

Case Study – Heating with Air Source Heat Pumps

Blue Coat Church of England School, Coventry



What prompted the initiative?

In 2020, as part of wider carbon reduction and sustainability ambitions, RPA schools were invited to join a project to decarbonise members heating systems in conjunction with the Department for Business, Energy & Industrial Strategy (BEIS).

Blue Coat were selected and identified via the Condition Data Collection (CDC1) as one set of their gas boilers were coming to the end of their useful life. On behalf of the DfE, Mott MacDonald completed a *Heat Decarbonisation Plan* (HDP) for the school. This described the current state of the school's energy use and its plans for reducing and/or decarbonising its energy use. The plan outlined what measures the school had already put in place, what it was doing next and its plans for the future, including planned timescales, and the intended outcomes.

What options were considered?

The purpose of the HDP was to describe how the school intended to replace fossil fuel reliant systems i.e. gas boilers, with low carbon, renewable energy alternatives e.g. Air Source Heat Pumps (ASHPs) or Ground Source Heat Pumps (GSHPs). A feasibility study identified which method of heating would be appropriate for use, as well as providing options to install an appropriate sized Solar PV array, to offset the anticipated increase in electricity costs.

How did you raise the money?

Fortunately for us, the HDP was completed in time for us to apply for a grant, as part of the next round of Public Sector Decarbonisation Scheme (PSDS) funding.

We worked with Surveyors to Education (S2E) and were successful, receiving £311k grant funding. The school had to contribute an additional £36k for the purchase of the ASHPs.

How did Blue Coats proceed?

Due to the constrained layout of the Blue Coat school site, we did not have sufficient grounds near the building to excavate and install GSHPs.

Therefore, we settled on ASHPs, which sit above ground and occupy less space.



How successful has the new system been?

The changeover to ASHPs has overall been a great success. We planned the commissioning and final switch over during a half-term break and users of the building **did not** notice any difference upon their return. In comparison to the previous gas boilers, the ASHPs regulate the temperature of building really efficiently. The only feedback we have received from staff is when they share concerns that their radiator is not hot, unaware that ASHP systems use low surface temperature (LST) radiators.

What challenges have you faced?

Unfortunately, we were unable to achieve installation of the planned Solar PV during the project. This has left us with higher electricity usage. However, the school has really good value energy contracts in place and the cost of electricity is 16p/kWh. Therefore, *even with the increase in electricity usage, the schools overall operating costs have not increased*. As well as reducing our carbon footprint, this is a great result all round.

What key lessons would you pass on to other schools who are considering replacing their heating?

The planning process and installation of the ASHPs was a new one for the school and one of only a few projects that the principal contractor had installed. As a result, the installation took longer than expected and ran past the agreed schedule. As the schedule is front loaded, all of the intrusive and disruptive works were completed over the summer break. This meant the works that were carried over were ancillary works, in plant rooms or electricity sub stations etc. and these did not interfere with the normal school operation.

You have to complete due diligence. However, this only goes so far and you're still trusting the contractor to perform as agreed. As ASHP installations at this scale are still somewhat new, you should ensure that you are 100% comfortable before committing to the process - be prepared for unforeseen problems.

Schools often share with us other concerns that they have about the suitability of Air Source Heat Pumps. Therefore, we think it is helpful to add these other **key notes**:

- An electrical load test will need to be completed on site for a short period of time, to assess the existing and increased power requirements for the ASHP proposals.
- You must work at an early stage with your local District Network Operator (DNO), and it is likely that a fuse upgrade will be needed. The DNO acts as a gatekeeper to the national transmission grid, distributing energy from the grid to homes and businesses. The DNO has to be satisfied that the local grid can cope with demand. So, before they can grant permission for connection where heat pumps are proposed, the DNO must ensure it can manage the increased demand of the new heat pumps.
- Air Source heat pumps are located externally and run for short periods during the night to maintain the ambient temperature. Before installation, an acoustic survey will need to be completed on site for approximately a week.
- Pipework from the ASHPs into the buildings will require either mounting on external steelwork (much like an RSJ) or burying as underground services.
- All radiators/fan convectors etc. and heating pipework will need to be changed.
- Radiators for ASHPs are Low Surface Temperature and will be upgraded to deeper triple panel radiators that are also longer in length. This could be disruptive if these items are located within units or benching.
- ASHPs do condense, therefore make sure you have appropriate ACO drainage installed around the compound where the ASHPs are located. This prevents the condensed water becoming a hazard in the winter months.



Does the school have any other Net Zero ideas?

As a Trust we continually update our Environmental Policy to reflect best practice in industry and new learning points through regular CPD. This applies to any retrofitting, refurbishment or new build activities we complete, as well as in the classroom through our teaching and learning and after-school activities. In addition, all our schools are subscribed to initiatives which provide measurable targets for the pupils and staff to work towards.

Most of these will result in some form of award or accreditation, which the schools proudly promote to show their commitment to net zero.

Here are some of our other **recent examples of retrofit, refurbishment and new build net zero works**:

When completing scheduled roof replacements across our estate, we are installing approximately 300mm of insulation as part of the waterproofing system. We will install external wall insulation on one building at Blue Coat as part of other scheduled refurbishment works.

Five of our eight schools have all-LED lighting. Due to the size of the install, Blue Coat completed these with an operating lease, resulting in approximately an £4k per month saving.

When aged or failing external windows and doors are replaced, we specify new, high-performance units.

We installed BEMS to monitor and operate our plant and equipment more efficiently, based on demand, occupancy and external weather conditions. In December 2023, this achieved a saving of £3,310 on gas bills alone (and a significant reduction in CO₂ emissions).

We replaced water heaters with new high efficiency, low energy water heaters.

We retrofitted A/C units in certain areas where they struggle to heat in the winter or stay cool in the summer. This has saved money, as we are not buying convector heaters or fans to provide heating/cooling at peak times, which use a lot of energy to operate.

When purchasing new catering equipment, we are spending more money initially on equipment that has better energy ratings, to enable savings in the long term over the course of its useful life.

We have installed a total of 10 electric vehicle (car) chargers across our schools for members of staff or visitors with electric vehicles. We hope to change our fleet of vehicles to electric in the near future.

We now have Solar PV arrays at four of our eight schools.

Our new build Hudson-Rose Sixth Form block successfully passed an airtightness assessment to be awarded a Passive rating.

We still have a long way to go and have plenty more planned in our roadmap to net zero!

How can I get more information?

There are lots of free webinars, case studies and resources out there. Notable items are:

- Regular attendance to Education Estates exhibitions, Net Zero conferences and MATA events.
- Learning Hub Online is a free resource and has 100's of short, informative videos on sustainability alone.
- Subscriptions to certain DfE and Salix newsletters
- Working with Let's Go Zero! or using local resources such as the Diocese Net Zero Carbon Project Officers or advisors.

We are very grateful to the Head of Estates for Inspire Education Trust who shared the information for this Case Study.

For further details, please contact colin.angus@coventry.anglican.org

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