



By Tim Pullen

## Heating Systems

### Gas or Oil-fired Boilers

All new condensing boilers are at least 85% efficient. Boilers are complex machines with components that get tired and worn out. Even with regular maintenance after 10 to 12 years efficiency will have dropped to a point where the boiler needs replacing. Old, non-condensing boilers may have started out at 65% efficient and gone down from there.



### Biomass Boilers



Typically these are advertised as 90%+ efficiency but clearly the actual efficiency will vary with the quality of the fuel. Wood pellet is a processed fuel with a moisture content something below 15% so 90% efficiency should always be achievable. Logs, on the other hand, can have an unknown moisture content. A log felled a year ago and air dried could have a moisture content as low as 30% but personal experience shows it can also be a good deal higher. Efficiency, in terms of the amount of heat put out from a given amount of fuel, is then very much lower than the advertised 90%.

Whatever the fuel, the level of efficiency will not vary greatly over time. So these boilers tend to have a useful life of 20 to 30 years.

### Heat Pumps

Efficiency is expressed as a Coefficient of Performance (COP) which is a measure of the amount of energy put in compared to the amount of energy put out. So a COP 4 machine will require 1kW of electricity to produce 4kW of heat.

A heat pump extracts heat from a given source (air, earth or water), amplifies it and moves it to another position. The COP is a measure of the amount of energy needed to move that heat under known conditions, and the COP will vary with those conditions. Generally the COP as advertised assumes a source temperature (i.e. the temperature of the air, ground or water the heat is being extracted from) and a

demand temperature (i.e. the temperature of the water you want). The closer together those two temperatures are the higher the COP.

The advertised COP is generally based on a source temperature of 7°C to 10°C, with a demand temperature of 35°C to 40°C. If you want your heat pump to deliver hot water at 65°C then you will get a different, and maybe significantly lower, COP.

To be clear, WeatherWorks are big fans of heat pumps, but we don't necessarily believe everything the suppliers tell us. Treat with caution anyone who tells you that their heat pump will deliver water at 65°C and maintain a good COP.