

## GSHPs vs oil fired boilers - V2

Oil boilers has generally been the first alternative fuel used to heat a property when the building is not on mains gas. However as heat pump technology has evolved and prices of oil increased, heat pumps are now becoming a more viable option for off mains gas areas.

### Cost of oil

There are a number of factors that make oil prices much more volatile than the average products you will buy down your high street. The price of crude oil is particularly sensitive to the laws of supply and demand which can vary worldwide with events such as fluctuations in the economy, political unrest and extreme weather events. Demand has been hit hard more recently due to the slowdown in the global economy and with credit drying up. Less of us are spending money on cars, petrol and holidays so there is reduced demand for fuel. Supply can be influenced by the Organisation of Petroleum Exporting Countries (OPEC) who will cut output in order to strengthen prices by reducing supply.

At the current time oil prices have dropped due to the recession and the reduction in demand for oil, however leading industry analysts are predicting as soon as we start to climb out of the recession prices of oil will increase to record highs. There is also some analysts who believe that the world has passed 'peak oil' which is the point in time when the maximum rate of global petroleum extraction is reached, after which the rate of production enters terminal decline.

Electricity prices as used to drive a ground source heat pump, do not suffer from the same volatile prices and by making the use of off-peak tariffs in well insulated buildings, the running costs can be significantly lower than those for oil boilers.



### Facts at a glance:

**Cost of oil** - Oil prices are very volatile and depend upon many factors. Prices have doubled and halved over the last two years. Prices are expected to increase as the recession draws to an end and the demand for oil increases. Heat pumps installed in the correct application can still show running cost savings against oil fired boilers.

**Oil Storage** - Bunded tanks are required to store oil on site. These take up room, can be a security issue and can be seen as an eye-sore. GSHP utilise electricity hence no storage is required.

**Life of products** - Condensing oil boilers have an approximate life of approx 7 to 10 years. GSHP have a design life of 25 years

**Maintenance** - Oil fired boilers require regular maintenance due to the dangers of combustion, as GSHP do not use combustion maintenance is kept to a minimum

**Sizing** - As energy requirements are getting lower for modern houses, oil fired boilers are oversized for the application resulting in poor efficiencies and reduced life.

### Storage of oil

Oil needs to be stored on site before being used in the boiler. This is generally done within a bunded oil tank. A bunded tank basically a tank within a tank; a large tank would house a small tank inside it. The larger tank would be able to hold 110% of the capacity of the smaller tank. This is done to protect the surroundings of the tank from any oil spills or leakages. It is important that there is sufficient space for such a tank and that there is access. With rising prices the incidences of oil being stolen is already increasing and it is important that sufficient security measures are applied.

As ground source heat pumps are run using electricity to drive the heat pump, no storage of fuel is required on site, providing peace of mind, additional space and removal of something that many people feel is an eye sore.

### Maintenance

Due to the fact that oil boilers use combustion in their heating process it is important that the boilers are serviced and maintained correctly. Failure to do this can cause the production of poisonous gases such as carbon monoxide. As ground source heat pumps do not use combustion, there is no risk of poisonous gases being emitted and as moving parts are kept at a minimum and are non-serviceable maintenance is kept at a minimum if not removed.

### Product Life

Oil boilers supplied now are generally the 'condensing' type due to the higher efficiency. Oil fired condensing boilers generally have a much shorter life (7 to 10 years) than traditional non-condensing boilers (which often last 20 years or more) as the heat exchangers can rot out quickly due to the acidic condensate. Ground source heat pumps are generally accepted to have a design life of approximately 20-25 years due to their lack of moving parts.

### Sizing

As buildings become better insulated, the size of the heating appliance reduces. For example, an average 80m<sup>2</sup>, three-bedroom house should need just 4kW of peak space heating. This should become around 3 kW from the end of 2005. To provide instant hot water demand, a combi-boiler, whether oil, LPG or mains gas, needs to be 24kW, and some are 28 kW. This is because it takes a lot of energy to give the required instantaneous temperature rise. If a 24kW oil combi-boiler (whether condensing or non-condensing) is fitted to an 80 square metre new house and connected to underfloor then only 4kW (peak maximum) will be required, this being  $4/24 = 16\%$  of the capacity that will ever be used. Oil boilers have a *downturn ratio* of just 25% (ie. this is the lowest output they can give without short-cycling) so it soon becomes apparent that the efficiency and life of the boiler is severely compromised. The SEDBUK rating ([www.sedbuk.com](http://www.sedbuk.com)) rating for boilers shows some oil combi's giving efficiencies as high as 93%. In practice, in an 80m<sup>2</sup> house it is pretty obvious that the efficiency levels are likely to be less than 50%. Obviously, a new 80m<sup>2</sup> house only needs the full 4 kW of space heating in very cold weather, and a more typical figure might be just 2.5 kW, giving a required downturn ratio of 10%. This is simply not possible with conventional condensing boiler technology at anything like the levels of efficiency that SEDBUK testing suggests. Sadly, there are no boiler manufacturers that offer, or are even developing a 4 kW thermal output oil fired boiler, let alone a condensing model of this size. It is becoming abundantly clear that condensing oil-combi boiler technology is fundamentally incompatible with low-energy well insulated houses with underfloor, which is what will be built in the future.

If the property is new build with underfloor throughout, with land available and off the gas main, then the case for fitting a ground source heat pump before an oil boiler is stronger than ever.