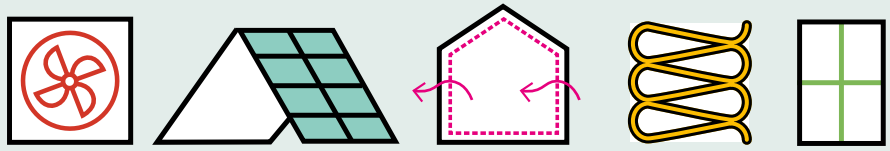
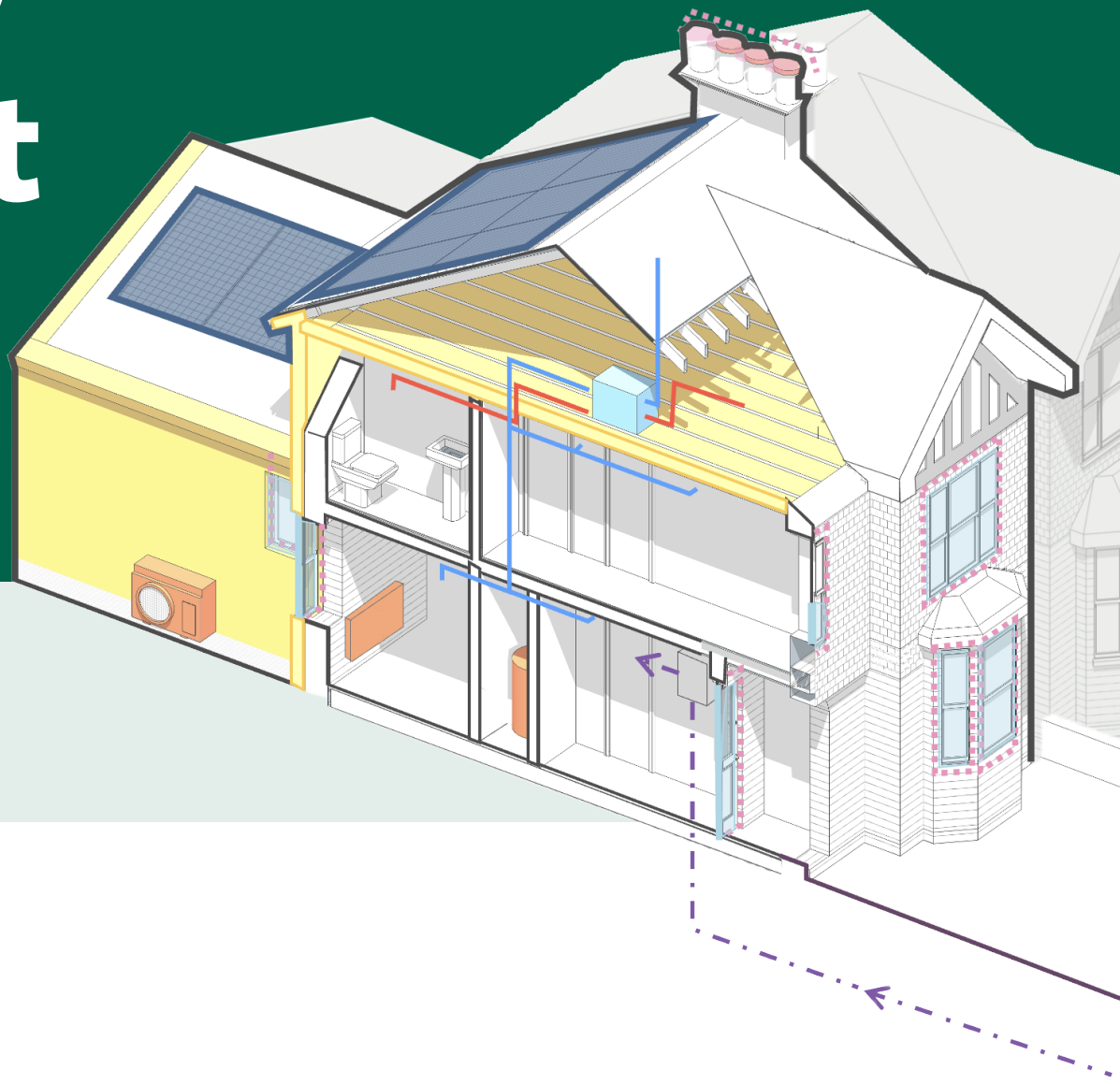
The Surrey Home Energy Improvement Guide





SURREY
COUNTY COUNCIL

Foreword

The importance of saving energy at home in Surrey

We know from public consultation with residents that many people in Surrey are concerned about the climate crisis and high energy costs and would like to make improvements to their home to reduce their energy usage and their carbon footprint. However, many residents are unsure where to start and don't know which measures would suit their particular property or which measures would be most effective.

We commissioned this guide to provide homeowners, landlords and local tradespeople in Surrey with practical information on how to make our homes more energy efficient and lower carbon, via a process known as 'retrofit'. The guide recommends 'packages' of energy saving measures for three of the most common housing types in the county: terraced homes, semi-detached homes and detached homes. However, much of the guidance can be applied to all types of homes.

Heat pumps are another focus of the guide – and it busts some myths about them along the way – since switching from a fossil fuel heating system (e.g. a gas boiler) to a heat pump is the single easiest and cheapest measure to reduce carbon, and this is key to our ambition for a net zero carbon county. However, our vision is for every home in Surrey to be affordable to run and healthy to live in, in addition to being low carbon, in line with our guiding mission: No One Left Behind. Investing in heat pumps alongside solar panels and other energy saving measures such as insulation brings a range of benefits, including reducing your energy bills; making your home more comfortable and resilient – to both the cold in winter and overheating in summer; and reducing health issues caused by damp and mould.

We very much recognise that residents will have different budgets and needs, particularly at a time when the extremely high cost of living continues to persist. Hence the 'packages' of measures presented in this guide – including some that are low or zero cost; so that you can start where you can, with the budget that you have available. The guide also introduces the idea of aligning energy saving upgrades with planned renovations and repairs to maximise overall cost-effectiveness.

As a Council, we are providing a range of support for people to retrofit homes, from providing free-of-charge in-person energy advice via our Home Energy Advice Taskforce (HEAT) to implementing energy efficiency programmes for those on lower incomes using central Government funding such as the Home Upgrade Grant (HUG). Additionally, in September 2024, we are due to launch a 'One-Stop Shop' for retrofit in partnership with FurbNow, a platform to help households access best practice guidance, approved retrofit professionals and trusted installers, guiding households through the end-to-end retrofit journey.

However, we also know from analysis in our Retrofit Skills Roadmap that it will cost an estimated £9 billion to retrofit all homes in Surrey to a net zero carbon standard. We therefore welcome the new Government's ambition in its pledged Warm Homes Plan and call on them to increase the ambition further in providing the funding and innovative finance instruments, such as low interest loans, to support retrofit installations in Surrey and across the country, and also to support the development of the skilled retrofit workforce that is desperately needed to decarbonise our homes.

Finally, I hope that you will find this guide useful and wish you well on your journey to a more comfortable, lower energy and lower carbon home.

Marisa Heath
Surrey County Council Cabinet Member for Environment

How to use this guide

The purpose of this guide is to show how you can improve the comfort of your home while reducing its energy use.

The vision of Surrey County Council is for every home to be affordable to run, healthy to live in and low carbon, in line with their Net Zero goals.

The guide gives general information about opportunities, benefits and types of improvements; as well as technical details for those who wish to explore further.

We have focused on three common housing types in Surrey, offering guidance on home upgrade solutions likely to be suitable for them. This means that not all the information in this guide will be relevant to your home, so you check your home type and focus on what it is relevant to you.

We hope that you will find this guide useful and wish you well on your retrofit journey.

Already keen to start your retrofit project? Sign up for the Surrey 'One-Stop Shop' here

Deciding to improve your home

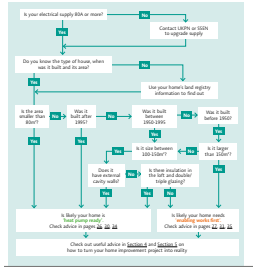
Make the most of your home project when the opportunity arises.

Understanding your house type

Select the house that is most similar to yours.

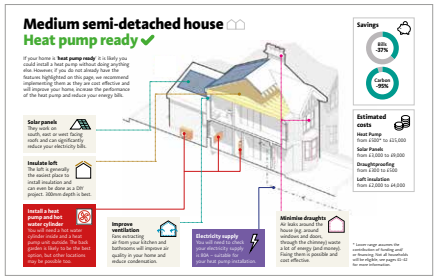
Is your home heat pump ready?

Understand if your home has the potential to install a heat pump straight away or after minor improvements.



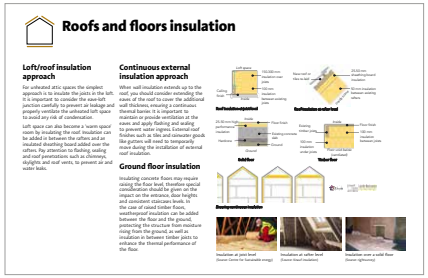
How to upgrade your home?

Section 3 is a visual guide to upgrade solutions for each house type. Section 6 represents the ideal retrofit.



Additional information

If you want to find out more about any of these measures, you can go to Section 5.



Still unsure

You might need the advice of a retrofit professional.

The Council can offer advice, please visit: www.surreycc.gov.uk/community/climate-change/residents/support-for-residents

Contents

1.

Deciding to improve your home

Your home can be much more comfortable with lower energy costs and reduced carbon emissions. This section explains the benefits of upgrading your home's heating system, of reducing how much heat it is losing through inefficient windows, uninsulated walls and roofs surfaces and of installing a solar panel system.

Your living experience can be improved by upgrading your home

It's easy to make a start

We hope that this guide will help you realise these benefits. Section 4 includes information on grants, including Surrey County Council's 'One Stop Shop' programme that subsidises retrofit assessments, encouraging homeowners to start the improvement process on the right foot.

Doing our part to reach Net Zero by 2050

With 28% of carbon emissions coming from our houses, making your home energy-efficient and fossil-fuel free is a powerful way to help Surrey and the UK to reach their Net Zero goals. Other benefits can directly improve your day-to-day life.

Reduced energy bills

If your home loses less heat, if your heating system is modern and efficient and if you are using a smart electricity tariff, your energy bills will reduce significantly.

Energy price fluctuations

Running an energy-efficient home where the cost of heating is lower will offer protection of future changes in tariffs.

Minimised resource use

Using water-efficient fixtures and appliances will help preserve this precious resource.

Increased property value

Studies have shown that energy-efficient homes with lower running costs are more attractive to potential buyers and increase property values.

Increased comfort

Reducing unwanted draughts and using an efficient ventilation system will improve the air quality in your home, creating a more comfortable and healthy living space.

Investing in your wellbeing

Ultimately, an efficiently renovated home represents an investment in your overall well-being. It fosters a healthier, more comfortable living environment while saving you money and minimising your environmental impact.

Reduced carbon footprint

By lowering energy use, moving away from the use of gas for heating and potentially incorporating solar panels, you will drastically reduce your carbon emissions and actively help Surrey and the country to reach Net Zero.

Build a brighter future

Upgrading your home is not just about the present; it is an investment for the future. By reducing your carbon footprint and creating a more energy-efficient place, you are building a sustainable legacy for those who follow.

Get started!

A constant opportunity

It may appear challenging to you to make your home more energy efficient. However, any time that maintenance works are required or that you start a small home improvement project, you have the opportunity to do this.

Before you begin, understand your home

To get started, think about your home. Throughout the seasons: Are there warm or cold spots? Are there areas you don't use because they are uncomfortable? Note any issues you are aware of, such as: high winter heating bills, old and failing boiler, draughty locations, cold rooms, damp and mould, etc. Make a note of what you would like to see improved.

Section 2 will help you identify your house type. Do you know how old is your boiler? What do you know about the insulation in your roof and walls? And what about those windows or doors that let in the wintry cold? With a few key pieces of knowledge in hand, you will be better equipped to choose the right improvements.

Help and advice from the right professionals

The best way to plan your journey well is to work with retrofit professionals. You might be able to use you DIY skills; however, booking a retrofit assessment is the first step to truly finding out what your specific home may need. Section 4 of this guide takes you through this process.

Now, get started!

Everything from home redecoration and appliance replacement to loft extensions and roof repairs present an opportunity to incorporate home energy improvements into your plans. By bringing them together, they become more cost-effective and less disruptive – and they will lead to more benefits overall.

Different types of changes in your family's life offer real opportunities for energy improvements

Grabbing the opportunity

Make the most of your project when the opportunity arises.

Modernising a home

Making the most of it

Because you are likely to be making significant changes throughout the home, it should be relatively easy to including energy saving measures as well. Consider draught proofing, improving insulation, ventilation and electrifying your heating system. Choose new appliances that are energy efficient and durable. Make sure leaks and damp are surveyed and resolved. Ageing windows and doors should be targeted and replaced with new high performing ones.

Benefits of a carefully planned process

- Lower cost of delivery as one project.
- Less disruption.
- Lower heat losses and improved ventilation.
- No missed opportunities.

Rewiring

Making the most of it

Think about a future heat pump or direct electric panel heaters, and about a potential electric vehicle in the future. What would they need in terms of electricity supply? Make these changes now.

Benefits of a carefully planned process

- You'll be ready for the future! Your home will be able to easily accommodate a new heat pump and electric vehicle charging point.

Roof repairs

Making the most of it

Fixing a roof represents a significant opportunity to improve it by adding insulation and considering the installation of solar panels to generate your own free energy.

Benefits of a carefully planned process

- It is worth identifying other works that can be aligned as part of the roof repairs.
- It makes the most of scaffolding costs and disruption.

Grabbing the opportunity

Rear extensions/ Loft conversions

Making the most of it

An extension project is expensive. Not only should it be as good as possible, with well insulated walls, floor and roof and good windows but it could help to improve the rest of the house, for example by enabling the installation of a heat pump or even a mechanical ventilation system with heat recovery.

Benefits of a carefully planned process

- Lower cost of delivery as one project.
- Less disruption.
- Low carbon heating.
- Improved ventilation.

Improvement bathrooms and kitchens

Making the most of it

- Ventilation is generally insufficient in bathrooms and kitchens. A room refresh is an opportunity to install a new ventilation system which will improve air quality and reduce the risk of condensation and mould.

Benefits of a carefully planned process

- Installation will reduce condensation and mould and the associated risks to health.

Boiler replacement

Making the most of it

It is perhaps the most important opportunity to grab as replacing a gas boiler with another one will lead to significant carbon emissions for the next 20 years. A heat pump system must be considered.

Benefits of a carefully planned process

- An essential move to make.

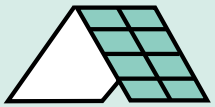
What type of works can you do to upgrade your home?

There are different types of improvement works you can consider to make your home more sustainable, more energy efficient and more comfortable.

The impact that these different types of work will have on those outcomes do vary, and the cost and difficulty of doing them will depend on what sort of home you have. This guide focuses on getting your home ready for installing an efficient heat pump and provides advice on other work you might also take into account. You might be able to do all, or a few of the measures in these pages; Section 3 will explain what you need to do, what you might choose to do, and what you may find challenging.

Install solar panels

Installing solar panels can save you a lot of money on your energy bills, particularly if you use as much of the energy generated directly, for example by storing it in the hot water cylinder.



Replace your gas boiler

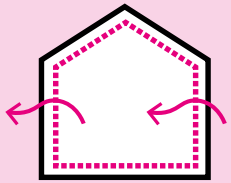
The biggest reduction you can make in your home's greenhouse gas emissions is to change your gas boiler to an air source or ground source heat pump or possibly to direct electric heating.

What type of works can you do to upgrade your home?

Reduce draughts and ventilate

Reducing draughts which leak heat from your home will make it more energy efficient and more comfortable. Your home should be well ventilated using an appropriate ventilation system (fans, ideally with heat recovery). This will make your home healthier and more energy efficient.

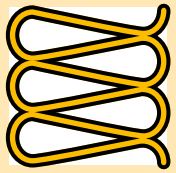
The images below illustrate a draught proofing process and a ventilation system with heat recovery



Source: www.heatspaceandlight.com

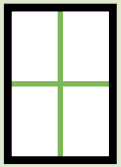
Insulate your home

Ensuring you have sufficient and well installed insulation in your loft is the quickest, cheapest and easiest way to save money on your energy bills. Insulating all parts of your home and particularly the walls, when it's done properly, can make your home more energy efficient and comfortable.



Upgrade your windows

Replacing old windows and doors with better ones will save you money on your energy bills, make your home more comfortable and should reduce draughts from around the frames. This is especially true if you currently have single glazing or double glazing that is more than 20 years old. New windows should ideally be triple glazed but other alternatives exist (e.g. vacuum glazing, high performance secondary glazing). It is important to improve ventilation when you upgrade your windows.



Let's talk about heat pumps

What are heat pumps?

Heat pumps are the much talked about heating system replacement for gas boilers. Moving away from the use of gas is essential to reduce our carbon emissions and mitigate climate change.

Heat pumps are powered by electricity (which is becoming greener year after year), and they are very efficient at generating heat.

Heat pumps are a reliable, tried and tested technology. To get the best out of this system, you need to know how to use it most effectively. This could be as easy as setting your heating to come on for longer than with a traditional system. Your installer should show you how to control your heat pump.

A correctly designed, sized and installed heat pump will provide comfort and long-term financial benefits for you.

Why is electricity better than gas?

Heat pumps run on electricity, which is getting greener all the time. In 2023, 41% of electricity generated in the UK was directly from low carbon sources such as wind and solar energy. By 2035 it is expected that all our electricity will be from low carbon sources. By contrast, the carbon emissions from fossil fuels, including gas, do not reduce and contribute to climate change. Using gas in our home is also a health and safety risk which can have tragic consequences.

Is this technology right for my home?

Heat pumps can be installed successfully in most homes with only some requiring energy efficiency improvements to make them 'heat pump ready'.

The Council has help available. See Section 4 on "Where to start your journey?" for advice on how best to prepare your house for a heat pump, and to discuss a plan for any simple energy saving measures that you can take, such as upgrading insulation.

