

# COMMERCIAL HEATING FOR SCHOOLS



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**“THE QUALITY OF SCHOOL BUILDINGS HAS AN IMPACT ON PUPILS’ LEARNING EXPERIENCE, AND ULTIMATELY ON ATTAINMENT LEVELS AND TEACHER RETENTION.”**

So states the House of Commons Committee of Public Accounts report on ‘The condition of school buildings.’ That quality extends beyond the fabric of the school building and into areas such as heating. School buildings have suffered from years of underfunding, leaving many with out of date heating systems that are inefficient and have high level of emissions. Replacing those systems is increasingly becoming a priority, but with school buildings being so diverse, what’s the best approach and why?

## WHAT STATE ARE OUR SCHOOLS IN?

According to the independent National Audit Office (NAO) and the Department for Education (DfE), spending on school buildings is low in historical terms and low compared with levels of need. The NAO states that the largest areas of need in terms of school repairs are electrical services (£2.5 billion to fix) and mechanical services, including heating and ventilation (£2.1 billion to fix). In England in 2023–24, around £1.8 billion is devoted to school maintenance and repair, which is clearly not enough. This comes on the back of a long term decline in spending on school buildings – **28% in cash terms and 46% in real terms between 2009-10 and 2022-23 according to the DfE.**

## THE DUAL CHALLENGES OF HEATING A SCHOOL

With inadequate capital funding available to schools over several years now, many heating systems have outlived their expected working lives and are not performing well. Some remain in operation purely by the skill of the operator and those doing the remarkable job of maintaining them well past their 'expiry' date.

But it's not just the age of many of these heating systems that mean they need to be replaced. Other factors are in play, notably energy costs.

Schools and universities represent 36% of total UK public sector building emissions. With Net Zero in 2050 – and with a number of local authorities working to an earlier date than this – the race is on to make schools carbon neutral. Replacing old fossil fuel burning heating systems will have a big positive impact on this.

## THE STARTING POINT FOR A SCHOOL HEATING SYSTEM

Bearing all these aspects in mind and more (what if the school has its own swimming pool, for example?), there's no single 'template' for designing a school heating system. The starting point for each school has to be a comprehensive

survey of the existing building services and must also address the nature of the building, including the fabric, insulation and lay-out. It should encompass occupancy levels / usage.

From here though, the heating options are usually a relatively straightforward choice between condensing boiler or heat pump, or a mixed 'hybrid' solution.

## HEAT PUMPS: FOR MORE ENERGY EFFICIENT BUILDINGS

Heat pumps utilise the free energy in the air to heat water, even when that air temperature is as low as -20°C. When heat pumps are partnered with a renewable electricity supplier, heat generation is 100% carbon neutral.

Heat pumps are up to a third more efficient than traditional gas boilers, with potential for even further efficiency as the technology develops, meaning they require less energy to run. Our natural refrigerant ECOMOD CO2 heat pumps have a seasonal co-efficient of performance (CoP) rating of 3 or better.

Funding for heat pumps in schools is available through the Public Sector Decarbonisation Scheme, making them an appealing option.



**Ysgol Tir Morfa Community School** in Rhyl, North Wales has two Ideal Heating 32kW ECOMOD monobloc air source heat pumps heating the newest part of the building. These are running in cascade into a 500 litre buffer. For Denbighshire County Council, this takes them one step further forward in their journey to become a carbon neutral council

by 2030. Gareth O'Loughlin of GGS Heating, that installed the heat pumps, has been pleasantly surprised by just how easy it has proven: "Installing the ECOMOD heat pump has been generally no different to installing the system with gas boilers. They both work in generally the same way. It's just how the heat is derived that's the difference from the gas. I'd definitely recommend Ideal products and their commercial side of it especially. We've had nothing but help. We've always found them easy to work with and the technical teams helpful."



Heat Pumps are also ideal for use in heat networks on larger education estates, such as universities and colleges.

