  
it's serious and the clock is ticking.

# OUR WHY...

**The built environment causes 42% of the UK's carbon emissions. A shocking statistic that none of us can hide from but architecture and the construction industry has a vital role to play in a transition to a zero-carbon future.**

Our practice was built on a passion for sustainability and remains at the forefront of what we do today. Addressing the climate and biodiversity crisis while making a positive impact on society is a responsibility we take very seriously.

We are committed to becoming a net zero business as well as making net zero carbon buildings and places that make a real contribution to our society, the new normal.

**'MAKING A DIFFERENCE IS AT THE HEART OF EVERYTHING WE DO.'**

We're signatories of Architects Declare (UK Architects Declare Climate and Biodiversity Emergency) and work closely with industry partners to raise awareness, share knowledge, demystify sustainability and innovate to deliver a net zero carbon UK by 2045, if not sooner.

Our in-house sustainability team have started measuring our carbon footprint and are challenging how we operate as a business at every level. We know it will be a challenge but we are committed to The Race to Zero (Join the race - Race to Zero & Race to Resilience (unfccc.int)) and will continue reporting the figures annually, with a focus on reduction across our operation.

As part of our initial offsetting strategy we are partnering and volunteering alongside the multi-award-winning conservation charity, Trees for Life, to help restore the Caledonian Forest with the planting of hundreds of trees each year.



## MAST ARCHITECTS HQ

location.  
*51 St Vincent Crescent, Glasgow*

description.  
*Office refurbishment*

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# EESSH 2

## 'WE BELIEVE IN A FABRIC FIRST APPROACH'

The practice's Sustainability Group, led by our Passivhaus Certified Designer, are continuously researching the latest information on renewables, building materials and new

technologies to ensure as a practice we are at the forefront of sustainable design. MAST believe in a fabric first approach and on this basis have worked with major

contractors to develop their Net Zero Carbon approach to new housing.

In 2017 the Scottish Government published Scotland's Energy Efficiency Plan (SEEP), a coordinated programme to improve the energy efficiency of homes and de-carbonise the heat supply following which the Scottish Government launched a route map towards an Energy Efficient Scotland 2 with two main objectives 1) removing poor energy efficiency as a driver for fuel poverty and 2) reducing carbon emissions through more energy efficient buildings and de-carbonising our heat supply.

**Under the Energy Efficiency Standard for Scotland Housing 2, all social housing, or can be treated to meet, EPC Band B, or is as energy efficient as practically possible, by the end of December 2032 and within the limits of cost, technology, and necessary consent.**

**MAST Architects are an award-winning architectural practice based in the West End of Glasgow. Our team of 40 staff makes us one of the largest practices in Scotland, and we have been ranked in the top 10 in the Urban Realm 'UR 100' and positioned first in the Scottish Procurement Alliance Framework.**

We are an industry leader in the residential sector with many of our projects adopting innovative methodologies as a vehicle to promote quality and collaboration. We can also offer landscape architect, energy assessor, principal designer and both Conservation and Passivhaus Certified design services.

