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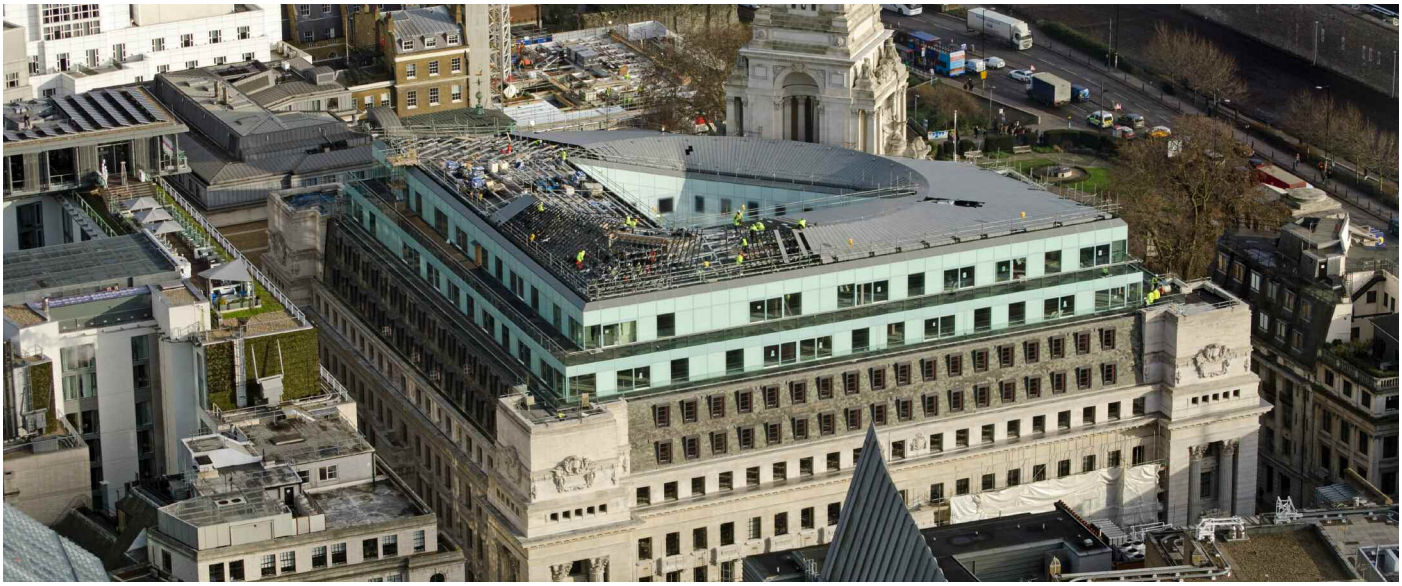
Edina

Edina 8MW CHP powers London Citigen, district heating scheme.



Edina Group replaces existing engines with new energy efficient combined heat and power (CHP) plant at E.ON's prestigious central London Citigen, district heating project.

Key benefits

The City Corporation benefits directly from the CHP system in a number of ways:

- Financial savings through lower energy charges
- Significant CO2 emissions savings
- Citigen profit sharing scheme
- Support for its Environmental Policy, Local Agenda 21, and Community Strategy
- Elimination of Health & Safety risks associated with cooling towers
- Removal of CFC and HCFC refrigerant gases in original cooling plant
- Space savings

London Citigen power plant located within the heart of central London has been supplying power generation to major public buildings since 1992. The power plant is part of a community wide energy project to provide more efficient, cost effective energy and carbon savings of 3,000 tonnes a year.

Situated within the Port of London Authority and neighbouring Central Cold Storage buildings in Charterhouse Street in the borough of Islington, the 20 year old plant recently received investment from E.ON's Community Energy business to modernise and update the CHP technology as part of its long term district heating strategy.

The principles underpinning the redevelopment of Citigen adhered to strict conditions, which included the preservation of the two listed buildings facades, improving the environmental credentials, safeguarding heat and cooling capacity in line with projected customer growth.

Following an extensive tender process, leading power and gas provider E.ON awarded CHP specialist, Edina Group, the contract to replace the existing engine and supply, install and maintain two MWM TCG 2032 V16 high efficiency gas powered generators.

Chosen for their high reliability and efficiency, MWM gas engines are world renowned for achieving maximum electrical and thermal efficiency, low operating and servicing costs and were recognised as the best fit for purpose, combined with the proven operation and maintenance support package from Edina, made this the winning combination.

The large scale community energy system is made up of a central power station and district heating network. Natural gas fuelled by the CHP plant is located near Smithfield Market and supplies heat and cooling to ten of the City's properties by an underground pipe network spanning over two miles.

MWM

Energy. Efficiency. Environment.

These properties include Guildhall, Smithfield Market and the Barbican Centre. Private customers are also supplied, including a sheltered housing unit for the elderly.

Cooling (as chilled water for air conditioning systems) is also provided to six properties via a separate parallel underground pipe network. Chilled water is generated mainly by absorption chillers which utilise heat from the engines as their main energy source, and are well suited for this application. Electricity generated is conveyed to the local distribution grid and sold through Citigen's parent group. This type of system is known as 'tri-generation'.

Project challenges

The plant/site is located in the heart of the Farringdon regeneration area situated inside two irregular multi-level buildings, of which, the Central Cold Store is a grade two listed building.

With the removal of the redundant pipework and two 350 tonne V18 compression-ignition reciprocating engines, heat and cooling services had to be maintained to existing customers during the refit.