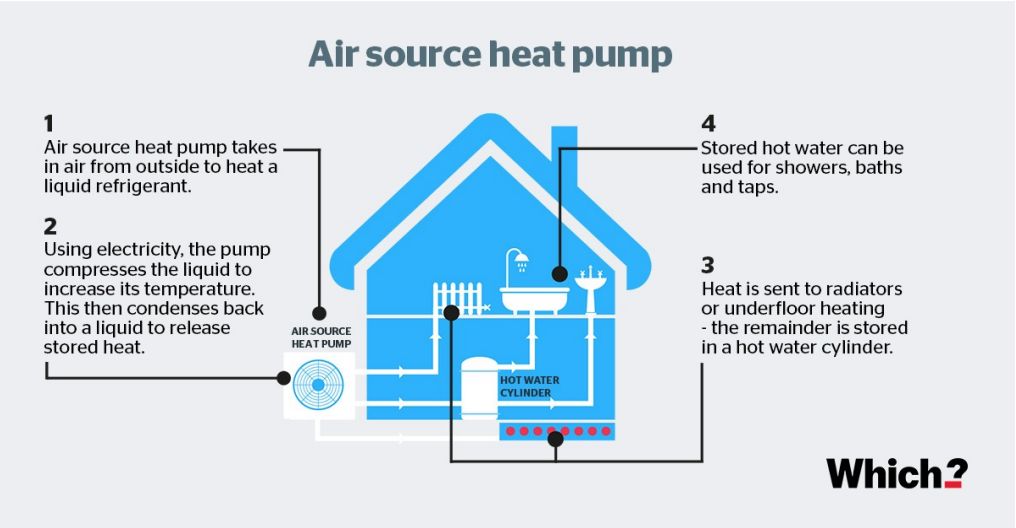


Diagram showing how a heat pump works.

How to get a heat pump?

The following steps are typical for most heat pump installations in existing homes:

1. Check with your system operator (UKPN or SSEN) that an **electrical supply** capacity of 80A is available. Make sure to ask for a free upgrade if it is not the case in your home. Section 5 provides more information on this.

2. Appoint a qualified building surveyor to carry out a detailed heat loss survey. This usually include calculations on any radiators that may need upgrading and provides a **heat loss estimate** for your home.

3. Once the heat loss has been estimated, a heat pump can be selected, and the **new heating system designed**.

4. Most heat pumps can provide up to 15kW of heat output, if your home demands more, then some **insulation upgrades** are required to reduce heat losses.

5. Most heat pumps are likely to be classified as permitted development, however **planning checks** may be necessary in some situations.

6. Once the above is completed, your new heating system is now **ready for installation and commissioning**.

Answers to common questions on heat pumps

Would a heat pump work in UK's cold weather?

YES. The largest heat pump uptakes are in some of the coldest countries in Europe (e.g. Norway). In comparison the UK has a relatively mild climate with operational efficiencies remaining high throughout the seasons.

Do I need to insulate my home fully otherwise a a heat pumps 'won't work'?

NO. Heat pumps can efficiently supply heat to any building, regardless of how well insulated it is. In poorly insulated buildings a larger heat pump will be required, together with larger heat emitters (e.g. radiators) to ensure it can operate efficiently.

Would a heat pump cost more than oil and gas boilers?

NO. A well designed heat pump should be at worst a similar cost to a gas boiler but in many cases can be far cheaper if paired with dynamic tariffs and solar. Energy companies (such as Octopus and OVO) are stepping up to provide a customised heat pump installation service to reduce the average total cost of the installation, the cost of installation will vary, and we recommended that you seek different quotes. Some grants like the **Boiler Upgrade Scheme (BUS)**, are available, reducing significantly the initial investment.

Octopus Heat Pump offer £500

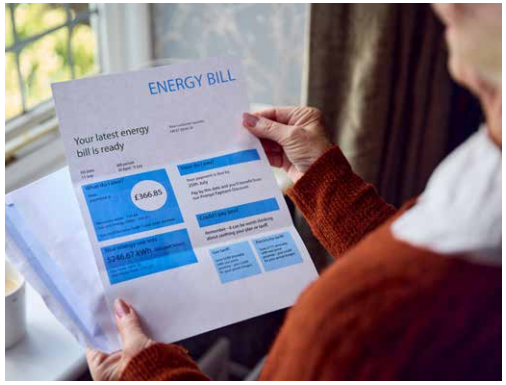
OVO heat pump offer £500

Would my energy bill increase in comparison with using gas or oil?

NOT NECESSARILY. Although the long-term cost of running heat pumps will depend on the price of electricity, correctly installed heat pumps can be up to 4 times more efficient than gas or oil boilers and will consequently offer lower running costs despite the higher unit cost of electricity.

Combining heat pumps with matched heat pump tariffs can reduce costs by up approximately 35-50% compared to a traditional gas boiler, while the addition of solar photovoltaics can further reduce bills.

NESTA Visit a Heat Pump Scheme



Answers to common heat pump questions

Does it take a long time to get a heat pump installed?

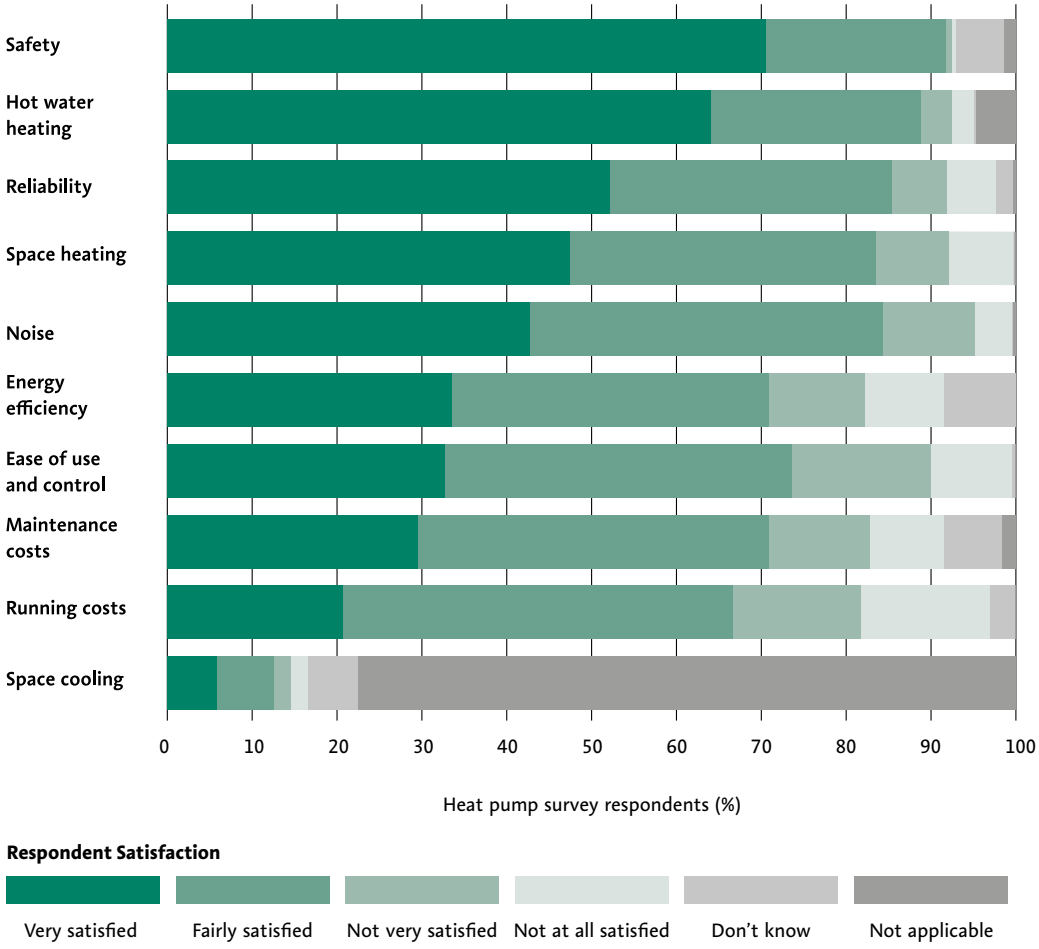
NOT NECESSARILY. Lead in periods are reducing, but it is still important to plan for this change, and preferably to have a quote ready to proceed with when you will want to replace your gas boiler. Proceeding with the installation in the summer season is preferrable.

A typical MCS heat pump installation can take be about 6 weeks from date of order to installation, and installation can take 4 or 5 days with 2-3 people working on it.

Shouldn't heat pumps be the last step of my home upgrade project?

NO. This can depend on your personal goals but installing a heat pump should ideally be one of the first steps of you home upgrade project as it delivers large reduction in carbon emissions. Upgrading the fabric over time is still important to improve health and comfort, reduce operating costs and mitigate the demand on UK's electricity supply.

More useful information can be found in this article by Carbon Brief.



Results from a user's survey carried out in the UK by Nesta showing satisfaction levels of heat pump users are very similar to those from gas boiler users.
Source: Nesta

2.

Understanding your house type

This section will allow you to identify what section of the guidance is more applicable to your home.

Which house groups are covered in this guide?

This guide is for anyone living within Surrey City Council who is interested in making their home more energy efficient, lower carbon, more comfortable and healthier.

Through data analysis, visits and photographs, we have identified the most common 'groups' of homes in Surrey. This guide focuses on three specific house types from the groups in this page and outlines home upgrade solutions which are likely to be suitable for them. Section 3 explores further how to upgrade these homes. Section 6 illustrates all the measures suggested for an ideal retrofit.

All homes are individual

While a particular home type is meant to be representative of a range of homes, please remember that each home is different and there are always exceptions.

Your home is unique and as such will have specific characteristics and opportunities. This guide provides a useful starting point, not a definitive set of recommendations for your home.

Terraced houses

Homes that are joined together to a row of other similar homes by a shared wall on each side.




Semi-detached houses

A type of home that is attached to another on one side, sharing one common wall.




Detached houses

A type of home that stands alone and does not share any walls with other properties.




Images taken from Google Street View ©Google 2024

It is very important to consider the advice in the following sections as indicative guidance and to develop a specific upgrade plan for your home with building professionals.

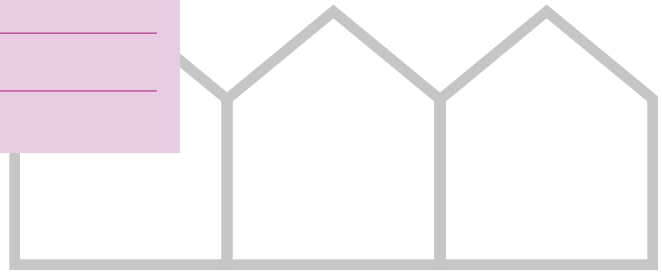
Small terraced houses

This house group covers a wide range of different types of houses which may not look identical. Their size, construction age and condition will also be different and will have a significant impact on how much work might be needed and what measures are appropriate.

However, a variety of characteristics and constraints are common to terraced houses.

This guide aims to clearly communicate solutions likely to be suitable for one 'typical' version of a terraced house, a '**small terraced house**':

- Built in 1950–1975
- Approximate floor 80m^2
- Simple footprint
- Relatively plain walls externally
- Cavity walls*
- Solid floor
- Presence of loft



Do not worry if your house does not exactly fit into this description though. For example, you might leave in a terraced house with a suspended timber floor or in a larger terraced house built in the 1960's. This guide will still be useful to you, but you will have to consider the advice with caution and consider it as a starting point. A building professional can help you identify specific recommendations for your house.

* cavity wall usually has a regular brick pattern. You can also tell by measuring the width of the wall, if it is more than 260mm thick, is it probably a cavity wall.


Ashford


Byfleet


Cranleigh


Oxted


Sunbury-on-Thames


Lingfield


Warlingham


Farnham

Images taken from Google Street View ©Google 2024

Medium semi-detached house

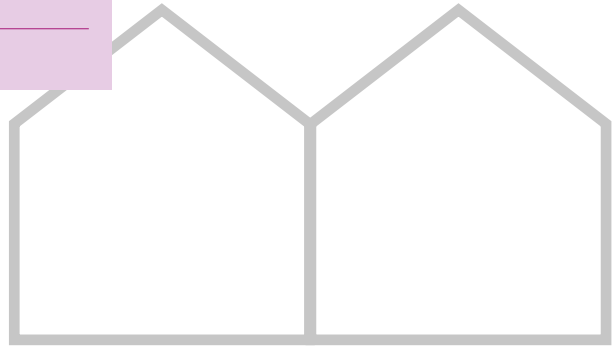
This house type covers a wide range of different types of houses which may not look identical. Their size, construction age and condition will also be different and will have a significant impact on how much work might be needed and what measures are appropriate.

However, a variety of characteristics and constraints are common to semi-detached houses.

This guide aims to communicate clearly solutions likely to be suitable for one 'typical' version of a semi-detached house, a '**medium terraced house**':

Do not worry if your house does not exactly fit into this description though. For example, you might leave in a larger semi-detached house built in the 1950's. This guide will still be useful to you, but you will have to consider the advice with caution and consider it as a starting point. A building professional can help you identify specific recommendations for your house.

- Built in 1900-1920
- Approximate floor 120m^2
- Solid walls
- Suspended floors
- Presence of loft




Runnymede


Woking


Tadworth


Chertsey


Sunbury-on-Thames


Egham


Camberley


Ashford

Images taken from Google Street View ©Google 2024

Large detached houses

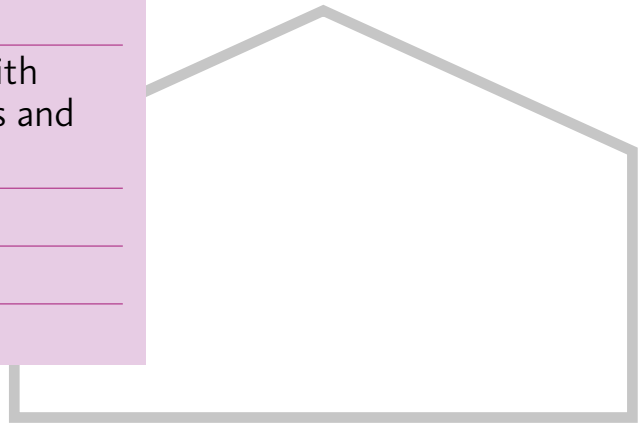
This house type covers a wide range of different types of houses which may not look identical. Their size, construction age and condition will also be different and will have a significant impact on how much work might be needed and what measures are appropriate.

However, a variety of characteristics and constraints are common to detached houses.

This guide aims to communicate clearly solutions likely to be suitable for one 'typical' version of a detached house, a '**large detached house**':

Do not worry if your house does not exactly fit into this description though. For example, you might leave in a smaller semi-detached house built in the late 19th Century. This guide will still be useful to you, but you will have to consider the advice with caution and consider it as a starting point. A building professional can help you identify specific recommendations for your house.

- Built in 1930–1949
- Approximate floor 200m^2
- Complex footprint
- Varied appearance with some plain elevations and some more complex
- Solid walls
- Solid floor
- Presence of loft




Epson


Addlestone


Warlingham


Runnymede


Guildford


Farnham


Horley


Knaphill

Images taken from Google Street View ©Google 2024

3.

How to upgrade your home?

This section gives an overview of the main measures you can take to improve your home. It also identifies how much intervention your house type needs and indicates how to undertake the potential measures, in what order and what benefits to expect.

A new and important concept: Heat pump readiness

What does it mean and how is it determined?

The combination of the building's fabric efficiency, its volume (size), the heating emitter size (radiators and/or underfloor heating) and the electric supply capacity will determine if a home is 'heat pump ready'.

Based on these characteristics, homes can be simply grouped into '**Heat pump ready**' and '**Enabling work first**' categories.

The adjacent table shows how different homes may be assessed and which category they would fall into.

Based on a maximum standard (single phase) electrical supply capacity of 80A, the highest corresponding heat output from a standard heat pump is around **15kW**. This number is important as it will set a practical limit on the maximum amount of heating (peak heat load) necessary to maintain the temperature of most 'typical' homes. If a home requires more than 15kW, fabric upgrades (see Section 5) or a three-phase electrical supply are likely to be necessary.

'Heat pump ready' homes

This type of homes have the potential to install a heat pump straight away or after minor improvements. For example, some minor insulation works may have to be undertaken (e.g. loft insulation) or some modifications to the radiators could be necessary alongside the heat pump installation, or to make the system more efficient.

'Enabling work first' homes

These homes require a more significant intervention before a heat pump should be installed. This could include more important changes to the building fabric (e.g. new windows) and/or heat emitters (e.g. new radiators). Upgrades to heat emitters may have the potential to reduce the extent of initial fabric works required.

Upgrades required before heat pump

Building fabric	Radiators	Electrical supply		
None	To optimise only	None	**Heat pump ready**	**Heat pump ready homes** ✓
None	To optimise only	Potential Upgrades	**Heat pump ready** with electricity supply upgrade	
Minor upgrades	Potential upgrades	Potential upgrades	**Heat pump ready** with minor fabric, electricity supply, and heat emitter upgrades	
Moderate upgrades	Potential upgrades	Potential upgrades	**Enabling work first homes** Moderate fabric modifications required	**Enabling work first homes** ⚙
Major upgrades	Upgrades	Potential upgrades	**Enabling work first homes** Major fabric modifications required	

This table summarises the two different categories of homes based on heat pump readiness. Section 5 explains with more detail what can be done.

How can you find out if your home is heat pump ready?

Electricity supply

You may not know if your property's electrical supply has a minimum rating of 80A which is needed to be suitable for a heat pump to be installed. If it is not, it may take some time to make it ready.

You should therefore check your electrical connection and get any work required completed so if your existing boiler breaks down, you can quickly get a heat pump installed (Section 5 provides additional information). In many cases, the local network providers, **UK Power Networks (UKPN)** and **Scottish and Southern Electricity Networks (SSEN)**, will upgrade your supply free of charge, if the electricity wiring inside your house is in good, safe condition. If your house was built recently (in the last 25 years) it should already have a suitable supply.

Other characteristics you need to find out about

Once you have confirmed your electrical connection is suitable, the next step will be to make sure that your home does not need more heat than the heat pump can provide.

Your home is 'heat pump ready' if the peak load is calculated to be less than around 15kW.

