

MAST ENERGY

SUSTAINABILITY & ENERGY
CONSULTANTS



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Introduction

01

At MAST Energy, we understand our clients' values and our primary aim is to create energy efficient homes which place occupants needs first.

We work closely with our clients to develop holistic strategies which ensure homes are highly energy efficient and promote occupant health and wellbeing.

Our goal is to share our knowledge with our clients and empower them to make economic, pragmatic and practical decisions which improves the performance of their housing and the livelihood of their occupants.

Our Mission

“Working together to build warmer, healthier homes to tackle fuel poverty and improve the livelihoods of people within well connected sustainable communities.”



Our Approach

01

MAST Architects have over 40 years' experience of working in the residential sector, delivering multiple award winning mixed tenure regeneration projects of up to £60M. Their primary focus has always been to drive innovation and change, seeking to exceed the minimum standards, shaping the homes people live in with a focus on energy conscious design.

MAST Energy has been set up to build on our previous experience and ensure sustainability is at the forefront of the design process. We work with our clients to understand their aims and objectives and their key energy and sustainability drivers, working to integrate these within the wider design and specification.

Whether working with our parent company or external consultants, we ensure homes have a focus on energy efficiency, underpinned by a robust and deliverable energy strategy, and are designed to be warmer, healthier and cost-efficient for residents.

We believe that all projects are unique and we work to *make a difference.....*

Our Team

Our team are a group of experts within their fields of energy consultancy and architecture and have extensive experience in delivering both new build and retrofit projects with a focus on sustainability.

Our areas of expertise include; Net Zero, Passivhaus, Retrofit, Repair and Refurbishment, Conservation and Whole Life Carbon.

We place the upmost importance on listening to our *clients* priorities to develop the correct energy strategy for *their* buildings which delivers on *their* objectives.



Michael Jarvis
Director

Michael is also a Director at MAST Architects with 30 years experience in delivering award winning energy efficient sustainable housing & buildings. Notable experience includes Passivhaus, district heating, geothermal and energy farms contributing to his role as Head of Certification for Energy at RIAS. As an industry leader, he has contributed to a number of technical, energy and sustainable design working groups.



Mark Johnstone
Director

Mark is also a Director at MAST Architects and in the last 25 years has delivered multiple award winning large scale mixed tenure residential projects of up to 500 units. His experience includes balancing sustainable design with innovative off site and modern methods of construction. Mark has worked with clients to develop robust net zero strategies and has led on pilot projects designed to Gold, Platinum and Passivhaus standards.



David Denholm
Director

David is also a Director at MAST Architects with 25 years experience of delivering an extensive number of retrofit, major repair and refurbishment projects. David leads MAST's Conservation & retrofit team offering clients strategic advice on balancing energy and sustainability led solutions within existing buildings, many of which are a non standard construction, listed or in a Conservation area.



Morgan Stephen Milne

Certified Passivhaus Designer

Morgan is a Certified Passivhaus Designer and leads MAST Architect's sustainability team. She has worked on numerous Passivhaus, Net Zero and Retrofit Archetype Schemes, drawing on her experience to deliver pragmatic solutions to client's sustainability goals. Morgan also has experience carrying out Whole Life Carbon Assessments using the industry recognised RICS Methodology.



David Locke

PAS 2035 Retrofit Co-ordinator

David is a PAS 2035 Retrofit Co-ordinator and Architect with extensive experience in both new build and retrofit projects. He has worked on a large number of retrofit projects to achieve the EESSH2 standard which have included EWI, IWI and enerphit principles. These adopt a pragmatic approach to meeting the standard whilst balancing capital costs with costs in use, addressing energy costs and fuel poverty.



Matthew Holloway

Conservation Accredited Architect

Matthew has held RIAS Accreditation in Building Conservation since 2010. He has delivered numerous retrofit, major repair and refurbishment projects including works to traditional (pre 1919), heritage and historically significant listed buildings, in a range of urban, rural, environmentally sensitive and designed landscape settings.

Our Services

Our primary aim is to assist clients in the development of their energy strategies for both new and existing buildings.

There are multiple, complex and competing factors to be considered when developing an energy strategy and each client will have different priorities.

MAST Energy can work with you to develop a project brief and subsequent proposals which are bespoke and tailored to your specific needs.



Net Zero Carbon

03

The Scottish Government have set a Net Zero target for the country by 2045 and to achieve this target we will need to tackle the carbon at all building life cycle stages. However, we understand that transitioning towards Net Zero is a complex process. We can work with you to develop a Net Zero strategy which tackles the areas which are most important to you now whilst setting out a route map to 2045.