### BARLIA, GLASGOW

location.  
*Glasgow City*

description.  
*New build housing*

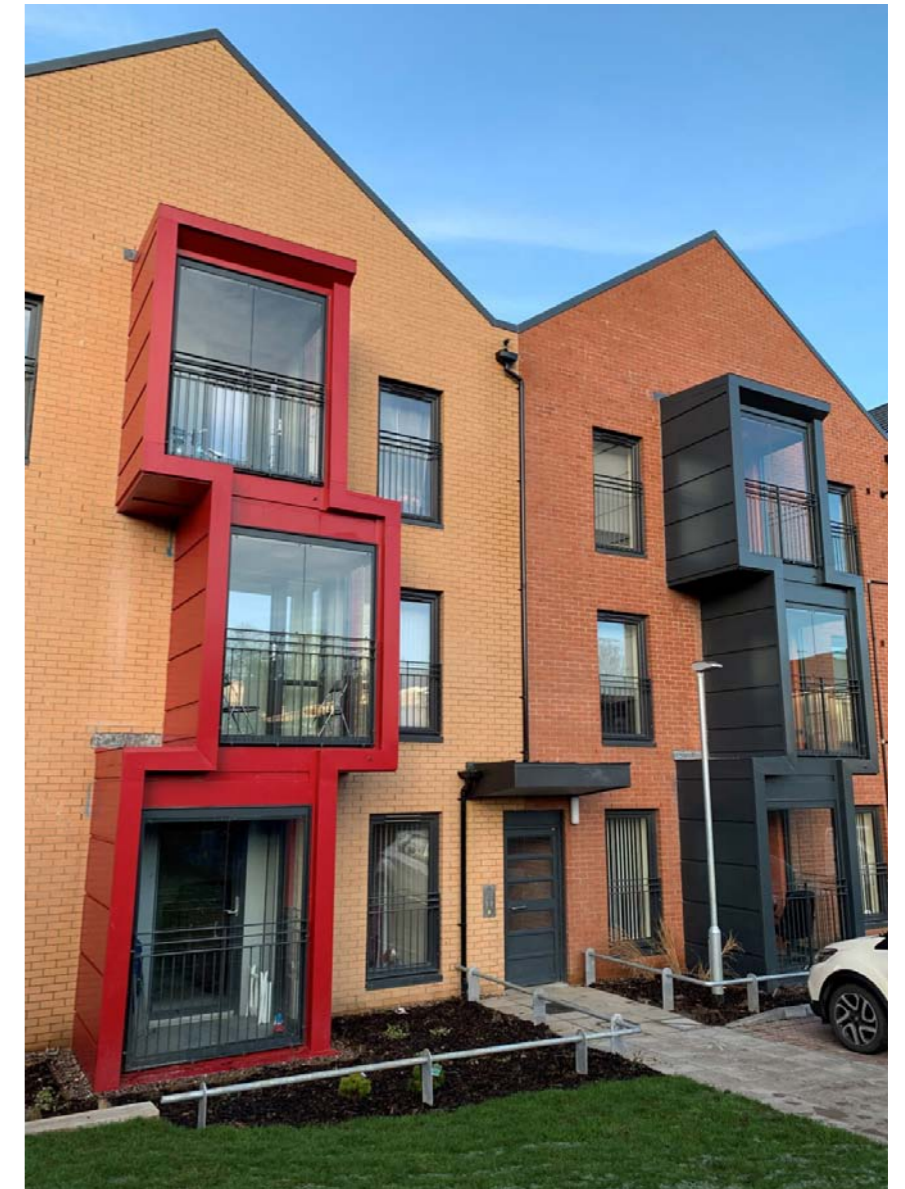
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### PAPPERT, BONHILL

location.  
*West Dunbartonshire*

description.  
*New build passive + net zero housing scheme*

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## THE CHALLENGES

EESHS 2 provides a wide and complex range of competing issues for strategic investment to address:

### NEW TECHNOLOGY

New technology is not always well-reflected in SAP assessments with some innovative technology giving a much lower modelled energy efficiency than is experienced by tenants. Landlords are expected to satisfy themselves that innovation provides benefits for energy efficiency and is in the best interests of tenants.

### FINANCIAL CHALLENGES

Financial challenges include short- and long-term affordability, impact on rents and fuel poverty, funding availability, mixed tenure, planned refurbishment and maintenance, diminishing returns on successive improvements, capital and running costs.

### EPC BAND B

The 2032 milestone recognises that EPC band B will not be met for all stock provided all reasonable efforts have been undertaken to improve the energy efficiency of the stock.

### LISTED BUILDINGS

Improvements to listed buildings or buildings within conservation areas will require particular care in relation to possible solutions and ensuring consents are in place.

### SAP

SAP methodology treats traditional buildings in the same way as others however energy efficiency improvements should take account of appropriate materials and breathability.

### BUILDING REGULATIONS

Changes to the Scottish Building Regulations are due in 2022 and 2024 which will introduce a new version of SAP (10) and requirements may have implications for EESHS 2.

### PARTICIPATION

To meet aspirations action will be required from government, tenants, and energy suppliers as well as tenants or owner occupiers who may refuse to participate meaning the landlord must make every reasonable effort to inform and explain why the work is necessary.

### AIR QUALITY

Improvements in energy efficiency have the potential for unintended consequences adversely affecting air quality, therefore, Landlords may want to collect data on carbon dioxide, temperature, and humidity, before and after projects.

