DECARBONISING CAXTON HOUSE

- LESSONS LEARNT -

A CASE STUDY ON DECARBONISING AND RETROFITTING A 1970S COMMUNITY HUB

POWER UP north london

CAXTON HOUSE

2022-2024

SUMMARY

Caxton House Community Centre is an important facility located in Archway, North London, providing vital support to local residents living in the area and ever vigilant to opportunities to improve its service offering. When **Power Up North London**, a local community energy group alerted the Centre to funding for installation of a heat pump, this retrofit and decarbonisation project was born. Using the "fabric first" approach, all windows in the Centre were replaced with high-performance windows and exit doors were refurbished to eliminate draughts. This was followed by the concurrent installation of an Air Source Heat Pump (ASHP) and Mechanical Ventilation with Heat Recovery units (MVHR). Combined with solar panels and LED lighting that were already in place, the net result is a low-carbon energy efficient building providing clean, filtered air to all centre users. The retrofit work cost c£300k, has taken 3 years to design, fund and deliver, and will save an estimated **18 tonnes of carbon each year** equivalent to the environmental benefit from a forest of **800 trees**.

There is work to be done to monitor and optimise the current systems to ensure that the energy savings and performance projections are being met and this evaluation is underway. The Centre will also need funding for smart heating controls and a bespoke low-carbon heating solution for its large sports hall. Given the importance of net zero carbon targets, and the crucial role low-carbon public buildings play in achieving this, we're confident that funding opportunities will present themselves in 2024 and beyond.

This report has been developed as an important case study for community buildings and a lot of valuable lessons have been learnt. The grants and support provided by the Greater London Authority, Islington Council and Biffa Award have made this project possible. The project management work was handled jointly by Caxton House's Finance and Office Manager, Sue Collins, and Tanuja Pandit from Power Up North London (PUNL), supported by other PUNL volunteers. Both UK-based and local suppliers were used to deliver the work, aspects of which demanded significant technical expertise.

INTRODUCTION



CAXTON HOUSE COMMUNITY CENTRE

Caxton House Community Centre was built nearly 50 years ago in 1975. It's located in an area of high social deprivation and provides a wide range of vital services, advice and user-led activities for local residents including health and wellbeing services, activities for children, young people and families, energy and cost-of-living advice, food support, and creative and educational activities. Currently, six other charities and not-for-profit organisations are co-located within the Centre.

POWER UP NORTH LONDON

PUNL is a local non-profit Community Benefit Society which delivers decarbonisation projects and tackles fuel poverty. They focus on energy efficiency work, installation of solar PV, renewable heat solutions and delivery of support to those in fuel poverty. They believe the community energy sector has an important role to play in ensuring a just, fair and inclusive transition to a decarbonised UK, and one in which ordinary people have greater control over the decisions that affect their daily lives.

Top: Energy-efficient triple glazed window installation
Bottom: Acoustic attenuation installation

In 2018 Caxton House started working with PUNL to improve energy efficiency and generate carbon savings. With funding from the Islington Community Energy Fund all the lights in the Centre were switched to LEDs. PUNL approached the Centre in late 2020 about replacing their gas boiler with a heat pump. It was jointly agreed that a “fabric first” approach would be the most effective, beginning with installing triple-glazed energy efficient windows throughout the Centre. PUNL successfully applied to the London Community Energy Fund (LCEF) for capital funding, supplemented by the Community Infrastructure Levy (CIL) from Islington Council.

A detailed decarbonisation feasibility report was commissioned to assess the best ways to make the Centre more energy efficient and to reduce its running costs and carbon footprint. Several funding rounds later, the Centre now has high-efficiency triple glazed windows throughout, a 50kW Air Source Heat Pump (ASHP) for space heating and Mechanical Ventilation with Heat Recovery (MVHR) units to improve air quality and to enhance the efficiency of air flows around the building.

