RETROFIT HOW-TO GUIDES

TWO

How to retrofit an Air Source Heat Pump

January 2023

ZERO CARBON 2040
Westminster Climate Action

City of Westminster

Contents

About the Retrofit how-to guides

Our series of planning 'How to' guides provide simple practical advice on a range of retrofit measures commonly proposed in Westminster. These guides are being prepared to enable householders and developers to find effective and sensitive ways to upgrade existing buildings to improve their energy performance. They:

- Provide information on retrofit measures and how effective they are;
- Explain what permissions you may need and how to apply;
- Explain what issues you should consider and how you can make a successful planning application.

You can find advice on retrofit more generally in our **Environmental Supplementary Planning Document**. The guides build on and provide advice on the full range of measures set out in the SPD.

If you want to achieve optimal improvements for your property we strongly recommend you consider developing a retrofit plan which identifies the best measures for your property following a **'Whole house' approach**. This will ensure that measures that optimise environmental performance are suitable, properly integrated and well-coordinated. In that way, no harm comes to building or occupants nor is money wasted on ineffective or damaging changes.

Introduction

An air source heat pump (ASHP) is an environmentally friendly way of heating a building.

It is a low carbon alternative to a gas boiler which can help you reduce your carbon footprint, may save you money, and could future-proof your home from regulation changes. This guide explains how heat pumps work and potential benefits of installing them, some practical issues to consider if you wish to install an air source heat pump in your home, as well as what permissions you may require from us and how you can make a successful application.

While this guide focuses on air source heat pumps, it is important to remember that upgrades are likely to be most effective in combination with other measures as part of a '**whole-house**' approach to retrofit. If you consider improvements in the context of a whole building approach, this makes sure all the upgrades work well together and delivers higher energy savings, ensuring you minimise both risks to building fabric and carbon emissions. You can find more advice and information in our **Environmental SPD**.

There are other types of heat pump, including ground source heat pumps. This guide is focused on ASHPs because this is the type of heat pump that is most likely to be applicable to Westminster residents. However, you can see advice on ground source heat pumps in our **Environmental Supplementary Planning Guidance** and on the **Energy Saving Trust website**.

Air Source Heat Pumps at a glance

Cost

£ £ £

Typical upfront cost between £7,000 and £13,000. See up to date information on grants on our **Climate Emergency pages**. Grants can be available including the Government's Boiler Upgrade Scheme (see **page 9**).

How effective is it?

Low carbon and highly efficient – will significantly reduce your carbon emissions. Heat pumps are around 400% efficient compared to a gas boiler, which is around 93% efficient. See **page 7**.

Consents required

- Planning permission may be required
- If you live in a listed building, listed building consent is required
- Check the rules at **Part 3**

Issues to consider

- Potential noise and vibration impacts will need assessment
- Locate the unit as far as possible from neighbours to avoid disturbance.
- Need sufficient space to locate an ASHP and also consider visual impact
- Works best in well maintained and insulated properties

Effectiveness: Low Medium High | **Cost:** £ Low £ £ Medium £ £ £ High

Part 1

How do Air Source Heat Pumps Work?

How do ASHPs work?

Air Source Heat Pumps extract naturally occurring heat from the air. There are two main types. Air-to-water heat pumps are the most common in the UK. They transfer the heat generated into water using electricity. The heated-up water is then pumped to radiators and underfloor heating systems. If the ASHPs is designed to provide Hot Water as well this will be stored in a hot water tank. Alternatively, air-to-air heat pumps can be used to heat air which is blown directly into a room via fans. They will not provide you with hot water as well. Some models of ASHP can also cool a building, using the same methods, but by cooling the water or air to a lower rather than higher temperature.