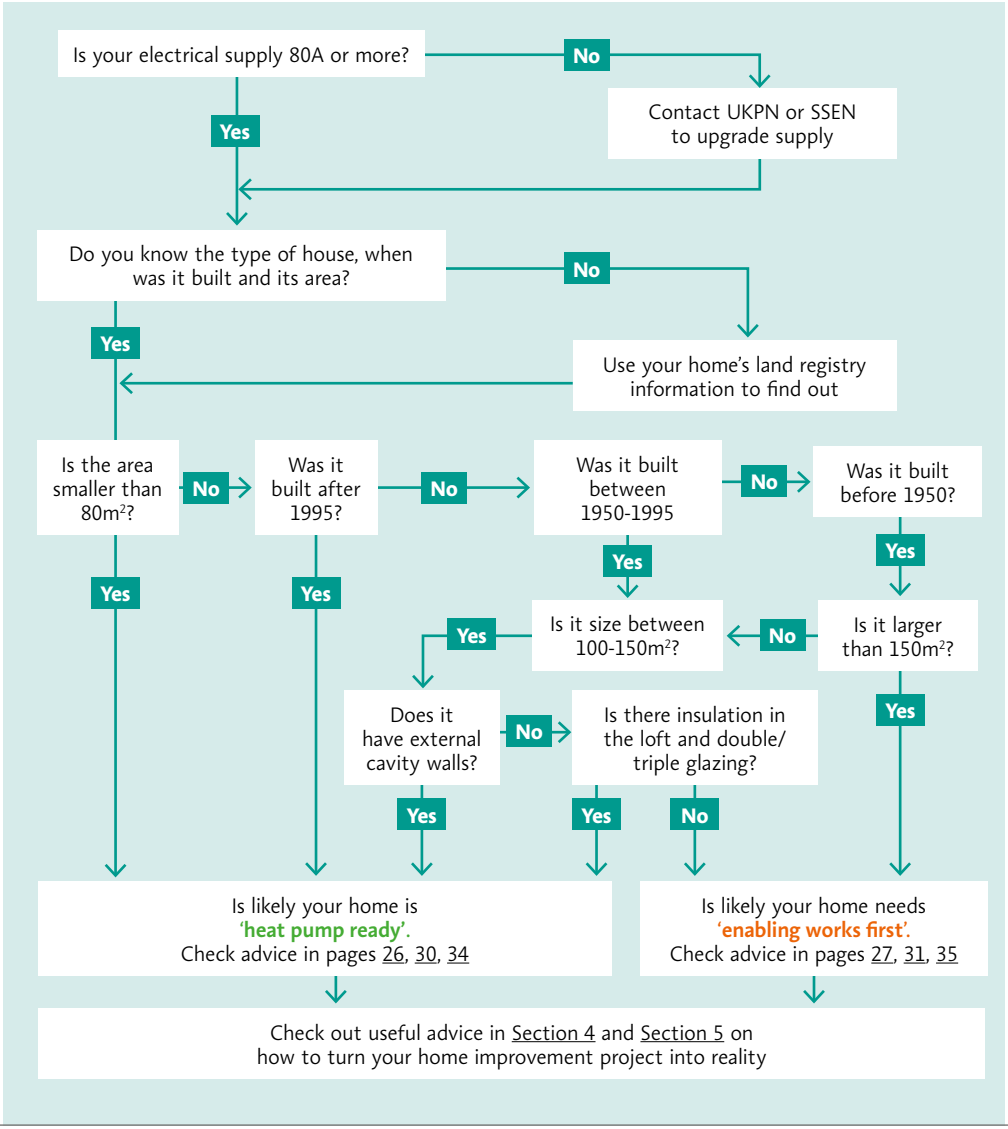
This can generally be achieved by many homes, for example:

- ☐ Homes smaller than 80m², **or**
- ☐ Homes built since 1995, **or**
- ☐ Medium size homes that have a floor area between 100-200m² **and** have cavity walls **or**
- ☐ Medium size homes that have a floor area between 100-200m² **and** have at least 300mm depth of loft insulation **and** have double (or triple) glazed windows.

For other homes, it may be necessary to undertake 'enabling works first' (e.g. insulation) so that the heat load falls below the 15kW limit.

For very large and very old buildings, it may be necessary to get a bigger heat pump, which would require a larger electrical supply (a three-phase supply). This can be costly, and in most cases, it is better to invest in reducing the heat needed.

In this section you will find examples of houses in both groups. An exemplar set of measures is also suggested in Section 6 as part of the ideal retrofit.



Small terraced house

Images taken from Google Street View ©Google 2024

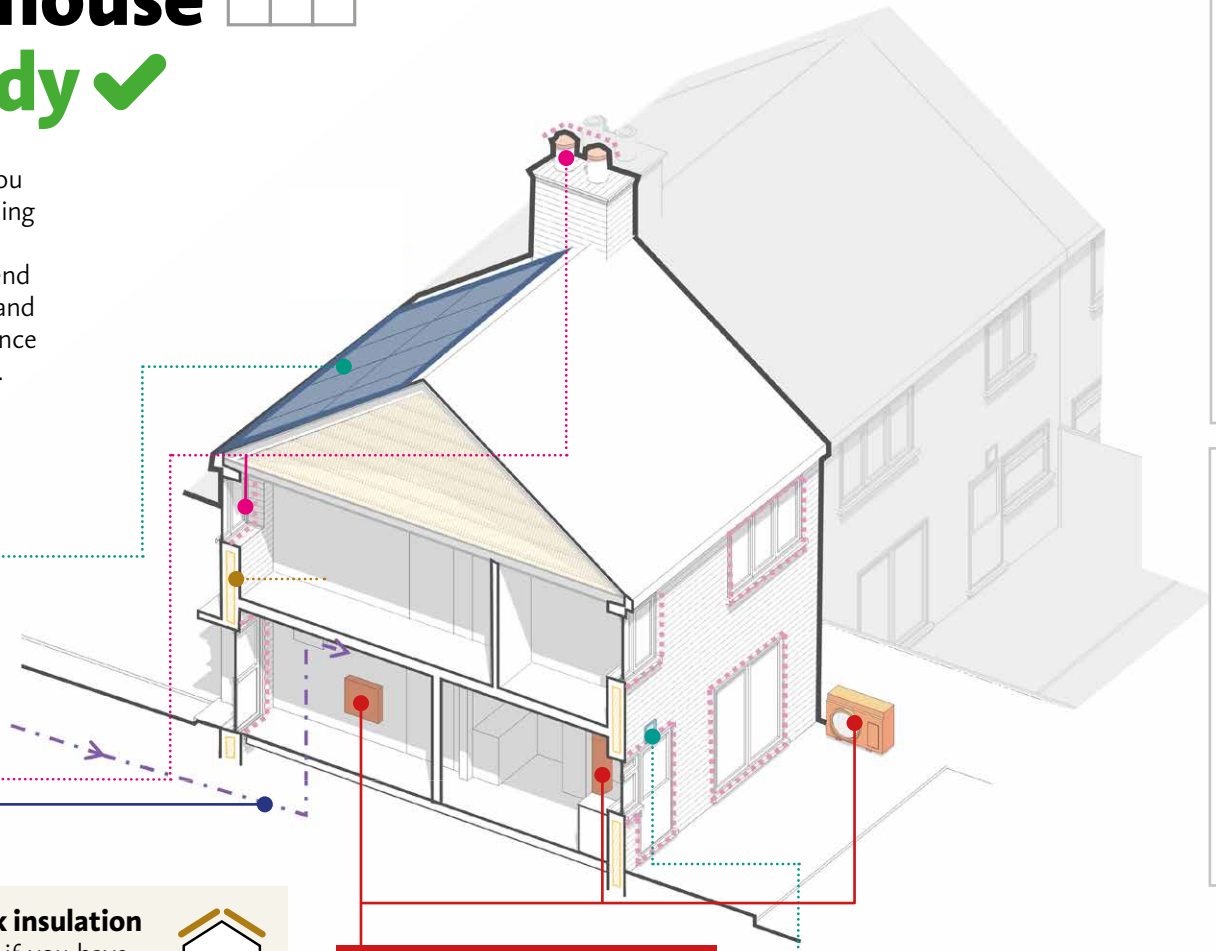
A set of measures is proposed for a terraced house built between 1950 and 1975. The house has a simple façade and is built with cavity walls and a loft space. The approximate area is less than 80m^2.

Two scenarios are presented, one where the house is 'heat pump ready' and a second where it is necessary to do some 'enabling works' first, to be heat pump ready.

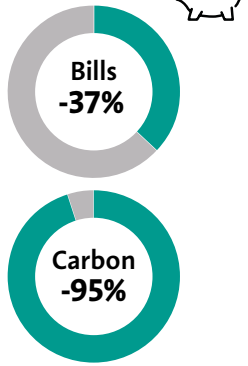
Small terraced house

Heat pump ready ✔

If your home is '**heat pump ready**' it is likely you could install a heat pump without doing anything else. However, if you do not already have the features highlighted on this page, we recommend implementing them as they are cost effective and will improve your home, increase the performance of the heat pump and reduce your energy bills.



Savings



Estimated costs

Heat Pump
from £500* to £15,000

Solar Panels
from £3,000 to £6,000

Draughtproofing
from £300 to £400

Loft insulation
from £1,500 to £3,500

Solar panels
They work on south, east or west facing roofs and can significantly reduce your electricity bills.

Minimise draughts
Air leaks around the house (e.g. around windows and doors, through the chimney) waste a lot of energy (and money). Fixing them is possible and cost effective.

Electricity supply
You will need to check your electricity supply is 80A – suitable for your heat pump installation.

Check insulation
Check if you have loft or cavity wall insulation in your home. If not, these are simple improvements you could make. For example, the loft is generally the easiest place to install insulation and can even be done as a DIY project. 300mm depth is best.

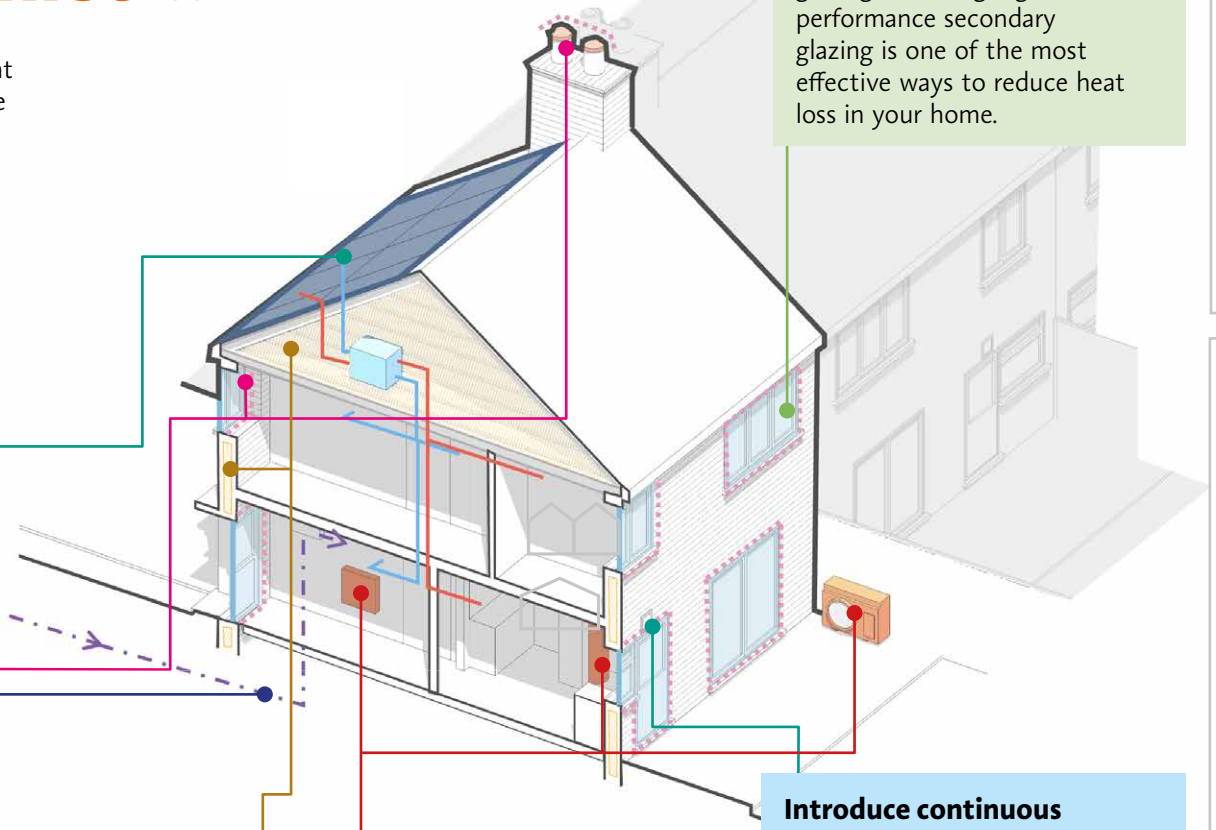
Install a heat pump and hot water cylinder
You will need a hot water cylinder inside and a heat pump unit outside. The back garden is likely to be the best option, but other locations may be possible too.

Improve ventilation
Fans extracting air from your kitchen and bathrooms will improve air quality in your home and reduce condensation.

* Lower range assumes the contribution of funding and/or financing. Not all households will be eligible, see pages 41–42 for more information.

Small terraced house
Enabling work first

Depending on your home, you could implement some or all measures below before or alongside your heat pump installation.



Solar panels
They work on south, east or west facing roofs and can significantly reduce your electricity bills.

Minimise draughts
Air leaks around the house (e.g. around windows and doors, through the chimney) waste a lot of energy (and money). Fixing them is possible and cost effective.

Electricity supply
You will need to check your electricity supply is 80A – suitable for your heat pump installation.

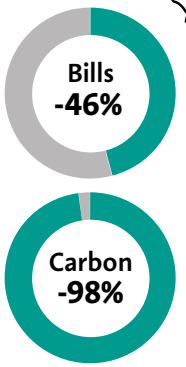
Check insulation
Check if you have loft or cavity wall insulation in your home. If not, these are simple improvements you could make.

Install a heat pump and hot water cylinder
You will need a hot water cylinder inside and a heat pump unit outside. The back garden is likely to be the best option, but other locations may be possible too.

Introduce continuous ventilation
You can install a mechanical ventilation and heat recovery system (MVHR) to bring in continuous fresh air to living spaces and extract it from kitchens and bathrooms. Continuous mechanical extract ventilation is an alternative but is not as energy efficient.

Upgrade windows
Replacing existing windows with triple glazing or adding high performance secondary glazing is one of the most effective ways to reduce heat loss in your home.

Savings



Estimated costs

Heat Pump
from £500* to £15,000

Solar Panels
from £3,000 to £6,000

Draughtproofing
from £300 to £400

Windows
from £5,000 to £10,000

MVHR
from £4,000 to £8,000

Loft insulation
from £1,500 to £3,500

* Lower range assumes the contribution of funding and/or financing. Not all households will be eligible, see pages 41–42 for more information.

Small terraced house

What is likely to be the impact of different measures?

	Heat pump ready homes		Enabling work first homes		
Heating	New heat pump to replace gas boiler	New heat pump to replace gas boiler	New heat pump to replace gas boiler	New heat pump to replace gas boiler	New heat pump to replace gas boiler
Solar panels	-	New solar panels on roof	New solar panels on roof	New solar panels on roof	New solar panels on roof
Draughts and ventilation	-	Draughts reduced and mechanical extract ventilation in bathrooms	Reduce draughts and install mechanical extract ventilation in bathrooms	Reduce draughts and install mechanical extract ventilation in bathrooms	Reduce draughts and install mechanical ventilation with heat recovery throughout the house
Insulation	-	Loft insulated	Loft insulated	Loft insulated + rear and front walls insulated	Loft insulated + rear and front walls insulated + ground floor insulated
Windows	-	-	New windows	New windows	New windows
	Increasing upfront costs and complexity				
Energy bills savings*	-40% to +3%**	- 38%	- 65%	- 77%	- 85%
Carbon emissions savings	- 90%	- 95%	- 97%	- 98%	-100%
	Reduced energy bills and carbon emissions				

* Based on specific calculations undertaken for an 80m² small terraced house.

** The impact in terms of energy costs will depend on the current level of heat losses, the efficiency of the heat pump and the type of electricity tariff selected.

Medium semi-detached house

A set of measures is proposed for a semi-detached house built between 1900 and 1920. The house has a simple façade and is built with solid walls and a loft space. The approximate area is between 100-150m^2.

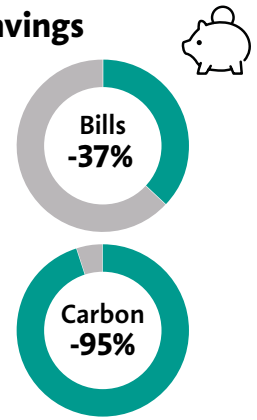
Two scenarios are presented, one where the house is 'heat pump ready' and a second where it is necessary to do some 'enabling works' first, to be heat pump ready.

Medium semi-detached house

Heat pump ready ✔

If your home is '**heat pump ready**' it is likely you could install a heat pump without doing anything else. However, if you do not already have the features highlighted on this page, we recommend implementing them as they are cost effective and will improve your home, increase the performance of the heat pump and reduce your energy bills.

Savings



Estimated costs

Heat Pump
from £500* to £15,000

Solar Panels
from £3,000 to £9,000

Draughtproofing
from £300 to £500

Loft insulation
from £2,000 to £4,000

Solar panels
They work on south, east or west facing roofs and can significantly reduce your electricity bills.

Insulate loft
The loft is generally the easiest place to install insulation and can even be done as a DIY project. 300mm depth is best.

Install a heat pump and hot water cylinder
You will need a hot water cylinder inside and a heat pump unit outside. The back garden is likely to be the best option, but other locations may be possible too.

Improve ventilation
Fans extracting air from your kitchen and bathrooms will improve air quality in your home and reduce condensation.

Electricity supply
You will need to check your electricity supply is 80A – suitable for your heat pump installation.

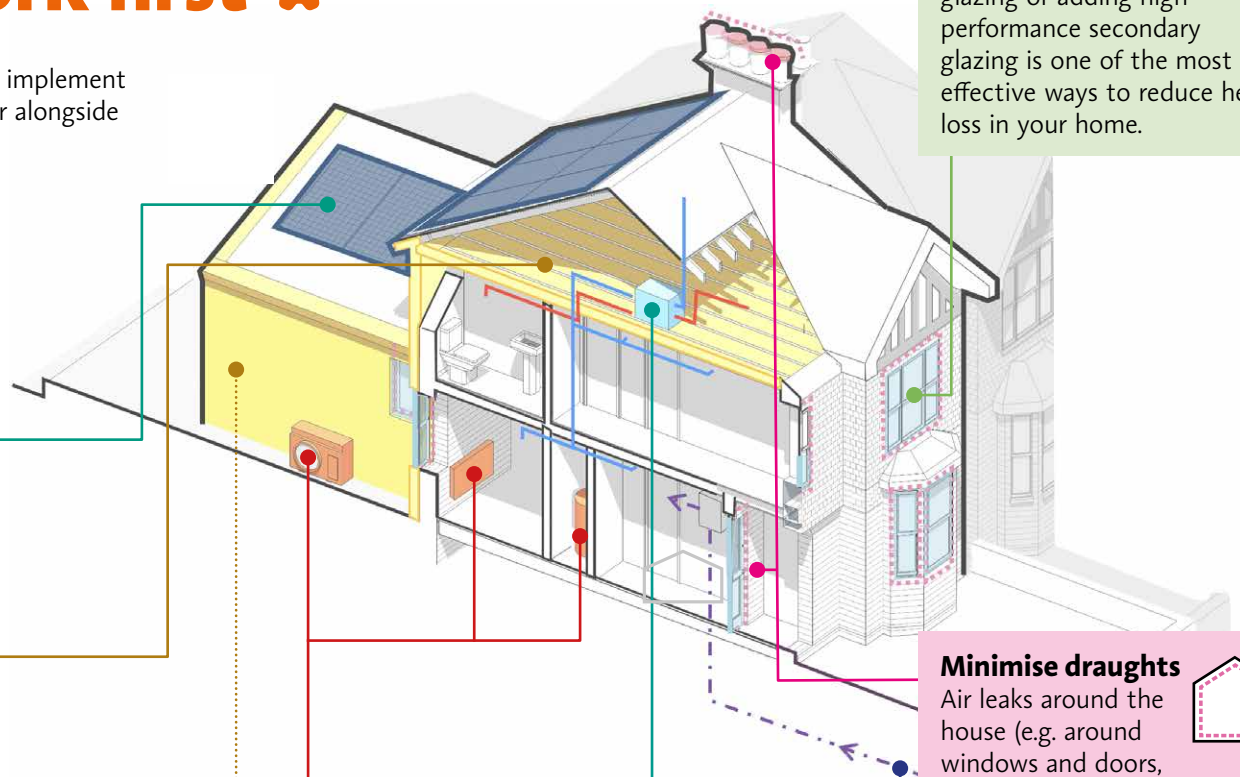
Minimise draughts
Air leaks around the house (e.g. around windows and doors, through the chimney) waste a lot of energy (and money). Fixing them is possible and cost effective.