There are numerous Net Zero Definitions which encapsulate the carbon emissions generated at different life cycle stages of a building from construction through to end of life;

- Up Front – Carbon generated by the construction stage of the building
- Operational – Carbon generated by the use of the building
- Embodied Carbon – Carbon generated by the construction, maintenance and replacement and demolition stages of the building
- Whole Life Carbon – Carbon generated by all the above combined

Strategic Services



Net Zero Carbon



Passivhaus / Enerphit Consultancy



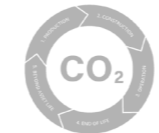
Passivhaus Equivalent (PHE)



Retrofit (EESSH2 / SHNZS)



Retrofit (Pre 1919)



Whole Life Carbon Assessment (WLCA)



Outline Specifications



Construction Detail Packs

PH / EP

Passivhaus / Enerphit is an internationally recognised energy standard which adopts a whole building approach with clear, measured targets which focus on reducing heat loss and energy demand in buildings. This is achieved by adopting a fabric first approach to buildings with optimal form and orientation. Passivhaus buildings also have an extremely high-quality of construction, achieved through a rigorous quality assurance process.

Passivhaus can also provide additional benefits in respect of;

- Building Performance
- Climate Emergency
- Health and Wellbeing
- People Performance

Our Passivhaus Certified Designers can work with you from concept through to completion to develop the correct approach for your project, guiding you through the process to achieve certification. We can also support you on completion of the project to ensure occupants understand how to use their new Passivhaus homes to gain the most value from the process.

Strategic Services



Net Zero Carbon



Passivhaus / Enerphit Consultancy



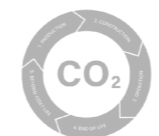
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Outline Specifications



Construction Detail Packs

PHE

It is recognised that Passivhaus standard creates highly energy efficient buildings, however, it can be very prescriptive and is not always practicable due to capital cost, maintenance and replacement costs, site constraints, brief constraints and planning constraints.

We advocate a Passivhaus Equivalent approach to the design and construction of buildings, utilising best practice guidance from the standard developed to suit the project brief, constraints and budget.

We can carry out options analysis to assess the impact on the energy performance of your building of implementing various best practice measures, including; siting and orientation, building form, fabric performance, MEP Systems and monitoring systems.

Similar to our Passivhaus projects we can also carry out a rigorous quality assurance process during construction and provide additional support on completion to ensure these buildings perform as designed.



Net Zero Carbon



Passivhaus / Enerphit Consultancy



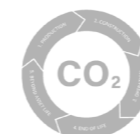
Passivhaus Equivalent (PHE)



Retrofit (EESSH2 / SHNZS)



Retrofit (Pre 1919)



Whole Life Carbon Assessment (WLCA)



Outline Specifications



Construction Detail Packs

Retrofit (EESSH2/SHNZS)

80% of the homes which will exist in Scotland by 2045 have already been built, meaning retrofit of existing homes is critical to reduce energy consumption, mitigate fuel poverty and achieve the countries Net Zero targets.

Retrofitting existing buildings is a particularly difficult challenge due to the scale, funding available, competing objectives and variety of existing building types.

We have a wealth of retrofit experience gained from our over 40 years of experience working within the field. This has been greatly supplemented in recent years by our work on several pilot projects and energy studies carried out in respect of Energy Efficiency Standard for Social Housing (EESSH and EESSH2) standard and Social Housing Net Zero Scotland (SHNZS) future standard. Key to the success of each of these projects has been our awareness that the occupant must come first, and any measures undertaken should mitigate fuel poverty.

We can work with you to develop the correct brief for your retrofit project and in turn the correct retrofit strategy to meet your needs.

Strategic Services



Net Zero Carbon



Passivhaus / Enerphit Consultancy



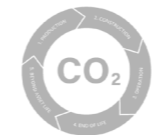
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Retrofit (Pre 1919)



Whole Life Carbon Assessment (WLCA)



Outline Specifications



Construction Detail Packs

Retrofit (Pre 1919)

'Pre 1919' buildings are generally those constructed before WW1 and are typically characterised by their solid loadbearing masonry wall, pitched roof structure with slated or tiled covering and timber floor constructions. The predominant pre 1919 building type is the tenement of which there are 175,000 in Scotland.

They are inherently more complex to retrofit due to their construction type and heritage significance, some building may also be located within conservation areas or have listed building status. These buildings, however, also have iconic significance and investment in them in the form of retrofit can extend their lifespan, preserving both homes and communities.

We have extensive experience developing and implementing retrofit strategies for pre 1919 buildings and understand their inherent complexities. Working with our Conservation Accredited Architect we can assess each building's unique characteristics and variables to ensure retrofit works are sensitive, appropriate, and sympathetic. A holistic approach will be pursued to achieve improvements within the constraints of the existing building, including heritage, technical, and financial aspects.