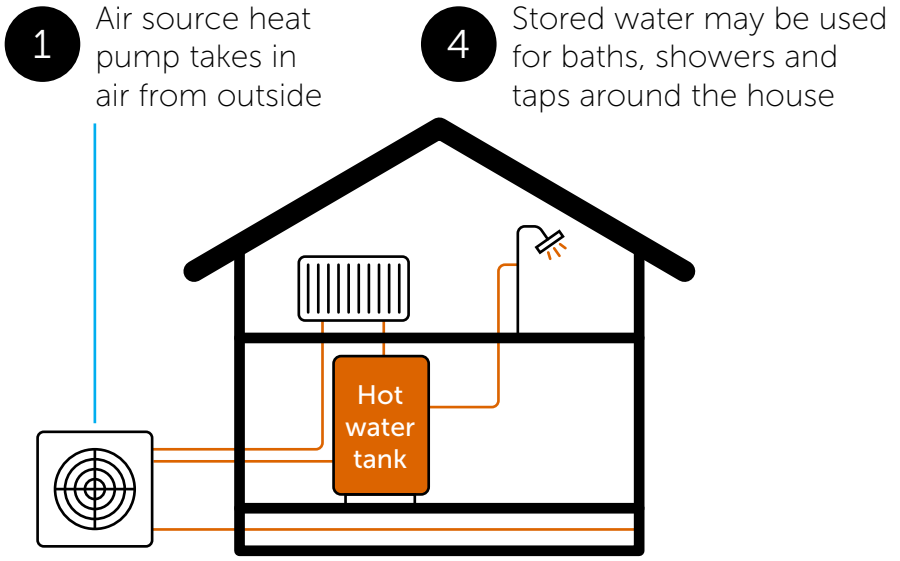
How efficient are ASHPs?

ASHPs are highly efficient heating systems because the amount of heat they produce is far greater than the amount of energy they use. This compares to gas boilers which produce less heat than the energy they use. A typical domestic gas boiler is around 93% efficient, which means that some heat (7%) is lost and emitted from their flue pipes. Heat pumps are around 400% efficient which means that they create four units of heating energy for every unit of electricity used to run the heat pump.

Do ASHPs work in cold weather?

Yes, they work in cold weather with some models working in temperatures as low as -25°C. They are common and work effectively in much colder countries than the UK such as Sweden.

Whilst ASHPs do become less efficient at heating as the outside temperature gets colder, they are still more efficient than gas boilers below 0°C.



For further information you can watch this **Energy Saving trust video** on Air Source Heat Pumps.

Will an ASHP get my home warm enough?

ASHPs heat buildings at lower temperatures (around 35°C – 50°C) than boilers (around 75°C). This means that to achieve a comfortable temperature the ASHP needs to be run more consistently for longer periods of time than a boiler-based heating system. Despite running for longer periods of time, they are still a more efficient way of heating a building.

Will installing an ASHP reduce my carbon emissions?

An ASHP will reduce the carbon emissions associated with heating in a building when compared to using gas, oil or LPG boiler. The amount saved will depend upon several factors including what is being replaced, the model of ASHP, its set up, and the size of the property. We would, however, expect there to be a significant reduction in CO_2 if you are moving from a gas boiler to an ASHP. The Energy Saving Trust estimate that for a three bedroom detached house, with radiator upgrades an ASHP would save upwards of 1800kg of CO_2 per year compared with a new A-rated gas boiler.

