

# Heat Pumps

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## The retrofit revolution

Rapid development of the technology means that heat pumps are a definite option for retrofitting industrial and commercial buildings, believes *Garry Broadbent*

The transition to low carbon electricity generation within the UK seems to have happened over an extremely short period and we are now regularly seeing carbon intensity figures for electricity generation of circa 200gCO<sub>2</sub>/kWh.

A dramatic increase in the application and use of clean electricity generating systems in the form of wind and solar has made a real impact over a very short space of time reducing carbon intensity levels from over 500gCO<sub>2</sub>/kWh less than ten years ago.

Clean electricity generation means that industry and commerce now have an opportunity to use this low-carbon power in ways that may not have been practical or attractive a few years ago where electricity contained a much higher level of carbon content.

Nowhere is this more relevant than in the application of heat pumps. It is clear that if we have cleaner electricity then heating via electricity will be less carbon intensive than it would have been even a few years ago. A heat pump is the most efficient means of using this low-carbon electricity to produce heat. As a result, a definite retrofit opportunity has been created to increase carbon efficiency.

### Competing with boiler

In summary, a heat pump would historically have had difficulty competing with a fossil-fuel boiler based on carbon intensity. However, the application of heat pumps can make sense based on the use of cleaner input power.

The result of this is that the application scope for heat pumps has widened significantly and this is particularly relevant where commercial and industrial retrofit applications are considered.

Perhaps the title of this piece is a touch dramatic but if we take revolution as its dictionary definition meaning a 'sudden change' then



A 200kW 80C air source pure thermal low GWP heat pump

we could definitely say that this is the case where heat pumps are concerned.

Perceptions and ideas are quickly changing based on the capability of high temperature heat pumps that are now able to operate on a straightforward retrofit basis within existing heating and hot water systems. Therefore, it is clear that the opportunity to utilise heat pumps within existing commercial buildings on a retrofit basis offers real potential to reduce carbon and importantly utilise clean electricity.

So this leads us directly into the question of retrofit heat pump use and can these units be practically applied in this way?

Any heat pump advocate would recommend that in a perfect scenario a heat pump system be

designed to operate as far down its output temperature curve as possible in order to create the highest levels of efficiency.

However, we must consider that it is not practical to work on a 45°C or 55°C maximum flow temperature basis within most commercial retrofit applications and therefore a system must be considered that is able to operate with flow temperatures of 70°C and above when necessary.

### Retrofit applications

Several retrofit application options are available on either a heat-pump-only or heat-pump-boiler hybrid basis. Each option can be configured to maximise value and efficiency to match the needs of the particular application using heat pumps that

are designed to operate with output temperatures to 80°C and above.

The base line with regard to any commercial retrofit application is that to modify the existing heating system infrastructure within a building can be impractical. For this reason a heat pump that can operate at the same flow temperature and conditions as an existing fossil fuel boiler can be an ideal solution. This higher temperature capability provides a way to utilise heat pumps via very straightforward integration within an existing heating or hot water system.

As an example the OHT air-source range provided by Pure Thermal delivers 80°C high temperature capability with a low global warming potential (Low GWP) refrigerant system.

The Pure Thermal Application Team commented that they are regularly providing heat pump selections with 75°C output flow temperatures where a heat pump is required to be integrated within a heating system that has an existing boiler. They also noted that many of the systems are hybrid where a boiler is used to operate with the heat pump in ambient temperatures below for example 2°C which reduces heat pump capital costs but importantly enables the high temperature heat pump to provide primary heating duty for the bulk of the heating season.

It is interesting to note that these high temperature heat pump ranges have the ability to deliver upwards of 900kW heating capacity in a single system with an 80°C output flow which is a real step change from how heat pumps have been conventionally viewed.

The heating capacity and higher temperatures available from these ranges mean that heat pumps can now be considered as a definite retrofit option as we now enter this period where the decarbonisation of heat is a rapidly developing priority. ■

Pure Thermal OHT air source range performance