* Lower range assumes the contribution of funding and/or financing. Not all households will be eligible, see pages 41–42 for more information.

Medium semi-detached house

Enabling work first

Depending on your home, you could implement some or all measures below before or alongside your heat pump installation.



Upgrade windows
Replacing existing windows with triple glazing or adding high performance secondary glazing is one of the most effective ways to reduce heat loss in your home.

Solar panels
They work on south, east or west facing roofs and can significantly reduce your electricity bills.

Insulate loft
The loft is generally the easiest place to install insulation and can even be done as a DIY project. 300mm depth is best.

Insulate walls externally
Plain walls can be insulated externally to reduce heat losses further (if necessary). This is less complex and disruptive than internal insulation.

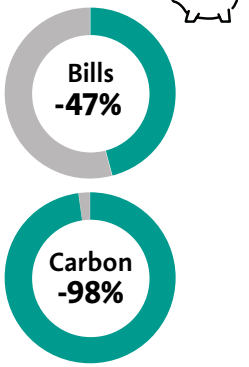
Install a heat pump and hot water cylinder
You will need a hot water cylinder inside and a heat pump unit outside. The back garden is likely to be the best option, but other locations may be possible too.

Introduce continuous ventilation
A mechanical ventilation and heat recovery system (MVHR) brings fresh air to living spaces and extract it from kitchens and bathrooms. Continuous mechanical extract ventilation is an alternative but is not as energy efficient.

Minimise draughts
Air leaks around the house (e.g. around windows and doors, through the chimney) waste a lot of energy (and money). Fixing them is possible and cost effective. New window installs should address this.

Electricity supply
You will need to check your electricity supply is 80A – suitable for your heat pump installation.

Savings



Estimated costs

Heat Pump
from £500* to £15,000

Solar Panels
from £3,000 to £9,000

MVHR
from £4,000 to £9,000

Draughtproofing
from £300 to £500

Loft insulation
from £2,000 to £4,000

Wall insulation
from £7,000 to £13,000

Windows and doors
from £8,000 to £15,000

* Lower range assumes the contribution of funding and/or financing. Not all households will be eligible, see pages 41–42 for more information.

Medium semi-detached house

What is likely to be the impact of different measures?

	Heat pump ready homes		Enabling work first homes		
Heating	New heat pump to replace gas boiler	New heat pump to replace gas boiler	New heat pump to replace gas boiler	New heat pump to replace gas boiler	New heat pump to replace gas boiler
Solar panels	-	New solar panels on roof	New solar panels on roof	New solar panels on roof	New solar panels on roof
Draughts and ventilation	-	Draughts reduced and mechanical extract ventilation in bathrooms	Draughts reduced and mechanical extract ventilation in bathrooms	Draughts reduced and mechanical extract ventilation in bathrooms	Draughts reduced and mechanical ventilation with heat recovery throughout the house
Insulation	-	Loft insulated	Loft insulated	Loft insulated + rear and flank walls insulated	Loft insulated + all walls insulated + ground floor insulated
Windows	-	-	New windows	New windows	New windows
	Increasing upfront costs and complexity				
Energy bills savings*	-40% to +6%**	- 37%	- 69%	- 80%	- 89%
Carbon emissions savings	- 90%	- 95%	- 97%	- 98%	-100%
	Reduced energy bills and carbon emissions				

* Based on specific calculations undertaken for a 140m² semi-detached house.

** The impact in terms of energy costs will depend on the current level of heat losses, the efficiency of the heat pump and the type of electricity tariff selected.

Large detached house

Images taken from Google Street View ©Google 2024

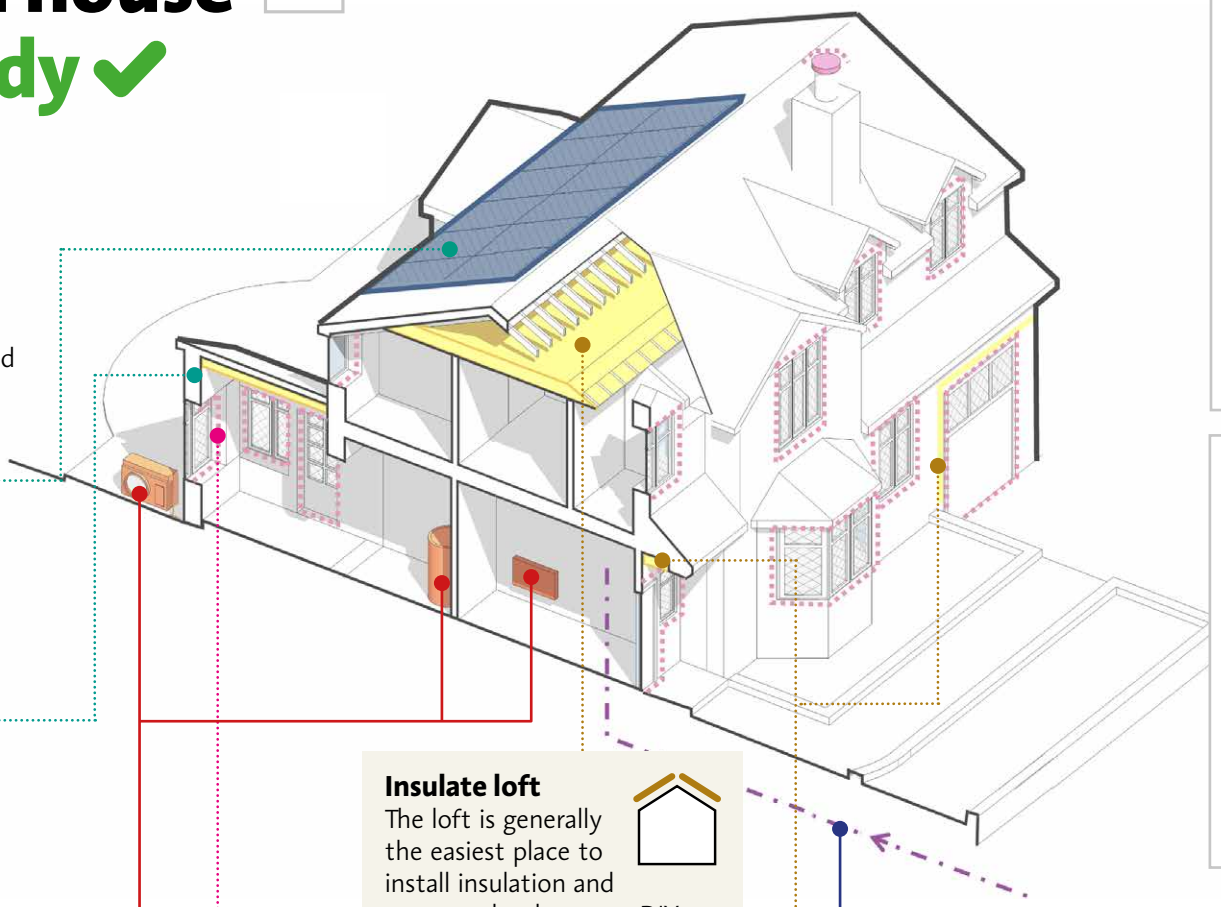
A set of measures is proposed for a detached house built between 1930 and 1949. The house has a simple façade and is built with cavity walls and a loft space. The approximate area is between 200-400m^2.

Two scenarios are presented, one where the house is 'heat pump ready' and a second where it is necessary to do some 'enabling works' first, to be heat pump ready.

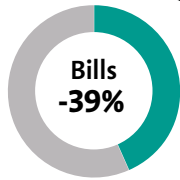
Large detached house

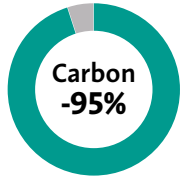
Heat pump ready ✔

If your home is '**heat pump ready**' it is likely you could install a heat pump without doing anything else. However, if you do not already have the features highlighted on this page, we recommend implementing them as they are cost effective and will improve your home, increase the performance of the heat pump and reduce your energy bills.



Savings





Estimated costs

Heat Pump
from £500* to £15,000

Solar Panels
from £3,000 to £12,000

Draughtproofing
from £300 to £600

Loft insulation
from £2,000 to £5,000

Solar panels
They work on south, east or west facing roofs and can significantly reduce your electricity bills.

Improve ventilation
Fans extracting air from your kitchen and bathrooms will improve air quality in your home and reduce condensation.

Install a heat pump and hot water cylinder
You will need a hot water cylinder inside and a heat pump unit outside. The back garden is likely to be the best option, but other locations may be possible too.

Minimise draughts
Air leaks around the house (e.g. around windows and doors, through the chimney) waste a lot of energy (and money). Fixing them is possible and cost effective.

Insulate loft
The loft is generally the easiest place to install insulation and can even be done as a DIY project. 300mm depth is best.

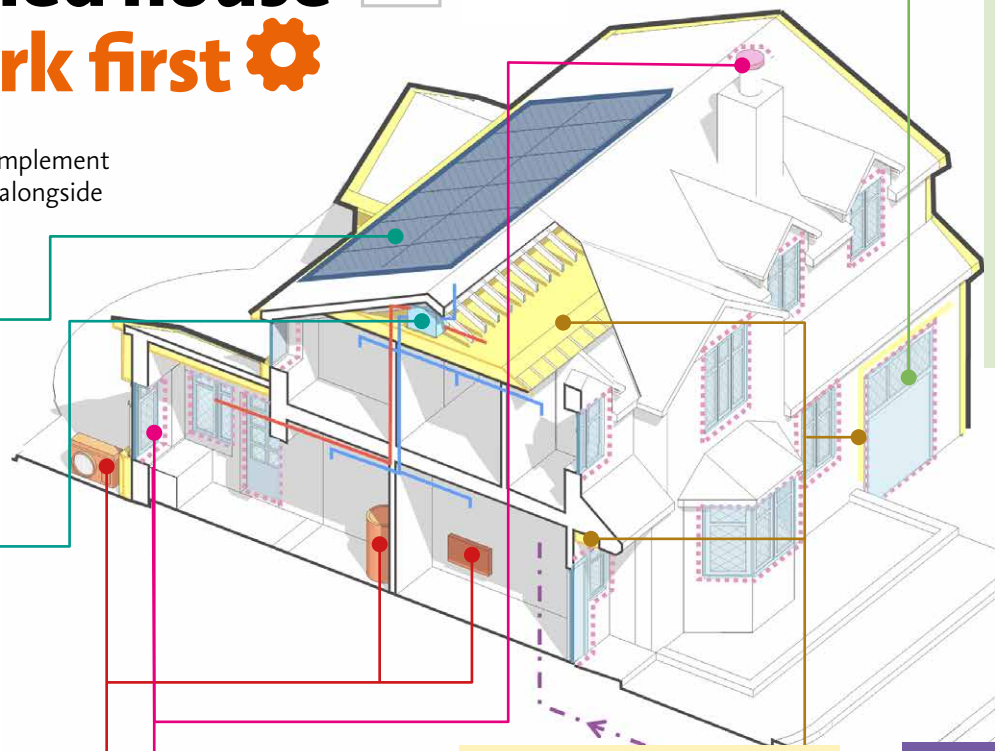
Insulate key areas
Insulating targeted areas where lots of heat is lost such as porch overhangs and walls to unheated garages can significantly reduce heat losses.

Electricity supply
You will need to check your electricity supply is 80A – suitable for your heat pump installation.

* Lower range assumes the contribution of funding and/or financing. Not all households will be eligible, see pages 41–42 for more information.

Large detached house
Enabling work first

Depending on your home, you could implement some or all measures below before or alongside your heat pump installation.



Solar panels
They work on south, east or west facing roofs and can significantly reduce your electricity bills.

Introduce continuous ventilation
A mechanical ventilation and heat recovery system (MVHR) brings fresh air to living spaces and extract it from kitchens and bathrooms. Continuous mechanical extract ventilation is an alternative but is not as energy efficient.

Install a heat pump and hot water cylinder
You will need a hot water cylinder inside and a heat pump unit outside. The back garden is likely to be the best option, but other locations may be possible too.

Minimise draughts
Air leaks around the house (e.g. around windows and doors, through the chimney) waste a lot of energy (and money). Fixing them is possible and cost effective.

Insulate loft
The loft is generally the easiest place to install insulation and can even be done as a DIY project. 300mm depth is best.

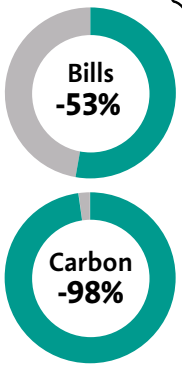
Insulate key areas
Insulating targeted areas where lots of heat is lost such as porch overhangs and walls to unheated garages can significantly reduce heat losses.

Upgrade windows
Replacing existing windows with triple glazing or adding high performance secondary glazing is one of the most effective ways to reduce heat loss in your home.

Electricity supply
You will need to check your electricity supply is 80A – suitable for your heat pump installation.

Insulate walls externally
Plain walls can be insulated externally to reduce heat losses further (if necessary). This is less complex and disruptive than internal insulation.

Savings



Estimated costs

Heat Pump
from £500* to £15,000

Solar Panels
from £3,000 to £6,000

MVHR
from £5,000 to £10,000

Draughtproofing
from £300 to £600

Loft insulation
from £2,000 to £5,000

Wall insulation
from £7,000 to £13,000

Windows and doors
from £10,000 to £18,000

* Lower range assumes the contribution of funding and/or financing. Not all households will be eligible, see pages 41–42 for more information.

Large detached house

What is likely to be the impact of different measures?

	Heat pump ready homes		Enabling work first homes		
Heating	New heat pump to replace gas boiler	New heat pump to replace gas boiler	New heat pump to replace gas boiler	New heat pump to replace gas boiler	New heat pump to replace gas boiler
Solar panels	-	New solar panels on roof	New solar panels on roof	New solar panels on roof	New solar panels on roof
Draughts and ventilation	-	Draughts reduced and mechanical extract ventilation in bathrooms	Draughts reduced and mechanical extract ventilation in bathrooms	Draughts reduced and mechanical extract ventilation in bathrooms	Draughts reduced and mechanical ventilation with heat recovery throughout the house
Insulation	-	Loft insulated	Loft insulated	Loft insulated + plain walls insulated	Loft insulated + all walls insulated + ground floor insulated
Windows	-	-	New windows	New windows	New windows
	Increasing upfront costs and complexity				
Energy bills savings*	-40% to +10%**	- 28%	- 70%	- 85%	- 91%
Carbon emissions savings	- 90%	- 95%	- 97%	- 98%	-100%
	Reduced energy bills and carbon emissions				

* Based on specific calculations undertaken for a 200m² semi-detached house.

** The impact in terms of energy costs will depend on the current level of heat losses, the efficiency of the heat pump and the type of electricity tariff selected.

4.

Turning your home upgrade project into reality

This section gives an overview of the main measures you can take to improve your home. It also identifies how much intervention your house type needs and indicates how to undertake the potential measures, in what order and what benefits to expect.

Where to start your journey?

Obtain energy advice from HEAT

Check for funding availability

Contact SCC 'One stop shop'

Obtain advice from Retrofit assessor

Create your own retrofit plan

First steps:

- Until end March 2025, get a FREE in-person energy advice survey from the 'HEAT' team via the LEAD project www.zerocarbonguildford.org/energy-surveys or phone 0300 123 3033.
- Always check to see if you can benefit from any grants or funding. Contact Action Surrey for grant support (or phone 0800 783 2503). See page 41 for details of current funding possibilities.
- Register your interest in the Surrey 'One-Stop Shop', which will handhold you through the entire end-to-end upgrade journey.
- Contact Surrey County Council Energy Advice Tool or phone Community Helpline on 0300 200 1008.
- Check whether planning permission or Building Regulations approval will be required and contact the council.

DIY or Trusted tradesperson

Draught sealing: installation or replacement of draught seals around doors and windows. Also sealing of pipes or cables through walls with caulk, expanding foam, filler etc. Always obtain advice from The Heat Team on ventilation.

Adjust windows: to ensure hinges and locks enable even compression of seals.

Secondary glazing: install system to suit windows and budget.

Loft insulation: install or upgrade loft insulation to at least 300mm, with AVCL membrane under and ensuring cold loft has ventilation.

LED lights: fit all fittings with LEDs to reduce energy use.

Approved installer

Heat pump: replace gas/oil boiler with heat pump to save money and carbon.

Photovoltaic (PV) solar panels: install PVs to roof, along with smart meter and battery if affordable.

Battery: adding a battery to take advantage of cheap "time of day" tariffs will reduce electricity costs.

Replace windows: consider replacing single glazing and old double glazing especially if pre-2001.

Cavity wall insulation: if not previously installed this is cheap and effective.

Professional advice
Retrofit coordinator, Retrofit designer

Whole house plan: to assess risks of measures, and agree a long term retrofit plan to suit your needs.

Non-cavity wall insulation: Internal Wall Insulation (IWI) or External Wall Insulation (EWI) can be complex and costly. Worth carrying out for additional comfort along with airtightness measures in a whole house retrofit.

Planning assistance: drawings and evidence for submission to local planning officers for certain measures eg. EWI.

Heritage Impacts: significance assessments within conservation areas or listed houses, to ensure that any retrofit work is carried out appropriately.

Increasing complexity

You can undertake the upgrade works in different ways

1.

Consider the easy, non-disruptive and relatively low-cost options first. Some of this work could be done by yourself (DIY) or carried out by your trusted tradesperson.

2.

Use the free advice from the Home Energy Advice Taskforce ('HEAT' team) and plan your next steps: this may be as simple as obtaining an initial quote from an installer, or identifying any specific issues with a retrofit assessor so that you can deal with them in advance e.g. insulating around an open porch or topping up old loft insulation.

3.

For more complex situations you should contact a professional or retrofit designer, who can assess the implications of the proposals from a 'whole-house' perspective to ensure that all measures carried out will work together and will meet regulatory and local planning requirements. They can also help you to estimate how long the works will take and how much they are likely to cost. It is possible it is suggested to improve your house's fabric as a priority ('fabric first' approach) as opposed to the 'heat pump ready' approach of this guide; both routes will make your home energy efficient, and it is ultimately up to you to decide what are the priorities for your home.