### EPC REFORM

EPC Reform is ongoing but with the inclusion of an additional metric, Energy Use Rating, which will provide an understanding of the carbon emissions associated with the heat supply to a dwelling.

### EMPTY PROPERTIES

Social housing that cannot be brought up to EPC D by April 2025, and is not subject to temporary exemptions, should not be let to social tenants, estimated at around 3,000 homes.

### FOSSIL FUEL BOILER

The International Energy Agency (IEA) say no new fossil fuel boilers should be installed after 2025.

CHALLENGING PROPERTIES

TENANTS AND MIXED TENURE

TRADITIONAL BUILDINGS

FUNDING

CONSENTS

BUDGET

MOISTURE

UNINTENDED CONSEQUENCES

ENERGY MODELLING AND RdSAP

RDSAP

TECHNOLOGY

NON-TRADING

LIMITATIONS TO RdSAP

# OUR APPROACH

## MAST APPROACH

- Conservation based holistic approach.
- Take a practical approach that generally follows PAS Framework.
- Importance placed on listening, reviewing available data & understanding client concerns.
- Optimized performance with careful specification.
- Consideration of life cycle costing & maintenance
- Fabric first but where technology is required, the most appropriate site by site solution.
- Best interests of current & future tenants as well as best value.
- Acceptance that each project is unique
- Understanding of wide range of competing issues.
- Providing options that use Enerphit 'principles'.
- Comprehensive report, benefits analysis and recommendations - Menu of Options (Scottish Housing Regulator audits).
- Assistance in managing performance gap.
- Review of technology/ sharing knowledge.
- Option to monitor.

## HOW WE CAN HELP

- MAST led team / 'One Stop Shop'
- Extensive team experience, specialists in conservation and housing
- Awareness of key issues, lessons learnt and costs
- Ability to advise on multiple typologies
- Targeted feasibility studies/ options appraisals/ delivery/ support to investment plans/ property surveys

## COATBRIDGE LIBRARY

location.  
Coatbridge

description.  
Conversion of Coatbridge library into residential use

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# SPA BENEFITS

01

Compliance with the procurement regulations in Scotland.

02.

A rigorous evaluation process, comprising quality and price elements ensures all appointed companies are able to provide best value to our client.

03.

Save clients time, resources and money

04.

Project specific community benefits

05.

Ability for direct award



To assist clients with these challenges and provide the many benefits of the SPA Framework MAST are leading a well-established and specialist team including NBM Construction Cost Consultants, Dr Richard Atkins (Energy Specialist), Clyde Design Partnership (Structural), Changeworks (Monitoring) and IRT Surveys (Thermal Imaging).

The benefits of the SPA Framework are:

## GREENHEAD ST.

location.  
*Glasgow City*

description.  
*Stonework repairs and roof upgrade*

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## ELDERPARK OFFICES

location.  
*Glasgow City*

description.  
*New extension, conversion and internal alterations to listed building*

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'SAVE CLIENTS TIME,  
RESOURCES AND MONEY'



# OUR TEAM

'IMPORTANCE IS PLACED ON LISTENING TO CLIENT PRIORITIES'

**With awareness of the key issues, knowledge from recent pilot projects and extensive experience in energy, conservation, housing and monitoring the team are ideally positioned to provide targeted feasibility studies, option appraisals and property surveys over multiple typologies to support investment plans and regulatory audits.**

The team can provide comprehensive reports with benefits analysis, recommendations and a menu of costed options, guidance on the latest technologies and assistance in managing the performance gap.

If you are interested in finding out more about how MAST's team can assist with EESSH 2 and a no obligation presentation, please contact David Denholm at [david@mastarchitects.co.uk](mailto:david@mastarchitects.co.uk) or 07855 795477.

MAST can also provide presentations on Net Zero and Passivhaus.

The team appreciates that every project is unique with a wide range of issues therefore have developed a conservation based holistic approach that is practical and generally follows the principles of the PAS 2035 Framework and Enerphit.

Importance is placed on listening to client priorities and reviewing available common technical data to provide an optimised performance solution. A fabric first approach is promoted but where technology is required, it is always appropriate to the site.



DAVID DENHOLM



MATTHEW HOLLOWAY



MAST Architects are an award winning architectural practice based in the West End of Glasgow. We are an industry leader in the residential sector with many of our projects adopting innovative methodologies and we are conversant with the adoption of BIM on residential projects as a vehicle to promote quality and collaboration.