Strategic Services



Net Zero Carbon



Passivhaus (PH)



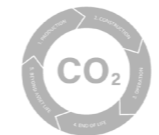
Passivhaus / Enerphit Consultancy



Retrofit (EESSH2 / SHNZS)



Retrofit (Pre 1919)



Whole Life Carbon Assessment (WLCA)



Outline Specifications



Construction Detail Packs

WLCA

A Whole Life Carbon Assessment assesses the carbon impact of a building over its entire life cycle, from the construction stage through to its end of life. The assessment establishes the carbon impacts of both;

- Embodied Carbon - carbon associated with raw materials, transport, construction, maintenance, repair and replacement.
- Operational Carbon - carbon emitted during the operation and use of a building e.g. heating, lighting, water and equipment.

The increased operational efficiency of buildings and the decarbonisation of the electrical grid in Scotland has resulted in a decrease in operational carbon. Consequently, embodied carbon now makes up a much larger proportion of a building's whole life carbon and must be tackled if we are to meet our Net Zero targets.

We can carry out a WLCA for your project to assist you in understanding the overall carbon footprint of your building. This can allow comparison to industry benchmarks but more importantly allow you to establish where improvements can be made to the design and specification of current and future projects.

Strategic Services



Net Zero Carbon



Passivhaus / Enerphit Consultancy



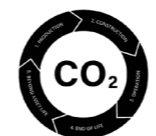
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Retrofit (Pre 1919)



Whole Life Carbon Assessment (WLCA)



Outline Specifications



Construction Detail Packs

Outline Specs

Having a robust outline specification for both new buildings and retrofit of existing buildings can be instrumental in achieving your sustainability goals. Specification or employers requirements do not often focus on the sustainable elements of a building. However, we can work with you to develop a specification which amongst other could include information on;

- Fabric Strategy
- Heating Strategy
- Ventilation Strategy
- Renewables Strategy
- Maintenance and Replacement Strategy
- Construction Methods & Material Sourcing
- Whole Life Carbon
- Designing for Deconstruction

By incorporating these areas into your outline specification we can help you ensure your wider sustainability goals are achieved.

Strategic Services



Net Zero Carbon



Passivhaus / Enerphit Consultancy



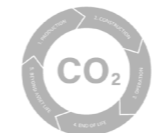
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Retrofit (Pre 1919)



Whole Life Carbon Assessment (WLCA)



Outline Specifications



Construction Detail Packs

Details

Our staff are architects first and as such have a wealth of knowledge and experience in developing detail packs for various construction types including new build, retrofit and modular constructions. We have experience working with contractors to develop their standard detail packs and through this process understand that the practicalities of constructing a detail on site are as important as the performance of the detail.

Considered construction detailing can mitigate heat loss in these areas. Heat is lost through the building fabric primarily in two areas;

- Infiltration – gaps in the air tightness envelope
- Thermal bridging – gaps in the insulation envelope

When developing construction details we consider these areas first alongside all other technical aspects to deliver details which meet the technical requirements, reduces the buildings space heating demand and energy costs.

We can work with you to develop a standard detail pack for your projects including preparation of thermal bridging calculations.

Strategic Services



Net Zero Carbon



Passivhaus (PH)



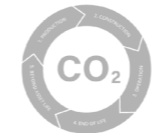
Passivhaus / Enerphit Consultancy



Retrofit (EESHS2 / SHNZS)



Retrofit (Pre 1919)



Whole Life Carbon Assessment (WLCA)



Outline Specifications



Construction Detail Packs

Our Services

MAST Energy provide a wealth of technical services to assist in the development of our client's energy strategies.

These services help us understand the energy performance, internal environment, running costs, whole life costs and whole life carbon of our clients buildings, all critical to the decision making process.

Our expertise in a variety of software packages allows us to utilise the correct software for the task at hand to provide our clients with the key information they need.



SAP

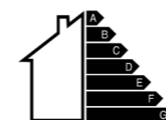
The Standard Assessment Procedure (SAP) is the national calculation methodology used throughout the UK for demonstrating compliance with the Building Regulations and for preparing EPC's.

We can provide SAP assessment for Building Warrant submissions to demonstrate compliance with Section 6 and provide EPC's on completion of the development in support of applications for completion certificates.

In addition to the above, we can also utilise SAP to assess differing energy performance specifications for projects.

It is likely SAP will be replaced in the near future by the Home Energy Model (HEM) which is currently under consultation by the UK Government. When this occurs, we will ensure we are at the forefront of the change, pro actively embracing new software on projects.