Who can provide initial advice?

To feel confident that any work carried out will be to a good standard, and most importantly, will achieve the agreed objectives (e.g. lowering your energy bills and carbon emissions), it will be important to understand the 'whole house strategy' that may be suggested by your free energy survey from the HEAT team.

You can use the Surrey County Council 'One Stop Shop', where you may be referred to a retrofit assessor, who will survey your house and formulate specific recommendations to suit your home, your household needs and your budget.

When you are ready to start the works, it will be important to use installers who are accredited to give a quality guaranteed service in the specific measures that are to be implemented.

Low-cost measures to improve your home

Draught proofing

- Use sealant, brush strips, or draught excluders in your letterboxes, chimneys, floors, and around doors and windows.
- Seal any gaps around pipes, cables and wires at the point of access to your home. Kitchen and bathroom often have gaps around pipes and fittings (e.g. soil pipe). Sealing these, including behind appliances, can prevent heat loss.
- Fill any cracks and gaps with caulk, filler, or weatherstripping.
- Reduce cold draughts from your chimney using a chimney balloon or a DIY alternative like an old pillow or ball of insulation in a paper sack.

Heating controls and use

- Install thermostatic radiator valves (TRVs) to control the temperature better.
- Consider lowering your thermostat even by a degree (particularly in rooms you use less frequently) to see whether it compromises your comfort or not. This will save energy and reduce your bills.
- Consider installing a smart thermostat as it can optimise heating schedules and reduce energy use further.

Maximise loft insulation

- To maximise energy efficiency, you should aim for 300mm of loft insulation. Ensure proper ventilation, seal the loft hatch. For complex lofts or when you are not sure, make sure you consult a professional.

Lighting

- Switch to LED light bulbs, which are more energy-efficient than traditional bulbs: they use up to 90% less energy than traditional bulbs.
- Avoid leaving holes in the insulation caused by fitting downlighters. When decorating, choose surface mounted lights. For lights that have already been installed, an off-the- shelf fitting can create an airtight seal over the light.

Behavioural changes

- Close internal doors to keep heat contained within occupied rooms.
- Wash clothes only when the machine is full and use eco or low temperature cycles.
- Air dry laundry whenever possible instead of using a tumble dryer.

Professional advice is available

Professionals and installers who can help

One of the issues you will face is to ensure that the work is planned, designed and carried out efficiently and to a high quality standard.

There are many different quality schemes available which can be grouped into two categories:

- **Type 1** is at installer level, is specific to the trade, and is often a requirement to qualify for grant funding, ensure an acceptable grid connection for solar panels, or to allow self-certification.
- **Type 2** includes special interest organisations, who lobby for improved standards and set their own additional requirements.

We recommend that when choosing a builder, contractor or installer, you should check and confirm that they are members of at least one scheme or organisation from each of types 1 and 2. Some examples are provided on page 63.

Advice on general issues related to home improvements

A retrofit assessor will recommend suitable improvements to your home; however, it is a **retrofit designer** who assesses any risks and designs a plan to mitigate them. Some areas that are part of their role include:

- Making sure that existing maintenance issues are resolved and not hidden by new materials, making them inaccessible and difficult to resolve in the future.
- Keeping the required levels of ventilation and ensuring condensation, damp and mould issues will not be present. The retrofit designer should identify and rectify any existing problems as part of the improvement plan of works.
- Evaluating and prevent any potential future overheating risks caused by the upgrades.
- Ensuring any heritage features are considered and maintained.
- Following and meeting all requirements from Planning Regulations, Building Control or Listed Building Consent.

Type 1: Required to access BUS grants for heat pumps or solar export payments

MCS CERTIFIED

HIES Consumer Code

RECC RENEWABLE ENERGY CONSUMER CODE

NAPIT

TRUSTMARK Government Endorsed Quality

Type 2: Voluntary schemes, often represent best practice

Which? Trusted trader

bpec

RETROFIT ACADEMY CIC

THE Green REGISTER OF CONSTRUCTION PROFESSIONALS

FEDERATION OF MASTER BUILDERS

EnerPHit Certified Retrofit Passive House Institute

PAS 2035

Heat Geek

AECB building knowledge

CERTIFIED PASSIVE HOUSE TRADESPERSON TRADESPERSON

Internal training programmes

ovo

octopus energy

Industry organisations that require their members to meet high standards – definitely worth checking that your installers have at least one of these memberships before committing

The cost of improving your home

How much are your home improvements likely to cost?

It is challenging to accurately estimate likely home improvement costs as they depend on so many factors: your home's characteristics and state of repair obviously but also whether the 'energy' retrofit measures will be delivered on their own or whether they will be combined with other renovation and modernisation works. Prices can also vary significantly from one installer to another. However, an indicative guide cost for all measures is shown in the adjacent table.

Contractor's overheads and profits, preliminaries and enabling works costs (e.g. rewiring), ancillary work, contingencies and design fees will all vary but also need to be taken into consideration, as well as planning fees, building control fees and, very importantly, VAT.

The first steps of upgrading your home are often affordable

- **The initial step** involves installation of a heat pump and hot water tank, basic insulation measures such as loft insulation and draught proofing. Solar PV should also be installed early, if possible, to reduce future energy costs.
- **The final step** involves further improvements to the building's fabric such as new windows, which could be planned to coincide with the end of life of the existing ones. A new ventilation system with heat recovery would also to improve energy efficiency and indoor air quality.
- **The exemplar step** involves a final package of improvements to the building's fabric, delivered through wall and floor insulation.

Measures		Cost
	Heat pump (e.g. *air to water* or *air to air*) and direct electric hot water tank.	£3,000–£10,000
	Improved draught proofing if necessary – e.g. filling cracks. Substantial airtightness should trigger a ventilation strategy overhaul.	£200–£1,000
	Loft insulation if required – 200-400 mm (40m^2).	£1,000–£4,000
	Photovoltaic panels, 5kWp array (10–12 panels) where possible.	£6,000–£11,000
	Initial step (example)	**£3,000–£26,000**
	PV, if not installed earlier.	see above
	Good double / triple glazed single casement (per m^2). New entrance door (1 unit).	£900–£1,300 £800–£3,000
	Mechanical ventilation with heat recovery – MVHR with associated ducts (earlier if substantial airtightness in first phase).	£4,000–£7,000
	Final step (example)	**£17,000–£38,000**
	Wall insulation, external – 100–200mm (110m^3). Suspended floor – 100mm insulation (40m^2).	£16,000–£35,000 £3,000–£5,000
	Exemplar step (example)	**£19,000–£40,000**

The above cost estimates are for a heat pump ready or close to heat pump ready house. These figures are estimated at Q3 2024 and are only indicative estimates per measure.

A specific cost assessment must be undertaken when planning a home upgrade.

Grants and funding opportunities

There are several funding schemes that could cover, at least partially, the cost of some of the improvements applicable to your house.

Accessing advice to understand what are the best measures to consider and how to implement them is also part of the benefits offered to residents.

Name	Overview		Eligibility requirements	Funding available?
Surrey's Home Energy Improvement One-Stop Shop **Phone 0300 200 1008**	**WHO:** Homeowners and landlords.	**WHAT:** The One-Stop Shop is a user-friendly platform offering Surrey households expert support on their retrofit project from start to finish.	Find more information on our webpage Or email energy@surreycc.gov.uk or phone 0300 200 1008	Discounts available on a Whole-House Assessment and Home Energy Plan carried out by a certified Retrofit Assessor.
Solar Together	**WHO :** Anyone owning a house (or renting a house or flat with landlord permission).	**WHAT:** Competitive prices for solar panels and batteries via group purchase, quality assurance.	The scheme is open to residents in selected areas – please check website for details. Register your interest here: Group-buying for solar | Surrey County Council (solartogether.co.uk) SMEs and Commonhold Associations are also eligible to join.	Surrey County Council is offering an opportunity to buy solar panels as a group, as part of Solar Together. Members benefit from Surrey County Council's group purchase scheme, and from insurance backed guarantees on installation.
The Great British Insulation Scheme	**WHO:** Anyone owning or renting a house or flat.	**WHAT:** Measures can include: loft, cavity or external wall insulation.	• The property's energy performance must be EPC D, E, F or G rated. • The properties council tax band must be A-D. • An online questionnaire is available for eligibility and amount.	Funding is dependent upon property characteristics and income. Financial contribution may be required for EWI (external wall insulation). Scheme ends March 2026.

Grants and funding opportunities

Name	Overview		Eligibility requirements	Funding available?
Free home energy survey	**WHO:** Anyone owning or renting a house or flat in Surrey, subject to eligibility.	**WHAT:** Free energy survey in your home. This survey can flag and provide basic remedies for issues such as draughts and support residents to reduce their energy bills.	Free energy surveys are available to those with properties with an EPC rating of D or worse, those who do not have gas central heating and those who face obstacles for improving the energy efficiency of their homes. A questionnaire for eligibility must be completed.	There is no charge for this service. Scheme ends March 2025.
Online Energy Advice Tool	**WHO :** Available to all.	**WHAT:** The online tool allows residents to check their home's EPC rating and shows funding, debt relief grants and additional resources.	Available to all with no restrictions.	There is no charge for this service.
Boiler Upgrade Scheme	**WHO :** Anyone owning a house or a flat (does not cover new housing or social housing).	**WHAT:** Subsidy to upgrade a fossil fuel burning boiler (e.g. gas boiler) to a heat pump.	Installation must be concluded within 120 days of grant confirmation and must meet minimum energy efficiency standards.	Currently £7,500 subsidy towards the total cost of the upgrade.

Addressing common practical concerns and mitigating risks

Improvement works to your home are essential to reduce your carbon emissions and energy costs. However, you may be concerned about potential issues during this process.

Disruption is a significant concern when considering a retrofit

The process can involve extensive work that may temporarily make parts of the home unusable. Installing insulation, upgrading the heating system or replacing windows can all create noise, dust, and other disturbances. A phasing plan to align with household needs (and budget) can help to minimise the impact of the works.

Uncertainty about the scope and outcomes of retrofitting can be daunting

You may be unsure about which improvements will provide the best return on investment, or how long the process will take. Choosing the right first step, in accordance with this guide, will provide a route to engagement with specialist advisors and installers who can carry out a property specific energy assessment to identify the most cost-effective measures, provide clear guidance and realistic timeframes.

Planning considerations can pose challenges during a retrofit

Some improvements, such as external wall insulation or solar panels, may require approval from the local planning authority. It is important to consult with them early in the process to understand the requirements and avoid delays. Advisors and installers should be able to advise on how to proceed if you are not sure.

Heritage and conservation may introduce constraints

Listed buildings and conservation areas have additional complexities. These buildings are subject to stricter requirements to preserve their historical and architectural significance. It is essential to engage with advisors who have expertise in working with heritage properties to ensure that only suitable measures are specified, and that they will preserve heritage and character whilst enhancing energy efficiency and reducing carbon emissions. The Sustainable Traditional Buildings Alliance and Historic England provide specific advice.

Key risks to be mindful of

1. Structural issues: Uncovering hidden structural problems once work begins can lead to additional costs and delays. A thorough inspection before work starts can help identify and address these issues early.

2. Poor workmanship: Hiring unqualified contractors can result in substandard work, leading to further issues down the line. Homeowners should choose reputable and experienced contractors, checking references and previous work.

3. Cost overruns: Unexpected costs can arise, pushing the project over budget. Setting aside a contingency fund and having a clear, detailed contract can help manage financial risks.

4. Non-compliance: Failing to comply with building regulations and planning permissions can lead to legal issues. Ensuring all works meet regulatory standards and obtaining necessary approvals is crucial.

5.

Further information on upgrade measures

In this section you will find more information about the technical solutions associated with low carbon heating, electrical supply capacities, building fabric and solar panels.

Heat pumps

There are different types of heat pumps

These are the main types:

1. Air-to-water heat pumps are currently the most common low carbon heating system being installed in the UK and are the easiest type to use as a direct replacement for an existing central heating system such as a gas or oil boiler which is connected to radiators in your home. They heat water and circulate it around the existing radiators or (if the radiators are upgraded) to larger, finned radiators to make the heat pump work more efficiently. They can also be used with underfloor heating. Air-to-water heat pumps provide both space heating and water heating and alternate between the two using a large hot water cylinder to store hot water.

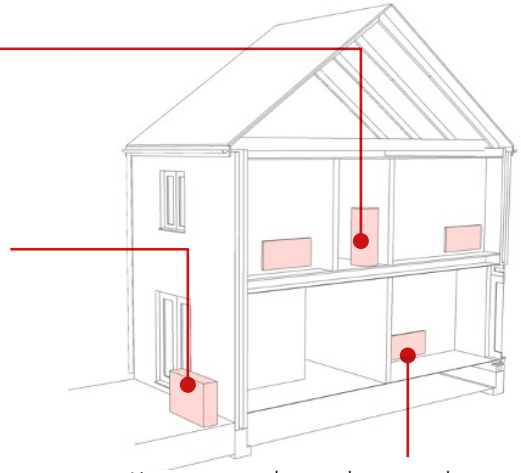
2. Air-to-air heat pumps warm up or cool down recirculated air within a room via a fan coil unit that is often mounted high up a wall. The ability of air-to-air heat pumps to cool as well as heat air means they are particularly useful for properties that have vulnerable occupants or a high risk of overheating. They can also be particularly suitable for smaller homes or in homes which do not currently have radiators. Hot water heating needs to be done separately with an electric immersion heater in a hot water cylinder.

3. Ground-to-water heat pumps are less common and are generally the most expensive option to install. They are often used for buildings where air source heat pumps are unsuitable, such as very large homes with a large garden or historic buildings. They work with radiators and a hot water cylinder in the same way as the air-to-water type.

For all types of heat pumps, there needs to be a hot water cylinder in the house, as close as possible to the heat pump.

For air-to-air heat pumps, there will be fan coil units on the wall in each main room

For either air-to-water or air-to-air heat pumps, there will be a box with a fan outside. It should be as close as possible to the house and at least 1m away from the boundary with your neighbours' properties. It can be standing on the ground, or fixed on a bracket on the wall, or standing on a flat roof, as long as there is access for someone to be able to maintain it. For ground-to-water heat pumps, the box is indoors and it does not have a fan.



Air to water and ground to water heat pumps will connect to your existing radiators or underfloor heating system. Replacing radiators with bigger ones can make the heat pump able to work more efficiently.

Deck mounted

Rear garden – ground mounted

Rear garden – ground mounted

Roof mounted

Front garden – ground mounted

Wall mounted

Source: pumpchic.com

Domestic electrical supply and heat pump connection process

Ensuring your home is heat pump ready

For every home, the starting point will be to check that your electrical supply is suitable. This will normally be a minimum rating of 80A for most homes. The local network providers will upgrade the supply to up to a 100A rating free of charge.

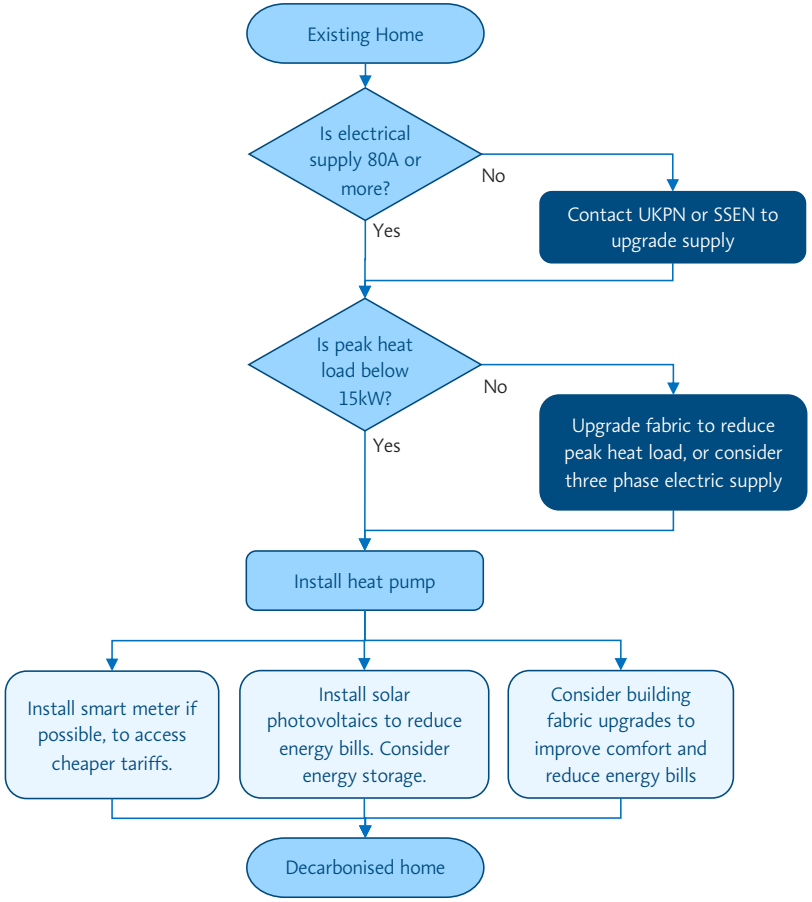
The main fuse next to the meter should be stamped with the fuse rating; if that is less than 80A then you will need to apply with UKPN or SSEN* to uprate it. In some cases, especially where groups of houses were all built at the same time, the individual fuse rating may be fine, although the connection is actually shared with your neighbour. Only a qualified person may be able to confirm this.

*UKPN and SSEN are the Distribution Network/ System Operators in Surrey. They are the companies that own and maintain the cables that connect to your electricity meter. The meter belongs to you or to the company that you pay your electricity bill to. The electricity supply company cannot carry out the upgrade work unless they have an explicit agreement with UKPN to do the work. There is more information on the process here.

Enabling the connection of your heat pump

The key items that must be considered include:

1. **Cut-out rating** of the main isolator switch next to your meter.
2. **Safety** of the UKPN* equipment which must be checked.
3. **Looped supplies.** This is where your house and your neighbours' have a shared connection to the main network – this will usually need to be removed by UKPN*.
4. **Maximum electrical demand** should be calculated to check the supply is adequate once the heat pump has been fitted.
5. **Heat electrical demand** should generally be below 15kW of heat output.
6. **Energy Networks Association database** should have the heat pump listed and marked as 'connect and notify'. This cannot be checked until you know which heat pump will be installed.



Recommended steps to check whether a heat pump can be installed at your home.

Solar Photovoltaics (PVs)

Solar PVs can help significantly with energy costs

Solar PVs can provide 'free' electricity (after purchase and installation costs have been recouped) which can significantly reduce your energy bills. This used to be considered as a 'side benefit' but is now becoming a stronger consideration with energy prices rising, as it displaces high-cost power from the grid. Electricity is used in your home for appliances, lighting and the heat pump (if installed) or for car charging. What is not used can be sold back to the grid through your energy supplier.

What needs to be considered?

