

Retrofit Archetypes

Archetype 3. Modern detached house

Introduction

This report is part of the Energy Efficiency Supply Chain (EESC) project that Southern Uplands Partnership (SUP) managed for Scottish Borders Council (SBC) during 2020-2025. The same team managed the Local Heat Energy and Efficiency Strategies (LHEES) Community Retrofit Pilot in 2024, and this report also draws on that work.

The LHEES project considered four housing archetypes:

1. A. Traditional row house
B. Traditional Detached house
2. Post-War semi-detached house
3. Modern detached house

This presentation is about retrofitting one of those: Archetype 3. Modern detached house. It is focused on how owner-occupiers could retrofit their houses, but the suggested measures will also be relevant to social or private rented houses of the same archetype.

Background to the project

The EESC project considered how a Community Retrofit programme could support private homeowners to undertake retrofit works, and hence to more rapidly expand the retrofit supply chain in the region.

We consulted with 20+ local communities in the region that had previously shown interest in ‘green’ initiatives. Oxton was selected as the one which best matched the project criteria.

A large proportion of the houses in Oxton are Archetype #3, Modern detached house. Most were built during the 1990s-2000s as part of two developments (Justice Park and St Cuthbert’s View), and all but a few of them are owner-occupied. This means there is a high degree of consistency for the retrofit measures that will be appropriate (albeit the wall type varies with Justice Park timber frame while St Cuthbert’s is cavity block).

The houses at Oxton

- Justice Park has 42 houses developed during the 1990s and 2000s (the earliest building warrant is c.1995 and the latest c.2007).
- There are lots of other houses in Oxton built during this period, including 4 houses off Station Road that back onto Justice Park (c.1993) and 20 houses in St Cuthbert's View (c.1998).
- Building regulations are applied at the time an application is made, even if the house is not built until many years later, so we can assume all these houses are classified as 1992-2002 regulations.
- Of the 150 houses in Oxton, 60 (40%) are classified as being from the 1992-2002 and potentially fit Retrofit Archetype 3.
- For the Scottish Borders region as a whole, over 7,000 houses (12%) are classified as 1992-2002.
- Allowing for a minimal retrofit at c.£30k* per house that represents in excess of £200 million of work for trades and professionals in the region for this Archetype alone.

* Indicative cost for basic level of retrofit and installation of a heat pump.

The houses at Oxton



<https://maps.app.goo.gl/e2AnLtDE3hn5bFuv6>

Retrofit Archetypes

As part of the Net Zero transition every house will need to be made more energy efficient, and heating will need to be decarbonised. Defining Retrofit Archetypes is a way to support that process.

- **Retrofit** is the design and building process to make that happen for an individual house, involving a range of typical building works.
- **Measures** are those building works (e.g. insulation, double-glazing, heat pumps) as appropriate to each house.
- **Archetypes** is a way of grouping houses with similar characteristics (e.g. age, wall construction, layout) where the same Measures are likely to be appropriate.

Retrofit Archetypes

Archetypes categorise buildings based on key aspects of their construction that will affect which retrofit measures are relevant. For this group of houses at Oxton the common characteristics are:

- property age: 1992-2002
- construction: timber framed walls, floor and roof
- cladding: rendered or brick walls, concrete tiled roof
- insulation: some but minimal insulation to walls, floor and roof
- windows: double glazed, timber frames + trickle vents
- built form: detached house, pitched roof, average floor area 150m², simple rectilinear footprint sometimes T or L-shaped, room-in-roof with dormer windows, sometimes with integral garage.
- number of storeys: 1 or 1½

The classification of archetypes is about the **building fabric**. Existing services (i.e. heating/energy systems) are not a defining feature but will of course be impacted by the retrofit works.

Retrofit Archetypes

Houses do not have to be identical to be part of the same Archetype, they just need to share these common characteristics. Nor is it about how a house looks, the same Archetype could have examples with a wide range of decorative styles and materials. But when a cluster of houses have been built as part of a large development, it is likely they will be variations on a few standard designs with some that are identical or mirror-image, and most will share a limited palette of materials. Clusters of houses from this 1992-2002 Archetype can be seen in many towns and villages across the Scottish Borders.



The Old Vineries, Clovenfords



Cardrona Way, Cardrona



Cotgreen Road, Tweedbank

Retrofit Archetypes

The 42 houses in Justice Park follow this pattern, with a wide range of building formats but all having some consistent features. We originally surveyed 12 houses and then did more detailed surveys on 8 of them. We looked especially at 3 of the houses because of their high degree of similarity (near-identical designs and no substantial alterations) allowing for easier comparison of the different retrofit measures.



