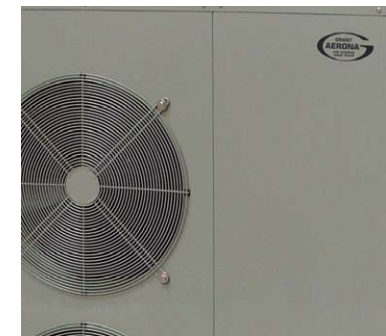


Is an air source heat pump the right choice for my home?



Important information and key things to consider before installing an air source heat pump



The basics...

This guide can help you make an informed choice between a traditional gas or oil fired heating system and one incorporating an Air Source Heat Pump.

Explained in more detail are the important steps that must be taken to ensure a satisfactory installation is achieved, how the technologies differ in their day to day operation and the potential savings that can be gained.



About air source heat pumps...

Air Source Heat Pumps (ASHP) are not a new technology although the models and outputs available today are very advanced in comparison to ones produced years ago. They have, in fact, been in existence for over 50 years and when installed correctly, can make a positive contribution to lowering annual heating costs and reducing CO₂ emissions.

Installation requirements....

For effective application and energy efficient use, ASHP heating systems should only be considered for installation in properties where the following energy saving measures have already been carried out:

- Cavity wall insulation – poorly insulated walls can account for around a third of heat loss from a house
- Lining and insulation of solid walls
- Loft insulation – 270mm thick insulation is the current minimum requirement
- Double glazing
- Draft proofing

Failure to complete these essential steps could result in a reduction in heat pump performance and increased running costs.



Selecting the right heat pump for your property...

An ASHP must be correctly sized to ensure that it can provide the required amount of heat output at the design conditions – typically when the outside temperature is at -3°C . To do this an installer must first accurately determine the heat loss from the property and then, using this information, correctly select the required size of ASHP based on the design outside air temperature.

The heat loss from the property must be determined from a full room by room heat loss calculation for the property concerned and **not** from:

- The output of the previously used gas or oil fired boiler
- An estimated heat requirement based on the floor area or building volume
- The use of a simple heat loss calculator (e.g. Mears calculator)
- The Energy saving Trust 'Whole House Boiler Sizing' simplified calculation method

The declared heat outputs for all ASHP's are based on the average UK outside air temperature of 7°C . However, as mentioned above, a suitable ASHP has to be selected that will deliver the required heat output at the design outside air temperature (typically -3°C) when there is less heat energy in the air for the ASHP to draw from. At -3°C , the output of the ASHP will be reduced (typically to around 80% of the declared output). It is this lower heat output value that must be used when selecting the size of ASHP to be installed.

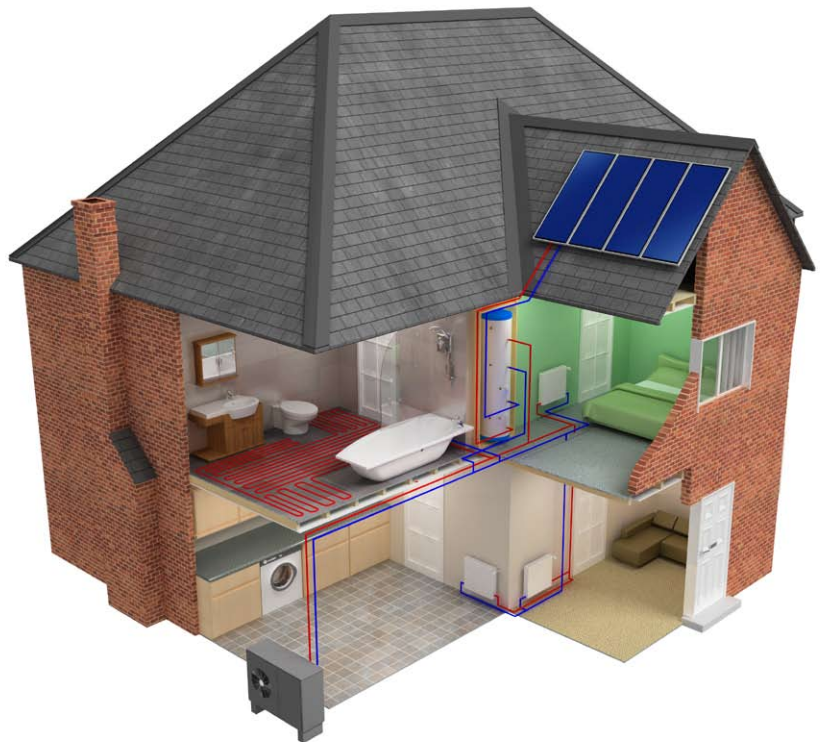
The installer should ensure that any proposed ASHP system has been correctly sized and the unit selected in this way before proceeding with the installation.

