

SUSTAINABLE WHADDON

Opportunities to enhance ecology and biodiversity
Opportunities to reduce our carbon footprint

DOMESTIC HEAT PUMPS

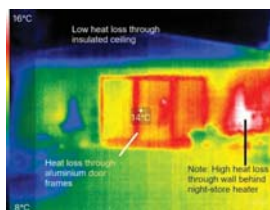
If you are looking to reduce your carbon footprint and to move away from heating your home with an oil-fired or LPG boiler, then one option might be to install a domestic heat pump. There are two basic types of heat pump; air-source heat pumps and ground-source heat pumps, and both operate in a similar way that has been likened to a fridge in reverse. They do this by taking low-grade heat from the air or ground, and compressing it to upgrade it to medium grade heat suitable for use in heating both internal spaces and hot water. There is therefore no boiler as such, and the equipment only requires electricity to operate the pumps, fan and compressor. The most common, and easiest to install, are air-source heat pumps. These need to be located externally, where air can be passed over the heat exchanger unit. Ground source heat-pumps take their heat from the ground, and require either a long run of pipework laid in a continuous zig-zag under a lawn, or a borehole to collect heat from depth.



An air-source heat-pump fitted to the side of our house in Whaddon

The temperature of the hot water output from a heat pump is not as high as that from a conventional boiler, and heat pumps therefore work well with underfloor heating, where a large area can be heated to a lower temperature. However, they can also be used with conventional radiators, but it is then necessary to increase the surface area of the radiators to compensate for the lower operating temperature. In a retro-fit installation, it is likely to be necessary to change single panel radiators to double-panelled, and double-panelled radiators to triple panelled. Similarly, a larger heat-exchanger is required in the hot water cylinder to heat the domestic hot water. Because heat pumps heat the radiators to a lower temperature, they are also designed to operate continually and to heat the house 24/7, though they drop to a lower operating temperature overnight. Their lower out-put temperature makes heat pumps less suited to heating a house up from cold in the morning and evening, which is often the conventional set-up for controls on gas or oil-fired boilers and where the occupants are out at work or school during the day, and a heat pump will take longer than a conventional boiler to bring a

house up to the desired temperature. With a well-insulated home, a heat pump can keep a house up to a pre-determined temperature without incurring excessive running costs and, with the increase in home-working, many more houses now require heating throughout the course of the day. Upgrading insulation in houses will be the subject of a separate, future article, but photographing your house with a thermal imaging camera can help identify areas of significant heat loss that would benefit from additional insulation.



Examples of a thermal imaging photographs with different aged buildings and types of construction, that illustrate the changing standards required by the Building Regulations. Left a building from the 1990s, Below right - our house built in 2003.

By way of an example; we live in a 3-bedroom, timber-framed house built in 2003 that is relatively well insulated. In December 2018 we changed our heating from an electric-fired boiler running conventional radiators, and with the controls set for heating in the morning and evenings, to an air-source heat pump set to run continually at 20° C during the day and 16° C at night. The work included changing all our radiators for ones with a larger surface area and, subsequently, we also changed our hot water cylinder to one with a larger heat exchanger (it proved a false economy not to have done this at the time). Prior to installing the heat pump, our total annual energy consumption for heating, hot-water, lighting and cooking was 9,000 KWh, but after the changeover our energy usage dropped to 4,500 KWh per annum. So, a 50% reduction in energy usage, but with heating now provided throughout the day. Since this coincided with our retirement, it also suited our change in lifestyle. Electricity prices have increased over recent years, but so too has the price of oil, and we believe our total energy costs per annum remain competitive. Heat pumps are manufactured with a variety of out-put capacities, and there will be a heat pump to suit most domestic installations, though very large, or poorly insulated houses may require two heat pumps working together. Currently, grants of up to £7,500 are available from the Government towards the cost of installing an air-source or ground-source heat pump (subject to conditions) and we benefitted from such a grant when we installed our heat pump.



David Grech, on behalf of Sustainable Whaddon.