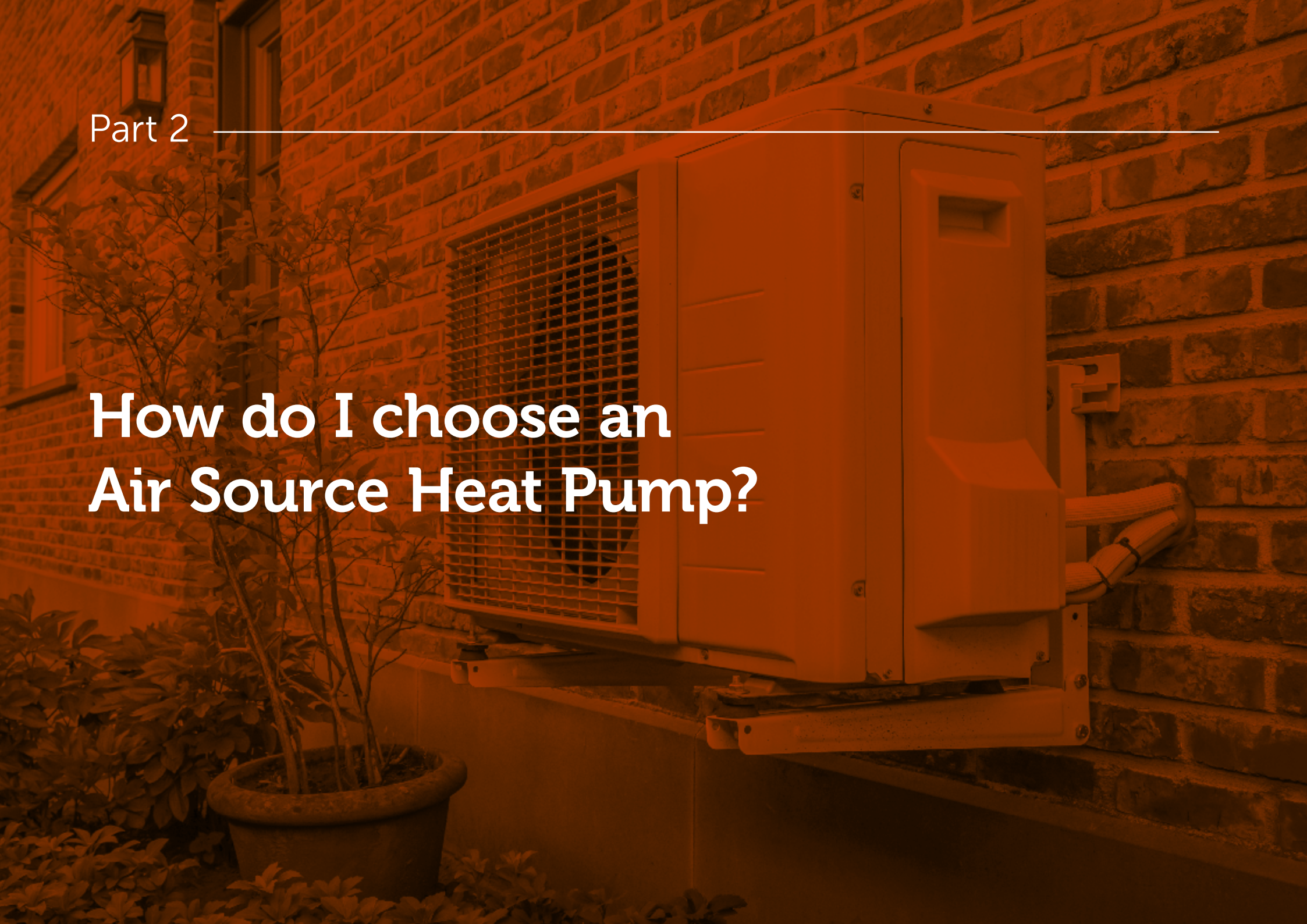
What is the Embodied Carbon Footprint of an ASHP?

ASHPs are primarily made out of steel components which require a lot of energy and resources to be produced, as well as using refrigerant. This means that the production of an ASHP requires a large amount of carbon. Manufactures are aware of this and many offer Environmental Product Declarations for their ASHPs, which state what the Global Warming Potential of their product is (usually in kg CO_2 equivalent per kg of product). The Global Warming Potential of ASHPs can vary significantly, and we would recommend you discuss this with your installer. While the production of an ASHP does have a carbon cost (materials and manufacturing process) it is nevertheless the case that its operational carbon savings will far exceed this embodied carbon.

Will installing an ASHP save me money?

Whether an ASHP can save you money depends on a number of factors, including which alternative method of heating you are comparing it against. At the time of writing, a typical ASHP can cost between £7,000 and £13,000 to purchase, although the UK governments Boiler Upgrade Scheme (2022 – 2025) provides grants for up to £5,000 for the purchase and installation of air source heat pumps. You will also need to consider associated costs such as replacement of radiators, installation of under floor heating and new water tanks, where required.

Running costs of an ASHP will vary depending upon the model, its set up, and the size of the property among other factors. **The Energy Savings Trust** provides up to date information on costs and potential savings.



Part 2

How do I choose an Air Source Heat Pump?

The guidance in this section sets out practical and technical considerations to establish if an air source heat pump is appropriate for your property and circumstances and which type to choose.

This will depend on the type and size of your property.

Where can I put an ASHP and how much space do they take up?

An ASHP will need to be placed somewhere on the outside of your building. It can be placed on the ground, on a flat roof, or fitted to a wall with mounts. It will need to have space around it to allow it to be able to draw in a good flow of air.

