Merton Household Retrofit Guidance

Introduction

Welcome to Merton Council's Household Retrofit Guidance.

Here to help! – This tool provides basic guidance on energy efficiency improvements that could help make it easier to keep your home at a comfortable temperature, whilst also making it a healthier place for you and your family to live and reduce your energy bills.

Cold and damp homes contribute to health issues including respiratory infections, allergies, and mould-related illnesses and have a higher condensation risk - keeping your home warm and regularly ventilated with fresh air will help to create a healthier environment.

Why? - In Merton the energy used to heat and power our homes accounts for 44% of the borough's total greenhouse gas emissions. Merton's Climate Strategy and Action Plan details the importance of reducing energy demand from our homes to help support our journey towards becoming a net-zero borough by 2050.

This guidance has been produced to help Merton residents understand how they can begin to make energy savings in their home and considers a phased approach to retrofit. This ranges from simple, low-cost energy saving tips through to deep, whole house retrofit measures.

Retrofit & your home

What is retrofit?

Essentially, retrofit is about making improvements to your home to make it more energy efficient. This often includes improving the insulation of walls, floors, roofs and lofts and upgrading windows and doors. This may also include upgrading your heating and hot water system and installing energy efficient lighting and white goods in your home. The energy hierarchy can help inform what steps you take to reduce the energy demand of your home.

Remember – the higher the energy efficiency of your home and appliances, the lower your overall energy use is likely to be!

Energy Hierarchy

The energy hierarchy outlines three key stages:

- Energy Conservation – Reducing the amount of energy we are using in our homes, primarily through behavioural changes e.g., not leaving appliances on standby and putting on warmer clothing before turning on the heating - small actions which all add up to save energy and money!

- Improving Efficiency – Improving the efficiency of the built fabric of your home (insulated walls, improved air tightness, more efficient windows) and the appliances being used (LED lighting, energy-efficient white goods, running a gas boiler at a lower temperature).

- Meeting any remaining energy demand with renewables and low carbon heating – Once the energy demand in your home has been reduced as much as possible, consider installing low carbon heating (such as air source heat pumps) and renewables (such as solar panels).

Retrofit ready

You should always prioritise the maintenance of your property prior to beginning any retrofit works as this is the main way to increase both your own comfort and the energy efficiency of the building. Regular maintenance of your home may also provide the perfect opportunity for energy efficiency improvements to be considered e.g., when windows need repairing or replacing. Maintenance of your home ensures that it is ‘retrofit ready’.

Fabric first approach

A Fabric First approach follows the energy hierarchy previously mentioned. Put simply, this means to improve the fabric, or shell, of a home before installing any technology such as low carbon heating or renewables. This ensures energy demand is reduced to as low as possible so that when technologies such as an air source heat pump are installed, they can run efficiently and cheaply because they are not required to meet as significant a demand.

Whole house planning

When considering the retrofit of your home, it is important to see your home as a whole system and not a series of disconnected parts – a lot of retrofit measures work together. This means you should think about how the installation of one measure could impact another.

The ‘whole house’ approach helps you decide which retrofit measures to install and in what order. Planning your measures in isolation rather than as a joined-up process risks unforeseen and possibly undesirable outcomes, as well as higher overall costs.

If you have recently installed a new kitchen or bathroom, for example, it would be undesirable to take these out to insulate the walls behind them. Think about how you can incorporate retrofit measures into other home renovation plans - you could save money by doing these at the same time.

A suitably qualified Retrofit Coordinator or Designer can help you in creating a whole house plan which follows the fabric-first approach and ensures that measures are completed in the correct order to suit you and your home.

Planning permission considerations

If your home is considered to be of heritage value (i.e., it is a listed building or is located in a conservation area), the retrofit works you can complete may require planning permission.

If your home is in one of Merton's Conservation Areas (refer to above map), you may need to submit a planning application for any work to the exterior of your property e.g., external wall insulation, new windows, solar panels, air source heat pumps.

If your home is an historic listed building, you will also need to apply for Listed Building Consent if you want to make any changes internally or externally.

Some home retrofit measures (as listed in the fabric measures section of this guidance) are covered under national Permitted Development rights. Permitted Development rights allow for certain building works to be completed without the need to make a planning application. Permitted Development rights do not apply to flats, maisonettes, listed buildings or within some conservation areas.

If you have any planning queries in relation to proposed retrofit works in Merton, please contact Development Management by email: planning@merton.gov.uk

Please note: It is your responsibility to ensure the relevant consents such as Planning Permission and Building Regulations approval are in place.

Retrofit measures

Below you will find a list of energy saving tips and ‘quick win’ measures to make modest energy savings in your home. This is followed by a list of deeper retrofit measures where more significant energy savings can be made.

Key:
£ = Less than £500, **££** = £500 - £5k, **£££** = £10k, **££££** = £10k+

Low and no-cost energy efficiency measures

Heating and appliance controls / use

Heating and appliance controls include timers, thermostats and plumbing/electronic components which help to keep your home comfortable without overheating and wasting energy. Central heating systems such as gas boilers and heat pumps typically have timing controls which allow you to control when your heating is on or off.