Retrofit Archetypes

We were able to access the original building warrant drawings for one of those houses: 34 Justice Park. This was helpful as it gave us accurate details of what was originally built (or at least what was intended) that we could compare to its current status. Houses don't often remain exactly as they were built, they are typically changed by different owners over the years. When we apply Retrofit Archetypes we still need to allow for a bespoke assessment of each house to pick up these differences.

We have used 34 Justice Park as the 'typical house' for this report.

(Original building warrant drawings follow)



Typical house

To help explain how the proposed retrofit measures could be applied for this Archetype, we took all that information about our typical house and created a 3D digital model (SketchUp).



Does your house match this Archetype?

Defining Archetypes is not an exact science but does your house include most of these typical features?

- **Property Age:** 1992-2002 > could be late 1980s to late 2000s.
- **Construction:** timber framed walls, floor and roof > timber rather masonry structural wall (internal skin) is the critical issue.
- **Cladding:** rendered or brick walls, concrete tiled roof > other sorts of cladding might not affect type of work but will affect cost.
- **Insulation:** minimal insulation to walls, floor and roof > this will affect how much you need to add.
- **Windows:** double glazed, timber frames > these will often have been replaced already, doors also.
- **Built Form:** detached house, pitched roof, floor area c.150m², simple rectilinear footprint, room-in-roof > there is no fixed threshold but the bigger and the more complex, the higher the cost.
- **Number of Storeys:** 1 or 1½ > working at height will affect cost.

Archetype 3. Modern detached house

Typical characteristics

Age	1992-2002
Walls	Brick veneer, timber frame
Roof	Timber frame, dormers
Floor	Suspended floor
Windows	Timber or UPVC double glazed
Built form	Detached houses, simple rectilinear plans
Storeys	1, 1½ or 2



Archetype 3. Modern detached house

Measures

Walls	External wall insulation	Generally applied to the existing wall surface, but the outer masonry skin can be removed first.
	Internal wall insulation	Consider upgrading insulation within the timber frame to minimise loss of floor area.
Roof	Loft insulation	Top up to 350mm min.
	Room-in-roof insulation	Insulate coombs, dwarf walls and eaves, also gable end walls.
Floor	Suspended floor insulation	Insulate from below if accessible, otherwise from above through new floor openings.
Windows	A-rated glazing	New double or triple-glazed windows or upgrade existing windows.
Doors	New insulated door	Check rating of existing door, replace or upgrade as appropriate.
Ventilation	Whole house ventilation strategy	Ensure adequate extract ventilation and compensatory ventilation.
	Airtightness	Improve airtightness of existing fabric where possible.
Energy	Heating	Install an air source or ground source heat pump, unless a heat network is like to become available.
	Electricity generation	Install solar panels and battery storage.

Measures

The types of building work that Retrofit involves are often referred to as ‘measures’. Following are explanations of the most common measures that you will find referenced in Archetype guidelines, individual house surveys, and EPC certificates. We have grouped them into three categories:

- **Insulation**
walls, floor + roof
- **Ventilation**
windows, doors + ventilation
- **Energy**
heat + electricity

Recommendations for improvement

The measures below will improve the energy and environmental performance of this dwelling. The performance ratings after improvements listed below are cumulative; that is, they assume the improvements have been installed in the order that they appear in the table. Further information about the recommended measures and other simple actions to take today to save money is available from the Home Energy Scotland hotline which can be contacted on 0909 909 2292. Before carrying out work, make sure that the appropriate permissions are obtained, where necessary. This may include permission from a landlord (if you are a tenant) or the need to get a Building Warrant for certain types of work.

Recommended measures	Indicative cost	Typical saving per year	Rating after improvement	
			Energy	Environment
1 Room-in-roof insulation	£1,500 - £2,700	£480	E 45	E 41
2 Cavity wall insulation	£800 - £1,600	£193	E 52	E 47
3 Floor insulation (solid floor)	£4,000 - £6,000	£139	D 57	E 51
4 Upgrade heating controls	£300 - £400	£88	D 60	E 54
5 Condensing boiler	£2,000 - £3,000	£247	C 69	D 65
6 Solar water heating	£4,000 - £6,000	£43	C 71	D 68
7 Replace single glazed windows with low-E double glazed windows	£3,300 - £8,500	£30	C 72	C 69
8 Solar photovoltaic panels, 2.5 kWp	£3,500 - £5,500	£303	C 79	C 78

Alternative measures

There are alternative improvement measures which you could also consider for your home. It would be advisable to seek further advice and illustration of the benefits and costs of such measures.