An ASHP can either be a monobloc which is a single unit, all located outside the building, or a split system which separates the components into an exterior and interior unit. A split system will require space inside the building. The size of an ASHP will depend on the amount of energy required. The bigger the space you need to heat, the bigger the ASHP you will need. As a rule of thumb, an ASHP will be bigger than a modern gas boiler of the same capacity. See further advice on planning considerations which will affect the design and siting in **Part 4**.

Will an ASHP work with my existing radiators and underfloor heating?

Existing radiators do not always work well with ASHPs, as they are designed for boilers which circulate water at much higher temperatures. This means that they may not be effective at distributing heat from the radiator into the room at these lower temperatures. This is more likely to be true of older radiators, than newer radiators. In some cases, it may therefore be necessary to install new radiators, which have a larger surface area to distribute heat more effectively throughout the room. This may not necessarily mean bigger radiators and some single panel radiators can be changed for double or triple panelled radiators which take up the same amount of wall space.

In cases where the existing underfloor heating has been designed to work with water it is likely to work well with a heat pump. In cases where the underfloor heating is an electric system, this will be incompatible with a heat pump.

I want an ASHP which provides hot water, do I also need to install a Hot Water Cylinder or Heat Battery?

If you want to use an ASHP to provide hot water, you will also need either a hot water cylinder (water tank) or a heat battery. This is because ASHPs do not provide hot water on demand in the same way a combi boiler does.

With a Hot Water Cylinder, the water is pre-heated and stored for when it is needed. The size of cylinder will depend upon the amount of hot water typically used in a building, but it can usually be fitted in most cupboards.

A Heat Battery, rather than storing the hot water, stores the heat in a phase change material, which releases the heat into the water upon demand. The effect is similar to that of a combi boiler. Heat Batteries are much lighter and smaller than Hot Water Cylinders, they are however relatively new technology and there are a limited number of products on the market at the moment.

Alternatively, you can install a hybrid system, with a boiler to provide hot water on demand, and a ASHP to heat the building. This would avoid the need for a Hot Water Cylinder or a Heat Battery but would require you to still have a boiler.

How loud are ASHPs?

The noise created by a typical domestic ASHP is 40 – 60 dB* compared to the average gas boiler which has a typical noise level around 60dB. Therefore, if correctly installed and appropriately sited, an ASHP is likely to be no louder than an existing boiler. ASHPs will be at their loudest in situations when they are working particularly hard e.g. it is very cold outside, or the heating has been set to a very high temperature. You should locate ASHPs where they will not disturb the building's residents or neighbours and you will need to ensure you comply with noise standards which are required by planning legislation as set out in **Part 3** and the design and planning guidance in **Part 4**.

Are there other technical issues I should consider?

Heat pumps are best suited to buildings which are well-maintained and have good insulation levels and draught-proofing. You should consider if repairs and improvements can be made to reduce heat losses and demand. If homes do not already have good levels of insulation, this may need to be added to depending on local circumstances. Particular care is needed with traditional historic and listed buildings where addition of insulation may require permission and adequate ventilation must be maintained. See **Part 4**.

You can also follow this link and input your postcode to get government advice and check if a heat pump is suitable for your home **www.heat-pump-check.service.gov.uk**

* (A-weighted sound pressure level at one metre)