Contact a local MCS certified solar installer to assess your property and provide information on solar panels and inverters. They can also give you a quotation with estimated costs and generation. We recommend asking for several quotes.

- Confirm the roof can take the additional weight loadings and wind forces.
- Install an inverter to convert the electricity generated from direct current (DC) to alternating current (AC). This allows the energy to be used in the home. The solar panel installer will usually do this.
- As typically scaffolding will be needed, consider whether this could provide opportunities to carry out other retrofit work such as wall insulation or replacing windows.

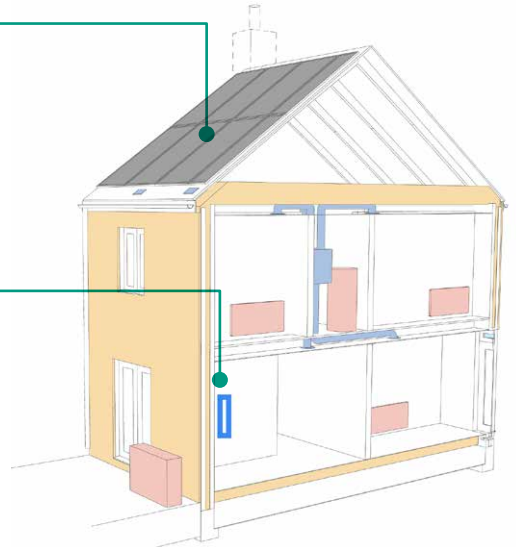
Practicality tips

- Install solar PVs on south facing roofs as a preference, although east and west facing roofs also can work well.
- Avoid existing objects on the roof, such as chimneys, parapets, equipment and overhanging trees. If partial shading is inevitable, install power optimisers to increase output and monitor individual panel's performance.
- Invest in a monitoring system to increase the reliability of the system. This will allow immediate identification of any issues.

Solar PV panels
Generate electricity for your home with solar PV panels. Unshaded south facing array will provide best output.

Inverter
Install an inverter to convert the electricity generated form direct current (DC) to alternating current (AC).

Export energy
Excess energy can be sold to the grid.



PV installations in different contexts


PV installation as tile replacement


PV installation over the tiles


PV installation on several roofs


PV installation on building with flats


PV installation over tiles


Concertina PV installation

Sources: www.greenandheritage.uk, www.home-renewables-scotland.co.uk/ ©Historic England, ©Degee Solar

Airtightness and draught proofing

What is airtightness?

Draughty homes are uncomfortable and increase the amount of heating needed (and your energy bills). Making a home more airtight is about eliminating or reducing draughts to retain heat and avoid letting it escape from the house through gaps and cracks, holes, splits and tears in the building envelope (i.e. walls, windows, floors and roof).

When you make your home more airtight, you also make it more comfortable. Along with a suitable ventilation system, an airtight home will also help to improve air quality and to protect the building fabric by reducing damp and the risk of condensation and mould.

What needs to be considered?

- Common areas of air leakage are around windows and door frames, as well as from suspended timber floors and junctions between walls, floors and roofs.
- Replacing windows represents a significant opportunity to improve airtightness.
- Applying airtightness tape to joist ends is a common measure required to achieve good airtightness, and large gaps may need filling with mortar (with a suitable primer).
- It is important to note that an airtight dwelling it is not completely sealed, it just means that unintended air leakage is reduced to a minimum. Airtightness and background ventilation should therefore be improved simultaneously to reduce condensation forming on internal surfaces and mould growth.

The associated importance of controlled ventilation

The efforts to make your home more airtight must be combined with the introduction of controlled ventilation. See '<u>ventilation</u>' section for more information.

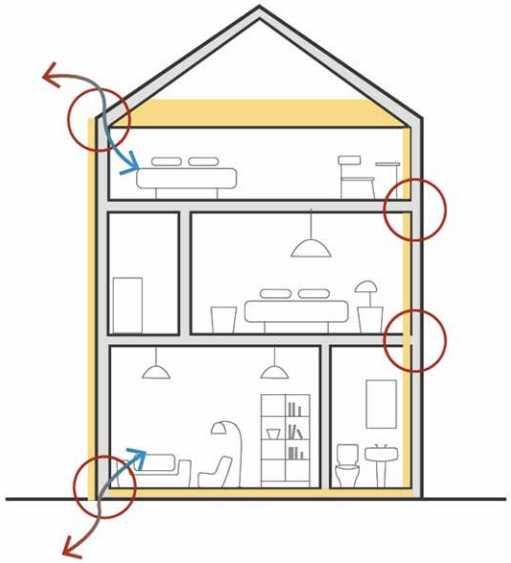


Diagram showing a few examples of potential air leakage points.

Source: Ecological Building Systems

A range of products are available to improve airtightness: specialist tapes, or specialised grommets that come in a range of sizes.

Source: Ecological Building Systems

Applying airtightness tape to joist ends will deliver good practice levels of airtightness.

Ventilation

Why is it important?

In most cases, homes rely on 'natural ventilation' – opening windows – which is not very effective at ensuring good air movement in all rooms of the house. This can lead to condensation and then mould forming in some places. A ventilation system helps to avoid these issues while improving energy efficiency.

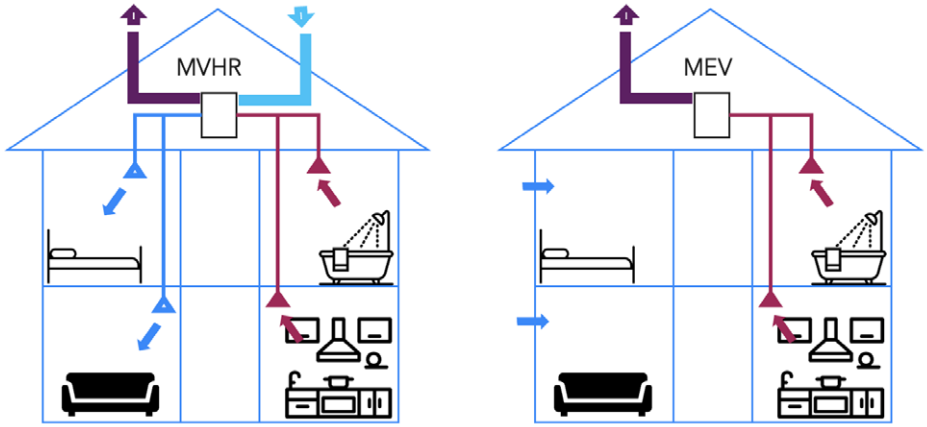
What types of ventilation system could be used?

The most energy efficient way to provide controlled ventilation is Mechanical Ventilation with Heat Recovery (MVHR). The equipment circulates air using two small fans, and transfers heat from the air extracted from kitchens and bathrooms into fresh air to be supplied to living rooms and bedrooms.

It is not always possible to find a space for the MVHR unit and/or the associated ductwork to every room, therefore, a compromise option is to use a system of mechanical extract with trickle vents in the living and bedrooms to allow fresh air into the rooms. Continuous or demand controlled mechanical extract ventilation (dcMEV) are suitable alternatives, although they are less efficient than MVHR, so heating demands will be greater.

What needs to be considered?

- Ducts should be insulated and sealed, especially the fresh air intake or exhaust ducts.
- To ensure the system works as planned, the system must be properly tested to ensure it is balanced, delivers the designed fresh air required and does not generate noise beyond what is expected.



MVHR (left) requires more ductwork than continuous, or demand controlled MEV (right) so can be more challenging to fit into retrofit, but MEV is less energy efficient than MVHR in most homes.

MVHR units can be retrofitted into ceiling voids or wall mounted (© Will South) Ductwork must be routed to every room. You will need a qualified installer and/or an MVHR manufacturer/supplier to calculate the fresh air required and to design the ventilation system for your home.

Windows and doors

Why are windows so important?

The level of improvement that current glazing technology can now achieve, and the fact that all upgrades can take place with minimal disturbance, make this fabric measure very interesting and impactful from an energy saving perspective. Improving the windows will also deliver significant additional benefits such as better thermal comfort (the window pane will be warmer), fewer cold draughts and better acoustic insulation, making it a very attractive proposition.

Better windows can be a one of the measures required to make a home 'heat pump ready', through energy savings and peak heat demand reduction.

Aim for the best possible window

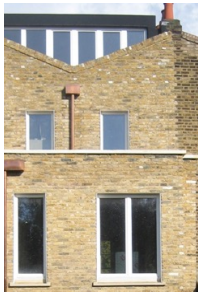
Altering windows is expensive and likely to only occur once every few decades, so it is crucial that changes are made with a view to optimising performance as much as possible. The images on the right show examples of appropriate windows in different scenarios.

- **Windows:** replace with triple glazed windows or the best available alternative where there is a constraint around appearance.
- **Doors:** replace with product with low U-value and good airtightness class.
- **Ventilation:** Ventilation must be improved when existing windows are replaced.
- **Airtightness:** seal and tape connections around the frames.

What needs to be considered?

- Consider simplifying windows and doors as part of upgrades.
- After windows are replaced, seal well around windows (junction between window and wall) using air-tightness tape.

Energy efficiency



Triple glazed casement
U-value ~ 0.8 W/m²K

Very high thermal performance. Airtight and the frame is robust.

Not always possible in conservation areas.

(Prewett Bizley Architects)

Advanced secondary glazing
U-value ~ 1.0 W/m²K

Original window is preserved. Less disruptive installation process.

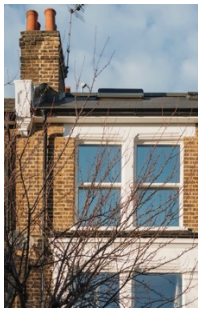
Repairs are needed to make the existing window good first, which adds costs.

(Prewett Bizley Architects)

High-quality double-glazed casement
U-value ~ 1.2 W/m²K

Fairly high thermal performance.

(nathanmccarter.co.uk)



Triple glazed mock sash
U-value ~ 0.9 W/m²K

Very high thermal performance.

Window is airtight and the frame is robust.

Fake astragals become apparent when observed close-up.

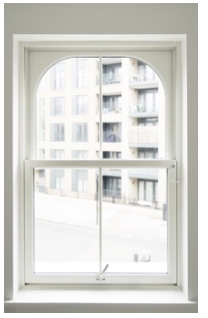
(Prewett Bizley Architects)

New evacuated glazing
U-value ~ 1.1 W/m²K

High thermal performance. Similar visual appearance to original window.

Frames are not thermally broken. Tend to be relatively expensive. Lead times can be lengthy.

(Prewett Bizley Architects)



Double glazed sash
U-value ~ 1.6 W/m²K

Average thermal performance.

Fake astragals become apparent when observed close-up.

(Prewett Bizley Architects)

Etude prewett bizley Levitt Bernstein People.Design

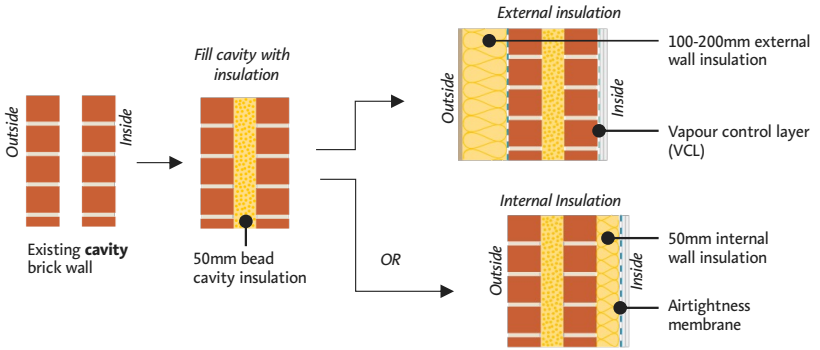
Wall insulation

Insulating externally or internally?

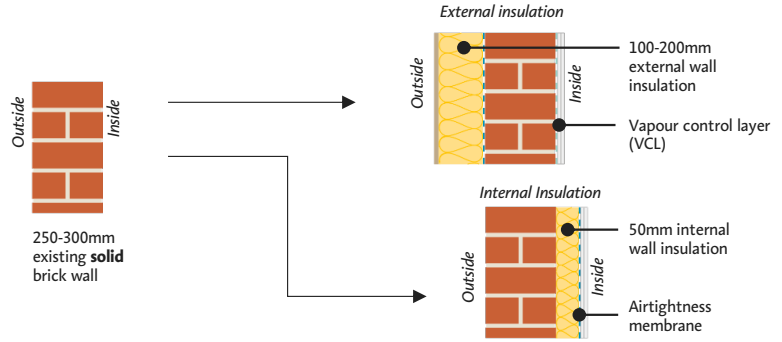
When possible, it is generally best to insulate walls externally rather than internally. Allowing the insulation to wrap around the building continuously, keeping it warm and dry, while avoiding the need to address weak points and junctions, is preferable. However, the choice will come down to what is practical and acceptable from a planning perspective.

- **Cavity wall insulation** can be pumped from holes in the external brick course with little disruption to occupants. It has no visual impact and improves energy efficiency, but often not by as much as external insulation. It is however generally the first step to adopt. Cavities should be cleaned to the base and filled with a non-hygroscopic, non-capillary active bead insulation to minimise the risk of moisture problems. Existing brickwork should be repointed to keep the wall dry and the rain out of the cavity.
- **External insulation (EWI)** is applied to the outside of walls. It is effective thermally, does not reduce internal space and creates less disruption during fitting. However, it generally requires planning permission as it will affect the external visual appearance. Roof eaves may need to be extended and gutters moved. Insulation is generally finished in render, brick slips or pebbledash cladding.
- **Internal insulation (IWI)** using breathable materials is recommended e.g. wood fibre insulation. Non-breathable materials e.g. rigid foam insulation, can achieve a good thermal performance and are often cheaper, but they can also trap moisture and are more challenging to install well, for example around junctions. Natural products are likely to be combustible but can be used safely in the right application. Where internal space is limited consider using thin products such as aerogel insulation.

Options for insulating cavity walls.
Ensure measures have been made to prevent condensation.



Options for insulating solid brick walls.



Etude prewett bizley Levitt Bernstein People.Design

Roofs and floors insulation

Loft/roof insulation approach

For unheated attic spaces the simplest approach is to insulate the joists in the loft. It is important to consider the eave-loft junction carefully to prevent air leakage and properly ventilate the unheated loft space to avoid any risk of condensation.

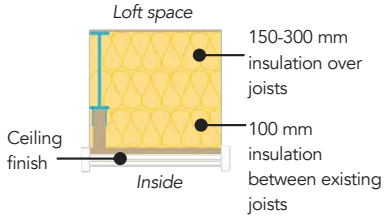
Loft space can also become a 'warm space' room by insulating the roof. Insulation can be added in between the rafters and an insulated sheathing board added over the rafters. Pay attention to flashing, sealing and roof penetrations such as chimneys, skylights and roof vents, to prevent air and water leaks.

Continuous external insulation approach

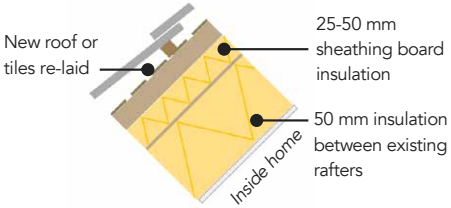
When wall insulation extends up to the roof, you should consider extending the eaves of the roof to cover the additional wall thickness, ensuring a continuous thermal barrier. It is important to maintain or provide ventilation at the eaves and apply flashing and sealing to prevent water ingress. External roof finishes such as tiles and rainwater goods like gutters will need to temporarily move during the installation of external roof insulation.

Ground floor insulation

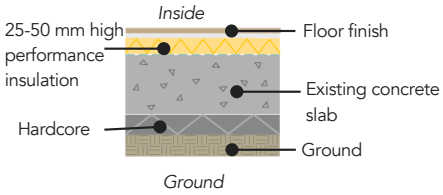
Insulating concrete floors may require raising the floor level, therefore special consideration should be given on the impact on the entrance, door heights and consistent staircases levels. In the case of raised timber floors, weatherproof insulation can be added between the floor and the ground, protecting the structure from moisture rising from the ground, as well as insulation in between timber joists to enhance the thermal performance of the floor.



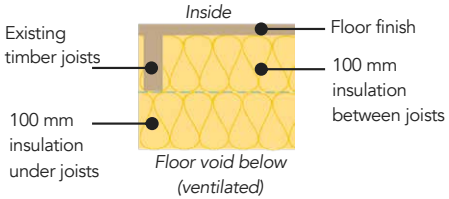
Roof insulation at joist level



Roof insulation at rafter level



Solid floor



Timber floor

Ensuring continuous insulation

Insulation at joist level
(Source: Centre for Sustainable energy)

Insulation at rafter level
(Source: Knauf insulation)

Insulation over a solid floor
(Source: rightsurvey)

6.

The ideal retrofit

A set of measures proposed for each typology illustrating the ideal retrofit in each case.

Small terraced house
The ideal retrofit

If you are interested in making your home as energy efficient as it can be, you can go even further with retrofit measures.

Solar panels
They work on south, east or west facing roofs and can significantly reduce your electricity bills.

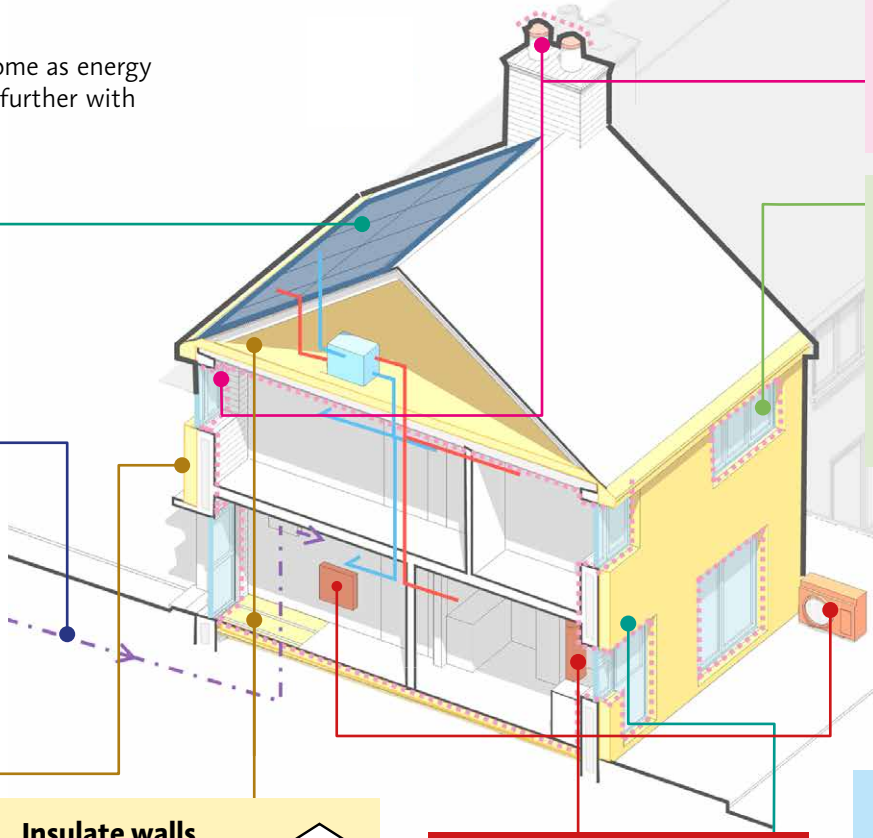
Electricity supply
You will need to check your electricity supply is suitable for your heat pump installation.