- External insulation with cavity wall insulation

Measures: Insulation

Thermal insulation is any material that blocks the movement of heat. To make our homes more energy efficient we need to increase the amount of insulation of the building envelope: the walls, floor and roof. Every little bit helps to improve the overall performance of the house. Insulation is part of the ‘fabric first’ approach.

Wall

- External Wall Insulation
- Internal Wall Insulation

Floor

- Suspended Floor Insulate
- Thermal Underlay

Roof

- Loft Insulation
- Room-in-roof Insulation

Thermal Bridging

- Insulation cold bridges



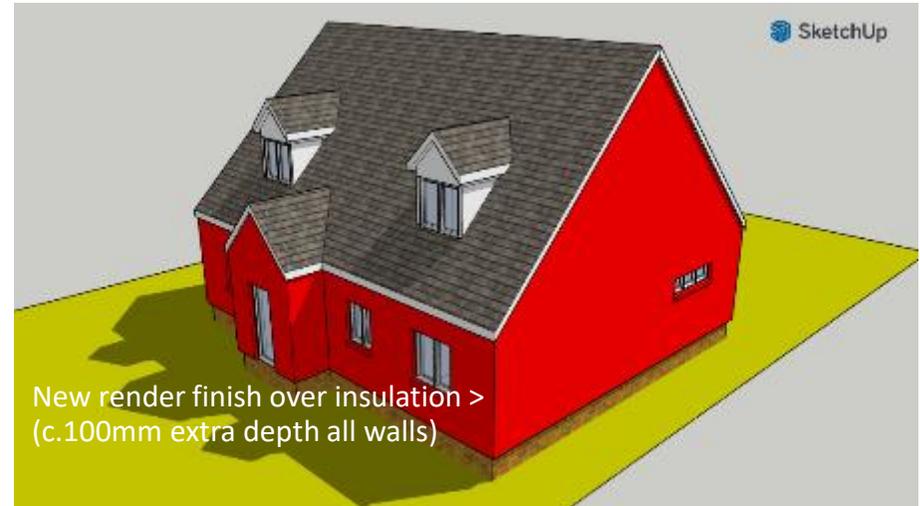
Wall Insulation

External Wall Insulation

External wall insulation involves fixing a layer of insulation material to the outside of the wall, then covering it with a special type of render or with cladding. The finish can be smooth, textured, painted, tiled, panelled, pebble-dashed, or finished with brick slips.

[Source: Energy Saving Trust](#)

If walls are already rendered or painted the new finish can be made to match, but any exposed stone or brick will be concealed. If the appearance of the facade to the street cannot be changed, just the side and back walls can be done. There are examples where the external masonry skin has been removed, which enhances performance but is a costly process.



Wall Insulation

Internal Wall Insulation

Internal wall insulation is done by fitting rigid insulation boards to the wall, or by building a stud wall filled with insulation material such as mineral wool fibre.

[Source: Energy Saving Trust](#)

There are a wide range of insulation options for timber framed walls. Natural insulation materials are preferable for various reasons but mineral fibre batts or PIR foam slabs are also commonly used. IWI will reduce the floor area, and may impinge on historic cornices or decorative wall finishes. It is a good idea to check the condition of any existing insulation behind the plasterboard, making good any problem areas, or upgrading it to reduce the reduce how much insulation is needed internally.



Floor Insulation

Suspended Floor Insulation

The most effective way to insulate a suspended floor and improve its airtightness is to retrofit insulation between the floor joists. This usually involves lifting the floorboards. If the floor is accessible from below (basement or crawl space) insulation can be fitted from underneath.

[Source: Ecological Building Systems](#)

Stopping draughts can be just as useful as the added insulation for improving the energy efficiency of suspended floors. Ventilation of the subfloor space has to be maintained so air vents etc. must not be blocked. Work can be coordinated with installing new pipes for radiators, or underfloor heating can be fitted on trays between the joists.



Floor Insulation

Thermal Underlay

Thermal underlay is a type of underlay for carpets or engineered timber floors. Aside from offering all the usual benefits of underlay, its primary job is to create an insulating barrier between the subfloor and your carpeting.