Sustainability is a key driver at MAST with the practice not only advocating this through our energy conscious design but also in our Carbon Reduction Team's efforts to monitor, refine and reduce our carbon footprint. The practice's Sustainability Group, are continuously researching the latest information on renewables, building materials and technologies to ensure as a practice we are at the forefront of sustainable design.



RICHARD ATKINS

Richard has worked with MAST Architects for many years providing energy assessor sub consultancy services.

Richard founded and provides the technical and IT support for [www.RIAS-regis.co.uk](http://www.RIAS-regis.co.uk) a scheme to approve Certifiers of Design (Section 6 - Energy) Domestic.

As Scotland's first Approved Certifier of Design, he has certified to date the performance of over 2,000 new dwellings. 1,006 of these have been completed with MAST Architects. Richard has completed a PhD in the Assessment of Sustainability in the Existing Built Environment.



SCOTT BRADSHAW

nbm Construction Cost Consultants are a Chartered Quantity Surveying practice based in central Scotland providing the services of Cost Consultancy, Contract Administration, Employer's Agent, Building Surveying and Principal Designer.



We specialise in affordable / social housing and have vast experience of refurbishment, cyclical maintenance, reactive maintenance and new build works in respect of same. With an experienced team of twenty two surveyors, twelve of which are Chartered we believe we are well placed for assisting any RSL in reviewing their existing stock with a view to improvements and meeting the current and future requirements as set by the Scottish Government.





RODDY HAMILTON JOANNA LONG

Changeworks is Scotland's leading environmental charity delivering solutions for low carbon living. Changeworks has been at the centre of delivery and innovation within the context of energy efficiency for over ten years and is currently managing energy and heat de-carbonisation projects across Scotland.

Our success to date has been built on a clear understanding of Scottish Government strategy around energy efficiency and heat de-carbonisation alongside the needs of diverse stakeholders including local authorities, housing associations, owner occupiers and the private rented sector as well as the supply chain.

We make it our job to both keep on top of changes to legislation and delivery frameworks and to evaluate and feedback where our experience can inform future scheme design or policy and to help deliver more successful projects.

# CRED- ENTIALS



TONY MULLEN

Clyde Design Partnership Ltd. was formed in May 1986 to provide an integrated and non-adversarial approach to construction procurement, a radical idea at the time but now widely accepted as the concept of partnering. Initially, and for a period of approximately 20 years, the practice provided various consultancy services including, Civil and Structural Engineering, Mechanical and Electrical Engineering, Architectural, Quantity Surveying, Project Management and Planning Supervision.



In conjunction with MAST Architects, Tony and the team at Clyde Design Partnership have worked on numerous projects including; comprehensive Tenement Improvement projects, full-scale energy centre with new heating, new windows, new insulated warm roofs and external wall insulation, air source heat pumps.



STEWART & ALAN LITTLE

IRT were founded by brothers Stewart and Alan Little in 2002 to provide impartial thermal imaging services to the building sector.



Since then the company have pioneered the sector and developed software to help clients make decisions without regret when it comes to leveraging grant funding and optimising their retrofit plans to achieve net zero.

## MEMBERSHIPS

- Constructionline Silver Membership
- Passivehaus Membership
- RIAS Chartered Practice
- Structural Timber Association
- British Standards Institute
- TRADA
- Scottish Federation of Housing Associations
- Women in Property
- Scottish Building Contracts Committee
- Association for Environment Conscious Building
- Association for Project Safety

## ACCREDITATION

- RIAS Accreditation in Conservation Architecture
- Passivehaus Designer
- PAS 2035 ABBE Level 3 Award in Energy Efficiency Measures for Older and Traditional Buildings
- PAS 2035 Designer.
- RICS Certificate in BIM Project Management
- CHAS Accreditation
- QMS ISO 9001 Certificate
- QMS ISO14001 Certificate
- Investors In People Gold
- Investors In Young People
- Glasgow Living Wage Foundation
- Scottish Business Pledge
- NBS Chorus

# CASE STUDY

**A good example of EESSH 2 energy efficiency improvement is our work to tenements in Strathbungo where pre 1919 tenements are being lifted from an EPC band E to band B.**

All properties had the benefit of vacant possession and were neither listed or within a conservation area.