Preparatory works for both CHP engines were done in advance to avoid additional costs of duplicate preliminaries, site set up and enabling works in future.

Site logistics was a major challenge, with on-going internal demolition works, refurbishment and construction running concurrently with Edina's equipment installation.

The co-ordination and phasing of work was essential to meet strict deadlines and health and safety requirements.

From an existing basement, situated 8 metres below street level, a new slab supported on concrete columns was cast to accept the installation of the new engines and acoustic cells.

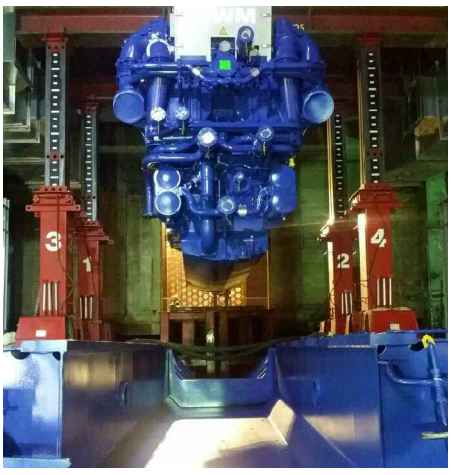
Due to the amount of equipment arriving on-site, road closures were inevitable. The approvals process required a 12 week notice period, placing significant importance of forward planning and delivering the project within the agreed timescales.

The restricted ground loadings meant that each 53 tonne engine was delivered in three parts (bedframe, engine and alternator) and reassembled in the basement.

The construction of the acoustic engine cells, pipework installation, cabling and the delivery, offloading and installation of equipment was challenging due a heavy reliance on scaffolding and lifting equipment.

Edina installed four silencer sets on the upper floor of the building above the engine cells. These were installed through a small opening in the roof using a tower crane.

The size of the roof opening and the crane's load capacity meant each silencer had to be landed in pieces, craned into the building, reassembled and skated into position.



In order to manage and organise the crane slots and adhere to the on-time arrival and departure of equipment, it was important to keep momentum and encourage the flow of equipment to give the installation contractors continuity of work.

Technical impact

Heat is recovered from the engine exhausts, turbochargers, jacket cooling, and lubricating oil, and is transferred via heat exchangers to the district heating network.

The absorption chillers are also supplied with heat. Any surplus heat produced is dissipated to atmosphere by cooling towers.

The operating regime of the engines is dictated by prevailing electricity and gas prices.

Typically, one engine operates during the day but not overnight or at weekends. When the engines are not operational, heat is supplied to the network and is maintained by backup boilers.

Chilled water is generated by two absorption chillers, each rated at 5.6MW and manufactured by Trane.

Electrically powered chillers provide a further 3.3MW of cooling and are used when engines and absorption chillers are offline.

The district energy network extends for a total distance of 3.6km through the north western parts of the City, with a branch running north into Islington.
For ease of installation and access, the majority of the pipework and cables make use of existing subways, basements and car parks, with the rest buried under roads.

Social and community

Lower heat price - Citigen's economies of scale and multiple customers allows 'cheaper than the alternative' pricing over a life cycle. Commercial offers are 10% lower than the alternative.

Emissions/Greener solution – CHP district heating delivers lower CO2 emissions. Connection to Citigen relieves its clients to report their own on-site emissions.

Fuel flexibility - Citigen's technology is future proofed to exploit bio-methane.

This cost effective, secure service helps to provide the energy needs of some of the Corporation of London's premises including the Barbican Art Centre, Guildhall, Bastion House and London Central Markets, as well as other major commercial customers.

The CHP system benefits the community in a number of ways, as outlined below:

- Financial savings through lower energy charges
- Significant CO2 emissions savings
- Support for its Environmental Policy, Local Agenda 21, and Community Strategy
- Elimination of Health & Safety risks associated with cooling towers
- Removal of CFC and HCFC refrigerant gases in original cooling plant
- Space savings

The scheme saves around 12,000 tonnes of CO2 each year and benefits from discounted energy charges from the operator.

The London Plan, a statutory spatial development strategy for Greater London and written by the Mayor of London, allows boroughs to require new developments over a certain size to incorporate sustainable energy approaches, such as being designed to link in to a district energy network, before granting planning permission.

This is used to encourage developers to link up to the energy network.

Community heating

The district heating scheme at Citigen provides a market for the heat generated from the CHP, which enhances the electricity production by 50% compared to conventional power plants.

Due to the networks flexibility, new heat loads and low carbon energy can be integrated to provide balancing from the growing share of renewables on the electricity grid, particularly when combining large hot water storage with CHP and heat pumps.

Finally, the Citigen heat network can connect buildings in high density urban areas where individual heat pumps or biomass boilers are unfeasible due to space requirements.

During the Association of Decentralised Energy (ADE) awards 2016, the Citigen project won the 'Integrated Energy Project of the Year' category award.

About Edina

Edina is a leading supplier, installer and maintenance provider for energy efficient CHP (combined heat and power) solutions for natural gas and biogas applications, providing complete turnkey and containerised plant and control panel systems manufactured in-house.

Edina is the sole distributor in the UK and Ireland for leading efficiency MWM manufactured gas engines, world renowned for achieving maximum electrical and thermal efficiency, low operating and servicing costs and high reliability and availability.

With over 30 years' experience in providing flexible power generation solutions, Edina works closely with its customers to understand and meet their requirements, from initial contact to long term maintenance support.

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