[Source: Simply Underlay](#)

When more substantial insulation on either a solid or suspended floor is not possible, a thermal underlay can make a worthwhile contribution to insulation levels. Products range from 3-15mm in thickness so have minimal impact on door heights etc. They can also improve airtightness if extended right to the wall line (skirting boards need to be removed).



Roof Insulation

Loft Insulation

A quarter of heat is lost through the roof in an uninsulated home. If your loft is easy to access and has no damp or condensation problems, it should be easy to insulate. If you plan to use the loft for storage, you can raise the level of the floor, making sure you don't squash the mineral wool when you fit the floor boards.

[Source: Energy Saving Trust](#)

Even if your house has some loft insulation already you can probably install more, with 350mm commonly recommended. That means it will have to be laid on top of the ceiling joists, not just between them. If these extra layers get squashed it reduces their insulation value, so adding a small area of raised flooring for maintenance access is helpful, or more if you want to use the loft for storage.



Roof Insulation

Room-in-roof Insulation

If you use your attic space for rooms, you need to make sure all walls and ceilings between heated and unheated spaces are insulated. Sloping ceilings (coombs) can be insulated in the same way as a flat roof ('warm' or 'cold'). Vertical walls can be insulated in the same way. Flat ceilings can be insulated like a standard loft. Make sure you insulate all round dormers.

[Source: Energy Saving Trust](#)

Attic rooms are one of the trickiest areas to insulate because you need to use different methods for the different parts. Coombs and dormers are a big sources of heat loss because there is so little separation between the inside and outside. Coombs are typically a 'cold roof' and maintaining a ventilation gap is critical, which also requires vents at the eaves and ridge.



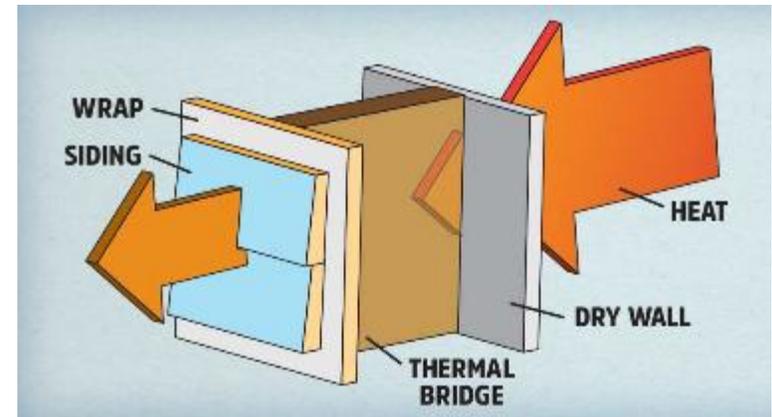
Insulation Cold Bridges

Thermal bridging

Thermal bridging is an increasingly recognised problem when insulating older buildings. A thermal bridge results when the inside and the outside are directly connected by elements that are more thermally conductive e.g. screws or timber joists passing through insulation layer. Where thermal bridging occurs, condensation is a major concern and the overall thermal performance of the building is reduced.

[Source: Greenspec](#)

The higher the level of insulation, the greater the risk for concentrated areas of condensation at any cold bridge. Window reveals are a major concern, also wall/ceiling junctions. Providing a continuous layer of insulation across the structural frame is the simplest way to avoid this.



Measures: Ventilation

Good ventilation is essential for indoor air quality and to prevent mould, but it's also important for ventilation to be controlled so that our houses don't leak heat. Windows and doors have always been the main way we control ventilation, but to boost energy efficiency we need to improve their performance and consider other ventilation options. Ventilation is also part of the 'fabric first' approach.

Windows

- A-rated glazing
- Refurbish existing windows
- Insulate reveals

Doors

- New insulated doors
- Refurbish existing doors

Ventilation

- Airtightness
- Condensation
- Whole house ventilation
- Heat recovery ventilation



Windows

A-rated glazing

Energy efficient windows are made of 2 or 3 glass panes with air gaps sealed in a single unit, surrounded by a frame made from UPVC, wood, or other material. Window manufacturers show energy efficiency using a rating from A++ to E.

[Source: Energy Saving Trust](#)

Old double-glazed units (U=2.5)* perform half as well as newer units (U=1.2) and triple-glazed is better again (U=0.8), that's why some level of window upgrade is almost always recommended to improve energy efficiency. Overall window performance is affected by the type of frame, how tightly openings seal, and various special treatments to the glass and glazing unit.