Technical Services



SAP Assessment



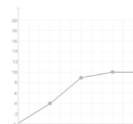
Approved Certifier of Design (Section 6)



PHPP Calculations



PSI Value Calculations



WUFI Calculations



PAS 2035 Retrofit Co-ordinator



Dynamic Simulation Modelling

ACD (Section 6)

Approved Certifiers of Design are qualified individuals allowed to certify the design of buildings in Scotland, and to issue certificates in support of applications to local authorities for building warrants and amendments to warrants. ACD's are audited by their scheme provider and as such must maintain extremely high standards in their work.

Our experienced Approved Certifier of Design can certify your project meets Section 6 (Energy) of the building regulations. Their certification provides a guarantee that your building is not only designed to meet the requirements of section 6 but is designed to do so in the most efficient and cost effective way to meet your requirements.

A 10% discount is applied to the building warrant application fees where a certificate of design is provided and applications are often dealt with in a more timeous manner as there is no need for further checking by the building standards officer.

Technical Services



SAP Assessment



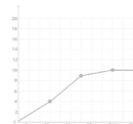
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PHPP Calculations



PSI Value Calculations



WUFI Calculations



PAS 2035 Retrofit Co-ordinator



Dynamic Simulation Modelling

PHPP

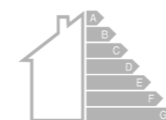
The Passivhaus Planning Package (PHPP) is a design tool produced by the Passivhaus Institute aimed for use by architects, engineers, and building designers when designing Passivhaus buildings. All Passivhaus buildings must be modelled in PHPP and the model assessed by the Passivhaus certifier at critical project stages.

The energy efficient performance of Passivhaus buildings rely on an energy balance between losses and gains. The PHPP is used as a design tool to establish the energy balance which allows a space heating demand of $\leq 15\text{kW/h/m}^2$ to be achieved by analysing a variety of data including;

- Form, Orientation and Over Shading
- Fabric Specification
- Heating and Hot Water Specification
- Ventilation Specification

We can use PHPP on Passivhaus, Enerphit and Passivhaus Equivalent projects, new build and retrofit projects, to compare varying specifications and products to optimise the performance of your building.

Technical Services



SAP Assessment



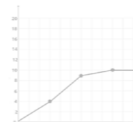
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PHPP Calculations



PSI Value Calculations



WUFI Calculations



PAS 2035 Retrofit Co-ordinator



Dynamic Simulation Modelling

PSI Calcs.

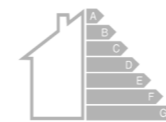
A large proportion of the heat lost in buildings is through the junctions in the building fabric where it is harder to maintain a continuous insulation line. These are the thermal bridges within the building and include amongst others;

- Ground Floor / External Wall Junction
- Window / Door Ingoes
- Roof / External Wall Junction
- Incoming Services and Duct Work

Our aim when we prepare construction details is to design them to be as thermal bridge free as possible. PSI value calculations determine the heat loss or gain at building junctions, and we can carry these out on your project to assess the thermal bridging and develop details which minimise it as much as possible.

We can also use these bespoke PSI value calculations in our SAP assessment of your project which will highlight the reduction in space heating demand to assist in achieving compliance with Section 7 Aspect 2.

Technical Services



SAP Assessment



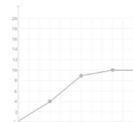
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PHPP Calculations



PSI Value Calculations



WUFI Calculations



PAS 2035 Retrofit Co-ordinator



Dynamic Simulation Modelling

WUFI Calcs.

The movement of moisture through the external fabric of a building is key to fabric performance. The proposed fabric must be designed and specified to ensure there is no build-up of moisture within the construction which causes condensation and mould and could lead to sick building syndrome. This is important in both;

- New Build Projects where the increasing levels of insulation can lead to a greater risk of moisture
- Retrofit projects where adding insulation to both the internal and external face of existing construction can lead to a greater risk of moisture.

A WUFI calculation is a dynamic hygrothermal simulation tool used to predict the movement of heat and moisture through a construction over time, if a construction does not allow for the correct movement of heat and moisture condensation risk occurs. We can carry out WUFI Calculations, if required, on your project to ensure the proposed construction will not lead to any risk of condensation. We can also liaise with product manufacturers to interrogate the results of the calculations and ensure the most suitable products are specified.

Technical Services



SAP Assessment



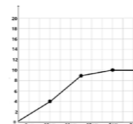
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PHPP Calculations



PSI Value Calculations



WUFI Calculations



PAS 2035 Retrofit Co-ordinator



Dynamic Simulation Modelling

PAS 2035

PAS 2035 is the British Standard for retrofitting existing dwellings. It was first published in 2019 in response to the Each Home Counts Review which highlighted systemic failures and poor standards in retrofit delivery.

PAS 2035 outlines how retrofit projects should be managed and delivered to ensure these failures do not continue to occur.

