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Out of sight, out of mind?

A report on the heating and hot water
challenge in UK schools.

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Introduction

Challenging times for British schools



It has been well-documented how the UK's schools – representing one of the country's most established service sectors – are currently facing a resource dilemma. Cuts to funding and rising cost pressures leave many in a position where they need to do all they can to maximise budgetary efficiencies. While staff and operational costs are on the rise and forecast to increase further over the coming years, Government funding is expected to be cut by as much as £3 billion by 2020.

With pressure on budgets arguably at an all-time high, there is a pressing need for schools to look at the cost-saving measures they can introduce to reduce unnecessary expenditure. With that in mind, energy consumption and associated costs have emerged as a potential area of intense focus with plenty of potential for improvement.

To many, energy usage is all about keeping the lights on, but with nearly 50% of a typical school's energy used solely for heating, it is high time that the education sector begins to explore more efficient ways to heat its buildings.

We know that heating and hot water are fundamental to the running of a school, but how can we improve energy efficiency, and deliver quicker payback periods for those schools reluctant to proactively overhaul their dated heating systems?

This white paper will firstly take a look at the burning issues schools are faced with when it comes to heating their buildings in a reliable, efficient, and most importantly, cost-effective way. From thereon in, we will explore exactly how the latest condensing boiler technology, technical support, and finance options can go some way to reducing the strain heating can place on operational budgets. Finally, we'll take an in-depth look at one school which has successfully transformed their heating and hot water provision.

By viewing heating and hot water technologies as much more than 'out of sight, out of mind' appliances, a school can make huge improvements to energy costs, reliability, and comfort levels for staff and students. This report explains how it can and should be done.

Nicola Fisher,
Marketing Manager at Bosch Commercial and Industrial

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Results

An education in the management of heating and hot water

The harsh reality is that a school without heating or hot water is forced to close. With this in mind, we wanted to gain an insight into how UK schools are currently financing and managing their heating and hot water provision and the key challenges they face.

In order to do so, contractors, consultants, governors, local authorities and head teachers were invited to take part in a nationwide survey investigating the current state of the heating, cooling and hot water landscape within schools and educational buildings in the UK. This is with the intention that the results will help schools, colleges and educational facilities to enhance their heating comfort and energy performance.

46%

of educational professionals agree that head teachers and governors are responsible for the smooth running of a school's heating system.

When compared to the 32% of respondents who suggested that the local authority is responsible, it's clear that the responsibility of managing a school's heating system has shifted significantly in recent years. Head teachers and governors are now in a position where they have to juggle energy management and budgets amongst a long list of other responsibilities. It is therefore crucial that school leaders are aware of the most efficient technologies available to them in order to safeguard their school's heating provision – and energy bills – for years to come.

33%

of respondents have encountered problems within the last six months with the heating system within their school or educational building.

Problems with heating systems can unfortunately be a frequent bugbear for the education sector, whether due to regular maintenance issues or complete breakdown. The fact that such a high proportion of schools have experienced problems so recently indicates the need for the bar to be raised when it comes to reliability. Proactive replacement of dated, inefficient heating systems is a start, but just as important is a robust maintenance regime which sees the boilers serviced every year.

Schools are having to contend with unreliable heating systems currently in place, which can leave them in a particularly vulnerable position where they can find themselves unable to keep the school open.

What's more, with unexpected breakdowns, schools are forced to make a large investment on new equipment as quickly as possible to ensure minimal disruption to students and staff, sometimes with the added cost of a temporary solution. Making a distress purchase under pressure, off the back of an unexpected breakdown, could mean that school leaders aren't considering the most appropriate technologies for their school's needs.

43%

conclude that unavoidable or unforeseeable breakdown is the most common cause for heating system breakdown in schools.



39%

believe that finding the funds for replacement equipment is the most problematic issue when it comes to resolving a heating system breakdown.

A significant proportion of decision makers in the education sector feel that finding the funds for replacement equipment in the event of a breakdown is more of a concern than both disruption to students' learning and finding a suitable company to carry out the work. This stresses the ever-increasing financial strain that schools face and the pressure that is felt in the event of an unexpected breakdown. Energy consumption can be particularly high in secondary schools, so these educational facilities need efficient solutions with attractive payback periods.

Despite the cost of heating and cooling a school taking up a significant amount of a school's fuel expenses, there seems to be little budget set aside to ensure a school's heating system is running as it should. As such, it could be that heating systems are being installed as a fit and forget solution,

Energy vs. Maintenance spend

38%

of respondents spend between

30-40%

of their school's annual fuel bill on heating and cooling.

YET 64%

of respondents spend less than

20%

of their maintenance budget on ensuring their heating system stays running.

meaning unforeseeable and unexpected breakdown is a common occurrence. Schools need efficient heating solutions as well as effective maintenance to reduce their heating and cooling bills and free up funds to be spent elsewhere.

Downtime of heating equipment is of particular concern to schools, and with most boiler breakdowns completely unexpected, it's important for closer relationships to be forged between the heating industry's manufacturers and schools.



