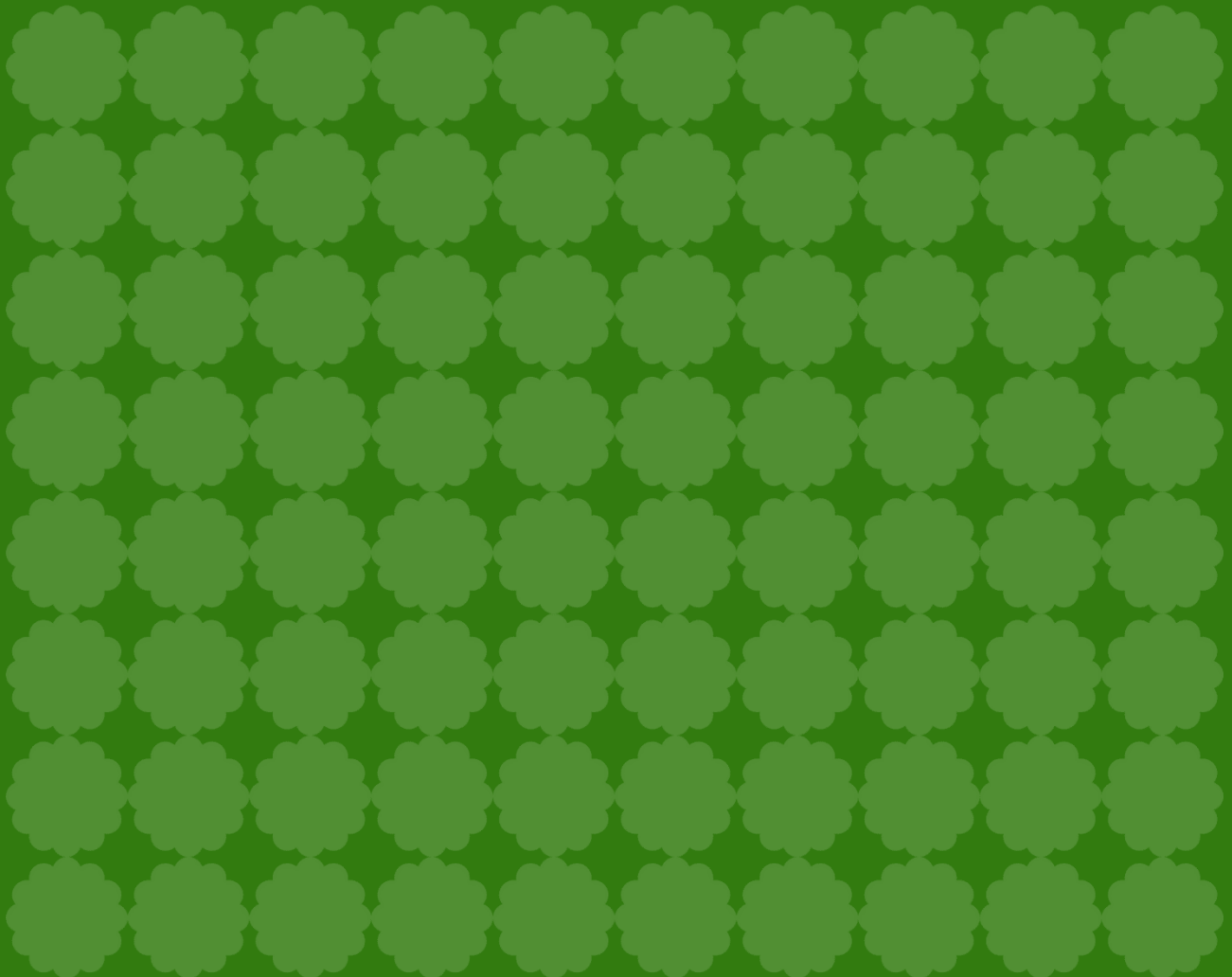


Air Source Heat Pumps

Myth Buster

March 2022



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The importance of air source heat pumps

For Greater Manchester to meet its carbon emissions target by 2038 we need to start making the transition on how we heat our homes and buildings from gas to electricity. Heating homes account for one third of our carbon emissions. The majority of homes in Greater Manchester are heated by gas; a greener solution is the use of electricity as this has lower carbon emissions as more and more sources of renewable energy are used.¹

Heat pumps are the most efficient way to generate heat from electricity; they have an important role to play in the transition to net zero, particularly in the residential sector where traditionally their market penetration has been low in the UK,² although they are common in other countries.