Our PAS 2035 Retrofit Co-ordinators have undergone the relevant training and can assist on your retrofit journey, being central to the process and ensuring compliance with the standard at all key stages;

- Retrofit Strategy
- Design and Specification
- Installation
- Post Installation

Our PAS 2035 Retrofit Co-ordinators will also be greatly assisted by the wider team and our wealth of experience on retrofit projects.

Technical Services



SAP Assessment



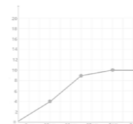
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PHPP Calculations



PSI Value Calculations



WUFI Calculations



PAS 2035 Retrofit Co-ordinator



Dynamic Simulation Modelling

DSM

Dynamic Simulation Modelling uses sophisticated computer software to assess the environmental performance of buildings. Similar to SAP and PHPP, the software models a building's geometry, orientation and location alongside the thermal properties of the fabric elements and performance of the M&E equipment. However, unlike SAP and PHPP, which are steady state models, DSM models creates a simulation of the building in real time allowing more detailed and more accurate information to be obtained.

A DSM model is most useful when you want to develop a greater understanding of your buildings performance and energy use. We can develop a DSM model for your project to assess the following;

- TM54 Calculations – Evaluate the operational energy use of a building including regulated and unregulated energy
- TM59 Calculations – Assess the risk of overheating in your building and options for mitigating this
- Energy Use – Assess energy use in relation to CO2 emissions, peak demands, energy cost and utilisation of renewable energy
- Daylighting - Assess the predicted day lighting in your buildings to achieve sufficient levels

Technical Services



SAP Assessment



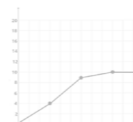
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PHPP Calculations



PSI Value Calculations



WUFI Calculations



PAS 2035 Retrofit Co-ordinator



Dynamic Simulation Modelling

Our Experience

MAST Energy can draw from our over 40 years experience working in the housing sector to develop the correct strategy for your project. Our wealth of experience allows us to consider all aspects of a project allowing the energy strategy to integrate seamlessly with the wider design. This approach can be adopted on both new build and retrofit projects.





Carmichael Court



Client Requirements

- Occupant health and wellbeing
- Capital, maintenance and renewal costs
- Design Guides / Employers Requirements



Technical Design / Building Regulations

- MEP Requirements
- Fire Requirements
- NHBC/Premier Guarantee
- Current Building Regulations
- Proposed Scottish Passivhaus Equivalent



Planning

- Pre-Application to Planning Submission Requirements
- National Planning Policy – NPF4
- Local Planning Policy