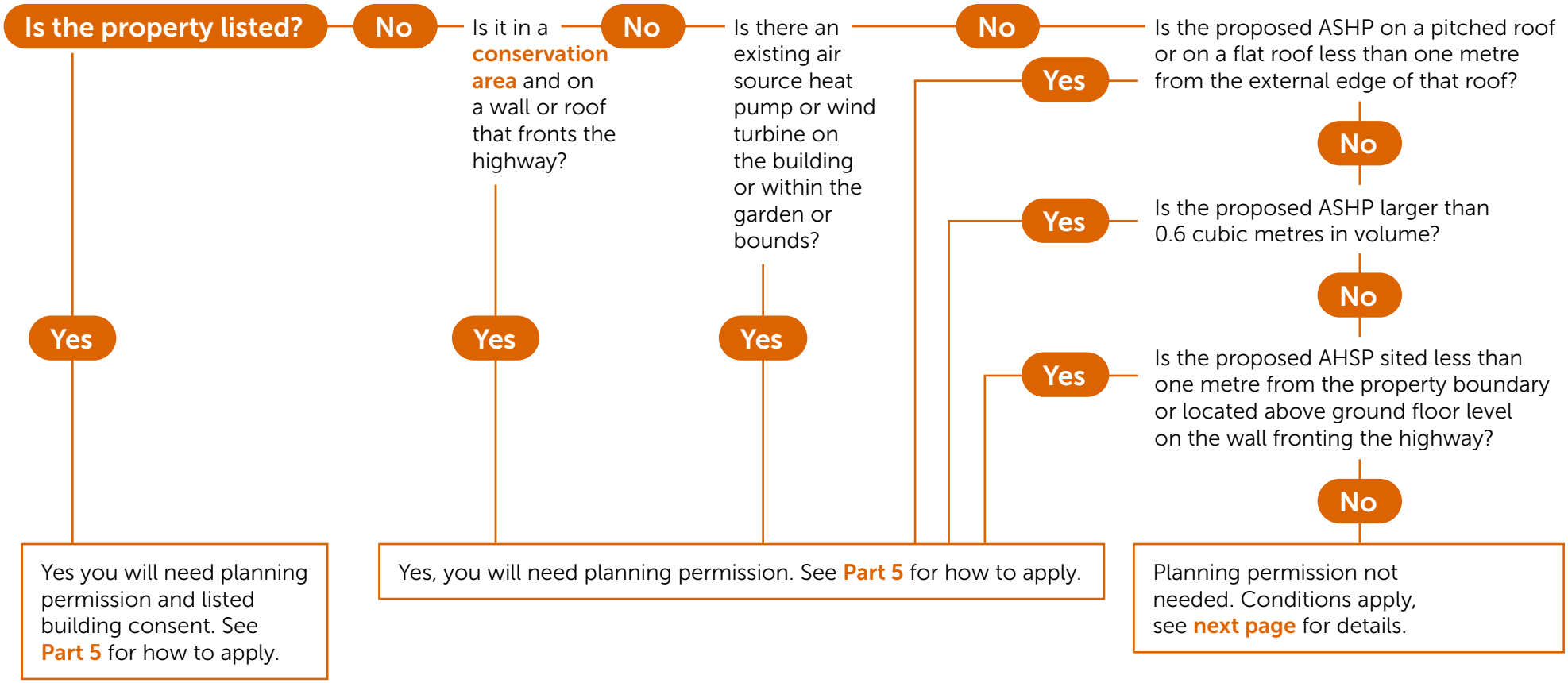
Part 3

Will I need planning permission for an Air Source Heat Pump?

Do I need planning permission to install an ASHP?

In some circumstances installing a single ASHP is considered 'permitted development' for buildings in residential use. This means that you do not need to apply for planning permission. There are however circumstances where you would need to apply for planning permission. Please follow the chart below to see if you need to apply. Whether or not planning permission is required if you are a leaseholder you should ensure that you have permission from the freeholder or check that permission from the freeholder is not required.

Use our online map to check if your building is **listed** or in a **conservation area**.



Even if you don't need planning permission, you will also need to comply with the following conditions:

- Installation must comply with the **Microgeneration Certification Scheme Planning Standards (MCS 020)** or equivalent standards. This can be achieved by using a **MCS certified contractor** to do the installation.
- The ASHP must be sited, as far as is practicable, to minimise its effect on the external appearance of the building and its effect on the amenity of the area. See design advice in **Part 4**.
- The ASHP must be removed as soon as reasonably practicable if it is no longer needed for microgeneration.
- The heat pump must be used solely for heating purposes.

If your building is **listed**, you will need to apply for both planning permission and **listed building consent** to carry out the works as in these circumstances it is not permitted development.

Can I get advice before I submit a planning application?

Yes, you can apply for pre-planning application advice. This is a paid for service. However, we offer a discounted pre-application advice fee for householder environmental performance improvements. You can find out more on our website at **westminster.gov.uk/planning-building-and-environmental-regulations/planning-applications/request-pre-application-planning-advice**.

Can I get written confirmation that I do not need planning permission and/or listed building consent?