FUNDING MODELS AND CONTAINING COSTS

KEY LEARNING

- **Identify a funding model that works best for your project and has achievable timescales.**
- **Keep funders informed at every stage of process so delays can be anticipated and accommodated with reasonable extensions.**
- **Offer a credible reprioritisation plan when experiencing delays or cost increases.**
- **Develop robust partnerships with organisations, volunteers and, where possible, access pro bono expertise to minimise expenses.**

Caxton House is a charity funded through a combination of fundraising for community programmes and events and venue hire, with a small annual grant from Islington Council. PUNL developed a funding model and explored several options for financing, it was soon clear that energy savings alone would not be enough to pay for the capital and installation costs. Grant funding was therefore the only option to achieve this retrofit and decarbonisation project.

Crane lifting the ASHP into position

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FUNDERS:

Mayor's London Community Energy Fund (LCEF), the Islington Community Energy Fund (ICEF), Biffa Award and Community Infrastructure Levy (CIL) funding from Islington Council.

Community Gardening Day 2023

Biffa Award plaque

Volunteer gardening

In the absence of a single capital fund that would cover the entirety of the project, it was necessary to identify multiple funding sources while taking into account that grant funding is usually awarded in stages. This thinking informed project planning, budgets and applications so funders could be confident that project delivery would be within budget and timescale.

Project timelines were stretched, especially in 2022 when hard decisions were being made about the type of heat pump: ground or air source and about sequencing the installation of a building management system alongside the heat pump system. Delays caused by planning requirements and the need for an acoustic unit meant that the Centre had to request multiple extensions from Entrust who administer the Biffa Award.

It was crucial to keep funders informed at every stage and maintain a good relationship, so delays could be anticipated and accommodated. Project costs escalated due to inflation and global market forces. Caxton House offered a credible reprioritisation plan to their funders who continued to support them through subsequent funding rounds. This enabled the delivery of the heat pump and mechanical ventilation solutions.

PUNL volunteers and partners gave many hours of their time at various stages of the project to help keep it on track and this also helped to control project costs. Pro bono support with the planning submission from a local architectural practice and a technical consultancy practice were also valuable enablers.

VALUE OF SITE KNOWLEDGE AND TECHNICAL LEAD

KEY LEARNING

- **A technical lead can support decision-making and oversee the technical aspects of delivery by suppliers/contractors**
- **A caretaker or equivalent with site knowledge can help keep the project on track.**

The project would have benefited from a technical project lead if the budget had permitted. In the absence of this role, the Centre's Finance and Office Manager Sue Collins and the PUNL project lead Tanuja Pandit brought multiple volunteers with technical skills into the project to support key decisions.

Sue was also vital to the project because of her site knowledge which ensured that the project was delivered to the right specification. For example, Sue supervised the installation of the 43 windows of multiple complex designs. Despite best efforts from the installers, two of the windows were initially installed incorrectly, but this was addressed quickly. This highlighted the importance of having a caretaker or equivalent supervisor with site knowledge to keep the project on track.

When assessing the exact location of the heat pump, there were many considerations, particularly noise pollution, visibility from the street, safety of the equipment, the cost of extra cabling runs and a concrete plinth, and of course the impact on building users. Sue and Tanuja had multiple conversations with the Heat Pump supplier's project lead and with the professional consultants supporting the planning application before the final location was agreed upon. A technical lead and site supervisor could have provided vital support in these discussions, saving time and costs.