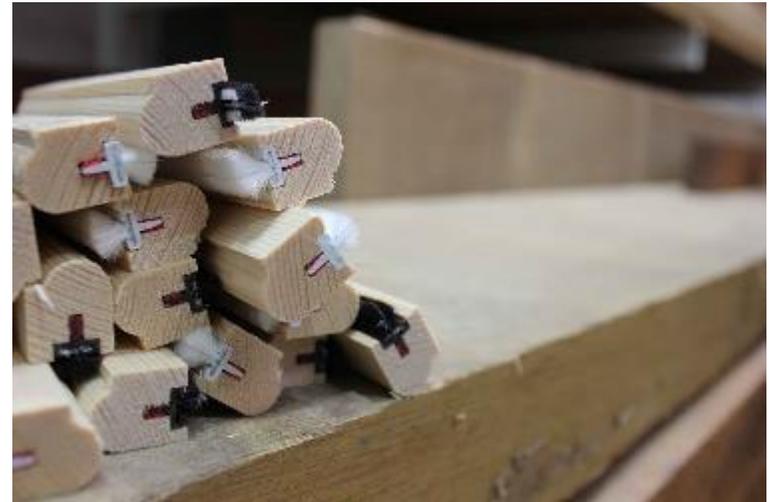
Windows

Refurbish existing windows

Repaired and adapted, older windows can be as energy efficient as new ones. Repairs usually cost less, and it is more environmentally sustainable to repair than to replace.

[Source: Historic England](#)

Provided the frame is still in good condition, most windows can be refurbished to improve their energy efficiency. This applies to better quality UPVC windows as well as traditional timber windows. Works can include: replacing seals and making sure opening sashes close tightly; upgrading the glazing units (see A-rated glazing); making sure there are no gaps around the edges of the window frame and wall.



Windows + Doors

Insulate reveals

Where the wall is very thin, heat is able to leak around the window frames. This is very typical of solid walled buildings, and is the cause of common mould and mildew patches around windows. The best way to prevent heat loss in window reveals is to insulate them.

[Source: Heritage House](#)

Includes the top, bottom and sides of all door and window openings. Whilst more critical for older houses this is applicable broadly. Current building regulations require reveals to be insulated and similar methods can be used in existing buildings. Methods include: insulation-backed plasterboard; fitting thin-profile products such as 'Aerogel' blanket behind joinery; using an insulating plaster (lime-based).



Doors

New insulated doors

Like any other part of the home, doors can be insulated and draught-proofed to prevent heat escaping. New external doors now generally contain integrated insulation to reduce heat loss and an effective draught-proofing system.

[Source: Energy Saving Trust](#)

Most new doors are not solid timber but made of 'composite' construction with a variety of materials, including an insulated core. Whether timber or composite, they will have integrated seals on all sides to prevent draughts. Plain doors perform best ($U=1.0$)* but doors with double or triple-glazing are available ($U=1.4$).

* U-value is a measure of how effective a material is an insulator, the lower the number the better the performance. The figures quoted are typical but will vary.



Doors

Refurbish existing doors

Draught-proofing external doors can stop a lot of heat from escaping, and won't cost you much. Internal doors also need draught-proofing if they lead to a room you don't normally heat.

[Source: Energy Saving Trust](#)

Similar to windows, the performance of doors can be significantly improved with tight-fitting seals arounds all edges. It also helps to remove or provide airtight covers for letter slots and keyholes. On traditional panelled doors, thin-profile insulation such as 'Aerogel' blanket can be fitted on the internal face of panels (because the panels are generally thinner than the main body) without changing the external appearance.



Rooflights

Energy Efficient Rooflights

To make skylights more energy efficient, manufacturers use various glazing technologies including heat-absorbing tints, insulated glazing, low-emissivity coatings, or translucent insulation material between several glazing layers.

[Source: US Department of Energy](#)

Rooflights are just like windows for energy performance: they provide the benefit of solar heat gain and daylight, but can have poor insulation value, poor airtightness, and are a common location for condensation and mould. The same measures apply: upgrade or replace with A-rated glazing such as triple-glazed ($U=0.8$) and tightly sealed frames, and insulate the reveals on all 4 sides.