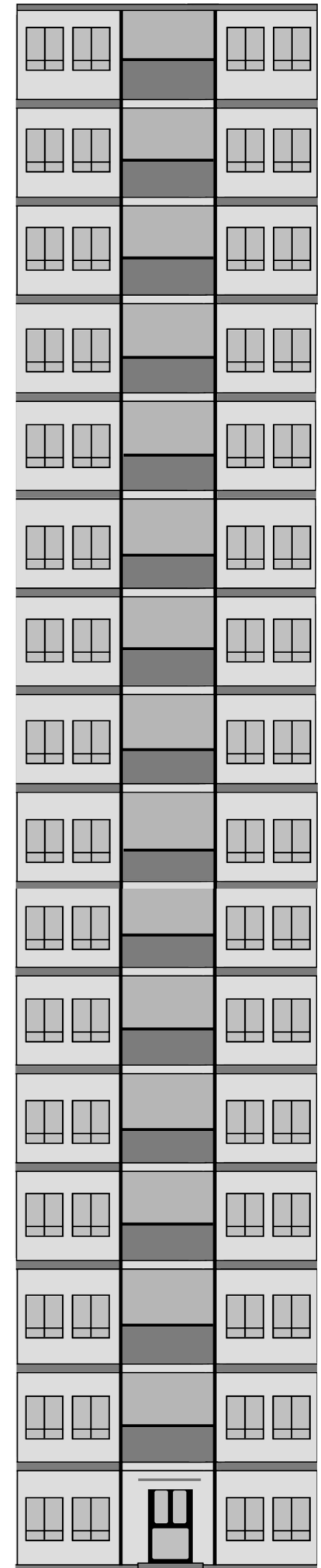
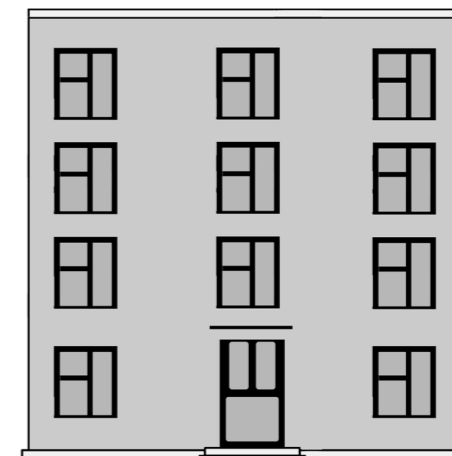
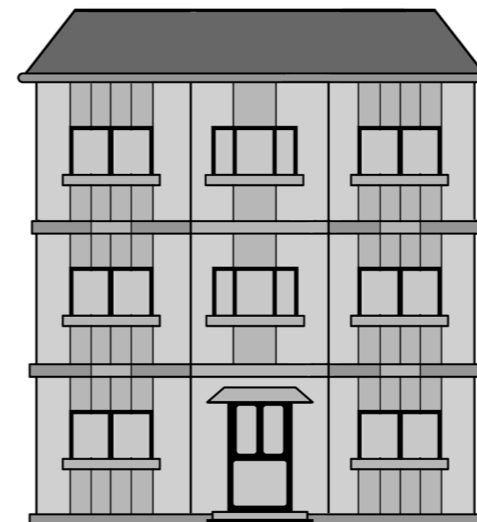
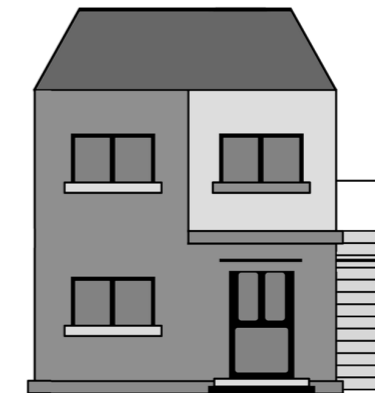
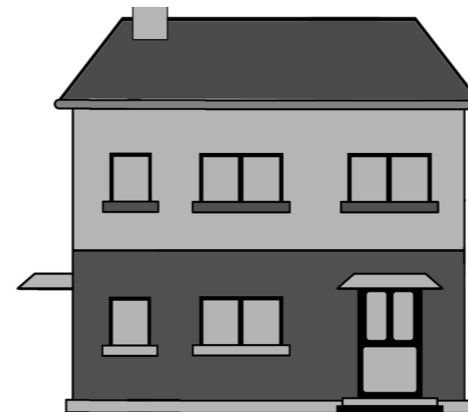
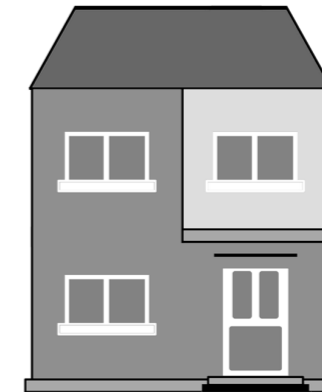
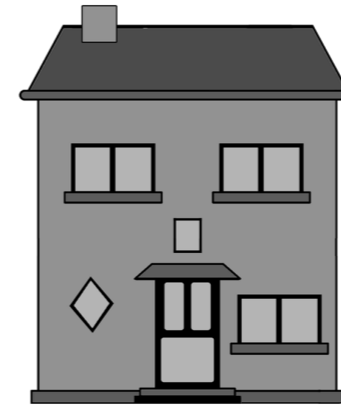
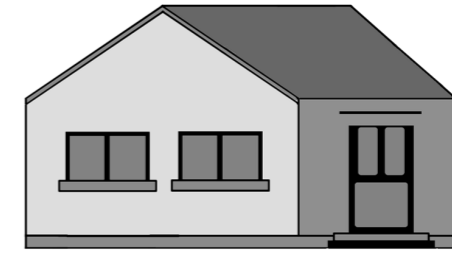
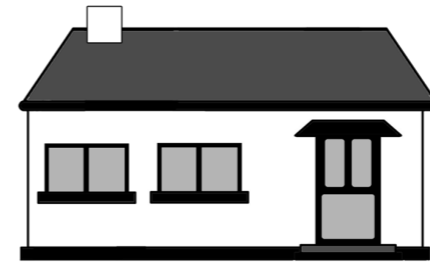
Retrofit

- PAS 2035 Accreditations
- Conservation Accredited Architect
- Expertise in retrofit and refurbishment

Archetype Study

The client has a stock of approx. 70,000 existing homes and the aim of the study was to establish a clear pathway for investment in terms of retrofit at a large scale. The study was split into four key areas to achieve the desired outcomes.

- Identify Archetypes – We segmented the housing stock based on; building type, age, construction type and pre-existing retrofit measures. Reduced the number of archetypes from 90 to 20.
- Identify Key Objectives – We discussed the client's desired outcomes for the project and identified four key objectives; energy demand, carbon emissions, statutory obligations and capital costs.
- Analyse Retrofit Measures – We worked with the client to develop a suite of appropriate measures and assessed each in relation to the objectives.
- Establish Retrofit Pro Forma – We developed a methodology and assessment tool which can be used for the development of retrofit strategies for future archetypes.