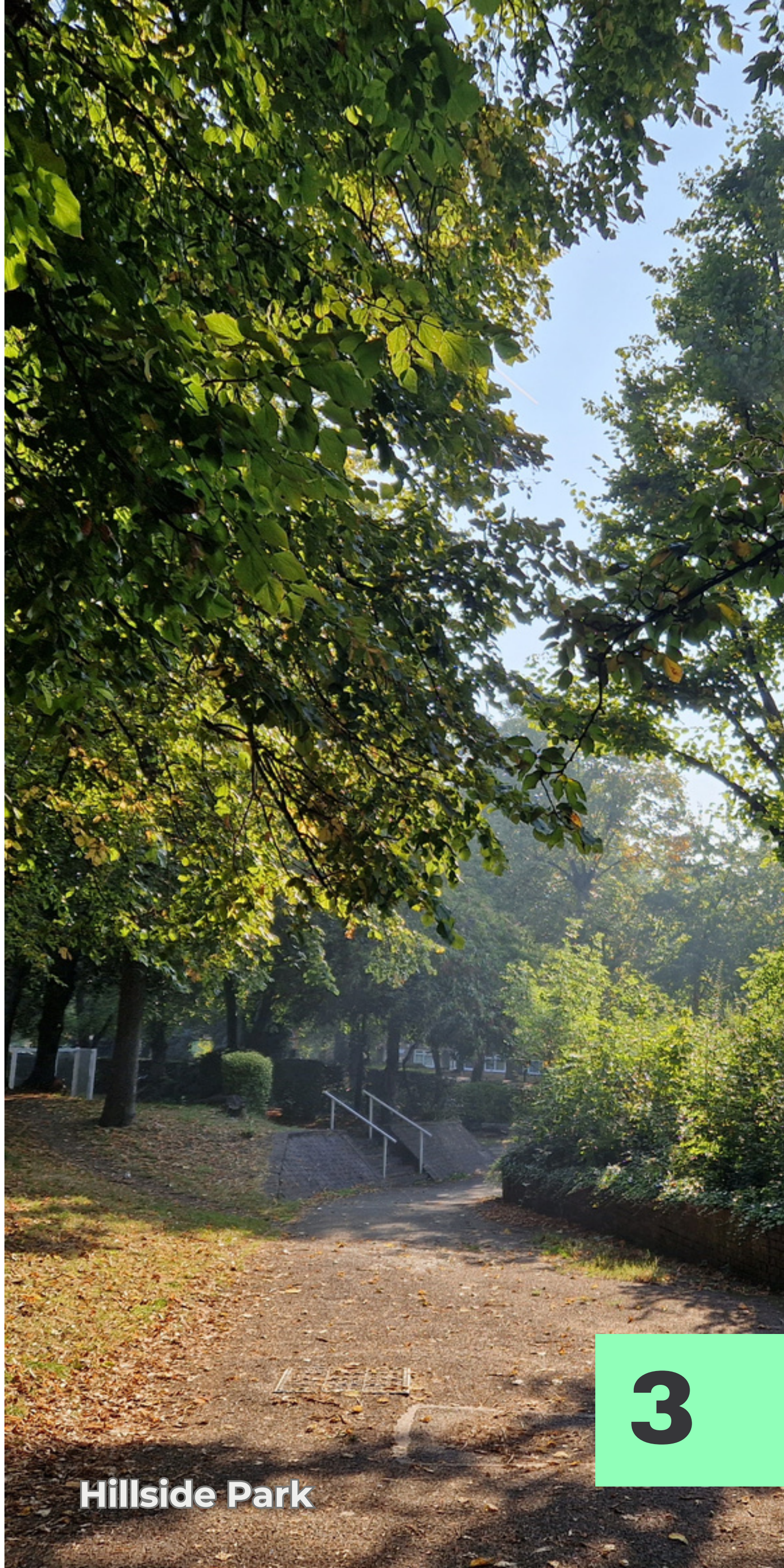
DECARBONISATION REPORT

KEY LEARNING

- **Commission a decarbonisation report both to identify and assess opportunities to reduce emissions and to increase eligibility for funding.**

The decarbonisation report was an important stage in the delivery of the retrofit project as it helped to unlock further funding and gave a clear direction on the sequencing of retrofit work. Feasibility funding from the LCEF was used to commission a decarbonisation study. It included recommendations for the phasing of retrofit interventions and estimates of their impact on energy usage.

Installation of MVHR units and a Building Management System (BMS) in advance of the heat pump was initially being considered. Some LCEF capital funding had been secured for this work. However, the BMS quotes were very high and it was agreed to delay this phase until after installation of the heat pump. An ASHP system was selected over Ground Source Heat Pump (GSHP) based on the available space, significantly lower capital cost, and ease of maintenance.