You can apply for a **Certificate of Lawfulness** to prove that you do not need to make a planning application.

Will I need Building Regulations approval?

Installation of an air source heat pump will have to comply with the rules set out in the Building Regulations. You should use an installer who can provide the necessary advice and who can self-certify their work by being a member of the relevant **Competent Person Scheme**. Should you not have that certification you will need to make a Building Control Application. You can see advice on the **building control pages** on our website.

See **Part 5** for advice on how to make your planning application.

Part 4

What is likely to get permission? Guidelines on design and siting

Design guidance for air source heat pumps

This section provides advice on siting and design issues to consider if you are installing an air source heat pump and what is likely to get permission.

Where is best to install an ASHP?

Section 2 sets out practical issues to consider in relation to size and type of ASHPs most suitable for your property which will affect location and siting. You should also think about the potential visual and amenity impacts of your ASHP and seek to minimise impacts on both your neighbours and heritage assets (conservation areas and listed buildings).

To minimise any visual and other impacts, it is important to site the ASHP on an area of the building that is discreet, away from the principal facades or in an area of the building which already has a service character, such as a rear yard, garden, or rear light well. If you live in an unlisted building and choose a location to the rear and away from neighbouring properties (at least 1m away from the property boundary), it is likely you will not need planning permission.

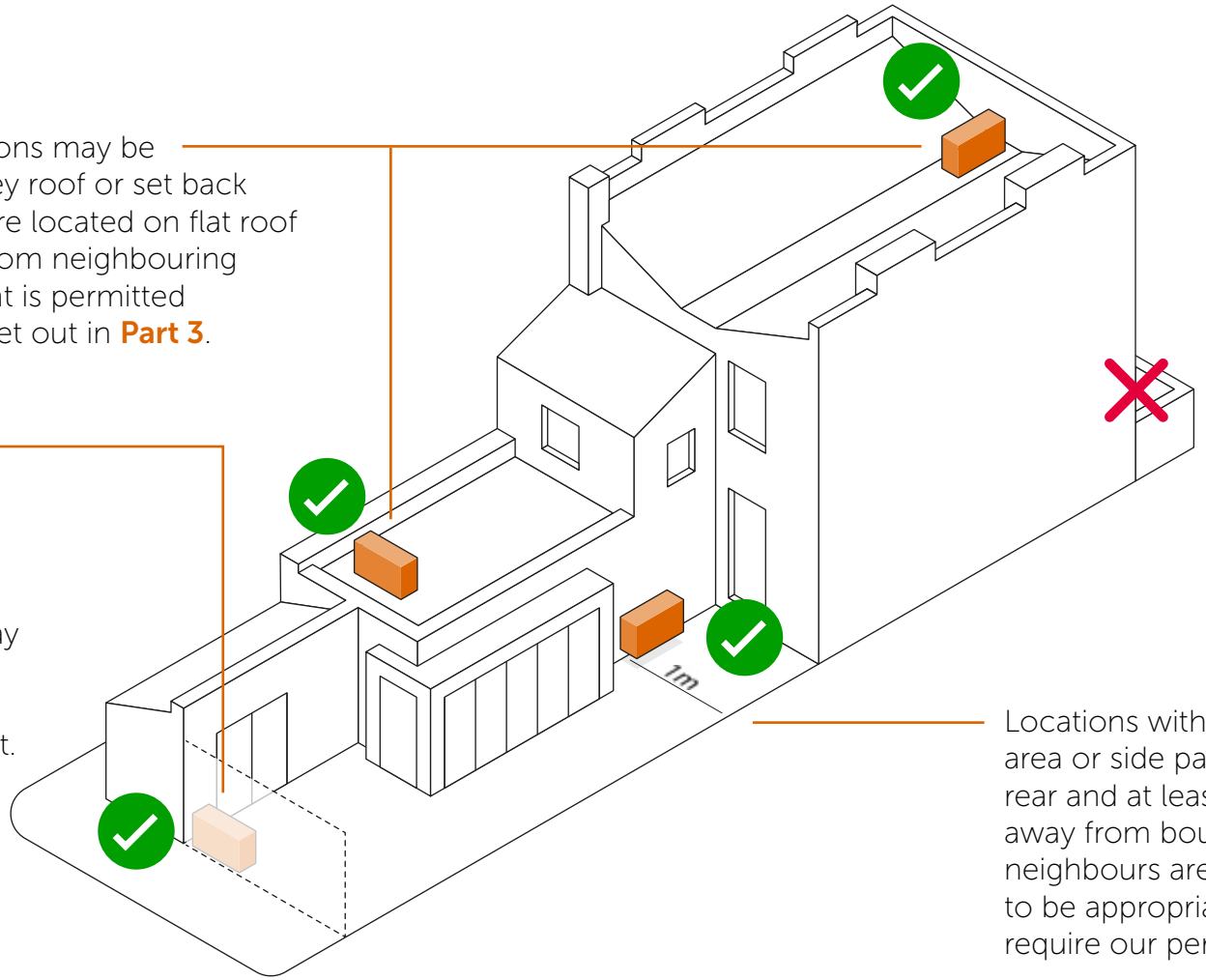
Screening the unit with greenery, fencing or appropriate enclosure may also help reduce its visual impact. However, you will need to ensure sufficient space around it for air flow – check the advice in the pumps manual. Where practicable, roof top locations may also be appropriate if the ASHP can be discreetly located to minimise visibility, for example set back from the boundary and behind a parapet.