Understanding how your heating controls work and making sure you’re only heating the parts of your home when you need it can save energy and money.

If you have radiators with thermostatic radiator valves, you can control the temperature of each room or zone of your house. For example, if you spend most of your time in downstairs rooms, you could set the temperature of these rooms to be higher than those upstairs. It is not advised to completely turn off radiators for extended periods of time in the winter as this can contribute to damp and mould.

Useful links:

- Heating controls - Energy Saving Trust
- Central heating controls - Centre for Sustainable Energy (cse.org.uk)
- Stay in control of your heating · Energy Advice London

Basic draught proofing

In some homes, particularly older properties, there can be unwanted draughts and leaks. These draughts create uncomfortable living environments and contribute to heat loss and higher energy bills. Cracks and gaps allow warm air to escape and are usually found around wall openings (including window and door frames and pipework openings), between and around floorboards, around electrical fittings and around the loft hatch. Leaky homes are also harder to keep cool in the summer.

Some basic draught proofing measures you could install in your home include:

- Exterior doors – fitting brush or hinged-flap draught excluders along the bottom of the door; adding an internal curtain that drops to cover the whole door.
- Windows – Using foam, metal or plastic draught strips to seal gaps.
- Around pipework entry – Use silicone mastic, wall-filler or expanding foam to fill any gaps in the wall.
- Floorboards and skirting boards – fill the gaps with flexible fillers, clear or brown mastic, decorators' caulk or similar.
- Letterboxes – fit flaps or brushes to keep the cold air out.
- Unused and open chimneys – installing a chimney draught excluder or chimney balloon. Note: chimneys which are not suitably sealed at the top must still be allowed to breathe to prevent moisture build up and potential damp issues.

Important **-** It is important to differentiate between unwanted air leaks in our homes and the ventilation necessary to keep us, and our homes, healthy. Never block air bricks, boiler flues or trickle vents on windows. Regularly open windows in kitchens and bathrooms where there is no mechanical ventilation, such as an extractor fan, as moist air needs to escape these rooms regularly.

Cost: **£**

Useful links:

- A helpful guide to draught-proofing - Energy Saving Trust

- DIY draught-proofing - Centre for Sustainable Energy (cse.org.uk)
- Draught-Proofing | Historic England
- Draught-proofing · Energy Advice London

LED lighting / White Goods energy rating

When choosing white goods for your home (e.g., fridge, washing machine, oven, etc.), try to find products which have the highest energy standards for your budget. Electrical items are rated on a scale of A to G with A being the most efficient.

Lighting makes up 15% of the typical UK household's electricity bills. Energy bill savings can be made here by switching lightbulbs to LEDs where practicable.

Cost: **£**

Useful links:

- Guide to energy efficient lighting - Energy Saving Trust
- Getting the best out of your LED lighting - Energy Saving Trust
- EST Lighting Guide - the Right Light.pdf (energysavingtrust.org.uk)
- Energy efficient lighting - Centre for Sustainable Energy (cse.org.uk)

Insulating pipes, tanks, and radiators

Insulating your pipes, radiators, and hot water tank (if you have one) is a quick and cheap way to save on your energy bills.

To insulate your pipes, you can purchase foam tubes that fit around any exposed pipes which carry hot water. This helps to keep the temperature in the pipes constant and along with frequent usage should help prevent any pipes from freezing.

Cost: **£**

If you have a hot water tank in your home, you can purchase an insulating jacket from DIY shops to fit around the tank. This works in the same way as the pipe

insulation in that it helps to prevent heat loss from the tank and save on energy. An 80mm jacket is recommended by British Standards.

Cost: **£**

For radiators fitted on external walls in your home, installing reflector panels behind the radiator will help to stop heat loss through the wall and reflect the heat back into the room. These are particularly helpful for homes with uninsulated solid walls.

Cost: **£**

Useful links:

- Insulating tanks and radiators - Energy Saving Trust
- The Complete Guide to Pipe Insulation - The Eco Experts

Water use/ Rainwater harvesting

Most carbon emissions from household water use stem from the amount of energy used to heat water in the home. Ways to reduce hot water use in your home include fitting regulators to taps or installing water efficient shower heads.

In the UK, the best way to reuse rainwater is with a water-butt connection to your home's downpipe. This will allow you to save water for use in the garden or to wash your car/bike and reduce the amount of mains water you use. A complete water butt kit will include a diverter pipe to fit to your down pipe and prevent overflowing, and a stand to enable easy access to the tap.

Cost: **£**

Useful links:

- Why we should all be saving water - Energy Saving Trust
- Advice to help you save water at home - Energy Saving Trust
- Reusing Rainwater and Greywater - Centre for Alternative Technology (cat.org.uk)

Fabric improvements

Understanding your property

Every home is different and there are important characteristics to understand in order to decide which energy reduction measures are suitable for your home. These include: house type (detached, semi-detached, terraced, bungalow), wall construction (solid wall, cavity wall) and property age.