As a result, boiler breakdowns will be quicker to resolve and less disruptive to a school's day-to-day operation, the most appropriate and efficient technologies will be routinely used, and there should be finance options for schools with insufficient funds for capital expenditure.

Pete Mills,
Commercial Technical Operations Manager
at Bosch Commercial and Industrial



Feature

Schooled in **boiler efficiency**

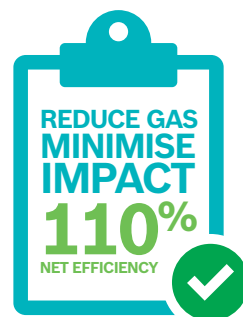


What mustn't be forgotten is that a school without heating or hot water has to close, so an unreliable heating system has the potential to cause a huge amount of disruption to pupils, parents and staff. So what do facilities managers, local authorities, and school governors need to bear in mind when it comes to minimising the risk of a failing heating system? The answer could well lie with the more widespread use of modular condensing boiler systems.

A new dawn for condensing boilers

The requirements of the Energy related Products (ErP) Directive mean that a new commercial boiler with an output of between 70 and 400kW has to be of a condensing type. For schools and educational facilities, it is likely that the vast

majority of these condensing boilers will be of the wall-hung variety, whereby systems comprising of multiple smaller output boilers in a cascade arrangement will become more common. This in itself will bring with it a number of benefits.



The benefits

Firstly, modern condensing boilers can deliver up to 110% net efficiency,

which offers huge gains in terms of reducing gas bills and minimising environmental impact.

Secondly, boilers of this type can also be installed in a cascade arrangement, allowing each appliance to be sequenced to come into and out of operation when required, and ensuring even load matching. This has the potential to enhance year-round efficiency and prolong the lifespan of the system by effectively sharing the load and any wear and tear across multiple boilers instead of just one. Better still, with multiple boilers rather than just one, the chances of a complete breakdown are much slimmer than they would be with a single appliance in place.

An additional benefit of a modular system is the ease at which boilers can be transported to site. The very nature of a wall-hung condensing boiler is that it is much more portable than some of the more traditional cast iron boilers many schools will already have in place. When it comes to accessibility, speed, and flexibility of installation, this can prove a huge advantage.

Retrofit: all gain, no pain

For those thinking of embarking on a boiler replacement project, upgrading a system needn't be as intrusive as you might expect. Whilst one solution definitely doesn't fit all, there are ways and means of integrating new condensing boilers into existing systems and pipework, without the risk of any contamination of the new boiler from the old heating system and loss of performance.

Today, most high performance condensing boilers need to be installed as part of a sealed system, but even those that don't still benefit greatly from being separated from an old system where the water quality may be difficult to control. For certain applications, conversion from an open vented to a sealed system can be tough to achieve with potential leaks from old pipework and fittings to consider, as well as the possibility of corrosion problems if the water from an old system is allowed to circulate freely around a brand new condensing boiler.

a school's list of priorities but a carefully planned proactive investment can be hugely beneficial over the long term. Arranging a site survey will allow the school in question to assess its potential energy savings, the corresponding payback period of the system, and exactly how overall comfort levels can be improved in the process.

Cutbacks at local authority level could still leave many schools struggling to access the funds needed to upgrade or replace unreliable heating systems. Given the potentially unstable decision route in schools, Pete Mills explains why more schools should be looking to make a carefully-planned shift to a condensing boiler system.

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In situations like these, the most practical way of overcoming this kind of problem is to leave the existing system open vented whilst separating the boiler's primary circuit using a stainless steel plate heat exchanger. Introducing a plate heat exchanger to the system ensures a safe and protected primary circuit for the new condensing boiler, whilst also ensuring there is no risk of system leaks from a higher sealed system pressure and eliminating any corrosion or restriction issues. Investing in a boiler replacement will rarely be at the top of



Finance & Aftersales Support

When it comes to overhauling a heating and hot water system – whether in a distress situation or as a proactive investment – access to funding is vital. Yet with a sizable proportion of schools facing complexities when it comes to finding appropriate levels of finance, it is important the options available are clear.

In broad terms, for schools without immediate access to capital, there are two main sources of funding for a new heating and hot water system.

Salix Finance

Salix Finance Ltd. provides interest-free Government funding to the public sector to improve energy efficiency, reduce carbon emissions and lower energy bills. Salix is funded by the Department for Business, Energy and Industrial Strategy, the Department for Education, the Welsh Government and the Scottish Government and was established in 2004 as an independent, publicly funded company, dedicated to providing the public sector with loans for energy efficiency projects.

The Schools Energy Efficiency Loans Scheme allows maintained and grant aided schools to apply for an interest free loan to finance up to 100% of the costs of energy saving projects.

Schools are able to apply direct to Salix for loan funding, or for those schools funded through Local Authorities, the Authority is also able to apply on their behalf.

In total, Salix supports over 120 energy efficient technologies, including replacement condensing boilers, replacement combination boilers, and associated control systems.

