Low carbon heating system Case Study

Cost (to supply, install and commission): £62,152.00 + VAT

Why

Heating was one of the first loads that we examined when we decided to decarbonise our building energy use. The existing arrangement, which depended on two aged and increasingly unreliable gas boilers, was in need of modernisation. Choosing a replacement technology has not been simple and constraints including cost and building tenure have prevented us extending this part of the program as far as we would have liked.

Our HQ building in Cheshire.

Background

When we started this building decarbonisation journey, our initial thoughts were to seek a solution to decarbonise and modernise the heating of the whole building. We first investigated investing in a Ground Source Heat Pump. These have cheaper long-term running costs than Air Source Heat Pumps and so, at first glance, this seemed like a logical choice. There is even land infront of our building that appeared to be suitable for he necessary underground pipework.

When this option was researched further it was established that the long pipe runs would reduce the heat pumps efficiency. We mentioned the idea to our landlord and were told that there may be implications to our rent too. We therefore had to look at other options.

A further cost consideration was that our HQ was constructed 70 years ago, to the building specifications of the time. The whole building needed energy efficiency upgrades, including wall insulation, new windows, and roof insulation to make it suitable for a modern heat pump system. Installing a heat pump would also require changing all the internal heating infrastructure such as pipes and radiators to make them more efficient when operating at lower flow temperatures. We rent our HQ building on a long-term lease. While we would benefit from any cost savings from improving the thermal efficiency of the building, and we have no plans to relocate, ultimately, we don't own the building fabric.

Balancing all these considerations, but also to limit cost and disruption, we therefore decided to concentrate on upgrading the thermal efficiency and heating system in just one part of the building. The top floor of the building was especially in need of modernisation, so we decided to concentrate on this section – a space with a floor area of 605m^2.

Reviewing technology again with this strategy in mind, we elected to install a VRF Heat Recovery system. This system is modular so as we update and refurbish other parts of the building, they can be added to the new heating system. The manufacturer chosen was the only one to provide a single branch control box that controls all the fan coils. This allows for simultaneous heating and cooling of each unit, allowing the installation of main pipe work to the branch control box to be via two pipes. All other manufacturers for heat recovery systems would require an extra pipe (three pipe systems) and an individual branch control box for each indoor unit to provide simultaneous heating and cooling. This system also allowed for one modular outdoor unit be used for all 15 indoor units.

The VRF Heat recovery system works in a similar fashion to an air source heat pump, but it also redistributes surplus hot or cool air from one room to another where needed, saving energy when compared to conventional air conditioning systems.

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What we did

A strategic decision was made that the area on the top floor of our HQ building needed modernising. The area comprised of several larger rooms used as meeting and training facilities, and some much smaller offices. These offices, which had sloping ceilings due to being located in the roof space were very narrow and could have a claustrophobic atmosphere. They could also get uncomfortably warm in the summer and cold in winter. It was decided to improve this space to make it a more hospitable place to work.

The first step was to improve the thermal efficiency of the area. This work will be covered in a future case study. We decided that, rather than removing the plumbing and radiators for the original central heating system on the top floor area, which may have created problems for the heating circuit, they would be left in situ but turned off using the radiator thermostats.

We requested quotes for the new system from three different companies. The company that we selected to install the new system had a strong track record with this technology and had done work in the building before so was already aware of its complexities. Installation went smoothly and feedback received from colleagues so far is that the system is performing well.

One of the ceiling units in situ.

Results

The top floor is now thermally more efficient and comfortable to occupants in both winter and summer. Individual rooms and spaces can be controlled independently making the system more efficient because the system can be controlled according to occupancy.

Next Steps

We want to decarbonise and modernise the heating of the rest of the building however, as mentioned above, this will be an expensive and disruptive, especially the work necessary to improve the heating efficiency. The work will need to fit around other business activity. The VRF Heat recovery system that we have installed is modular, so we can add to it as and when we are able to refurbish more of the building although any such further investment will be dependent on discussions with our landlord.

As part of our decarbonisation journey we have also installed EV chargepoints.

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Useful Tips

- If your building is landlord owned, open discussions as early as possible about if they will help you, what you can and can't do, and any potential implications for your lease.
- Improving building heat efficiency and insulation and before you install a new heating system is a must, however this work can be very disruptive. Approaching the work section by section has minimised disturbance to occupants in the rest of the building.
- The external components of the system take up a lot of space.
- The control panels for the new system can take a bit of getting used to. Consider the guidance you will make available to those people who occupy or look after the space.
- If the new system that you are installing has a rated output of more than 12kW, or if combined with existing air-conditioned units the output is more than 12kW, then it must be inspected every 5 years by an energy assessor to comply with TM44 and Energy Performance of Buildings Regulations. Information about this can be found here. (https://www.gov.uk/government/publications/air-conditioning-inspections-for-buildings/a-guide-to-air-conditioning-inspections)

This upgrade work was completed as part of the Net Zero Cheshire Building Decarbonisation project, part funded by Cheshire and Warrington LEP. For more information about the work that we have undertaken to decarbonise our HQ building, and advice for other businesses wanting to make a similar journey, please visit: https://netzerocheshire.eatechnology.com

Some of the external units.

Case Study

Global Footprint

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