Wrap house in insulation
To further prevent heat loss, aim to wrap your whole house in insulation.

Insulate ground floor
Between floorboards.

Insulate walls externally
Add external insulation where it is easier to do (e.g. plain walls).

Insulate loft
The easiest place to add insulation to.



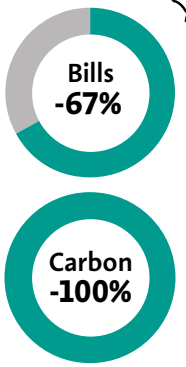
Minimise draughts
Air leaks around the house (e.g. around windows and doors, through the chimney) waste a lot of energy (and money). Fixing them is possible and cost effective.

Upgrade windows
Replacing existing windows with triple glazing or high performance secondary glazing is one of the most effective ways to reduce heat loss in your home.

Install a heat pump and hot water cylinder
You will need a hot water cylinder inside and a heat pump unit outside. The back garden is likely to be the best option, but other locations may be possible too.

Introduce continuous ventilation
You can install a mechanical ventilation and heat recovery system (MVHR) to bring in continuous fresh air to living spaces and extract it from kitchens and bathrooms. Continuous mechanical extract ventilation is an alternative but is not as energy efficient.

Savings



Estimated costs

Heat Pump
from £500* to £15,000

Solar Panels
from £3,000 to £6,000

MVHR
from £4,000 to £8,000

Draughtproofing
from £300 to £400

Loft insulation
from £1,500 to £3,000

External wall insulation
from £7,000 to £13,000

Floor insulation
from £2,000 to £5,000

Windows and doors
from £5,000 to £12,000

* Lower range assumes the contribution of funding and/or financing. Not all households will be eligible, see pages 41–42 for more information.

Medium semi-detached house

The ideal retrofit

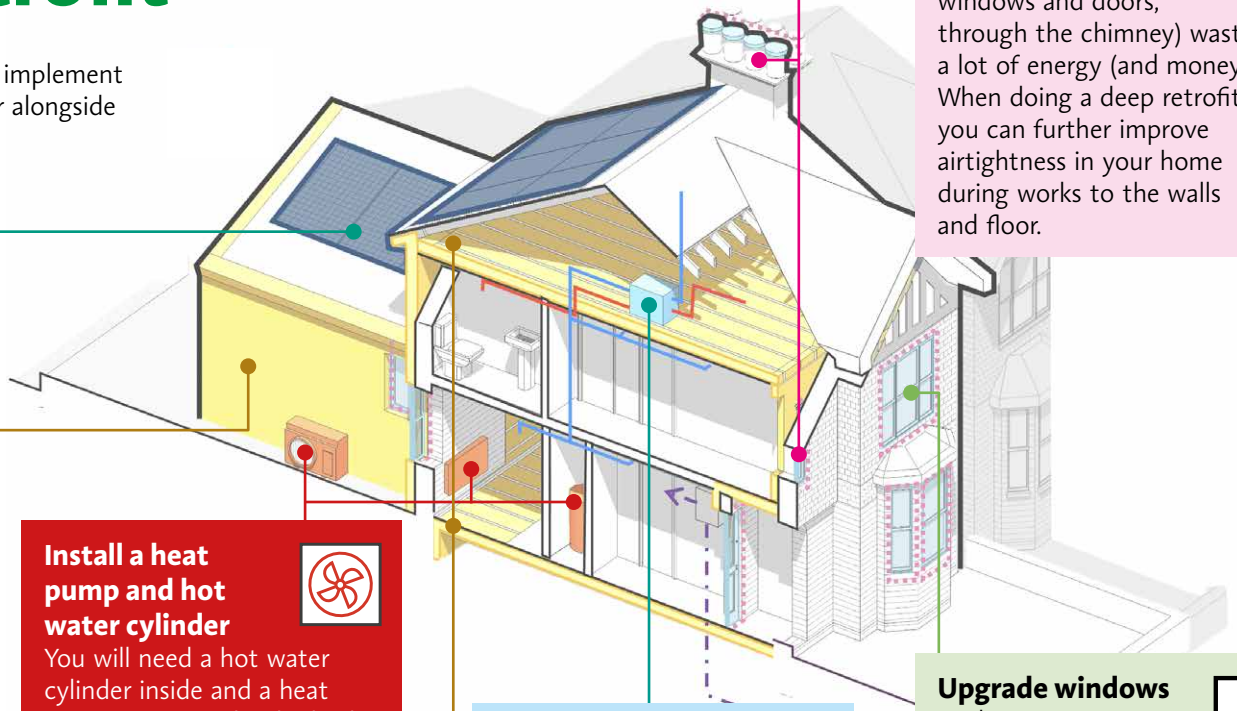
Depending on your home, you could implement some or all measures below before or alongside your heat pump installation.

Solar panels
They work on south, east or west facing roofs and can significantly reduce your electricity bills.

Wrap house in insulation
To further prevent heat loss aim to wrap your whole house in insulation.

Insulate walls internally
At front of house to avoid disturbing detail and character on the exterior.

Insulate walls externally
Add external insulation where it is easier to do (e.g. plain walls, side wall).



Install a heat pump and hot water cylinder
You will need a hot water cylinder inside and a heat pump unit outside. The back garden is likely to be the best option, but other locations may be possible too.

Insulate ground floor
Between floor joists.

Insulate loft
The easiest place to add insulation to.

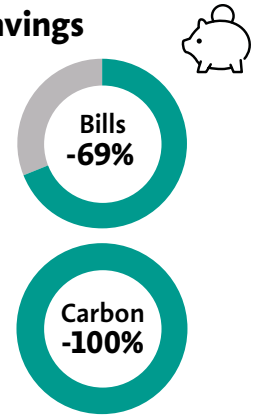
Introduce continuous ventilation
You can install a mechanical ventilation and heat recovery system (MVHR) to bring in continuous fresh air to living spaces and extract it from kitchens and bathrooms. Continuous mechanical extract ventilation is an alternative but is not as energy efficient.

Minimise draughts
Air leaks around the house (e.g. around windows and doors, through the chimney) waste a lot of energy (and money). When doing a deep retrofit you can further improve airtightness in your home during works to the walls and floor.

Upgrade windows
Replacing existing windows with triple glazing or high performance secondary glazing is one of the most effective ways to reduce heat loss in your home.

Electricity supply
You will need to check your electricity supply is suitable for your heat pump installation.

Savings



Estimated costs

Heat Pump
from £500* to £15,000

Solar Panels
from £5,000 to £9,000

MVHR
from £4,000 to £9,000

Draughtproofing
from £300 to £500

Loft insulation
from £2,000 to £4,000

Wall insulation
from £10,000 to £20,000

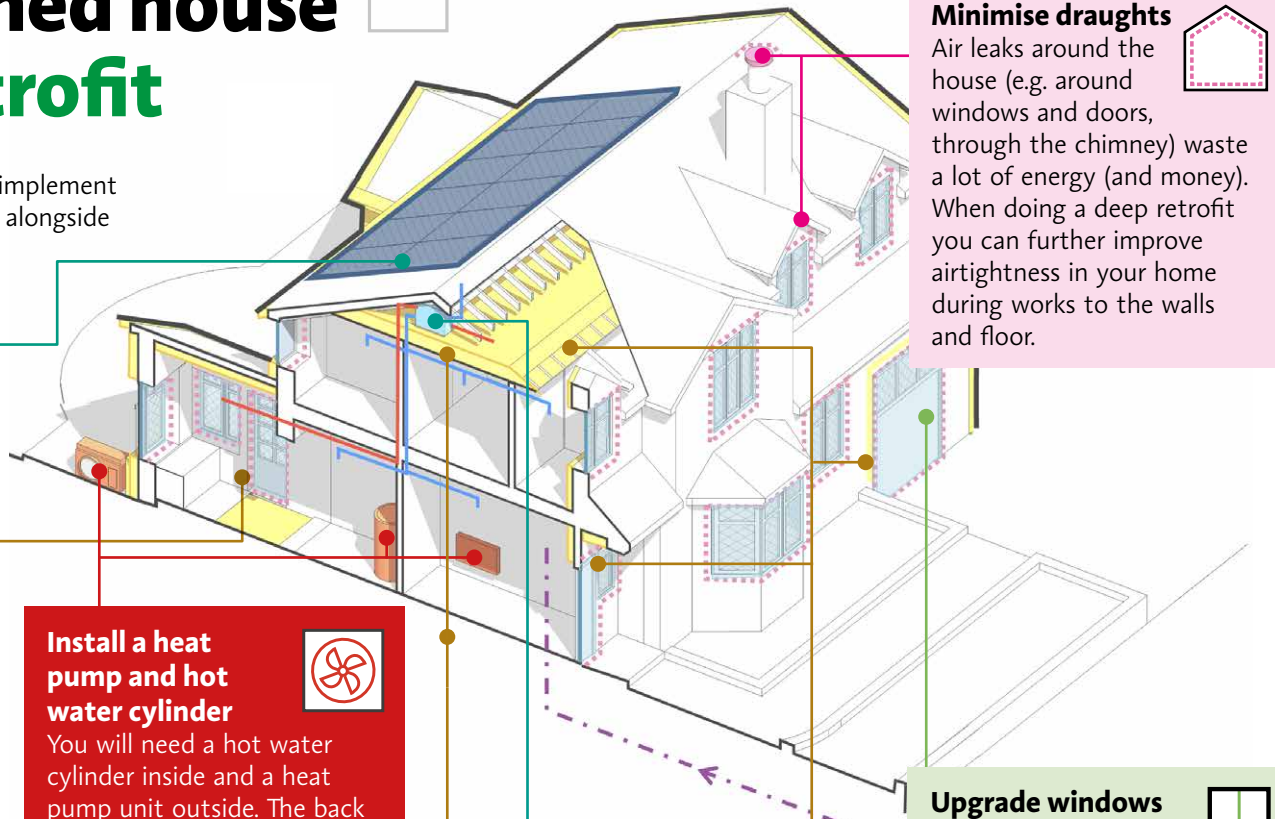
Floor insulation
from £2,000 to £5,000

Windows and doors
from £8,000 to £15,000

* Lower range assumes the contribution of funding and/or financing. Not all households will be eligible, see pages 41–42 for more information.

Large detached house
The ideal retrofit

Depending on your home, you could implement some or all measures below before or alongside your heat pump installation.



Solar panels
They work on south, east or west facing roofs and can significantly reduce your electricity bills.

Wrap house in insulation
To further prevent heat loss aim to wrap your whole house in insulation.

Insulate walls internally
At front of house to avoid disturbing detail and character on the exterior.

Insulate walls externally
Add external insulation where it is easier to do (e.g. plain walls).

Install a heat pump and hot water cylinder
You will need a hot water cylinder inside and a heat pump unit outside. The back garden is likely to be the best option, but other locations may be possible too.

Insulate ground floor
Between floor joists or solid floor.

Insulate loft
The easiest place to add insulation to.

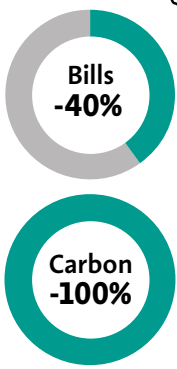
Minimise draughts
Air leaks around the house (e.g. around windows and doors, through the chimney) waste a lot of energy (and money). When doing a deep retrofit you can further improve airtightness in your home during works to the walls and floor.

Introduce continuous ventilation
You can install a mechanical ventilation and heat recovery system (MVHR) to bring in continuous fresh air to living spaces and extract it from kitchens and bathrooms. Continuous mechanical extract ventilation is an alternative but is not as energy efficient.

Upgrade windows
Replacing existing windows with triple glazing or adding high performance secondary glazing is one of the most effective ways to reduce heat loss in your home.

Electricity supply
You will need to check your electricity supply is suitable for your heat pump installation.

Savings



Estimated costs

Heat Pump
from £500* to £15,000

Solar Panels
from £5,000 to £12,000

MVHR
from £5,000 to £10,000

Draughtproofing
from £300 to £600

Loft insulation
from £2,000 to £5,000

Wall insulation
from £10,000 to £25,000

Floor insulation
from £3,000 to £7,000

Windows and doors
from £10,000 to £25,000

* Lower range assumes the contribution of funding and/or financing. Not all households will be eligible, see pages 41–42 for more information.

7.

Appendices

The content of this section expands the information provided before and provides additional details that are often useful when planning a home upgrade.

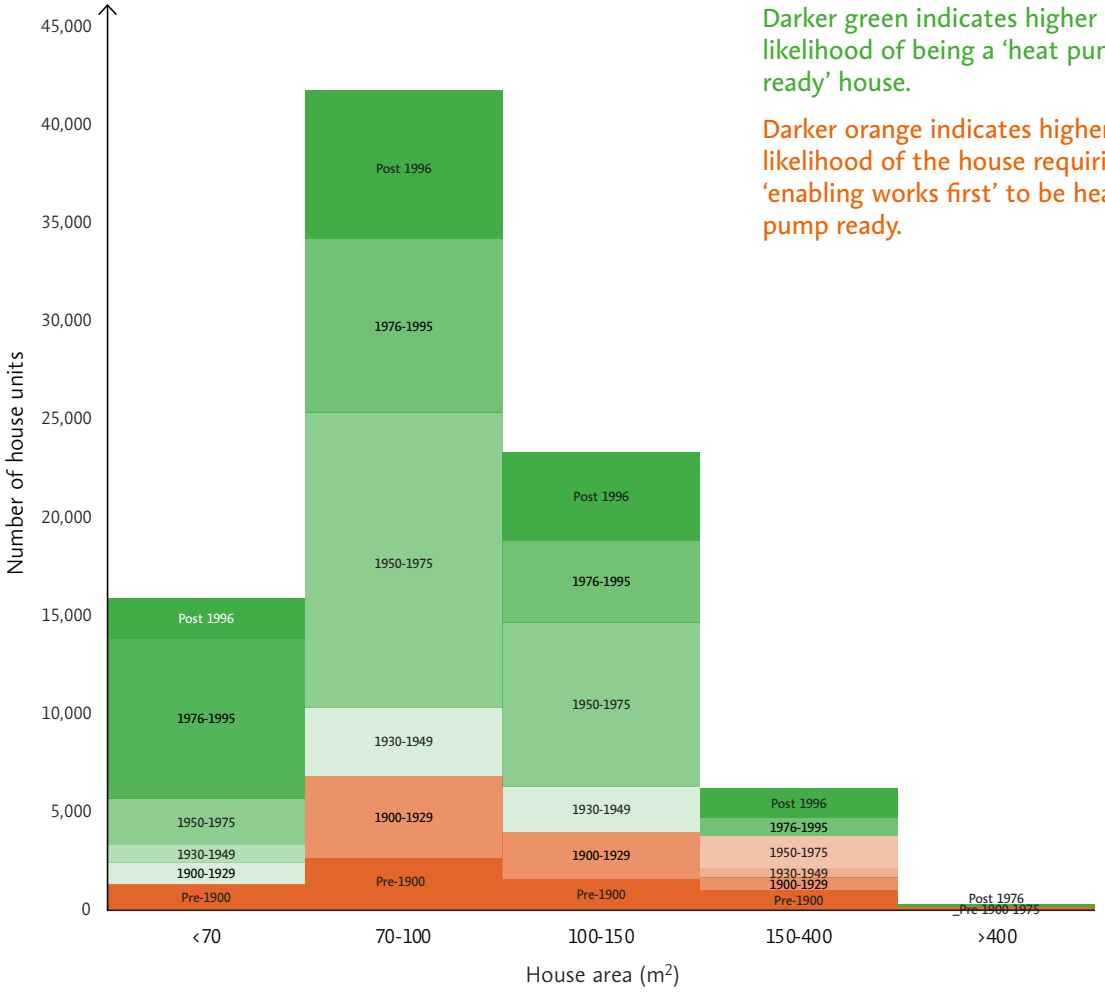
How likely is it that your home is ‘heat pump ready’?

Are terraced houses in Surrey likely to be ‘heat pump ready’?

The age and size of a house are a good starting point to assess, at a high level, the likelihood of a home to be ‘heat pump ready’.

The chart on this page provides a summary of a statistical analysis undertaken for all terraced houses in Surrey.

Images taken from Google Street View ©Google 2024



Darker green indicates higher likelihood of being a ‘heat pump ready’ house.

Darker orange indicates higher likelihood of the house requiring ‘enabling works first’ to be heat pump ready.

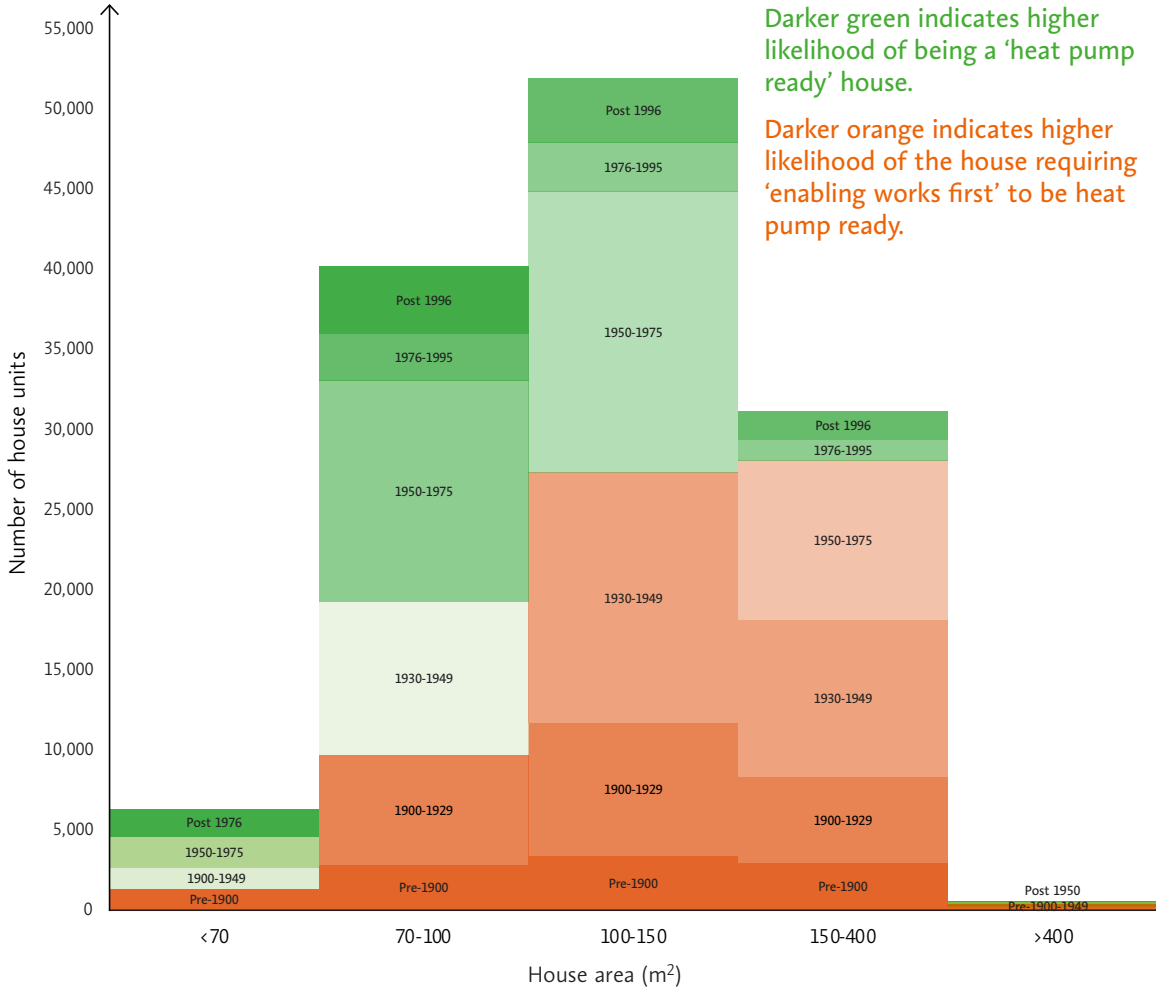
How likely is it that your home is 'heat pump ready'?