To support a general concept of fabric first and improving airtightness of each flat the main features of the works include:

[1] Repair work to external masonry walls to avoid moisture ingress.

[2] IWI – made up of 20mm insulating lime plaster parge coat acting as a vapour permeable airtightness layer and 100mm calcium silicate board. Wood fibre board was originally considered as the main insulation material, but this is usually rated as Class E fire combustible. Calcium silicate is the only solid board we have found which has a high degree of vapour permeability, a high thermal performance, and is rated as Class A non-combustible.

The Target U- Value for the external wall is 0.36 which seems high compared to new builds but increasing the thickness of insulation may have led to interstitial condensation.

[3] Airtightness was improved and thermal breaks reduced to give an overall airtightness of 5 air changes per hour.

[4] Double glazed timber windows were installed (after consideration was given to both timber and UPVC triple glazing).

Timber Triple glazed windows which were almost double the price of double glazed timber windows AND although UPVC triple glazed windows were the same cost, a lifespan of less than 30 years was at odds with the client's objective of minimising environmental impact.

[5] Natural ventilation is provided with intermittent extract fans in kitchens and bathrooms.

[6] EcoFIT pure 825 VUW 256/6-3 (H-GB) 25kW Combi Condensing Boilers were installed to each flat

Along with:  
Waste water heat recovery under baths and shower trays.

[7] Ground floor insulation between the joists. Under joist was limited due to solum depth and [8] 350 mm Roof Insulation FITTED within a 'cold roof' system.

So overall, the specification followed Enerphit principles achieving EPC Band B and incorporating planned maintenance at a cost per unit of £74,000.00 OR £1700 per sq. m.



## STRATHBUNGO TENEMENTS REFURB.

location.  
Glasgow City

description.  
Energy efficiency refurbishment work



# CASE STUDY

**Our Team have undertaken an initial appraisal of five domestic properties in Dumfries and Galloway, to assess their potential for refurbishment and improvement.**

The buildings dated from the 1930's and were single storey, of masonry construction, a construction type representative of some 11% or 326,000 dwellings throughout Scotland. Such dwellings present a significant challenge if Scotland and the UK are to meet the net zero targets introduced by both governments.

This project aim is to demonstrate those interventions that are feasible, in a rural location, and the costs and the performance benefits associated with them.

This Study adopts a simple step by step approach, in considering what elements might be included in a refurbishment and improvement, the energy performance impact of these and the cost of delivering them. The Study was structured to consider three basic options to provide the client with a shopping list of potential approaches and solutions. The costed options included:

1. Bring the dwellings to a good habitable standard, including new oil central heating to create a Baseline cost and energy performance

2. Suggested alterations and fabric upgrades to set an Improved Baseline cost and energy performance

3. Explore services interventions identified by the Study Team, detailing the construction cost and energy impact where applicable against the Baseline and Improved Baseline cases.