Airtightness

Improving Airtightness

Airtightness is aimed at stopping uncontrolled movement of air by closing gaps and cracks in the building fabric, in windows and doors, or around cables and pipes, through which warm air can escape and cold air get in.

[Source: Homebuilding & Renovating](#)

Airtightness goes beyond draught-proofing, it's about minimising gaps in every part of the fabric. Behind skirting boards and cornices, the edges of window and door frames, around power sockets or cables, all are common points of failure. Even a skim coat of plaster on walls and ceilings can help. Airtightness is measured using 'blower door' and 'smoke pen' tests. Old houses tend to be very leaky, testing at 15 air-changes/hour (ACH) or higher, while newer ones might be 5 – 7 ACH. The Passivhaus standard requires less than 1 ACH.



Ventilation

Condensation

After adding a warm layer of insulation to your home, moisture from daily household activities (bathing, drying clothes, cooking, and breathing) is now trapped inside. This excess moisture could cause condensation in any cooler area which has potential to lead to mould and health problems. To avoid this, you should install effective ventilation to allow your home to breathe.

[Source: Changeworks](#)

Increased risk of condensation and mould is the downside of better insulation and airtightness, the importance of which is often overlooked during the retrofit process. It is exacerbated by many modern building materials that don't 'breathe' (allow the free passage of moisture). Traditional solid-walled buildings were designed to allow moisture movement so need special care.



Ventilation

Whole house ventilation

A whole house ventilation system may include intermittent extract fans, mechanical ventilation with heat recovery, combined with background ventilators. These systems ensure extraction of moist air and supply of fresh air, crucial for maintaining indoor air quality and preventing condensation after energy efficiency retrofits.

[Source: Airflow quoting PAS2035 Ventilation Assessment](#)

Making sure there is adequate ventilation can involve simple measures: ‘intermittent extract fans’ means cooker hoods and bathroom fans; ‘background ventilators’ means trickle vents or windows that can be cracked open. Good cross ventilation, including high-level windows or rooflights to vent hot air, help to ‘purge’ stale air overnight and prevent overheating. Ventilation needs to be planned, it doesn’t just happen.



Ventilation

Heat recovery ventilation

Heat recovery ventilation extracts stale humid air from 'wet' rooms (bathrooms, kitchen, utility) and passes it over a heat exchanger that recovers 80% of the heat. Another duct draws fresh air from outside, filters it, then passes it over the heat exchanger, to supply warmed fresh air to living areas and bedrooms.

[Source: Homebuilding & Renovating](#)

This mechanical ventilation system is often used in buildings with very high levels of airtightness (e.g. Passivhaus) where natural ventilation is not adequate to ensure air quality, and to maximise energy efficiency, but it can be used in any house. It has added benefits of distributing heat evenly through all rooms, stopping mustiness, filtering pollutants and pollens, and allowing windows to stay closed in noisy locations.



Measures: Energy

Alongside ‘fabric first’ measures we need to overhaul our energy systems, making sure we use energy as efficiently as possible and decarbonising energy supply. The way we use energy in our homes is still largely derived from the expansion of the national electricity grid and the introduction of gas or oil boilers in the 1950s & 60s, but that is now rapidly changing with modern technology, especially the transition to renewable energy for both grid-based and home-based electricity generation.

Decarbonised heat

- Heat Pumps
- Heat Networks
- Heating controls + insulation

Renewable energy

- Solar electric panels
- Solar thermal panels
- Energy storage

Energy management

- Heating controls + insulation
- A-rated light fittings + appliances
- Energy tariffs



Decarbonised Heat

Heat Pumps

Heat pumps are 3 times more efficient than traditional gas boilers, meaning they substantially reduce the carbon footprint of your home.

[Source: UK Government Energy Efficient Home](#)

Heat Pumps are becoming the default option to replace gas or oil boilers. They are a well proven technology, essentially just a fridge working in reverse. Most are Air-Source that capture latent heat from the outside air, but they can also be Ground-Source which use a borehole or buried pipe loops to capture heat from the ground. Heat Pumps are rated by their Coefficient of Performance (COP), that is how many units of heat energy are produced for each unit of electrical energy they use to operate. ASHP are typically 2-3 COP whilst GSHP are much more efficient and can be 5-6 COP.



Decarbonised Heat

Networked Heat Pumps

Networked heat pumps offer a solution to decarbonise heat for mid-density housing.