For those living in homes which are not detached, consideration should be given to party walls and whether the outside of your home could be insulated at the same time as your neighbour to make the most of associated costs e.g., scaffolding.

Knowing the wall construction of your home is also important. In Merton this is commonly a solid or cavity brick wall. Solid walls can be insulated internally or externally. New cavity walls will be built with insulation inside the cavity of the wall. However, some older cavity wall houses do not have insulation in this area and could benefit from this.

The importance of ventilation

As we spend most of our time inside buildings, ventilation is important to improve indoor air quality by removing potentially harmful pollutants from the air. Ventilation also helps to regulate internal moisture levels produced by breathing, washing, cooking and drying clothes. Finally, ventilation can also help prevent overheating.

In our homes, ventilation is particularly important in high-moisture areas such as kitchens and bathrooms. Using extractor fans and opening windows will help stop moisture from spreading to other areas of the house where the moist air could condense on cold surfaces which may lead to damp.

Drier areas in your home such as bedrooms also need ventilating. If your windows have trickle vents (small channel vents found on the top and side of modern windows), leave these open to help fresh air get around the room.

Fans are available which recover the warmth from any extracted air and return this back into the room – these are called single-room Mechanical Ventilation with Heat

Recovery (MVHR) systems. For more extensive retrofit projects, a whole-house MVHR system could be more suitable (see Airtightness and Ventilation section below for more details).

Deep fabric improvements

Loft insulation

Before insulating your loft, it is important to make sure the loft space is in good condition and dry to ensure no moisture or mould is trapped in.

Standard loft insulation is suitable for most homes and is typically supplied in rolls which are laid between or over floor joists. This is seen as a typically straightforward job and rolls of mineral wool insulation can be bought from DIY stores or builder's merchants.

If you need to use your loft space as storage, joist extenders to lift loft boards above the insulation level can be used. It is important to make sure the loft boards don't touch the insulation as a ventilation gap between the insulation and the loft boards is necessary to reduce risks of condensation.

Make sure you don't squash the mineral wool when installing the boards as this will reduce its insulation value!

Insulating your loft will keep your house warmer but make the roof space above colder. The cooler air in your insulated loft could mean that cold draughts come through the loft hatch. To prevent this, you can fit an insulated loft hatch and put strips of draught-excluding material around the hatch edges. Alternatively, you can fit a piece of rigid foam insulation to the back of a loft hatch but make sure to also install draught strips around the edge.

Cost: **£-££**

Disruption: Low

Useful links:

- Loft insulation - Centre for Sustainable Energy (cse.org.uk)

- Roof and loft insulation guide - Energy Saving Trust
- Building Regulations: Loft Insulation - Insulation - Planning Portal

Cavity wall insulation

Cavity walls are external walls made from two ‘skins’ with a cavity, or gap, between them. These are typically a brick outer leaf and a blockwork inner leaf. The cavity or gap can be filled with insulation to stop warm air from escaping to the outside. A key advantage to cavity wall insulation is that it does not affect the internal or external appearance of the property.

Cavity walls are commonly insulated by injecting insulation into the cavity through a series of small holes drilled through the outer skin. The holes are then sealed back up once the cavity is filled.

If you think your property could benefit from cavity wall insulation, it is important that an assessment is carried out and any cracks or pre-existing damp problems are resolved prior to installation. A reputable installer will be registered with the Cavity Insulation Guarantee Agency (CIGA) and be able to provide you with a 25-year guarantee for the works.

Risks: If you have any damp patches on your internal walls then they should not be insulated until the problem is resolved.

Associated works: Loft or roof insulation to ensure continuous line of insulation wrapping the home.

Regulatory considerations:

- Cavity wall insulation is not considered to be development requiring planning consent – no planning permission is likely to be required for internal works in properties which are not listed.
- Listed Building Consent likely to be required for listed buildings.
- Making significant changes to thermal elements (walls, roofs or floors) would normally require Building Regulations approval through a building control body. The CWI installer should be able to submit a notice to a building control body on your behalf.

- Applicable Building Regulations: Part A (Structural Safety), Part F (Ventilation), Part L (Conservation of fuel and power).

Cost: **££**

Disruption: Low / Medium

Useful links:

- How to install cavity wall insulation - Energy Saving Trust
- Cavity wall insulation - Centre for Sustainable Energy (cse.org.uk)
- Building Regulations: Cavity Wall - Insulation - Planning Portal
- Energy Efficiency and Historic Buildings: Early cavity walls | Historic England

External wall insultation (EWI)

External wall insulation involves adding a layer of insulation to the outside walls of your home. External wall insulation won't affect the size of the rooms in your home, but you must consider how it will affect the external appearance and how you will match the existing finish as close as possible.

External wall insulation is typically finished with a protective render coating or cladding such as brick slips/tiles. The total depth of external wall insulation ranges from 50mm to 130mm, depending on the system used.

External wall insulation will not only improve the energy efficiency of your home, but it will also: renew the appearance of outer walls, improve weatherproofing and sound resistance, help keep warm air out in summer months, and it can be installed without disruption to your household.