FINDING THE RIGHT SUPPLIERS

KEY LEARNING

- **Suppliers and installers are in demand - make sure to leave enough time for sourcing suitable companies.**

Finding suitable suppliers, especially for capital equipment, proved challenging at all stages of the project. A busy working community centre is very different to a typical installation site and all grants come with tight delivery deadlines, so suppliers had to be available to these timelines.

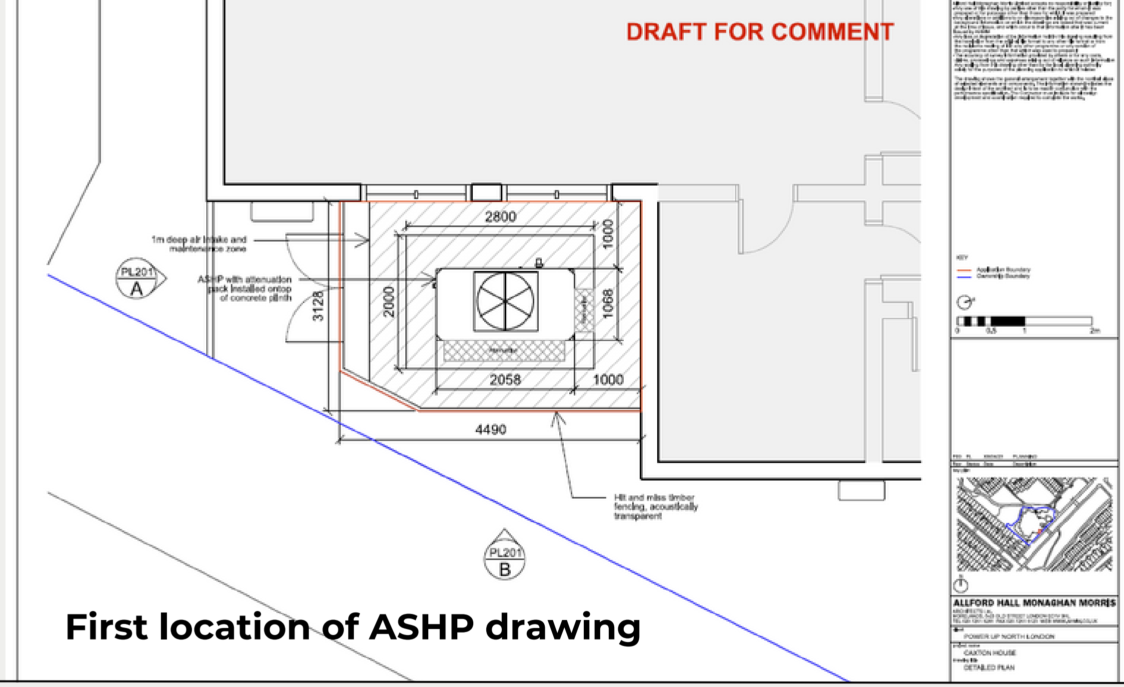
Suppliers were identified by reaching out through community energy networks and putting together a shortlist for site visits based on initial screening discussions. Following site visits suppliers' proposals were evaluated on cost and benefit and the latter included the opportunity for modular implementation and availability of support after installation.