When in operation, ASHPs discharge a plume of cold air. This should be taken into account when choosing a location and orientation of an ASHP to ensure that the cold air is not being discharged into a communal or frequently used space.

Where is best to install an ASHP?

Discreet rooftop locations may be acceptable, within valley roof or set back from the parapet. Where located on flat roof and one metre away from neighbouring boundary, development is permitted subject to conditions set out in **Part 3**.

If locating within a garden, consider landscape or other screen to minimise visual impact. Where located one metre away from the neighbouring boundary, this is permitted development.



Avoid locations to the front of the property and facing the highway.

Locations within service area or side passages at rear and at least one metre away from boundary and neighbours are most likely to be appropriate and not require our permission.

Noise

You should also carefully consider potential noise and vibration impacts and always locate ASHPs where they will not disturb the buildings residents or neighbours. Noise will be less likely to be an issue if you choose a location which is remote, away from your neighbours' windows (particularly where they are to living rooms or bedrooms), or important amenity areas (such as gardens or balcony spaces). You should also avoid attaching the pump to shared walls. You will need to submit an acoustic report if planning permission is required. You should use a reputable installer and as set out above, even if permission is not required installation must comply with the Microgeneration Certification Scheme Planning Standards (MCS 020) or equivalent standards. This can be achieved by using a MCS certified contractor to do the installation.

Find an MCS certified contractor

Where is best to install a ASHP if the building is listed?

If your building is listed, particular care will need to be taken to ensure that the installation of an ASHP does not negatively impact on its special architectural and historic interest, ensuring the external unit is discreetly located and preferably not attached to the listed building itself. You will need to consider associated internal alterations, including the location of any internal pipework, radiators or equipment – use existing pipe runs where possible and choose routes which avoid loss of historic fabric and will not obscure architectural detail.

You should also bear in mind that historic buildings of traditional construction require a level of passive natural ventilation and the design of the heat pump system will need to allow for the lower levels of insulation and higher rate of ventilation.

Read – For further advice on heat pumps in listed and historic buildings, you can read Historic England's **Guidance on Heat Pumps**

As works to listed buildings can be more complicated, we strongly recommend you **seek pre-application advice** before submitting your application.

Part 5

How do I make an application to install an Air Source Heat Pump?

What does my application need to include?

You will need drawings and information to explain the location, design and appearance of the air source heat pump and any noise and vibration it may generate.

Your application should include the following:

Completed application form

Signed and dated. Make sure you complete the ownership certificate at the end of the form. for most people this is likely to mean completing either Certificate A – where you own all the property affected; or Certificate B where there are other interested parties e.g., where you are a flat owner/occupier in a larger building.

A location and site plan

This is to clearly identify the building affected. Your location plan needs to be a scaled plan of the site at 1:1250 or 1:2500 scale, which outlines in red the boundary of the application site. You can read this national guide on **how to prepare a site plan** and you can **buy a plan online**.