External wall insulation should be fitted by a specialist installer. These can be found through the National Insulation Association (NIA).

Risks: Whenever you fit solid wall insulation to a building, you will need to take account of water vapour. Your specialist installer should develop a moisture control strategy that is specific to your building.

Associated works: Your roofline may need to be extended to cover the top of the insulation.

Regulatory considerations:

- External wall insulation is Permitted Development for dwellings not in a conservation area (any external materials used must be of a similar appearance to the existing dwellinghouse).
- Planning Permission likely to be required for flats, maisonettes, and homes in conservation areas.
- Planning permission and Listed Building Consent required for Listed Buildings (unlikely to be acceptable due to impact on historic fabric).
- In conservation areas, a combination of external wall insulation to the rear of a property and internal wall insulation to the front may be acceptable where the rear elevation is not of heritage interest.
- Making significant changes to thermal elements (walls, roofs or floors) would normally require Building Regulations approval through a building control body. The EWI installer should be able to submit a notice to a building control body on your behalf.
- Applicable Building Regulations: Part F (Ventilation), Part L (Conservation of fuel and power

Cost: **££££**

Disruption: Medium

Useful links:

- Advice on insulating your solid walls - Energy Saving Trust
- Solid wall insulation - external - Centre for Sustainable Energy (cse.org.uk)
- Planning permission - Insulation - Planning Portal
- Building Regulations: Solid Wall - Insulation - Planning Portal
- Energy Efficiency and Historic Buildings: Insulating Solid Walls (historiceng-land.org.uk)

Internal wall insulation

Internal wall insulation is a good option for insulating solid wall buildings where, for heritage or aesthetic reasons, it is not suitable to use external wall insulation.

Internal wall insulation is also an appropriate option for when completing a phased retrofit where you might insulate one room at a time.

Internal wall insulation is more disruptive than external wall insulation, so consider how you might incorporate this into wider home renovation works.

There are several different internal wall insulation products, varying from rigid insulation boards fixed to the existing wall, timber stud frames filled with insulation and insulated plasters. A retrofit designer / coordinator will be able to advise you on the best product for your home.

Risks: Moisture build up behind internal wall insulation is a risk. The use of breathable insulation products is recommended to prevent this. Whenever you fit solid wall insulation to a building, you will need to take account of water vapour. Your specialist installer should develop a moisture control strategy that is specific to your building.

Associated works: Continuing internal wall insulation between floors (i.e., between floor joists) to ensure a continuous insulation line is wrapping the property. If possible, the wall between the floorboards should also be plastered to improve air tightness in this area.

Regulatory considerations:

- Internal wall insulation or any internal works are not considered to be development requiring planning consent – no planning permission is likely to be required for internal works in properties which are not listed.
- Listed Building Consent required for Listed Buildings.
- Making significant changes to thermal elements (walls, roofs or floors) would normally require Building Regulations approval through a building control body. Applicable Building Regulations: Part F (Ventilation), Part L (Conservation of fuel and power), Part P (Electrical Safety).

Cost: **£££**

Disruption: High

Useful links:

- Advice on insulating your solid walls - Energy Saving Trust
- Solid wall insulation - internal - Centre for Sustainable Energy (cse.org.uk)
- Energy Efficiency and Historic Buildings: Insulating Solid Walls (historiceng-land.org.uk)

Flat roof insulation

The easiest way to insulate a flat roof is from above the structure. This can be done as an overlay to the existing roof covering (only if the roof structure is sound) or as a total renewal where the roof is insulated above the structure and a new roof covering is installed.

Insulating above a flat roof is best completed when the roof covering needs to be replaced, at which point it should be upgraded to meet current Building Regulations specification.

Insulating under a flat roof is possible but has a higher risk of condensation problems and should therefore be specified by a competent person such as a Retrofit Designer / Coordinator.

Regulatory considerations:

- Insulating a flat roof is Permitted Development as long as the new roof does not project more than 150 millimetres from the plane of the existing roof.
- Planning Permission required for flats, maisonettes, and listed buildings.
- Listed Building Consent required for Listed Buildings.
- Making significant changes to thermal elements (walls, roofs or floors) would normally require Building Regulations approval through a building control body. Applicable Building Regulations: Part L (Conservation of fuel and power), Part P (Electrical Safety)

Cost: **££**

Disruption: Low

Useful links:

- Roof and loft insulation guide - Energy Saving Trust
- GreenSpec: Housing Retrofit: Timber Flat Roof Insulation
- GreenSpec: Housing Retrofit: Concrete Flat Roof Insulation
- Building Regulations: Insulation and thermal elements - Roof - Planning Portal

Pitched roof insulation

In most homes, insulation is not required in pitched roofs as the insulation layer is in the loft floor (see loft insulation).

If you plan to renovate your loft space into a habitable room, then the pitched roof will need to be insulated. This is not a DIY job, and you will need a competent person to ensure that the insulation is appropriate and complete, and that adequate ventilation is provided where needed.