SCHEMATIC DRAWINGS

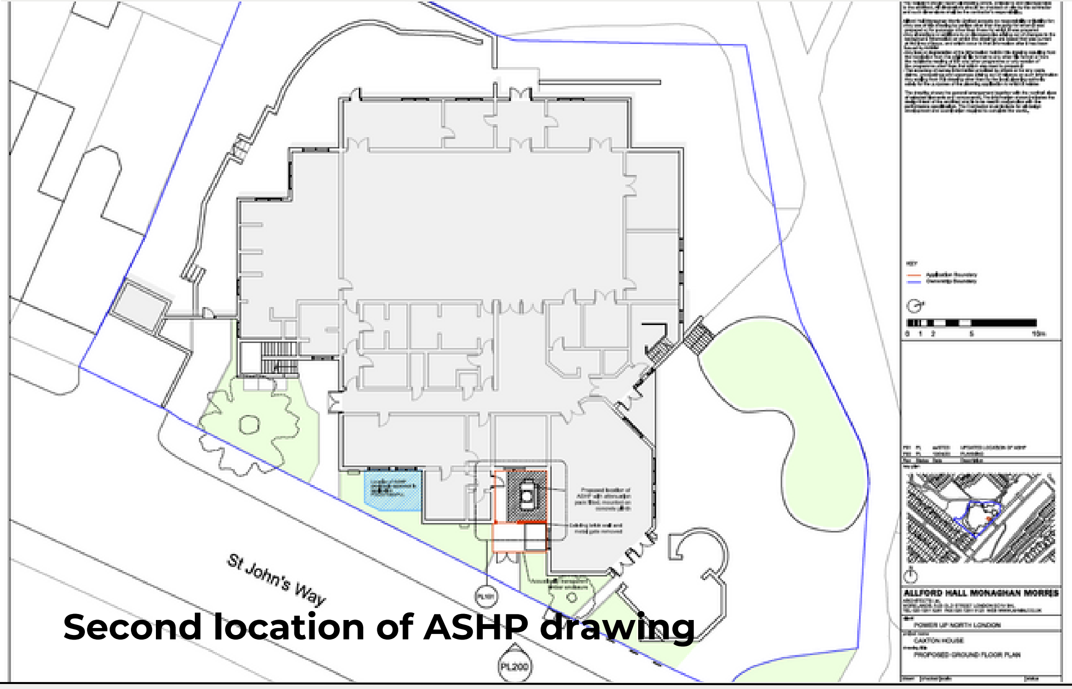
KEY LEARNING

- **Having the original electrics and plumbing schematics will expedite design work.**

For the MVHR and ASHP projects schematic drawings of the electrics and plumbing within the Centre would have expedited the design work and minimised costs in this area. Often such drawings are not available for community sites like Caxton House and the Centre was no exception. Given the cost of commissioning such drawings, suppliers had to fill in the gaps with site visits and on-site measurements which was pragmatic but not ideal.



First location of ASHP drawing



Second location of ASHP drawing

PLANNING GUIDELINES

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KEY LEARNING

- **Be certain of local planning rules, they are often different for ASHPs vs GSHPs.**
- **The planning process adds time and cost to the project and pro bono support is very valuable.**

Lessons were learnt about clarifying the Council's planning rules as these vary across councils. GSHPs would have been covered by permitted development rules but not ASHPs. The ASHP installer also believed that they were covered by the permitted development rules, but this was not the case in Islington so planning permission was necessary to ensure that the unit did not breach the Council's noise limits. The ASHP unit was already in production so fast work was required to ensure that planning guidelines were met and planning consent was granted.

PUNL's relationships with a local architectural practice, Allford Hall Monaghan Morris (AHMM) architects, and a local technical consultancy, Hoare Lea, proved invaluable. AHMM completed the planning application, including a technical sound report prepared by Hoare Lea. After an 8-week review period, planning consent was given, subject to the installation of a sound attenuation unit. The acoustic unit added significant costs and time to the project, partly because all such units are made bespoke and also because the supplier has a busy order book. The size of the acoustic unit precipitated a further review of the heat pump location and another planning application.

Left: initial attenuation (sound proofing) drawing
Right: installation of attenuation unit