Building regulations...

The installation of an ASHP system is covered by the Building Regulations (in England and Wales) - and the Scottish Building Regulations. Correct application to the Local Authority Building Control Department should be made prior to any work being started. The installer should inform the householder of any relevant applications to Local Building Control and also check that completion documents are obtained at the end of the installation as these may be required at a later date e.g. for the sale of the property.

Planning permission...

In addition to the above, householders should check with their Local Authority Planning Department prior to any work commencing, as in some cases planning permission may be required for the installation of an ASHP.



The heating system...

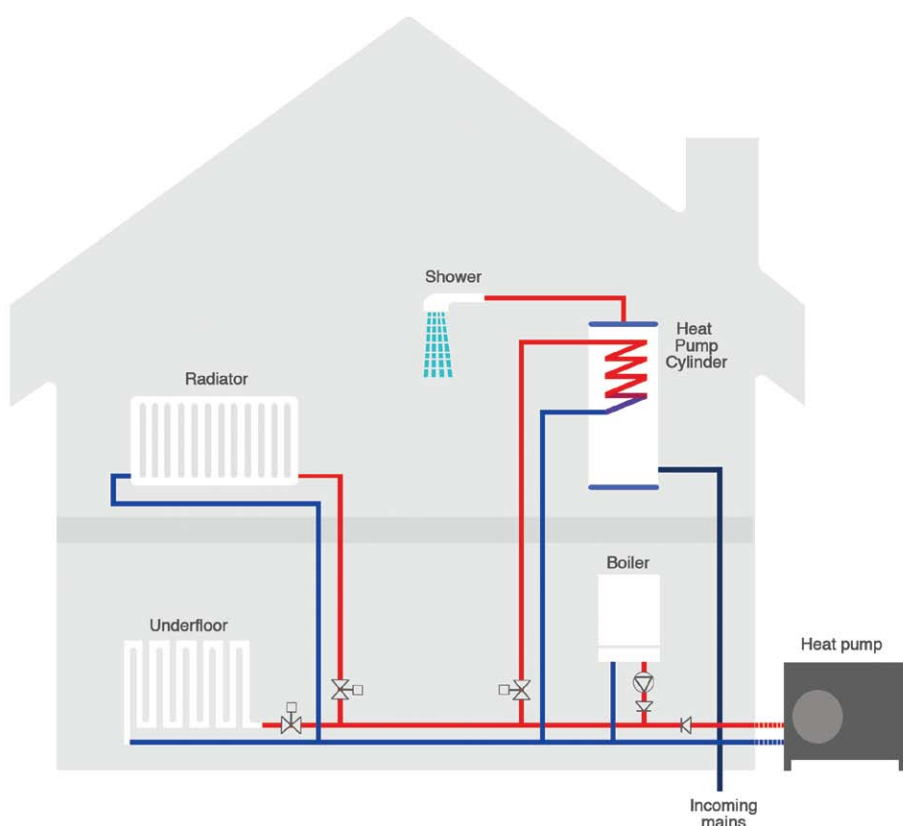
Water heating...

ASHP's should only be used with dedicated 'Heat Pump' type indirect hot water cylinders. These cylinders are specifically designed for use with ASHP's and have a larger heating coil to compensate for the lower water flow temperature from the ASHP, enabling them to heat up more rapidly.

The use of a 'conventional' indirect cylinder with an ASHP is not recommended as this will result in significantly longer hot water heat up times and greater energy usage.

The recommended minimum temperature for hot water heated and stored in a hot water cylinder is 60°C. However, during colder weather it can be inefficient to use an ASHP to heat water in a cylinder all the way up to 60°C. This is due to the reduced efficiency of the ASHP at the higher water flow temperatures required to achieve this. A more efficient method is for the ASHP to heat the water to around 45°C and then use an electric immersion heater (fitted in the cylinder) to raise stored hot water temperature the last 15°C up to 60°C. In the case of the Grant Aerona, it is recommended to utilise the Grant Domestic Hot Water Boost Kit in combination with a Grant Heat Pump Cylinder.