When looking at new build it may be worth considering the option of ground source heat pumps, at a new build stage this can be a cost effective option as it can be worked into the build costs (see Appendix for more details.)³

Heat pumps, air source or ground source, are relatively unknown by the British public, a central government survey (conducted by BEIS) in 2018 showed that only 27% of people were aware of heat pumps.⁴ This lack of awareness has contributed to common myths about Air Source Heat Pumps which have undergone significant improvements over recent years, here are some of the more common myths:

¹ [5-year-plan-branded_3.pdf \(greatermanchester-ca.gov.uk\)](#)

² Chartered Institution of Building Services Engineers (CIBSE): [CIBSE - Building Services Knowledge](#)

³ See Appendix 1A.

⁴ [BEIS Public Attitudes Tracker - Wave 28: key findings \(publishing.service.gov.uk\)](#)

Myth 1: “Can Heat Pumps only be installed in new build?”

No. Heat pumps can be installed into any property type and can be fitted into older buildings that are traditionally considered harder to heat.⁵

Heat Pump Installers will consider the property, its occupants, and lifestyles, to find the right heat pump system for the property. The following are examples of what may assist towards an effective, efficient and low carbon heating system: insulation upgrades, changes to radiators and pipework, positioning of the heat pump outside the property, hot water cylinder or a particular type of heat pump set-up dependent upon your property.⁶

Myth 2: “Are Heat Pumps only to be used for heating rooms and not water?”

The most common type of heat pump in the UK are air-to-water heat pumps. They absorb heat from the outside air and transfer this heat to water. The system distributes heat via a wet central heating system so providing heat to radiators, or underfloor heating, as well as to a cylinder for hot water.⁷

Heat pumps are more efficient when the radiator temperatures are lower. The radiators or underfloor will be correctly sized and designed so that the occupants will be warm and comfortable even in winter.

A heat pump usually requires a hot water cylinder but if there is not enough space for one, a heat battery can be considered instead (it does the same job as a hot water cylinder, but can be up to 75% smaller).⁸

Myth 3: “Do you need underfloor heating for air source heat pumps to work?”

⁵ [Setting the record straight on heat pumps - Energy Saving Trust](#)

⁶ [Setting the record straight on heat pumps - Energy Saving Trust](#)

⁷ [Setting the record straight on heat pumps - Energy Saving Trust](#)

⁸ [Setting the record straight on heat pumps - Energy Saving Trust](#)

No. While Underfloor heating can be a more efficient way to heat a house or building, radiators can be extremely efficient in giving out heat over a long period at lower temperature settings provided that they are correctly sized. ⁹

Myth 4: “Do Air Source Heat Pumps only work when its warm outside?”

No. Like any heating system when it is cold, air source heat pumps will need to be on for longer to keep a house warm, how long depends on a number of factors, including how well insulated it is and the desired room temperature. Air source heat pumps can still effectively extract heat from the air even when temperatures drop to as low as -15°C. ¹⁰ Some manufactures in recent years have made air source heat pumps that work at -25°C.

Myth 5: “Do Heat pumps require more maintenance than boilers?”

No. Heat pumps require a similar level of maintenance to gas boilers. Many heat pump manufacturers provide a seven-year warranty if the unit is serviced regularly. Similar to boilers, heat pumps should be serviced annually to ensure they are working efficiently and to extend the lifetime of the system. According to the Energy Saving Trust, a well-maintained and well-operated heat pump can function for 15-20 years or more. ¹¹ (Ground-source heat pumps should last longer because the heat exchanger/collectors are below ground and not exposed to the elements.) This compares favourably with the lifecycle for gas boilers at 8-12 years and contributes to reducing the total cost of ownership.

⁹ [Low carbon heat pumps: debunking the myths - Energy Saving Trust](#)

¹⁰ [Low carbon heat pumps: debunking the myths - Energy Saving Trust](#)

[Daikin who are one of the largest retailers of Heat Pumps in the country also have a heat pump that can work when temperatures hit -25°C outside.](#)

¹¹ [Setting the record straight on heat pumps - Energy Saving Trust](#)

Myth 6: “Is planning permission required for all heat pump installs?”