[Source: Kensa](#)

Ground-Source Heat pumps are much more efficient than Air-Source but the cost of installing the boreholes or pipe loops is significant, so it makes sense to share those components between a few houses. Each house still needs its own Heat Pump but these are typically quite small, needing much less space than an equivalent ASHP would. The Heat Pumps all run individually from the household electricity, there are no shared operational costs.



Decarbonised Heat

Heat Networks

Heat networks distribute heat from a central source to a variety of different customers. By supplying multiple buildings they avoid the need for individual boilers or electric heaters.

[Source: UK Government Energy Efficient Home](#)

Heat Networks are expected to be used in 20% of UK houses by 2050. Hot water is supplied from a local energy centre via underground pipes. The heat could come from numerous sources: biomass boilers, commercial grade heat pumps, or waste heat from agriculture and industry. The only functional part of a heat network for any house is the Heat Interface Unit (HIU) that transfers heat from the network to the central heating and hot water systems in the house. An HIU is about the size of a combi boiler and can be fitted on a wall or in a cupboard.



Renewable Energy

Solar electric panels

If you generate renewable electricity at home, you can use it to power electrical appliances, or even an electric vehicle. This lowers the amount of electricity you import and pay for. Combining renewable energy with energy storage means you make more use of the energy you generate.

[Source: Energy Saving Trust](#)

For many households, ‘electrify everything’ will be the best approach: heat pumps, induction cookers, electric vehicles, all require electricity. Solar PV (photovoltaic) can make a major contribution to that energy use, especially if the system includes a battery to store electricity generated during the day for use at night.



Renewable Energy

Solar thermal panels

Solar thermal panels use sunlight to heat the water you'll use in your bathroom or kitchen. Even in cloudy Britain, solar energy can meet more than half of your annual hot water demand.

[Source: Centre for Alternative Technology](#)

Solar thermal panels are perhaps the ultimate type of low-tech renewable energy generation: the sun warms water in an array of pipes on your roof, with the hot water stored for use later, with no moving parts and no operational costs. Older versions had loops of copper pipe under glass panels, newer ones tend to use evacuated glass tubes which are much more efficient.



Renewable Energy

Energy Storage

Energy storage systems let you capture heat or electricity when it's readily available. By storing it to use later, you make more use of renewable energy sources and are less reliant on fossil fuels.

[Source: Energy Saving Trust](#)

Electrical storage batteries linked to solar PV have become very common in the last few years, with prices coming down and performance going up. The units are compact with options for locating them inside or outside. But there are also heat batteries, which divert surplus or off-peak electricity to heat a container of phase-change material. The house central heating or hot water systems draw from this stored heat, reducing their operational energy use.



Energy Management

Heating controls + insulation

Heating controls includes timers, thermostats, plumbing and electronic components. They help manage when the heating should be on and what temperature rooms should be. Heating controls are improving all the time, but research shows that few people understand their controls.

[Source: Energy Saving Trust](#)

Even if you are not replacing the current heating system it may be worth updating controls, and learning how to use them: just turning down the central heating flow temperature can make a big difference. Modern systems allow a higher level of control, including responsive to the weather and remote operation. Meanwhile, better insulation of hot water cylinders and pipes ensures heat is not wasted, which will reduce energy demand.



Energy Management

A-rated light fittings + appliances

Energy efficient lighting helps lower electricity bills and carbon dioxide emissions, all without reducing the quality of light in our homes. You can also use sensors or timers on external lights, so they are only on when they need to be.

[Source: Energy Saving Trust](#)

Even if you are not upgrading the insulation of your house, you can reduce energy use by installing light fittings and appliances with high energy efficiency ratings. For lighting that simply means swapping incandescent bulbs for LED, though sometimes the fitting is best replaced. For cooking, install an induction hob and fan-forced or microwave oven. Even within those products there is a wide range of efficiency levels so check the rating labels.