A bivalent heating system



Bivalent systems...

Not all heating systems use only an ASHP to provide all the heat (known as a monovalent system). The use of an existing gas or oil-fired boiler to provide a back-up heat source for the ASHP during severe weather conditions (a bivalent system) is possible. This may be necessary where the property concerned is either very large or has a high heat loss.

A bivalent system can be achieved by coupling an existing boiler to the ASHP, controlling the boiler operation by means of the built in ASHP temperature sensors (Grant Aerona only) and the addition of some simple controls - see diagram opposite. Alternatively, it could also involve the use of a thermal store or buffer tank to allow the ASHP and boiler to be connected together. Such a system can also incorporate other heat sources such as solid fuel or wood burning appliances (and possibly solar thermal) all contributing to meet the heating and hot water requirement for the property.

Running costs...



Electricity consumption....

Installers should encourage householders to investigate lower electricity tariffs with their energy supplier (e.g. Economy 10) or alternatively look at another supplier.

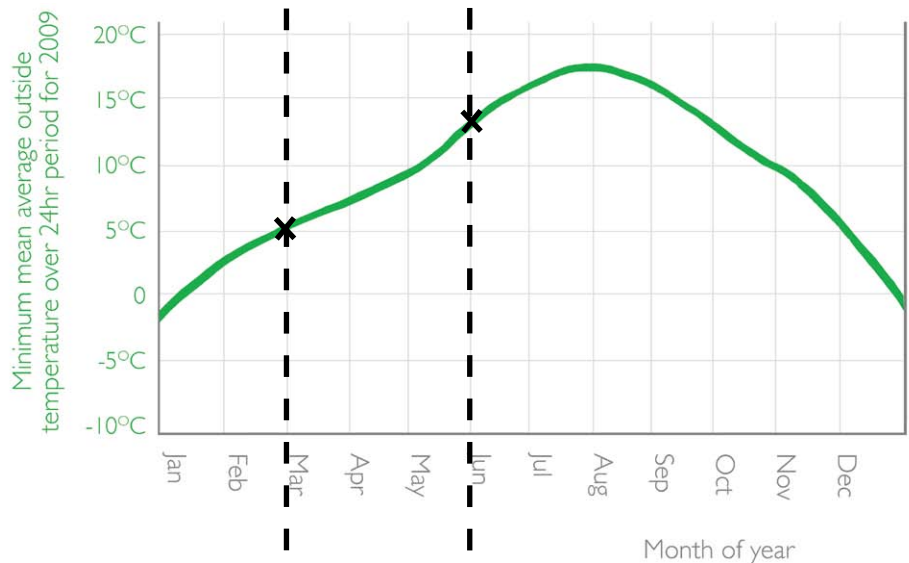
Household electricity consumption will increase using an ASHP. However, there will usually be NO gas or oil bill to pay to heat the house, unless a bivalent heating system is chosen. Householders should therefore consider the overall cost of heating, i.e. the increased electricity cost compared with the saving in oil or gas bills.

As with all domestic heating systems, running costs will always be greater during the winter months. Any comparison of ASHP running costs with conventional heating appliances should be made over the whole year - see graphs below.

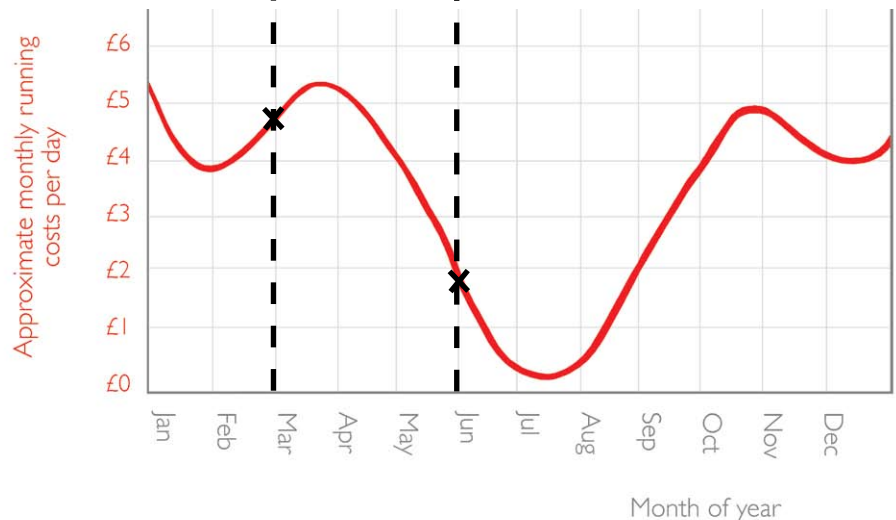
As a guide to the graphs, with a minimum mean outside temperature of 5°C in March, running costs of a Grant Aerona 15.5kW air source heat pump would be approximately £4.80/day (8 hours running, assuming 45°C flow/40°C return water temperature). Whereas, in June when the average minimum mean temperature is slightly warmer at 13°C, running costs reduce to approximately £1.90/day.