No. Installation of a single heat pump at a domestic property such as a house, or a block of flats, is usually classed as permitted development and so does not require planning permission ¹² (See Appendix 1.B for more information). There are some exceptions to this e.g. if the land is in a conservation area ([The Town and Country Planning \(General Permitted Development\) \(England\) Order 2015](#) ([legislation.gov.uk](#)) see Appendix 1.C for more information. permitted development rights only apply to installation of a single pump and that PP is required for non-domestic installations.

Myth 7: “Are Heat Pumps big and ugly?”

No ugly ducklings here. The largest part of an air source heat pump system is normally installed outside the property, so other parts of the system will not take up much space inside. The external units of air source heat pumps are normally of a similar size (depending on heat requirement) to the external unit of conventional air conditioning systems, commonly seen outside offices. The units can be colour-coded for aesthetics with different types of screening (provided that air flow is maintained) to match the exterior of a property. Inside the house, the heat pump system’s heat distribution network (e.g. radiators) are not much different from the one used in fossil fuel heating systems.

The external unit requires some space around it to obtain a good flow of air. “Split” systems are connected to an internal unit which is often smaller than an average boiler.

For more information, see Appendix 1.D.

¹² [Planning Permission: Air source heat pump | Heat Pumps | Planning Portal](#)

Myth 8: “Do you need a well-insulated house to install a heat pump?”

No. While a heat pump can be installed in any property to make it affordable to keep warm the home will need a certain level of insulation. The better the insulation the smaller the heat pump you will need to heat your home and the lower your energy bills will be. In some situations, minimum energy efficiency standards are a prerequisite to access government financial incentives.¹³

Myth 9: “Are Heat Pumps expensive to install and run?”

According to the Heat Pump Federation, a fully commissioned air source heat pump system can cost between £6,000 to £10,000*, there may be additional expenditure to upgrade the existing heating system if some of the radiators are too small. It is important to recognise that if the heating distribution system i.e. the radiators, pipework, underfloor heating etc., have been properly sized for a condensing boiler to operate in condensing mode, then it is likely that no upgrades will be required.

*Please note these figures are only estimations.

Similar to any form of heating the cost of running an air source heat pump system will be dependent upon usage, how well insulated your home is and how warm you want it to be. The price of Air source heat pump systems are falling and with the government grants introduced in April 2022 are comparable with installing a fossil fuel system; in some circumstances new more modern efficient radiators are desirable. The new heat pump system will come with warranties, and more efficiency circulation pumps.

There are some financial incentives currently available to assist homeowners towards the cost of installing Heat Pumps. In Greater Manchester, eligible residents can access funds via Green Homes Grant - Greater Manchester Combined Authority (greatermanchester-ca.gov.uk). (Currently available till mid 2022.) There is also the recently announced national heat pump fund, the Boiler Upgrade Scheme, where

¹³ Heat Pump Federation, Residential Consumer Advice: [Microsoft Word - HPF Website Residential Consumer Advice March 2021 r2 \(website-files.com\)](#)

residents can receive £5,000 towards the cost of a heat pump install from April 2022-25 (Heat and buildings strategy (publishing.service.gov.uk)) . For more information, see Appendix 1E.

The biggest potential for operating cost increases comes from how heat pumps are used by residents rather than the technology itself. ¹⁴ If used incorrectly they can be costly. For more information, see Appendix 1F.

An air source heat pump, is 3-4 times more efficient than a gas boiler, potentially saving the resident money on heating bills as they give out a lot more heat than the electricity they use to run. While the Government is committed to moving energy taxes from electricity to gas, currently electricity is more expensive than gas. The higher heat pump efficiency means that the running costs often work out similar, and if an old and inefficient fossil fuel system is being replaced, bills could potentially reduce greatly.¹⁵

(Going 'all electric' will remove the standing charge for gas this saving may vary between £36 and £290 pa, this is only an estimated figure, depending on supplier/deal.)

The UK presently applies a reduced VAT rate of 5% to the installation of air source and ground source heat pumps in domestic accommodation.¹⁶

Myth 10: “Are Air Source Heat Pumps loud?”

No. The technology has advanced considerably, and modern heat pumps are not as noisy as when they first came out in the market and if installed correctly they are no louder than a fridge¹⁷ or a traditional boiler flue. For more information, see Appendix 1G.