Risks: The most significant risk with insulating pitched roofs is condensation/moisture. Maintaining adequate ventilation and ensuring paths for moisture to escape is key.

Associated works: Repair to roof structure should be made prior to insulating to ensure longevity of the construction.

Regulatory considerations:

- Alterations to the roof of a house (e.g., re-roofing or inserting skylights) is Permitted Development.
- Planning Permission required for flats, maisonettes, and listed buildings.
- Listed Building Consent required for Listed Buildings.
- Making significant changes to thermal elements (walls, roofs or floors) would normally require Building Regulations approval through a building control body. Applicable Building Regulations: Part L (Conservation of fuel and power)

Cost: **££**

Disruption: Medium

Useful links:

- Roof and loft insulation guide - Energy Saving Trust
- GreenSpec: Housing Retrofit: Ventilated Pitched Roof Insulation
- GreenSpec: Housing Retrofit: Unventilated Pitched Roof Insulation
- Building Regulations: Insulation and thermal elements - Roof - Planning Portal

Floor insulation

Insulating the ground floor of your home is an excellent way of keeping your property warm. If you're on an upper floor you don't usually need to insulate the floor space as most heat is lost through the ground floor.

It is important to know what the construction of your ground floor is before you can decide how to insulate it – ground floors are typically solid concrete slabs or suspended timber floors (floorboards laid over timber joists with a void underneath for ventilation).

Insulating the ground floor is disruptive, particularly for solid concrete floors and therefore it is best done when the floor needs replacing or as part of wider works e.g., a ground floor extension.

Solid concrete floors are usually insulated by fitting rigid foam insulation on top of the concrete slab and finishing with chipboard to allow for flooring to be installed. This will raise the level of the floor so consideration for other changes such as doors, skirting and electrical sockets is required. Insulation can be placed underneath concrete slabs; however, this is only advised if the floor needs replacing in its entirety as part of a wider scheme of work.

Timber floors are typically insulated by fitting rigid insulation board between the timber joists (usually supported by small battens) or by installing a windtight breathable membrane over the joists to support a fibrous or wool insulation. The insulation should not extend below the depth of the joist to ensure ventilation under the floor is continued. Natural insulation materials such as wood-fibre or sheep's wool are encouraged in older buildings as they allow both air and moisture vapour to pass through slowly and minimise the risk of condensation.

Risks: For suspended floors, special care needs to be taken to ensure continued ventilation through the floor void. Careful consideration should be taken for the type of insulation used and a Retrofit Designer / Coordinator should be able to advise on this.

Associated works: For suspended timber floors, it is important to inspect the floor structure and complete any repairs or maintenance prior to insulating. This also applies to any works required to ensure maintained cross-ventilation within the sub-floor void.

Regulatory considerations:

- Installation of floor insulation is not considered to be development requiring planning consent – no planning permission is likely to be required for internal works in properties which are not listed.
- Listed Building Consent required for Listed Buildings.
- Making significant changes to thermal elements (walls, roofs or floors) would normally require Building Regulations approval through a building control body. Applicable Buildings Regulations: Part L (Conservation of fuel and power), Part P (Electrical safety)

Cost: **£££-££££**

Disruption: Suspended Floor: Medium Solid Floor: High

Useful links:

- Floor insulation information and advice - Energy Saving Trust
- Retrofit Floor Insulation – Suspended Timber Floors: Guide to Best Practice (publishing.service.gov.uk)
- Solid floor insulation: guide to best practice (publishing.service.gov.uk)
- Floor Insulation Guide | EDF (edfenergy.com)
- Floor insulation - Centre for Sustainable Energy (cse.org.uk)
- *Building Regulations: Floor Insulation - Insulation - Planning Portal*

Windows & door upgrades

Installing energy efficient glazing and high thermal performance doors will help reduce heat loss in your home.

Windows

If your home has single glazing, metal frame windows or double-glazing installed prior to 1990 then replacing these with new double or triple glazing will provide significant energy savings. Replacing reasonably well performing double-glazed windows is not advised as the energy saving benefits do not outweigh the additional cost. If some panes in your double-glazing are misted, it means the seal inside the two panes has failed and the windowpane is no longer providing insulation. Check with an installer if you can replace failed panes rather than the whole window to save costs.

If you are aiming for a high performing deep retrofit, then triple glazing would help achieve the required energy performance.

Secondary glazing is an alternative option for homes where new double or triple glazing is not possible (i.e., traditional buildings of heritage value). Secondary glazing is placed on the inside of a window opening and creates a vacuum between the windows which can achieve up to a 60% reduction in heat loss. Secondary glazing can be single or double glazed and is available as hinged, sliding or fixed systems. Thought should be given to cleaning and maintenance of the existing windows.

Doors

Older doors tend to have little insulative properties and can be very draughty. New external doors typically contain insulation to reduce heat loss and comply with current Building Regulations. Doors which are Passivhaus-certified will achieve the highest standard of thermal performance.