Mean average outside temperatures over a 24hr period, determined from the highest and lowest monthly temperatures in 2009.

Source: www.metoffice.gov.uk



Typical running costs for a Grant Aerona 15.5kW air source heat pump, based upon the unit operating for 8 hours per day, on a tariff of 12 pence per kW/h.



Information to remember...

How air source heat pumps operate....

ASHP systems typically operate at lower water flow temperatures so the system will have one or more of the following characteristics:

- ❑ Underfloor heating set at around 35-40°C
- ❑ Larger radiators than those that may have been fitted with a previous system using an oil or gas fired boiler, to provide the required heat output when operating at lower system water temperatures.
- ❑ Radiators that will feel cooler to the touch compared with previous conventional heating systems.

ASHP systems will take longer to get the house up to temperature after they are switched on. Therefore, heating system timers or programmers **MUST** be set to switch the system on earlier to allow a longer heat up period.

A better and more energy efficient way to control a system is to use a programmable room thermostat in place of a timer and room thermostat. It must however be understood that a programmable room thermostat does not switch off but changes the thermostat setting from normal daytime setting (typically 21°C) to a setback temperature at night or when the house is unoccupied during the day (typically 12 -15°C). This keeps the building fabric warm constantly, shortening warm up times. This therefore reduces the amount energy required from the ASHP to raise the building core temperature to the desired level.

Cold weather icing...

As ASHP's extract heat energy from the outside air drawn through the unit, under low temperature conditions (particularly in winter months) condensation will form and freeze on the finned evaporator coil of the unit. This is a normal occurrence and the ASHP is designed to cope with this. The control system will detect when the coil has iced up and will automatically enter a 'defrost' cycle.

During this short 'defrost' period the fan will stop and the ASHP will cease supplying heat to the heating system in order to melt the ice. On completion the fan and ASHP will automatically restart and resume supplying heat to the heating system. This will not adversely affect the building temperature.



Noise levels...

ASHP's use either one or two fans to draw air through the unit to extract the heat energy. These fans will produce a moderate sound level that might be perceived by some as a nuisance, either by the occupants of the building with the ASHP system or the neighbours. In particular this may be a greater problem at night when the background noise level is much lower.

Careful choice of the ASHP location can help to minimise or eliminate the potential nuisance, e.g. not too close to bedroom windows (particularly with a bungalow) or too close to a neighbours boundary or property. The installer should check and discuss with the householder the possible siting options before proceeding with the installation.



Pre-quotation Check list...

Have you considered that...

- Energy saving improvements may be needed to make any potential heat pump installation as economical and as efficient as possible.
- System improvements are likely to be required such as installing underfloor heating and/or upgrading the sizes of pre-installed radiators.
- Where electricity is the only energy source used, a change to the electricity tariff might be possible enabling the heat pump to run more economically e.g. Economy 10.

Ensure your installer...

- Has carried out accurate calculations to ensure the heat pump is correctly sized to your property's needs.
- Explains the best way for the heat pump to operate ensuring that the appliance is run as efficiently and as economically, as possible.
- Advises you on any energy saving improvements that may be needed.

Have you checked whether...

- Your installer is fully conversant with this technology and has undertaken a manufacturer's training course.
- Local Authority Planning Permission is required prior to any installation work being carried out along with any Building Regulation compliance.
- If you intend to claim any potential financial incentive, your installer is MCS Approved.
- Noise and general operation of the heat pump will not cause you or your neighbours problems now or in the future.
- You require a hot water boost kit fitted to increase the domestic hot water temperature output to your requirements.

Notes:

Further information is available to download from our website...



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