Elevations, plans and section drawings

These will be scaled drawings which show what the building looks like from the outside. Only those elevations showing the location of the ASHP need to be included. You should also provide plans and sections showing any associated equipment and pipes, including details of internal works for listed buildings.

The specification of the ASHP.

The manufacturers manual or specification of the ASHP.

Acoustic Report.

This needs to highlight any noise and vibration generated by the proposed ASHP and how this compares with existing external background noise levels. The report should also set out how any noise and vibration impacts will be mitigated.

Fee

Listed Building Consent has no fee. See the fee schedule on our website. **Fees** for Householder and full planning permission application. A full application applies if you live in a flat/ apartment. For example, if you live in a mansion block.

For applications located within a conservation area or a listed building:

A Design & Access and/or Heritage Statement

This is to explain the impact on the heritage significance of the building. Both a Design and Access and Heritage statement are required for listed buildings but this can be one document. There is guidance and a template you can use on our website, see **heritage statements** and **heritage statement template**.

You can apply online via the **national planning portal website**. You can see advice on our website on '**making a planning application**'.

If your application includes other works for example if you are also building an extension, other documents may be required and you should check the guidance on our website. To find out more about information needed with your application, you can review the information on **validation requirements** as this explains what documents you have to include.

How long does it take to get permission and/or consent?

For planning applications and listed building consents for retrofit measures, decisions are usually completed within 8 weeks from the date of validation (this is the date we confirm all the required information has been submitted).

Can I get any planning advice before I submit my application?

To find out whether your proposal is likely to be accepted, you can also apply for **pre-planning application advice**. We now offer a **discounted pre-application advice fee** for householder environmental performance improvements, including heat pumps.

Part 6

Where can I find out more information?

Planning Portal Advice on Greener Homes

planningportal.co.uk/info/200140/greener_homes

Energy Saving Trust Advice

energysavingtrust.org.uk/advice/air-source-heat-pumps

Microgeneration Certification Scheme Approved Suppliers

mcscertified.com

Trustmark.org.uk
Government approved list of suppliers that come with a 25 year guarantee and insurance

Historic England Advice

Guidance on Heat Pumps

Installing Heat Pumps in Historic Buildings

Advice on Grants

Boiler Upgrade Scheme

The Boiler Upgrade Scheme provides homeowners with grants of up to £5,000 towards the cost of air source heat pumps

Find out more and access the scheme at www.gov.uk/guidance/check-if-you-may-be-eligible-for-the-boiler-upgrade-scheme-from-april-2022

See up to date information on grants on our Climate Emergency pages

EcoFurb – Low Carbon Home Service

Transform your house into a low carbon, sustainable home with Ecofurb, an end-to-end home renovation service. Ecofurb helps homeowners plan energy efficiency improvements, provides impartial advice and oversees the works.

www.ecofurb.com

Feedback

We will continue to add to and improve this document to make it as useful as possible for you. If you have any feedback, please send this to planningreception@westminster.gov.uk

Glossary

Air-to-Air heat pump – A variety of air source heat pump that collects heat from external air and deposits it into the air in an indoor space that needs to be heated, or collects heat from indoor air and disposes of it outside to cool an indoor space.

Air-to-Water heat pump – A variety of air source heat pump in which a direct action outdoor unit is combined with an indirect indoor system such as radiators. It collects heat from external air and transfers to water to provide heat through a radiant heating system.

Carbon Footprint – The total amount of greenhouse gas emissions created by an individual, organisation, event, service, or product, such as a heating system, expressed by carbon dioxide equivalent.

Combi boiler – a combination gas boiler which provides heating and hot water solutions in one unit.

Embodied Carbon – Non-operational greenhouse gas emissions associated with a building's lifecycle.

dB – decibel or unit used to measure sound level.

LPG Boiler – LPG boilers use liquid petroleum gas which is stored in an external storage tank to heat water in the central heating system.

MCS – Micro-generation certification scheme. MCS is owned by the DECC. It is a scheme devised by the Government to regulate both products and installers operating within the UK market.

Permitted Development – Nationwide planning permission to carry out certain limited forms of development without the need to make a planning application. These provisions are granted under the Town and Country Planning (General Permitted Development) (England) Order 2015. Local planning authorities have the power to remove permitted development rights through planning conditions or Article 4.