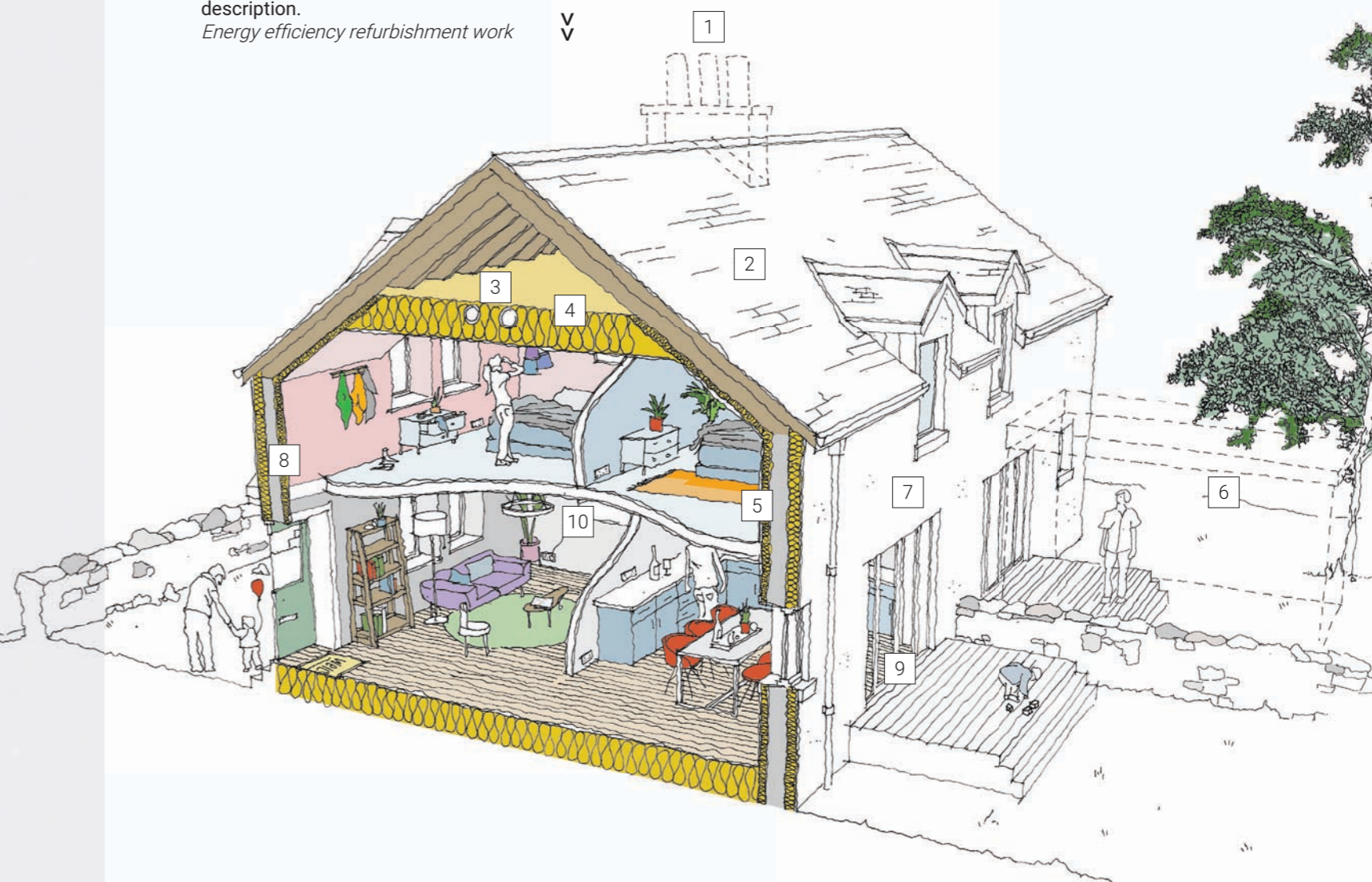
The Study concluded that the most appropriate approach included:

- Comprehensive renovation of roofs, windows, services and fittings, including new LED low energy lighting
- Fabric improvements to improve the building form factor, and reduce heat loss and air infiltration
- Installation of Exhaust Air Heat Pumps (EAHP)
- Installation of photovoltaic panel arrays to each dwelling
- Installation of battery storage systems to maximise use of renewable energy generated by the dwelling
- Installation of EV charging points
- Installation of electricity sub-metering to support a Post Occupancy Evaluation of the completed project

## NAVAR, GLENLEE REFURB.

location.  
Glenlee

description.  
Energy efficiency refurbishment work



1. Remove chimney to reduce air leakage.
2. Replace roof covering, slate over breathable underlay.
3. Install new exhaust air heat pump.
4. Insulate loft with 400mm mineral wool.
5. Inject mineral wool insulation into cavity and line with 25mm PIR insulation and 22x50mm SW battens with plasterboard.
6. Existing extensions to be removed to improve form factor and allow better views to garden.
7. 100mm rigid mineral wool external insulation with acrylic render fitted externally.
8. 25mm PIR foil backed insulation & 38mm wide service zone fitted internally.
9. Increase size of window opening to create french doors, replacement uPVC double glazed windows throughout.
10. New LED lighting throughout.

## CARTCRAIGS ROAD

location.  
*Glasgow City*

description.  
*External Wall Insulation*



## BROOMHILL

location.  
*Glasgow City*

description.  
*External Wall Insulation*



## ELDERPARK

location.  
*Glasgow City*

description.  
*Stonework repairs , rainwater goods  
and window upgrades*



LISTEN.  
EXPLORE.  
CREATE.  
DELIVER.



CONTACT US!

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