¹⁴ 'Heat Pump Running Costs' David Kemp: Procure Plus

¹⁵ [Setting the record straight on heat pumps - Energy Saving Trust](#)

¹⁶ [Energy-saving materials and heating equipment \(VAT Notice 708/6\) - GOV.UK \(www.gov.uk\)](#)

¹⁷ Energy Saving Trust: [Low carbon heat pumps: debunking the myths - Energy Saving Trust](#)

Heat pumps generally produce noise levels of 40 to 50dB(A), similar to a fridge, if background noises are lower than this level then you may hear the air pump, e.g. in very quiet rural areas.

Appendix

1A. The potential added value of ground source heat pumps

‘Many commentators are now increasingly concerned about overheating in new build homes as we improve the thermal envelopes of buildings. Passive cooling, which can be delivered by ground and water source heat pumps, by circulating the ground fluid through fancoils, is an incredibly economically sound way of mitigating against the overheating problem. Putting the infrastructure for this in at original build is the most cost-effective way.

There is also the added benefit of improved flexibility from ground and water source. The efficiency of ground and water source is not impacted by ambient conditions. It tends to be colder and more humid overnight, so air-source performance takes a dip. Therefore, it’s much more attractive to combine ground and water source with time-of-use tariffs for load shifting. Again, if all this is built into the build, it is very cost-effective.

Also, from the developer’s perspective, if the boreholes are funded by a third party, the developer only needs to fund what’s inside the house. We know of many players who are looking to do this – own boreholes and to earn from them over the very long term.

Alternatively, there is a further opportunity for 3rd party involvement by way of a conventional energy centre and district heat network on new build sites. Under this system architecture, the property developer would only need to fund the heating and hot water distribution elements inside of the house, and the Heat Interface Unit (HIU) to supply them. Conventional or low (ambient) temperature networks are particularly attractive if they can tap into sources of waste heat. This will become an increasing focus for LPAs in the future.

Essentially, there is a place for all heat pump architypes, indeed, the Heat Pump Federation was established to make this exact point, but we need to be free to select the most advantageous option in all cases. In some locations, even the District Network Operator will be very keen on the enhanced flexibility of ground source,

rather than having to invest more in distribution capacity to support air-source.’ Bean Beanland, Heat Pump Federation.

1B. Planning Permission

Please note the below is relevant to domestic properties. Planning permission is required in all instances for installation of air source heat pumps on non-domestic premises.

i. Dwelling-house or block of flats¹⁸

Permitted development (planning permission is not required) if:

- The air source heat pump complies with the [MCS Planning Standards or equivalent standards](#);
- The proposed heat pump would be the only heat pump on the same building or within the curtilage of the building;
- The volume of the unit (including any housing) must not exceed 0.6 cubic metres;
- Pump is set in more than 1m from the property boundary;
- The pump is not to be installed on a pitched roof;
- If installed on a flat roof, the pump is set in more than 1m from the external edge of the roof;
- If installed on a wall which fronts a highway, the pump should not be installed on any part of that wall which is above the level of the ground floor storey;
- There are no existing wind turbines on the building or within the curtilage of the building;
- Equipment which is no longer needed for microgeneration shall be removed as soon as reasonably practical;
- The pump shall be used only for heating purposes;
- The pump is positioned to minimise its impact on the external appearance of the building and amenity of the area; and

¹⁸ [Planning Permission: Air source heat pump | Heat Pumps | Planning Portal](#)

- The pump is removed as soon as practicable when no longer needed.
- The pump is positioned to minimise its impact on the external appearance of the building and amenity of the area; and
- The pump is removed as soon as practicable when no longer needed.

ii. Dwelling-house or block of flats within a Conservation Area or World Heritage Site

Permitted development - conditions as above (i), with the addition of:

- Pump not to be installed on a wall or roof which fronts a highway or be nearer to any highway which bounds the curtilage than the part of the building which is nearest to that highway

iii. Listed Building

- Planning permission and Listed Building consent required.

iv. Scheduled Monument

- Planning permission and Scheduled Monument Consent required

v. Building Regulations

- Part E (Resistance to sound)
- Part G (Sanitation, Hot Water Safety and Water Efficiency) – when altering hot water system
- Part P (Electrical safety)
- Permission not required if installed under Competent Person Scheme

Planning portal, building regulations information on heat pumps, see [this webpage](#).