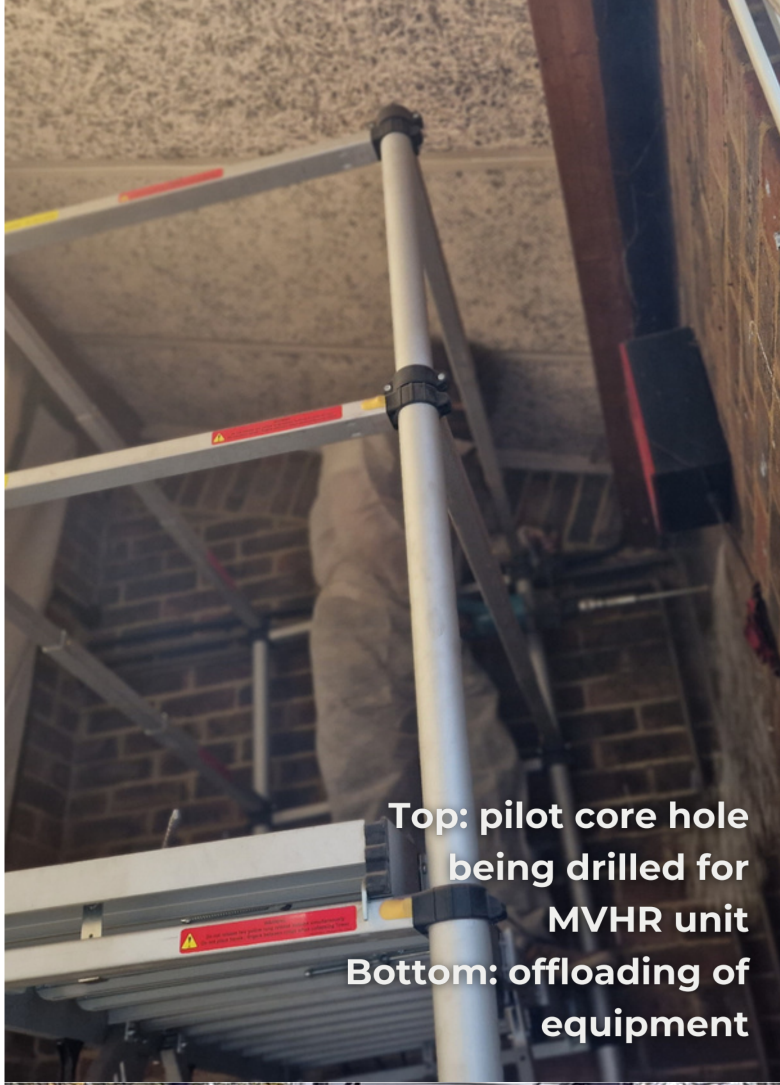
SITE DISRUPTION

KEY LEARNING

- **Plan installation for dates/times that minimise disruption.**
- **Give adequate notice and speak to participants and user groups about the project so all are invested in it.**
- **Identify a storage location for equipment, particularly for MVHRs.**

An additional consideration in most retrofit projects is that the buildings are in use. Minimising site disruption and understanding site constraints is especially important for a working community centre; Caxton House is open 7 days a week, almost all year round, and needed to minimise disturbances to user groups and any loss of hire income that would impact its sustainability. August was chosen for the window installation, being a time when the Centre is less busy. This worked well and the window project was completed within three weeks, as committed to by the installer.

Scheduling the installation of the MVHRs was more difficult as the Centre had to take delivery of a large quantity of ducting and materials and store them for two to three weeks at a time as each zone was worked on.



Top: pilot core hole being drilled for MVHR unit
Bottom: offloading of equipment

MVHRs also require core holes to be drilled into walls and given the building's construction this was a noisy, dusty and very disruptive process. The installers worked evenings and overnight across a week per unit to complete the installation, keeping daytime disruption to a minimum. If you are able to close the building during a retrofit, this could reduce disruption and can expedite installation.

For the installation of the ASHP a concrete plinth had to be built first as a base. As the unit had already been delivered at this stage, the 450kg unit had to be moved on to the plinth without disrupting traffic and the two bus routes that run along the busy road in front of Caxton House. A large crane was brought into the car park at the side of the building and extended over the roof to lift the ASHP into place on its plinth, avoiding the need for road closures.

Delivery of the attenuation unit (sound proofing)


Temporary fencing around the ASHP


The ASHP installed on the plinth

FLEXIBILITY – "EXPECT THE UNEXPECTED!"