Conservation areas and listed buildings

If you live in a conservation area, it is expected that any changes to the exterior of your home continue to preserve or enhance the character of the area. This means that any new windows and doors should complement the character of the building and area. This typically means upgrading existing glazing or replacing windows and doors with good quality products which are in keeping with the original architectural style. Where windows are robust enough to accommodate extra thickness and weight, slim-line double glazing can be retrofitted into existing window frames to improve thermal performance. Thermal single glazing could also be used where double glazing is not possible. Where historic windows cannot be upgraded without causing harm to their significance (e.g. in a listed building) then consideration should be given to additional draught proofing works and the installation of secondary glazing.

Risks: When your windows are replaced, it is vital to make sure the building remains well-ventilated as new windows and doors will contribute to improving the air tightness of your home. New double glazing is required to have trickle vents and you should keep these open where possible to allow fresh air into your home and moist, stale air to escape.

Regulatory considerations:

- Installation of new windows and doors is Permitted Development (see the Planning Portal for specific conditions which apply).
- Planning Permission required for flats, maisonettes, and listed buildings.
- Listed Building Consent is required for Listed Buildings.
- If your new windows and doors are installed by a FENSA registered installer, they will be approved to carry out the work to comply with Building Regulations and supply you with a certificate showing the work has been completed by a registered installer upon completion.
- Applicable Building Regulations: Part L (Conservation of fuel and power), Part N (Glazing safety).

Cost: **£££**

Disruption: Low / Medium

Useful links:

- Energy efficient windows and doors - Energy Saving Trust
- How to draught-proof your windows and doors - Energy Saving Trust
- Energy efficient glazing & high performance external doors - Centre for Sustainable Energy (cse.org.uk)
- Secondary glazing - Centre for Sustainable Energy (cse.org.uk)
- Planning Permission - Doors and windows - Planning Portal

Air tightness and ventilation

Airtightness

Basic draught proofing and low-cost ventilation is covered above. When considering a deeper retrofit project (e.g., aiming for net zero carbon for example), an airtightness strategy is necessary. This involves incorporating an airtightness layer around the entirety of the home - a way to imagine this is having a bucket with no holes placed inside a leaky bucket with holes.

A mixture of detailed design and the use of advanced membranes, sealants and insulation is used to help achieve a desired air tightness level. A Retrofit Coordinator or Designer will specify a target airtightness for your retrofit project and airtightness testing typically takes place before and after a project to ensure this has been met. For some retrofit building standards (e.g., EnerPhit) a target air tightness figure is specified.

Ventilation

When the insulation and airtightness of a building is improved, it is important to ensure that adequate ventilation is maintained – the more airtight a building is, the less natural ventilation it receives. It is important to note that just because a house is airtight does not mean it isn’t ventilated – either by natural means such as windows and trickle vents, or mechanically by extraction ventilation or Mechanical Ventilation

with Heat Recovery (MVHR). The key difference is being able to control how and when air comes in and out of the building rather than allowing it to regularly leak.

MVHR is a whole-house system that extracts stale air from rooms in your house and supplies fresh air. When warm, stale air is extracted from your home through MVHR, the system recovers around 80-90% of the heat to pre-warm the fresh air being supplied back into your home. Air is typically extracted from warm and wet rooms in the house (kitchens, bathrooms) and supplied into bedrooms and living spaces. MVHR systems are commonly found in new-build homes and whole-house retrofits which reach high thermal performance and airtightness standards.

A whole-house MVHR system is not cheap and can be complex. It requires air ducting to be installed throughout the house and this can be an intrusive process therefore combining this with other more significant retrofit works is advisable. The MVHR unit itself is around the size of a large suitcase and additional space is required for ducts and exhausts therefore consideration on where this would fit in your home is also necessary. A Retrofit Coordinator or Designer will be able to advise further on the design and requirement of MVHR in your home retrofit.

Associated works: MVHR is typically only necessary for whole house retrofit projects and therefore should be completed as part of a larger scheme of works due to the intrusiveness of installation.

Regulatory considerations:

- Installation of MVHR is not considered to be development requiring planning consent.
- Listed Building Consent required for Listed Buildings (where deemed acceptable).
- Applicable Building Regulations: Part L (Conservation of fuel and power), Part P (Electrical safety), Part F (Ventilation).

Cost: MVHR - **£££+**

Disruption: MVHR: High

Useful links:

- A helpful guide to draught-proofing - Energy Saving Trust
- Ventilation - Centre for Sustainable Energy (cse.org.uk)
- Mechanical ventilation with heat recovery - Centre for Sustainable Energy (cse.org.uk)

Renewables & low carbon heat

Solar PV (Photovoltaics)

Solar photovoltaic panels (Solar PV) convert energy from the sun into electricity. Typically installed on the roof of your home, PV panels generate your own renewable electricity to power your home. This will lower your energy bills and significantly reduce your carbon emissions.

For most homes, it is only feasible to install solar panels where there is enough roof space available. An unshaded, south facing roof is ideal for maximum output from your panels, however east or west facing roofs could also be considered (but will typically yield around 15-20% less energy). Solar panels can be fitted on flat roofs; however, they will usually need to be mounted inside frames which allow them to be angled correctly.