N.B. The above is a summary and reference should be made to the permitted development rights set out at Schedule 2, Part 14, Class G of [The Town and Country Planning \(General Permitted Development\) \(England\) Order 2015](#) ([legislation.gov.uk](#)).

Other considerations: Avoid fixing to any wall of home, resilient/vibration isolation measures need to be considered if locating closing to walls.¹⁹

1C. Non permitted development

Further details on development that is not classed as permitted:

G.2 Development is not permitted by Class G if—

- (a) in the case of the installation of an air source heat pump, the development would result in the presence of more than 1 air source heat pump on the same building or within the curtilage of the building or block of flats;
- (b) in the case of the installation of an air source heat pump, a wind turbine is installed on the same building or within the curtilage of the dwellinghouse or block of flats;
- (c) in the case of the installation of an air source heat pump, a stand-alone wind turbine is installed within the curtilage of the dwellinghouse or block of flats;
- (d) the volume of the air source heat pump's outdoor compressor unit (including any housing) would exceed 0.6 cubic metres;
- (e) any part of the air source heat pump would be installed within 1 metre of the boundary of the curtilage of the dwellinghouse or block of flats;
- (f) the air source heat pump would be installed on a pitched roof;
- (g) the air source heat pump would be installed on a flat roof where it would be within 1 metre of the external edge of that roof;
- (h) the air source heat pump would be installed on a site designated as a scheduled monument;
- (i) the air source heat pump would be installed on a building or on land within the curtilage of the dwellinghouse or the block of flats if the dwellinghouse or the block of flats is a listed building;

¹⁹ Richard Knightley, Environmental Health, Manchester City Council.

(j) in the case of land within a conservation area or which is a World Heritage Site the air source heat pump—

(i) would be installed on a wall or a roof which fronts a highway; or

(ii) would be installed so that it is nearer to any highway which bounds the curtilage than the part of the dwellinghouse or block of flats which is nearest to that highway; or

(k) in the case of land, other than land within a conservation area or which is a World Heritage Site, the air source heat pump would be installed on a wall of a dwellinghouse or block of flats if—

(i) that wall fronts a highway; and

(ii) the air source heat pump would be installed on any part of that wall which is above the level of the ground floor storey.

1D. Different Types of Air Source Heat Pumps

According to the Energy Saving Trust (A guide to air-to-water heat pumps - Energy Saving Trust) there are two types of air-to-water heat pumps: monobloc and split systems. Monobloc systems have all the components in a single outdoor unit; pipes carry water to the central heating system and a hot water cylinder inside your home. Split systems separate the components between indoor and outdoor units. Monobloc systems cost less, are quicker to install and use less space. (Energy Saving Trust)

1E. Heat Pump Fund 2022 and other incentives

The recently announced national heat pump fund, the Boiler Upgrade Scheme, will allow residents to receive £5K towards the cost of a heat pump install from April 2022.²⁰ The scheme, which covers England and Wales only, will run for three years from 2022 – 2025.

²⁰ [Heat and buildings strategy \(publishing.service.gov.uk\)](https://www.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/102424/heat-buildings-strategy.pdf)

MCS²¹ certification is a requirement of this Boiler Upgrade Scheme. TrustMark²² is not.

The grant is NOT means-tested.

It is to be delivered through vouchers, with installers able to make grant applications and redeem vouchers for their customers. (The total available budget is limited, so that the grants will be available on a first come first served basis for three years.)

The £450m fund for the Boiler Upgrade Scheme equates to 30,000 heat pump installations a year through to 2025 – 90,000 heat pumps in total. (The government's actual target of heat pump install is far higher at 600,000 heat pumps per year by 2028.)²³

SCOP (Seasonal Coefficient of Performance) describes a heat pump's average annual efficiency performance. SCOP is used to indicate how efficient a specific heat pump will be for a given heating demand profile/household. The minimum heat pump SCOP requirement has increased from 2.4 to 2.8. This represents a new minimum and reflects the development of new technology that is becoming ever more efficient.²⁴

In October 2021 there was an announcement of a £60million innovation fund to make heat pumps more efficient.

Heat pumps are powered by electricity, once installed residents pay for this through their electricity bill however; this will replace previous fuel costs. Residents may also be eligible to apply for [Domestic Renewable Heat Incentive \(RHI\) - GOV.UK \(www.gov.uk\)](https://www.gov.uk/guidance/domestic-renewable-heat-incentive-rhi) which is payment received to the resident for the heat energy that is produced. (The RHI closes to new applications on 31st March 2022.)