Tenement Study

Retrofit 04

We carried out a technical appraisal of the clients existing tenement stock to inform practical and cost effective energy efficiency measures for void or decanted dwellings to address EESSH2, fuel and rent poverty. A methodology was developed which outlined the required decision making processes, principle tasks and responsible party at each key stage.

- Survey – To assess the layout, siting and design, state of repair, internal condition and heritage significance.
- Analysis – To assess heritage significance and existing services, fabric, ventilation and layout constraints.
- Options – List of relevant improvement options for review against budget constraints, cyclical replacement and maintenance works.
- Strategy – Carry out energy assessment of preferred improvement measures.
- Consents – Procure relevant statutory consents.
- Implementation – Procure site works overseen by PAS 2035 Retrofit Co-ordinator
- Evaluation – Post occupancy monitoring to assess in use benefits of measures implemented to inform future projects.



Cartcraigs Road

The project included the refurbishment design and specification of a 17 storey flatted block in the Southside of Glasgow. Occupant engagement was key to the success of this project and at the project outset several designs were presented to the client and taken forward for consultation with the occupants to ensure they were involved with and informed of the process.

Several retrofit measures were installed including;

- Replacement of existing cladding with thermally efficient external wall insulation with a render finish.
- Replacement double glazed windows, with a premium placed on the fitting process to combat high winds and draughts which had previously been a concern for occupants.
- Replacement insulated roof with enhanced safety system and feature lighting.

The retrofit works carried out to this building improve the energy performance and ensure the buildings longevity. The project won the INCA High-Rise Refurbishment Award in 2022 highlighting the success of the project.



PHE Study

The primary aim of the pilot project is to better understand the potential changes required to housing to meet the Scottish Passivhaus Equivalent on a typical affordable housing development. The project is split into three key stages;

- Evaluation Stage – Each of the six pilot houses has a different performance specification to assess the impact of changes to fabric u-values, air permeability and ventilation, heating systems and renewables. These were assessed in SAP and PHPP to assess the predicted heating demand alongside an analysis of capital, running and replacement and maintenance costs
- Construction Stage – A rigorous quality assurance process is being undertaken throughout the construction process which will be supplemented by air tightness and thermal imaging to ensure the houses are constructed as designed.
- Monitoring Stage – Complex monitoring equipment will be installed in each of the houses to allow post occupancy evaluation of the energy consumption, fabric performance, system performance and internal environment. The results of the monitoring can be compared to those from the evaluation stage to assess which specification performs best in reality.

New Build 04



Pappert PH

The development of 26 houses includes 6 no. designed to meet the Passivhaus standard and the remaining 20 to meet Building Regulations Section 7 Platinum Aspect 1 (Net Zero). The Passivhaus houses are orientated North/South, the ideal Passivhaus orientation, and two house types were developed to ensure the primary habitable rooms face South maximising solar gains.

As part of the project we worked with the contractor to develop a standard set of Passivhaus construction details utilising their preferred construction type, 140mm timber frame. These details were developed through detailed discussions with the wider design team to ensure they not only met the Passivhaus criteria but would follow practical construction techniques allowing them to be easily installed on site.

The houses also follow the five key principles of Passivhaus design to ensure the criteria of the standard are met;

- Highly insulated
- Air tight
- Thermal bridge free
- Efficient MVHR
- Passivhaus windows



Eco House

The Eco House was built for West Lothian College to create a sustainability training centre at their Livingston campus. The state-of-the-art training facility is used to upskill students with the skills, knowledge and practical experience that will be vital as the construction sector moves towards Net Zero.

The centre has been designed and constructed as two, semi-detached units, completed to two levels of finish. The first unit has been constructed to a complete finish mimicking a typical one-bedroom bungalow and complies with Section 7 Platinum Aspect 1 and Gold Aspects 2-8. This allows monitoring of the fabric performance and technologies to provide a greater understanding of their impact on energy performance. It also provides the students with an insight into how these technologies operate which is vitally important as homes become more complex.

The second unit has been constructed to a shell finish. The purpose of this unit is to provide students hands on training in the installation, commissioning and maintenance of the above fabric measures and technologies. The flexibility of the shell unit will also allow the training centre to adapt to changing technologies and the changing needs of the construction sector.