When installing your solar PV, it is also worth discussing the option of installing a PV diverter with your installer. When your solar panels generate excess electricity above your own demand, this electricity is typically sent back to the grid. A PV diverter switch can send this electricity to power the immersion heater in your hot water tank to use later. This could mean that the amount of energy you need to meet your hot water demands reduces.

Associated works**:** It is important to make sure the roof structure of your building is in good condition and can sufficiently support any additional weight from the installation of a solar panel system. Your installer will need to survey your property to check the suitability of the roof structure and works may be required to upgrade the structure prior to installation.

Regulatory considerations:

- Installation of Solar PV is Permitted Development if it is within the limits outlined on the Planning Portal Planning Permission - Solar panels - Planning Portal.
- In conservation areas, solar panels should not be installed on a roof which fronts a road/highway. Solar panels on flat roofs in conservation areas require planning permission.
- Listed Building Consent is required for Listed Buildings.
- Applicable Building Regulations: Part A (Structural Safety) – need to confirm the roof can take the weight of the panels, Part G (Sanitation, Hot Water Safety and Water Efficiency) – when altering a hot water system, Part J (Combustion appliances and Fuel Storage systems) – when altering a boiler system, Part P (Electrical Safety).

Cost: **££-£££**

Disruption: Low

Useful links:

- Solar PV - Centre for Sustainable Energy (cse.org.uk)
- A comprehensive guide to solar panels - Energy Saving Trust
- Getting the best from your solar PV panels (cse.org.uk)
- Planning Permission - Solar panels - Planning Portal

Solar thermal panels

Solar thermal panels use energy from the sun to warm water for storage in a water cylinder. Solar thermal systems use panels which are made up of a series of tubes which contain a mix of water and glycol. This fluid is pumped around a circuit which passes through your hot water cylinder, passing on any heat gains gathered from the sun into the water cylinder.

Solar thermal systems won't provide all of the hot water demand required throughout the year; however, they do increase the base temperature of the water - a

conventional boiler or immersion heater is typically used to make up the difference in temperature.

Like solar PV, solar thermal panels are best placed on a south facing roof. Solar thermal systems are often compatible with conventional boilers and hot water cylinders. If you have a combi-boiler, you will also need to add a hot water cylinder to the system to benefit from a solar thermal system and you will need to consider where this might be located in your home.

Associated works**:** It is important to make sure the roof structure of your building is in good condition and can sufficiently support any additional weight from the installation of a solar system – your installer will need to survey your property to check the suitability of the roof structure and works may be required to upgrade the structure prior to installation.

Regulatory considerations:

- Installation of a solar thermal system is Permitted Development if it is within the limits outlined on the Planning Portal Planning Permission - Solar panels - Planning Portal.
- In conservation areas, solar thermal panels should not be installed on a roof which fronts a road/highway.
- Listed Building Consent is required for Listed Buildings.
- Applicable Building Regulations: Part A (Structural Safety) – need to confirm the roof can take the weight of the panels, Part G (Sanitation, Hot Water Safety and Water Efficiency) – when altering a hot water system, Part J (Combustion appliances and Fuel Storage systems) – when altering a boiler system, Part P (Electrical Safety).

Cost: **£££**

Disruption: Low

Useful links:

- Solar water heating - Centre for Sustainable Energy (cse.org.uk)
- Advice on installing solar water heating - Energy Saving Trust

Battery storage

Domestic batteries are typically used alongside solar PV panels. If you can store electricity throughout the day when the sun is shining, you can then use this electricity at night when the solar PV panels are not generating any electricity.

A domestic battery can also be used to store electricity bought from the grid at cheaper times of the day (depending on your tariff). This can reduce the amount of electricity you require at peak times and therefore lower your energy bills.

Domestic batteries are typically installed in garages or utility rooms, however, speak to your installer to find the best location for your home.

As the purchase cost of domestic batteries is still very high, it is worth weighing up whether this is the best option for the budget you have available after you have reduced the energy demand from your home. Ask an installer to explain the lifespan and cost savings from a domestic battery based on energy consumption in your home.

Cost: **£££-££££**
Disruption: Low

Useful links:

- How to store energy in your home - Energy Saving Trust
- Battery storage - Centre for Sustainable Energy (cse.org.uk)

Air Source Heat Pump

Air Source Heat Pumps (ASHP) are the most common type of heat pump used in homes. They work in the same way as a fridge or freezer but in reverse, with the refrigerant and a compressor providing useful heat rather than cooling.

Heat pumps are powered by electricity and typically achieve an efficiency of 300% - this means for every unit of electricity they consume they will produce 3 units of heat. In contrast, a new condensing gas boiler would achieve an efficiency of 90%. If you

have a heat pump you will also need to have a hot water cylinder as they do not produce hot water on demand like a combi-boiler.