Bosch & Hitachi Capital

Thanks to a new partnership between Bosch Commercial and Industrial and Hitachi Capital (UK) PLC, a range of finance packages are now available to those looking to fund the installation of a new heating and hot water system.

The finance options, which can be tailored to meet the needs of privately or publicly-funded organisations*, offer an alternative solution for those either unable to fund major works from cashflow or preferring to spread the cost over a number of years.

Perfect for those eager to minimise CAPEX, each tailored finance package allows schools to unlock and accelerate projects which may have otherwise been delayed.

Not only does a finance arrangement give schools the opportunity to fast-track a project, it also allows them to finance the total installation cost, including:

- Equipment
- Installation
- Ancillary costs, invoiced up front

To find out how Bosch & Hitachi Capital may be able to help your school to overcome the challenge of funding a new boiler installation, visit www.bosch-industrial.co.uk or call 0330 123 3004.

UNLOCK
YOUR
PROJECT

A school may be in desperate need of a new heating system, and it may need to take up one of the finance options available in order to make what is invariably a significant outlay.

In order to ensure the performance of the new system is maximised throughout its full lifespan however, which aftersales services are worth considering in order to protect your investment?

Commissioning

To maximise the potential of your industrial boiler, successful commissioning is essential. After a process of cold testing, the installed system is started up and fully commissioned in accordance with the required standards, specifications and manufacturer's instructions. After successful commissioning, a comprehensive handover (including training for staff) will follow.

Troubleshooting & spares

The latest boiler systems are manufactured for efficiency, longevity and reliability. However, should any unforeseen problems arise, it is vital that you have direct access to a dedicated site engineer or technical support team who can help with any query – however simple or complex. From there, it is also vital that spares are on hand and deliverable to site within 24 hours.

Service contract

To ensure that your boiler and its associated controls operate safely and in accordance with applicable regulations and manufacturer's instructions, it is essential that regular maintenance is completed by a fully trained engineer. By investing in a service contract, planned maintenance will be completed proactively – in accordance with your tailored service package and individual requirements.



Case Study

Heating overhaul for sixth oldest school in the world



Conclusion

Time for change



As part of an extensive sustainability programme and after suffering several legacy boiler failures, Royal Grammar School Worcester required a reliable and efficient heating solution across its seven plant rooms.

Having opted to enhance its sustainability credentials and replace a poor performing heating system, the school needed to tackle the integration of new boilers across its estate while using its pre-existing pipework.

After two initial boiler breakdowns where the school had to rely on electric heaters during term time, Bosch Commercial and Industrial were approached to carry out a review of the estate and identify other areas of risk. Many of the existing boilers were over 15 years old so would be costly to repair, if they could be restored at all, and were not in line with the school's ambition to improve energy efficiency and future proof its estate. Overall, it was decided that a total of 21 high-efficiency condensing boilers would be installed across seven critical locations, with each plant room presenting its own unique challenges.

Old meets new
Bosch Commercial and Industrial recommended its GB162 boiler as its compact dimensions made it especially suitable for the plant rooms, many of which were difficult to access and were

restricted in space. The range of outputs available and the option to cascade meant that the school could cater for different heat demands across different areas of the site. With net efficiencies of up to 110% and NOx emissions of less than 40mg/kWh, the GB162 range provides clean, low-carbon heating and hot water.

Energy efficiency is a top priority for the school and the GB162's ability to automatically modulate its output down to less than 20 per cent in order to precisely match the demand for heat, will result in reduced fuel consumption and improved overall seasonal efficiency.

MANY OF THE EXISTING BOILERS WERE OVER 15 YEARS OLD SO WOULD BE COSTLY TO REPAIR.

One of the key challenges of the project was the old and corroded pipework system, which had the potential to affect the operation and efficiency of any new heating appliances. To overcome this, a plate heat exchanger was installed to provide two elements of protection and to separate the old and new systems.

Conclusion
Given the external pressures on schools nationwide, it is far from surprising that the efficient operation of a heating system is rarely a priority. Yet the fact remains that dated systems can experience difficulties, and schools are rarely equipped to react accordingly.

Ian Roberts, Bursar at RGS Worcester, added:

“After investing in new boiler installations across the site, we have seen a noticeable improvement in how effectively our maintenance team operates. The consistency of having just the one type of boiler to maintain is saving time and helping us to build a specialist workforce.”



Over the course of this report, we've looked at how big a concern a complete system breakdown is for school stakeholders, and the severe consequences of having no heating or hot water. Crucially however, it is important for schools not to dwell on the negatives. The latest boiler technology – coupled with comprehensive finance and aftersales packages – allow governors, local authorities, and other key decision-makers to take a much more proactive approach and begin to reap the rewards immediately.

From increasing energy efficiency and lowering bills, to boosting reliability and saving valuable space, there is an extensive list of benefits attached to a boiler replacement. Better still, thanks to the finance options now available, projects can be accelerated and CAPEX reduced.

While buying a new boiler may have been seen as little other than an unwanted distress purchase in years gone by, it is high time this stance was changed. With the support on offer through manufacturers, stakeholders have a huge opportunity to make an investment that will truly benefit their school for many years to come.

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