Queens Quay

Queens Quay is the first residential phase of an ambitious programme to revitalise longstanding derelict land in Clydebank. It is connected to Scotland's first major Water Source Heat Pump, taking heat from the nearby River Clyde and pumping it to buildings through a below-ground district heating network. The district heating network:

- Lowers bills for residents offering a reduced tariff and no costs for servicing or repairs
- Increases security of supply ensuring a minimum of down time and constant access to heat for all users
- Contributes towards climate change targets to reduce CO2 emissions and move to a gas-free infrastructure.

A 'fabric first' approach was also taken, concentrating on maximising the performance of the building envelope and introducing further renewable technologies.

Multiple award winning including Herald Property Awards, Best Regeneration Project and Inside Housing Awards, Best Affordable Housing Project.



Craigbank Pilot

As part of the wider development of 178 homes, the pilot scheme was developed to consider the application of varying levels of sustainability to a typical 2 bedroom semi detached affordable house type. Five different levels of sustainability were developed;

- The Benchmark House - Silver Aspects 1-8
- The Simple House – Gold Aspect 1 and Silver Aspects 2-8
- The Renewable House – Gold Aspect 1-8
- The Platinum House – Platinum Aspect 1 and Silver Aspects 2-8
- The Passive House – Certified Passivhaus Standard

Following completion, the ten dwellings are part of an ongoing monitoring exercise by the client to compare the benefit of the various sustainable features adopted. The post-completion monitoring over a period of years will establish the benefits of each pilot model, in terms of resident comfort, ease of operation, and the true reduction in fuel bills. An exemplar project and one of the first pilots of its type in Scotland, demonstrating our contribution to driving innovation and change.



WLCA

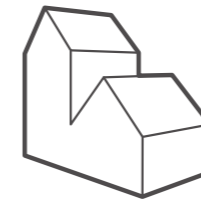
The West Craigs Development includes 400 new homes which are being constructed by two main contractors. We were appointed to carry out a Whole Life Carbon Assessment for a range of house types within the development for each contractor. The WLCA calculates both the embodied carbon and operational carbon across the 60 year lifespan of the building from 'cradle to grave.'

The purpose of the assessment was to assess the overall carbon emissions of the houses and compare these to recognised industry benchmarks. The results of the assessment also allowed us to identify the biggest carbon contributors, benefits of off-site construction and impact of material source location.

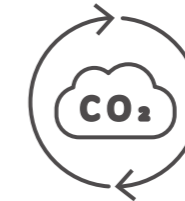
By understanding the carbon impact of these we were able to make suggestions to the client for changes to their outline specification which would reduce the whole life carbon of their homes. This will also assist them in setting carbon targets for future homes.

EMBODIED CARBON

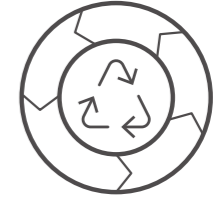
FORM FACTOR



LOW CARBON MATERIALS

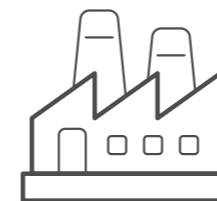


DESIGN FOR CIRCULARITY

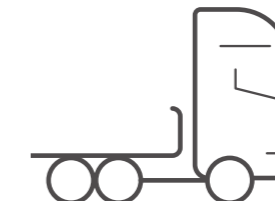


PROCUREMENT CARBON

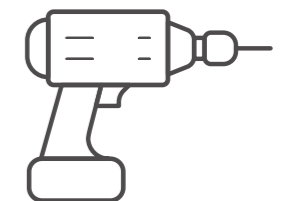
EXTRACTION AND PROCESSING



TRANSPORT



INSTALLATION

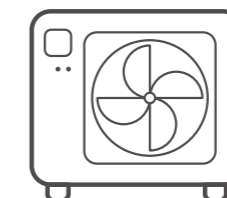


OPERATIONAL CARBON

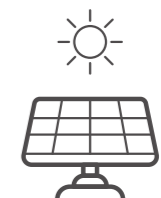
FABRIC FIRST



ZERO EMISSIONS HEATING



RENEWABLES

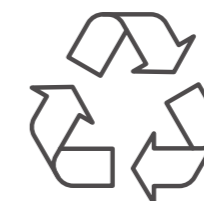


END OF LIFE CARBON

MINIMISE WASTE



RECYCLE MATERIALS



DESIGN FOR DECONSTRUCTION



Contact Us

What can MAST Energy do for you?

Whether you are working on a new build or retrofit project or developing a wider energy strategy for your organisation, MAST Energy can help you achieve your goals.

We can provide a range of strategic and technical services, drawing from our new build and retrofit experience, to provide the correct service for your project.

Our aim is to empower our clients to make the correct decisions for their project to level the playing field and mitigate fuel poverty.

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If you would like to discuss your project in more detail and learn more about what **MAST Energy** could do for you, please contact us at;

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