The amount of noise created by heat pumps is a common concern. The noise level depends primarily on how hard the heat pump is needing to work (they have to work harder in winter as the outside temperature is lower). The noise level of a heat pump is measured at one meter from the heat pump and in the UK there is a legal limit of 42 decibels (db)– this is the same as a fridge (42 db) and less than a dishwasher (65 db) and vacuum cleaner (85 db).

Heat pumps should be located to avoid any negative impacts on neighbouring properties in terms of outlook, noise, and vibrations.

Heat pumps are still expensive to install. However, if you are in a position where you have improved the thermal efficiency of the fabric of your home and could now benefit from a heat pump, you may be eligible for a grant under the UK government's Boiler Upgrade Scheme to cover part of the cost of replacing a gas boiler with a heat pump.

Risks: Without reducing the energy demand of your home through fabric first measures, you may risk increasing your energy bills by installing a heat pump due to the current high costs of electricity versus gas.

Associated works: To ensure your heat pump is running as efficiently as it can, fabric measures to improve the thermal performance of your home should be prioritised.

Regulatory considerations:

- Installation of an ASHP is Permitted Development if it is within the limits as outlined on the Planning Portal: Planning Permission: Air source heat pump - Heat pumps - Planning Portal.
- Planning permission and Listed Building Consent required for Listed Buildings.
- Applicable Building Regulations: Part E (Resistance to sound), Part G (Sanitation, Hot Water Safety and Water Efficiency) when altering hot water system, Part P (Electrical safety).

Cost: **£££-££££**

Disruption: Medium

Useful links:

- Heat pumps - Centre for Sustainable Energy (cse.org.uk)
- A guide to air source heat pumps - Energy Saving Trust
- Apply for the Boiler Upgrade Scheme: Overview - GOV.UK (www.gov.uk)
- Planning Permission: Air source heat pump - Heat pumps - Planning Portal

Ground Source Heat Pump

Ground Source Heat Pumps (GSHP) transfer heat from the ground outside your home to heat the water which is used in your radiators and underfloor heating.

You will need land near your home which is suitable for digging trenches or drilling boreholes (deep holes in the ground) to install a ground source heat pump. You will also need space inside your home for the indoor heat unit which often contains the hot water cylinder (typically the size of an American style fridge).

The installation of a ground source heat pump is very expensive, primarily because there is a lot of groundwork involved (particularly with horizontal trenches). This means they are typically used for larger rural properties or groups of buildings. A ground source heat pump installer should be able to advise on the suitability of ground source heat for your home.

Associated works: To ensure your heat pump is running as efficiently as it can, fabric measures to improve the thermal performance of your home should be prioritised.

Regulatory considerations:

- The installation of a GSHP on domestic premises is usually considered to be Permitted Development.
- Open loop systems require consent from the Environment Agency.
- Listed Building Consent required for Listed Buildings (where deemed acceptable).

- Applicable Building Regulations: Part E (Resistance to sound), Part G (Sanitation, Hot Water Safety and Water Efficiency) when altering hot water system, Part P (Electrical safety).

Cost: **££££+**

Disruption: High

Useful links:

- Heat pumps - Centre for Sustainable Energy (cse.org.uk)
- A guide to ground source heat pumps - Energy Saving Trust
- Planning Permission: Ground source or water source heat pump - Heat pumps - Planning Portal

Jargon busting

- Passivhaus – Passivhaus is an energy performance standard and certification for new build dwellings. The standard and certification set rigorous energy efficient design standards to provide high level of occupant comfort using very little energy for heating and cooling.

- EnerPHit – EnerPHit is the Passivhaus standard equivalent for building retrofits.

- Whole House Plan – A whole-house plan allows for a holistic view of all retrofit measures in a property. This ensures that retrofit measures are being implemented in an order which does not negatively affect thermal performance. A suitably qualified Retrofit Coordinator or Designer will be able to support you in the creation of a plan specific to your home.

- Net Zero - Achieving a balance between the carbon emitted into the atmosphere, and the carbon removed from it. This balance will occur when the amount of carbon we add to the atmosphere is no more than the amount removed.

- Party Wall – A party wall is a wall shared by two adjoining property owners (e.g., the wall separating semi-detached or terraced houses).

- PAS2035 – A code of practice created to ensure that retrofit standards and approaches on housing stock are completed to a consistent standard. It was created in 2015 to try to address a previous lack of consistency across retrofit projects. You can find out more at https://retrofitacademy.org/knowledge/pas-2035/

- CO_2e – This is the abbreviation for 'carbon dioxide equivalent'. CO2e is a standard unit for measuring carbon footprints. It provides a unified way of comparing the impact of different greenhouse gases on the environment.

- EPC – EPC is an abbreviation for Energy Performance Certificate. An EPC is a legally valid document which provides an energy efficiency rating (displayed on an A-G scale) in relation to a property's running costs. This rating will take into account the potential energy performance of a property (fabric) and its services (heating, lighting, hot water)

Financial support

Visit our webpages for an up-to-date list of available funding schemes to stay warm and save energy:

- Get help to make your home warmer and save energy | Merton Council
- Cost-of-living support | Merton Council

You can also explore retrofit options for your home with a free online plan builder from Ecofurb.