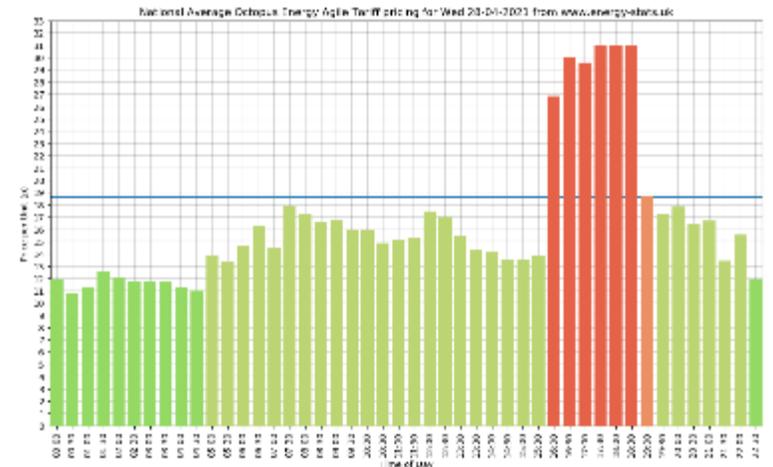
Energy Management

Energy tariffs

The biggest savings for people with heat pumps can be made by switching to a time-of-use-tariff or a heat-pump-tariff. Your savings will come more quickly if you're using a dedicated tariff.

[Source: WHICH magazine](#)

Because we are changing the way we use energy it makes sense we reconsider how we pay for it. Heat pumps should be left running 24/7, electric vehicle charging is best done in the middle of the night, but solar panels will be generating most on a hot summer day. Does someone have a health condition that needs a constant high temperature, or do you travel for work and are rarely home? Energy companies are starting to offer deals aligned with these different customer needs. The right tariff can significantly reduce the payback period for some measures.



Archetypes, Measures + the Retrofit Process

Not all of these Measures will be appropriate for every house that fits the definition of Archetype 3. Modern detached house, but hopefully this report will give homeowners a better idea of options to consider.

It is crucially important that every house is assessed individually by a trained professional before any substantial retrofit works are undertaken, because each will have their own bespoke circumstances, so please don't rely on this report alone.

Thanks

During the course of this project, we have consulted with various organisations, government agencies and businesses, and have engaged with many different communities across the region. We would like to take this opportunity to thank them all for their invaluable advice, assistance and encouragement.

We hope you find this presentation helpful to understand what the retrofit process is about and how it might apply to your home.

Glossary

- LHEES** Local Heat and Energy Efficiency Strategy, the Scottish Government policy that requires all Local Authorities to develop a strategy for decarbonising buildings in their area.
- Net Zero** Cutting carbon emissions to a small amount of residual emissions that can be absorbed by nature, or Carbon Capture and Storage (CCS), leaving zero change in atmospheric levels.
- Retrofit** Where new features and technologies are added to existing buildings. To achieve Net Zero that means anything that will make buildings more energy efficient or climate resilient through measures such as better insulation and installing renewable energy equipment.
- Passivhaus** Certification scheme for buildings that provide very high levels of energy efficiency through things like insulation and airtightness. This can reduce the need for space heating to the extent that a conventional heating system is not needed.
- Airtightness** A measure of how well sealed the building fabric is. Airtightness is measured by how many air changes per hour occur when all doors and windows are closed.
- Blower Door** The Blower Door test is a way to measure airtightness. A fan is temporarily fitted across an external door opening and sucks air from the house, with the fan rate adjusted until incoming and outgoing air flow is balanced.
- Smoke Pen** This is a small pen-like device that burns a wick to release smoke (similar to an incense stick). This is used during an Airtightness test to locate points of air leakage.
- Thermal Image** Special cameras can be used to identify the location and level of heat loss from building fabric. The test has to be done during cold weather with the house heating system on in all rooms to create a heat differential with the outside, and is done at dusk or early evening.

Useful links

- For information about the Scottish Borders Local Heat and Energy Efficiency Strategy and Delivery Plan please visit: scotborders.gov.uk/lhees
- To view information and guidance on community engagement provided by Scottish Borders Council please go to: scotborders.gov.uk/say/community-engagement or email the team at communityengagement@scotborders.gov.uk
- South of Scotland Enterprise (SOSE) provide a range of services for enterprising communities, see: southofscotlandenterprise.com/community
- Scotland's Heat Network Fund overview and guidance for communities, see: gov.scot/publications/heat-network-fund-application-guidance/
- Heat in Buildings Strategy, see: gov.scot/publications/heat-buildings-strategy-achieving-net-zero-emissions-scotlands-buildings/pages/2/
- Home Energy Scotland (HES) energy and funding advice for homeowners: homeenergyscotland.org
- Business Energy Scotland (BES) offers business support: businessenergyscotland.org
- Local Energy Scotland (CARES) provides support for community schemes: localenergy.scot
- LETI is one of many organisations across Scotland and the UK producing guidelines for Retrofitting houses: leti.uk/retrofit



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