But heat pumps will not be suitable for all school buildings. In reality, only those buildings that are thermally efficient can reap the benefits of a heat pump. That's because heat pumps work at lower temperatures to boilers. If the school building is an old 'leaky' one or has insufficient insulation, the heat will escape too rapidly and the heat pump system will require more energy to keep at the desired temperature, meaning the heat pump is then not operating at maximum efficiency.

### **BOILERS: MAXIMISE ENERGY EFFICIENCY**

For school buildings that aren't suited to heat pumps, modern condensing boilers are the best option.

For new school buildings, under the revised Building Regulations Approved Document L, natural gas boilers must have a Gross Seasonal Efficiency (GSV) of 93% for single boilers with less than 2MW output and to 88% to those with more than 2MW. For oil boilers, the GSV is 93%.

When it comes to existing buildings, compliance to Building Regulations is required in buildings with a floor area greater than 1000m<sup>2</sup>, where the proposed extension is both greater than 100m<sup>2</sup> and more than 25% of the total useful floor area of the building. It also applies to existing buildings where new fixed building services are being installed, or where there is an increase to the capacity of fixed building services.

Building Regulations Approved Document L also sets a maximum flow temperature of 55°C for wet space heating systems: "all parts of the system, including pipework and emitters, should be sized to allow the space heating system to operate effectively and in a manner that meets the heating needs of the building, at a maximum flow temperature of 55°C or lower." As well as encouraging the use of heat pumps, this lower flow temperature enables condensing boilers to operate at their most efficient. Condensing boilers can recover heat via the flue and use it for pre-heating purposes. They can only do this when the temperature of the water returning to the boiler is less than 54°C; it's most efficient if the temperature is 30°C.

Most existing older boilers in place in schools, however, are set up to output at 80°C and return at 60°C so, whilst the boiler works, it does not condense and that valuable extra heat is not recovered and reused. Updating the heating system, if it is a viable option, and replacing old boilers could provide schools with savings on their energy bills, so can be a good investment, especially at a time of high energy prices.

Our best-selling Evomax 2 and Imax Xtra 2 commercial boilers are extremely popular in



school buildings. In fact, Evomax 2 is the UK's number one wall mounted commercial condensing boiler thanks to its high efficiency and low emissions of NOx <40mg/kWh (Class 6). It has up to 99.6% full load efficiency and up to 110% part load efficiency, can operate at up to 30° Delta T, and boasts a high turndown of 5:1. What's more, Evomax 2 and Imax Xtra 2 commercial boilers come with a full range of accessories, including frame and header kits when installing the boilers in cascade.

## HYBRID SYSTEMS: BRIDGING THE GAP

For many schools, we are seeing a combination of low carbon heating technologies adopted. This enables schools to make the most of their heating systems in terms of efficiency and decarbonisation. That's why we have designed our ECOMOD heat pumps to be installed alongside other Ideal solutions, such as the Evomax 2 and the Imax Xtra 2 commercial condensing boilers, to build a low carbon hybrid heating system.

As part of its sustainability strategy that embraces responsible energy management, **Tinsley Meadows Primary School** in Sheffield has taken this hybrid approach. They have installed two Ideal Heating Commercial ECOMOD 14kW air source heat pumps running in a hydraulic cascade. These have been installed alongside two wall hung Evomax 2 40kW commercial condensing boilers, for a low carbon hybrid heating system, offering lower running costs and comfort all year round. Chris Snowden, Technical Operations Manager at Service 2 that installed the system, explains the hybrid approach taken at Tinsley Meadows: "the ECOMOD heat pumps have been designed to be the main heating source, backed up by the new gas boilers at times of heavy demand. It means the school always has sufficient heating without relying solely on gas."



## CONCLUSION

**School buildings must be a safe environment in which to learn and work, but they also need to be a comfortable one. Installing new heating systems not only provides the level of warmth required, but will help schools reduce energy usage and emissions, ultimately helping pave the way the Net Zero.**



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