²¹ The Microgeneration certification Scheme (MCS) certifies low-carbon products and installations used to produce electricity and heat from renewable sources. MCS certification is a mark of quality and demonstrates your adherence to recognised industry standards, highlighting quality, competency, and compliance.

²² TrustMark is the only Government-endorsed 'find a tradesperson' scheme in the UK. All TrustMark firms are required to commit to the standards set out in the TrustMark Core Criteria.

²³ [What the Heat and Buildings Strategy means for MCS certified installers - MCS](#)

²⁴ [What the Heat and Buildings Strategy means for MCS certified installers - MCS](#)

1F. Comparative efficiency of condensing & combination boiler

A 12-month study by the Energy Saving Trust of UK household boilers found that A-rated condensing combi boilers were on average 83% efficient and heat only boilers 80.3% efficient. The report concluded, “the in-situ performance of the boiler is significantly less than the rated SEDBUK²⁵ seasonal efficiency”.²⁶

1G. Noise

BS 4142: 2014 +A1 2019 is a standard that details methods for rating and assessing industrial and commercial sound. The assessment of noise of a commercial / industrial nature is commonly based on this standard. It describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes sound from fixed installations which comprise mechanical and electrical plant and equipment.

The assessment method in BS 4142 is based on the difference between the measured ‘background sound level’ without the influence of any industrial noise source, and the ‘rating level’ of the industrial source, at the receiver location.

The background sound level (LA90,T) is the sound level existing in the absence of the ‘specific sound level’ at the receiver location. The specific sound level (LAeq,Tr) from the industrial source can be subject to a certain weighting (penalty) where it displays an identifiable character (such as tonality, impulsivity, intermittency or otherwise distinctive features) to provide a ‘rating level’ (LAr,Tr).

The background sound level is subtracted from the rating level and the difference used to inform the assessment of the effects. BS 4142 advises: ‘The significance of sound of an industrial and/or commercial nature depends upon both the margin by

²⁵ SEDBUK stands for ‘Seasonal Efficiency of Domestic Boilers in the UK’. It is an energy efficiency rating scheme which was developed by boiler manufacturers and the UK government to enable a fairer comparison of the energy efficiency of boilers.

²⁶ ‘Heat Pump Running Costs’ David Kemp: Procure Plus

which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs’.

BS 4142 advises that an initial estimate of the impact of the specific sound be conducted by subtracting the measured background sound level from the rating level and consider the following:

Typically, the greater this difference, the greater the magnitude of the impact.

A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.²⁷

In a domestic context, when installing under permitted development rights, the pump must comply with MCS Planning Standards (MCS 020), or equivalent, with respect to noise output.

There is a differential between domestic and non-domestic installations– depending on the specification and number of pumps, and the context, a Noise Impact Assessment may be required for non-domestic installations, and in a number of cases additional mitigation may be required, e.g. acoustic enclosures, in order to reduce noise output (generally due to concerns regarding night-time hours).

Bean Beanland, Heat Pump Federation:

Heat pump cabinets have improved acoustic performance and all components are quieter in current generation devices. Rubber dampers would assist with

²⁷ Manchester City Council have set out guidelines in relation to noise which can be found in their Planning & Noise Technical Guidance
Noiseandplanning_guidance.pdf

transmissivity if the units were mounted on the building in some way, but not if detached from the building.

Noise Impact Assessments (NIA) are optional and requirements in Greater Manchester will vary. If in doubt it is important that a conversation occurs to see if a NIA is required with your Council's planning and environment health team.

Useful Resources that you may wish to explore:

Electricity North West:

[Heat pumps \(enwl.co.uk\)](https://www.enwl.co.uk)

Information on connecting heat pumps to Electricity North West's network -

[Heat Pumps \(enwl.co.uk\)](https://www.enwl.co.uk)

The Energy Saving Trust:

[In-depth guide to heat pumps - Energy Saving Trust](https://www.energysavingtrust.org.uk)

Heat Pump Association:

<https://www.heatpumps.org.uk/>

Heat Pump Federation:

[Heat Pump Federation | Supporting The Development Of Heat Pumps In The UK \(hpf.org.uk\)](https://www.heatpumpfederation.org.uk)