Pigeon nest and egg

KEY LEARNING

- **Be flexible, no matter how well planned, all projects require course correction from time-to-time.**

Flexibility is the name of the game in retrofitting.
On a couple of occasions, the MVHR designs had to be modified to take account of user needs, joists and plinths, or existing ducting runs that had not been fully appreciated at the design stage. Flexibility and imagination were required when deciding on the final location of the heat pump given the site constraints and considering the size of the acoustic unit. The unplanned cost of the attenuation unit and increased project costs required that the number of mechanical ventilation units was adjusted to stay within the funding envelope, without compromising the effectiveness of the overall solution.

During one of the ventilation installations, the outer ducting had been installed but a delay in finishing the job allowed sufficient time for pigeons to build a nest and lay their eggs! The nest and eggs were all safely moved to a new location and no harm was done.

TIME AND DATA

KEY LEARNING

- **A project of this size and complexity will require staff time even with a technical lead and caretaker on board.**
- **Base data on gas and electricity consumption is critical to assessing energy and carbon savings.**

This project required a significant amount of the Centre's staff time. Some of this was down to the effort required for grant applications and responding to the funders, and some to the learning curve about planning rules, the need to find a suitable location for the ASHP unit and the disruption from the installation of MVHRs. At various stages Sue also had to accompany the installers on their design visits around the building. Additionally, delivery timings were unpredictable so that Centre staff often had to move the materials from kerbside to the Centre and then to a suitable temporary storage location. For sites that have a full-time Caretaker and suitable storage this issue may be resolved more easily.

Reliable base data on the monthly and annual gas and electricity consumption is very useful for calculating energy and carbon savings once the retrofit project is implemented. For this project the combination of COVID-related changes in site use and the absence of granular data meant that the baseline was less robust. However, calculations of energy and carbon savings are still possible and they show that each phase (solar panels, LED lighting, triple-glazed windows, draft-proofing and ASHP & MVHR) resulted in improvement in energy efficiency.

NEXT STEPS: MONITORING TO OPTIMISE SYSTEM

Following installation of the ASHP the focus is now on staff training and performance monitoring. The efficiency of the system and the amount of carbon saved will depend on optimising heat use within the building. Unlike a gas boiler, ASHP heating works on constant low-temperature heat over a sustained period. This will require fine tuning of the system set up, monitoring of radiator performance and working with users on making adjustments when heating their work spaces.

Using sensors to capture temperatures around the building, data and insights are being gathered about over/underheating. The data on actual electricity and gas use will enable calculation of energy, carbon and financial savings. It will take one complete annual cycle to ensure the heating and ventilation systems in the building are working as required. The plan is to add to this case study to produce a data-rich learning document from the monitoring and the adjustments that have been made as a result.

This is a project with long-term potential for improving users' lived experience within the Centre and for benefiting the environment. The Centre will continue to make investments in reducing energy use, targeting net zero by 2030.

Top: ASHP internal control panel
Bottom: Ian from ISO energy commissioning the ASHP

ACKNOWLEDGEMENTS

This project would not have been possible without the support from funders and the expertise provided by PUNL volunteers.

The Centre Is very grateful for the financial support provided by the project funders and in particular by Elizabeth Ainslie at Islington Council, Greg Shreeve at the Greater London Assembly, Katy Dines at Biffa Award, Sham Sahota and Emma Long at Entrust. Without their flexibility and their support this project would not have been possible.

The Centre is also indebted to PUNL volunteer Mona Khalili who provided unwavering support with financial and technical analysis and was a vital part of the project, to Tom Luff who helped with articulating the project benefits to a wider audience, to Aidan Kelly for help at the commissioning stage and to John Ackers who continues to get a thrill from the data gathering and system optimisation work!

Toby Costin, Chair of Crew Energy provided essential support and encouragement at the set-up stage and with supplier recommendations. Ayushi Vyas and Simon Briggs at Energy Systems Catapult helped with the financial model and with examining the pros and cons of different business model options for the supply and purchase of heat. Ella Smith from AHMM architects and Steph Gaunt from Hoare Lea Technical Consultants handled the entire planning process from start to finish. Their work is hugely appreciated and it made a big difference to the project.

Biffa Award
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