VITAL ENERGi

CASE STUDY

Battersea Power Station

ENERGY CENTRE AND DISTRICT HEATING

EXECUTIVE SUMMARY

Battersea Power Station is an emerging luxury mixed-use development and is regenerating the former power station into new homes, shops, restaurants, offices, and over 19 acres of public space, with the first phase already open. Battersea Power Station Development Company had a vision to bring the power station back to life and so we have been working on the project since 2013 to design and build a solution that would allow the power station to once again be a source of energy. This involves the construction of a modern day energy centre in the basement of the power station and a district heating and cooling network to supply heating, cooling and electricity to the entire 42-acre site.

PROJECT OVERVIEW

Battersea Power Station, one of London's most iconic landmarks, supplied power to the capital from the 1930s until its decommissioning in 1983. It is now at the heart of one of central London's largest, most visionary and eagerly anticipated new developments, which will turn the 42-acre former industrial brownfield site into a new town centre with homes, shops, restaurants, offices, a new tube station with an extension to the London Underground Northern Line, and over 19 acres of public space.

Circus West Village, the first phase of the Battersea Power Station redevelopment, opened in 2017 and is quickly becoming one of the capital's most exciting riverside destinations, with its eclectic mix of independent and design-led bars, restaurants and shops. We have been working with the developers for several years as lead designers to create a solution that would provide heating, cooling and electricity for the entire Battersea Power Station site, including Circus West Village.

PROJECT SUMMARY:

CLIENT
Battersea Power Station Development Company

PROJECT
Battersea Power Station

TIMESCALE:
2013 - Ongoing

ESSENTIAL STATS

- Energy Centre: 73,000 square foot
- Carbon Reduced: 5,000 tonnes per annum
- Total Pipe Length: 6.4km
- Heating Capacity: 42.75MW

The North East and South West chimneys have been adapted to be utilised by the energy centre's flues. The exhaust flues for the boilers and CHPs will rise up the building using the wash tower and then through the existing chimneys in a total length of 960m.

'This energy centre will be a hugely important part of the new neighbourhood town centre at Battersea Power Station, supplying energy not only to its own community but potentially to other local residents nearby. This energy centre provides an important link to this fantastic building's past, as a local source of power in the nation's capital once again.'

GARY EDWARDS, HEAD OF TECHNICAL SERVICES AT BATTERSEA POWER STATION DEVELOPMENT COMPANY (BPSDC)

OUR SOLUTION

Our solution entails the construction of a district heating and cooling network and a 73,000 sq ft basement energy centre, which will be split over two levels. At full build, the energy centre will have a total heating capacity of 42.75MW, cooling capacity of 30MW and electrical capacity of 7.3MW. This is generated from two 2MWe CHP engines, one 3.3MWe CHP engine, three 10MWth gas-fired boilers, seven 60m^3 thermal stores and six 4MW chillers, making it one of the largest energy centres we have worked on.

Our solution has been tailored to the growth of the overall development to increase in scale and add additional infrastructure and building connections as they are constructed. This allows for energy to be available only when demand is required to provide a more efficient solution.

Due to the scale of the development, an energy centre spanning around 73,000 sq ft is necessary to hold all the plant required. As the physical size of the energy centre's components are so large, when combined together they required the space of two levels. Likewise, due to the space needed for the energy centre, the most feasible option would be to place it in the basement rather than a standalone building in order to maximise the site area.

The scheme will reduce carbon emissions by 5,000 tonnes per year which is the equivalent of taking up to 1,000 cars off the road each year, with a total pipe length of around 6.4km which is the length of over 2,500 double decker buses.

Reduced Noise Emissions

The energy centre is located in the building's basement, with two floors being excavated below ground level to provide the space necessary to cater for all the large equipment. Another benefit of this location was that it would be hidden from sight from the residents and allowed the developers to maximise all ground space to construct residential properties, retail units and green spaces. The energy centre has also been acoustically protected to reduce sound pollution. As the energy centre is underground, a ventilation solution was needed. We designed large openings in the ground floor to provide a free area for supply and extracting fumes, along with plenums located above the energy centre.

Energy Centre

The energy centre is split into zones and levels, which provide the heating, cooling, electricity generation, electricity distribution, heating and cooling distribution, water treatment and bore hole extraction all from the same building. The only exception is the existing energy centre from the first phase, which will no longer provide heating and hot water individually, but instead will be connected to the main energy centre to provide additional resilience to the network.

Increasing Efficiencies

We have increased the efficiencies of the solution by designing a bore hole extraction area, which will capture water from below the ground to be treated in our water treatment tanks and utilised in the system. This minimises the necessity to use water from the national network.

Phased Design

We analysed the heat profiles to create a design which could cater for the growing load and applying a flexible approach to adapt to the changing nature of the development. The energy centre plant will be installed in two phases: phase 1 includes two 2MWe CHP engines, two 10MW boilers and three 4MW chillers; and phase 2 includes the remaining one 10MW boiler, one 3.3MWe CHP engine and three 4MW chillers. As the plant had to be installed by lowering through demountable sections in the roof of the energy centre and down the two levels, it was essential that the future plant could also utilise this route. We had to be considerate of this factor when designing the pipework and ventilation systems inside the energy centre to avoid this area for the future plant installations.