Are semi-detached houses in Surrey likely to be 'heat pump ready'?

The age and size of a house are a good starting point to assess, at a high level, the likelihood of a home to be 'heat pump ready'.

The chart on this page provides a summary of a statistical analysis undertaken for all semi-detached houses in Surrey.

Images taken from Google Street View ©Google 2024



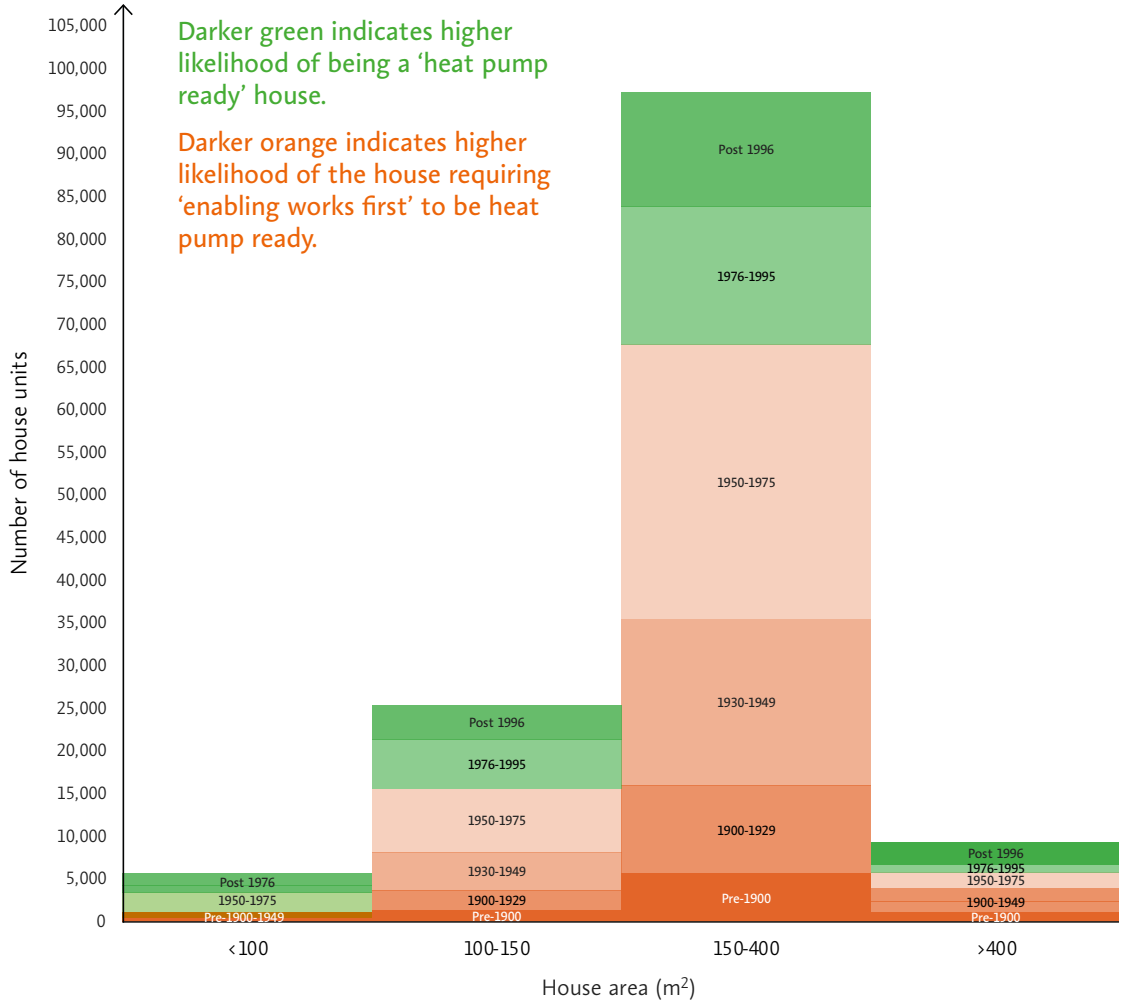
How likely is it that your home is ‘heat pump ready’?

Are detached houses in Surrey likely to be ‘heat pump ready’?

The age and size of a house are a good starting point to assess, at a high level, the likelihood of a home to be ‘heat pump ready’.

The chart on this page provides a summary of a statistical analysis undertaken for all detached houses in Surrey.

Images taken from Google Street View ©Google 2024

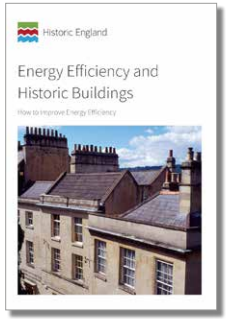


Published guidance on retrofit

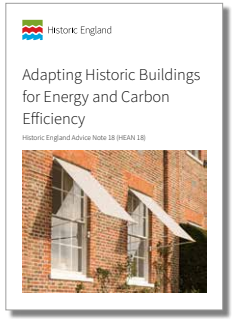
London Energy Transformation Initiative (LETI) Climate Emergency Retrofit Guide
Source: LETI (2021)

A guide to Retrofitting your home
Source: Trust Mark (2021)

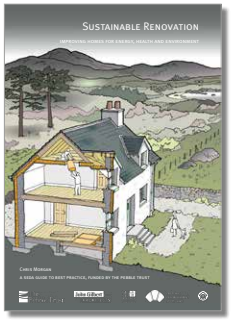
Energy Efficiency and Historic Buildings: How to Improve Energy Efficiency
Source: Historic England (2018)



Adapting Historic Buildings for energy and Carbon Efficiency
Source: Historic England (2024)



Sustainable Renovation: Improving homes for energy, health and environment
Source: The Pebble Trust (2018)



Retrofit How-To-Guides on retrofitting windows and heat pumps
Source: Westminster City Council (2022)

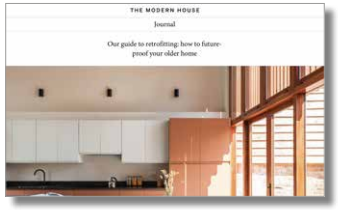
Retrofit Guide for Homeowners (ventilation)
Source: Aereco (2021)

Transform your house into a low carbon sustainable home
Source: EcoFurb (2020)

Published guidance on retrofit

Whole House Eco-Retrofit
Source: Centre for Alternative Technology (2023)

Whole House Eco-Retrofit
Source: Centre for Alternative Technology (2023)



Retrofitting existing homes: Guide for UK homeowners
Source: Urbanist Architecture (2023)

Other trusted sources for good information and advice about retrofit include:

AECB – Association for Environment Conscious Building.

STBA – Sustainable Traditional Buildings Alliance.

EH – English Heritage

HES – Historic Environment Scotland.

The Green Register / The Retrofit Academy – Retrofit.Support website

UKCMB – the UK Centre for Moisture in Buildings.

Home for a Low Carbon Future
Source: People Powered Retrofit (2019)

Retrofitting your home
Source: Cambridge City Council (2022)

Retrofit Pattern Book
Source: Greater Manchester Combined Authority, University of Salford and Red

Quality assurance schemes

Professionals and installers who can help

A variety of schemes and training operated by different organisations aim to improve quality assurance and to protect the consumers that choose low carbon technologies. This is achieved either by covering individual projects, or the installers.

Examples of organisations within the different schemes are summarised in this page.

Examples of type 1 quality schemes

- **MCS (Microgeneration Certification Scheme)** – required for grant funded schemes such as the Boiler Upgrade Scheme (BUS), which provides £7,500 towards the cost of a heat pump installation. Extended warranties and guarantees will often be available.
- **TrustMark** is a backed quality scheme that requires installers to comply with a strict code of conduct. This includes clear and transparent pricing, warranties and guarantees. The scheme covers a wide range of trades and services, including builders, plumbers, electricians, roofers and more.
- **NAPIT** is a trade body that enables specified installers to self-certify the compliance of their work with the Building Regulations. This covers many trades, from roofing and windows, to heat pumps and renewables.

Example of type 2 schemes

- **Federation of Master Builders (FMB)** certified contractors are vetted and regularly inspected to ensure competence, a commitment to quality, and adherence to industry best practices, including deposit protection schemes and warranties.
- Trade certification schemes seek to ensure a quality service and provide industry wide advice. Examples include the **National Insulation Association (NIA)**, **The External Wall Insulation Industry (INCA)**, and the Cavity Insulation Guarantee Agency (CIGA).
- Industry special interest organisations include voluntary membership bodies, whose purpose is to produce best practice information and encourage adherence to British Standards such as PAS2030 for Retrofit installers and PAS 2035 for Retrofit Advisors.
- Energy companies: both **Octopus** and **OVO** have created in-house training programmes and consumer friendly offers on heat pump installations. Check their websites for more information.

Further advice and funding opportunities

Name	Overview		Eligibility requirements	Funding available?
Home Upgrade Grant Phase 2 (HUG2) **Phone 0800 783 2503**	**WHO:** Surrey residents NOT already connected to mains gas.	**WHAT:** Measures can include: cavity wall insulation, external wall insulation, loft insulation, underfloor insulation, heat pump, new windows and doors	The property's Energy Performance Certificate must be EPC D, E, F or G rated. Occupants must be: • In receipt of means-tested benefits, or • Have an annual gross household income below £36,000 (if gross income is over, contact Action Surrey regardless).	Funding for off-gas properties varies on a sliding scale between £3,000 and £38,000, based on survey and property characteristics. There are no financial contribution or deposits expected from owner-occupiers. Scheme ends March 2025.
Surrey County Council – Green Skills	**WHO :** For those wanting to get qualified in green skills, including retrofit.	**WHAT:** Funded places on green skills courses for all trade and construction professionals.	Check for subsidised training bootcamps. Other free learning resources are also available on the website.	Free or subsidised training courses with nationally recognised qualifications.
Smart Export Guarantee (SEG)	**WHO:** Anyone who produces their own electricity from renewable technology.	**WHAT:** Export tariff payments from your energy company.	SEG tariffs are available by application from most energy companies, and will pay for energy exports from solar panels, wind turbines, hydroelectricity, anaerobic digestion, micro combined heat and power (micro-CHP). Your renewables installer may assist with this process.	You will be paid for the energy you export to the grid, usually metered. Different energy companies have different export tariffs, so check around for best value.

Further advice and funding opportunities

Name	Overview		Eligibility requirements	Funding available?
Energy Saving Trust Advice	**WHO:** Anyone who wants good quality advice on saving energy.	**WHAT:** National organisation giving independent and impartial advice on energy efficiency and clean energy solutions.	-	Comprehensive and independently researched advice given on energy saving measures (e.g. insulation, draught stripping, airtightness and ventilation), and on renewable energy systems for householders (e.g. heat pumps, boilers, solar and batteries). There is no charge for this service, which includes advice on funding and grants.
Energy Company Obligation (ECO4)	**WHO:** Anyone owning a house (or renting a house or flat with landlord permission).	**WHAT:** An energy efficiency scheme funded by legal obligations on energy suppliers to deliver energy efficiency and heating measures to domestic premises.	ECO requires energy providers to support those in need with energy-efficient measures. You will need to be in receipt of a relevant benefit (e.g. Child Benefit, Income Support etc.) which can be checked on the website or can be referred by your Local Authority if you have a low income AND a household member with a long-term health condition. Installed measures are dependent upon the energy efficiency rating of the property but could be related to energy efficiency (e.g. insulation), or an upgrade to your heating (e.g. new boiler).	ECO4 is not a grant scheme – funding is dependent upon the energy companies and the methodology that they use to determine eligibility. The over-riding goal is to reduce energy bills. Any proposed work may not be full funded and a contribution from the householder may be required. Scheme ends 31 March 2026.

Glossary and key concepts

Airtightness or air permeability rate:
A measure of how much air naturally leaks out of or into a building, through gaps around doors, windows, cracks, etc. Usually measured in $m^3/m^2/hr$ at a pressure of 50Pa.

Building fabric:
A term used to describe collectively the walls, roof, floor, windows and doors of a building.

Building fabric efficiency:
A measure of how effective a building's fabric is at retaining heat.

Cavity wall:
A type of wall construction that consists of two parallel layers of masonry separated by a gap, or cavity. A cavity wall usually has a regular brick pattern. If your wall has been covered by render, you can also tell by measuring the width of the wall, if it is more than 260mm thick, is it probably a cavity wall.

CO_2:
Carbon dioxide, a greenhouse gas.

Coefficient of Performance (CoP):
A measure of efficiency usually used for heat pumps. The CoP is the amount of useful energy (heating or cooling) produced from every unit electricity used, e.g. a heat pump with a CoP of 3 produces 3 kWh of heat for every 1 kWh of electricity it uses.

Energy efficiency:
The relative amount of energy a building or system uses to achieve a certain aim (e.g. maintain a specific internal temperature).

Energy Performance Certificate (EPC):
A legally valid document which provides an energy efficiency rating (displayed in an A-G scale) in relation to a property's running costs. Net Zero strategy is targeting that all homes reach EPC band C by 2035.

Fabric first approach:
Is a method of improving the energy efficiency of a building by prioritising the building's envelope, or 'fabric' before considering heating systems or renewable energy generation.

Heat demand:
It is the amount of heat required to keep a building within an acceptable, comfortable temperature range. It is expressed in $kWh/m^2/yr$ and can be calculated through energy modelling.

Heat load:
it is the amount of heat energy that needs to be added to a space to keep the temperature comfortable on the coldest days of the year. It is expressed in kW.

Heat loss/gain:
The loss of heat from a warmer to a colder space / the gain of heat from occupants, equipment or the sun.

Heat pumps:
An efficient form of low carbon heating that extracts ambient heat from the environment to provide space and/or water heating. Heat pumps run on electricity, not gas.

Insulation:
Material used to reduce heat losses by providing a thermal barrier between the inside of your home and the outside.

kWh:
Kilowatt hour, a measure of the amount of energy used or generated in one hour.

Leaky building:
A building with a low level of airtightness.

Mechanical Ventilation with Heat Recovery (MVHR):
A type of ventilation system that recovers heat from extracted air before it is vented outside the building and uses it to warm up incoming fresh air.

Net Zero Operational Carbon/Energy:
A 'Net Zero Operational Carbon/Energy' building is one where no fossil fuels are used, all operational energy use has been minimised in order to meet specific energy use target or limit (in kWh/m^2yr) and enough renewable energy is generated to balance energy use (on an annual basis).

Glossary and key concepts

Net Zero' (whole life) Carbon:
A 'Net Zero' (whole life) Carbon' building is one where the total of all greenhouse gas emissions, both operational and embodied, over an asset's life cycle (i.e. modules A0-A5, B1-B8, C1-C4) are minimised and meet specific carbon, energy and water targets or limits, and with residual 'offsets', equals zero.

Passivhaus:
A quality assured standard and methodology for low energy buildings and comfort. The standard is defined by the International Passivhaus Institute. EnerPhit is the equivalent for retrofits. It is considered the exemplar level retrofit target.

PAS 2035:
a British standard that sets best practice guidance for retrofitting homes to improve their energy performance, ensuring efficiency and improved performance. When seeking for advice on upgrades is recommended to use PAS2035 registered professionals.

Photovoltaics (PV):
A technology which is used to generate renewable electricity using energy from the sun.

Renewable energy:
Energy produced from a renewable source e.g. wind or solar.

Retrofit:
In simple terms, works to a building after it was built. Typically works are designed to reduce the energy use of the building, making it more environmentally friendly, as well as, warmer and more comfortable for its occupants.

Solar thermal system:
It is a technology that absorb the energy from the sun through panel (solar collectors) to heat up water to use in the home.

Space heating demand:
The amount of heat energy required to heat a space to the required temperature. Space heating demand is a good proxy for the building fabric efficiency and is usually expressed in kWh/m^2/yr.

Thermal bridge:
A point, line or area in a building's external envelope which loses more heat than its surroundings, i.e. a weak point from a heat transfer point of view.

Thermal line:
The conceptual representation of where the building fabric insulating layer is. It is formed by the insulation in walls, roofs and floors as well as windows, rooflights and doors.

Thermographic survey:
A thermal imaging camera is used to identify areas where heat escapes from a building.

U-value:
The metric used to quantify the rate of heat loss for different elements. The higher the U-value, the more heat the element will lose.

Waste Water Heat Recovery (WWHR):
A proprietary system which uses heat from waste water and transfers it to the incoming cold water.

Whole house plan:
A comprehensive strategy for home improvements that aims to ensure a property operates in as energy-efficiently as possible, with all aspects of the building complementing each other. A whole house plan considers the entire building, and how all aspects of it can work together, even if the measures are completed in stages. A retrofit specialist will assist in creating a specific whole house plan for a home.

Acknowledgements

This guide and associated study has been commissioned by Surrey County Council and delivered by Etude Consulting Limited and Bioregional to support low carbon, domestic retrofit in Surrey. It has been part-funded by the Department for Energy Security and Net Zero via the Local Energy Advice Demonstrator (LEAD) programme administered by the Greater South East Net Zero Hub. Please get in touch via our websites for further information.

Thanks to Zero Carbon Guildford and the Surrey Climate Commission for linking us with Surrey residents for the feedback workshops. Thanks also to those obliging residents for their time and their invaluable feedback during and after the workshops. Design by Steers McGillan Eves.