

metropolitan

*Powering King's Cross -
past, present and future*



CASE STUDY

The landmark development at King's Cross is one of the largest and most prestigious developments presently being undertaken in the UK. Consisting of 5 million square feet of commercial property and 2,500 new homes, it is home to London's University of Arts and Google's UK headquarters.

The area covers 67 acres, with 20 new streets and 10 new public squares. This is, however, not necessarily what makes it so remarkable.

While the development itself is hugely significant in terms of size and location, it is the work beneath the ground and behind the scenes that is likely to have the biggest effect on the future.

With 30,000 people expected to be housed, employed and entertained at King's Cross by 2016, providing them with the essentials of life is a major part of the project. Delivering heat, electricity, water and fibre telecoms to the area set a huge challenge for the developers, especially under the strict planning regulations surrounding the permitted level of carbon emissions.

Flexibility and future proofing

The development partnership wanted King's Cross to become a flagship development not just in terms of its size but also its message for the future. They needed a community whose sustainable living would set the example for many years to come. The development partnership needed to show how it is possible, even within the demands of today's society, to reduce bills and eliminate waste of resource.

With the site containing existing and historic buildings, the old utilities infrastructure was still in place but was not deemed fit for purpose. While the development partnership required traditional utilities for some of their provision, they also needed so much more. They required future-proof solutions and boundless flexibility, as well as having the desire to work with one company, in partnership.

Metropolitan offered the development partnership the expertise, flexibility and innovation required and soon became its long-term partner for this 15 to 20-year build and beyond, as owner and operator of the site networks.

Combined heat and power

The first challenge at King's Cross was to provide an alternative to the traditional gas network, with individual boilers in each home, instead delivering sustainable heat and hot water to the wide range and large number of properties on the development. The solution came in the form of a site-wide District Heating Network, with Metropolitan installing Combined Heat and Power (CHP) engines in a dedicated Energy Centre.

The CHP plant engines are driven by natural gas, providing a 50% saving in carbon emissions when measured against a traditional utility solution (like a combined cycle gas turbine), and 80% efficiency, compared to 30% in the conventional UK electricity supply.

Traditional power stations use high-carbon, fossil fuels and only deliver to the end user about 30% of the energy generated. The rest is lost as heat in the journey from a remote power station to site.

It is 'back to the future' with CHP and district heat, returning to local generation of energy. The heat, which is traditionally a waste product of the generation of electricity, becomes a valuable, low-carbon advantage.

When there is no demand for heat from the communal heat network, heat is stored in a thermal store, which is basically a large hot water tank. This allows the CHP engines to be run efficiently, increasing the savings in carbon emissions.

Furthermore, the power generated by the CHP is sold to the grid. As the site-wide electricity network is operated on an open access basis, residents can choose their electricity supplier in the normal way.

For much of the time, the system at King's Cross is self-sufficient, delivering the site's complete heat and power needs. During periods of high demand, there is a top-up option, with further electricity from the grid. This is indicative of the flexibility that the system offers.

The CHP plant engines were installed to time with each new phase of the development and the heat network can be extended as required. Metropolitan is able to 'plug in' each new building to the network, when required. On a long-term, phased build such as this, installing the CHP plant in stages allows the output to meet demand and to increase as the development increases/grows in size and use. This is important in supporting cash flow in the early years of a site's development.

ESCo

The Energy Service Company (ESCo), is a joint venture between Argent and Metropolitan, known as Metropolitan King's Cross or MKC. The ESCo manages the supply of the heat across the development and this unique approach means that the heat bills for the King's Cross development are the lowest known in the UK. This creates not only a sustainable, but also a low-cost community, helping with Government fuel poverty targets.





"We have been working with Metropolitan since 2008 and they are an essential part of the team delivering the infrastructure at King's Cross. They have been flexible, innovative, and always willing to work with us when plans changed. With their help, we have been able to provide our occupiers with 21st century infrastructure and deliver our targeted carbon savings of around 60%."

Anthony Peter, Project Director, Argent.

Pink Panther

The first CHP engine to be installed at King's Cross was painted bright pink in aid of Breast Cancer Research. Indeed, the Jenbacher engine was nicknamed the Pink Panther and has become famous in its own right. The heat generated provides hot water across the development, meaning there is no need for conventional boilers in the buildings themselves.

Such was the partnership (of the developer and the utilities provider) between Argent and Metropolitan that they jointly undertook a bike ride from Jenbach in Austria, where the Pink Panther was made, to King's Cross. The 760-mile ride took the team of four Argent riders and eight Metropolitan riders nine days to make the trip, raising £15,000 for Breast Cancer Research and £15,000 for Global Generation (www.globalgeneration.org.uk), a local community charity based at King's Cross providing skip gardens and teaching skills for sustainable living.

Tri-generation

Taking the entire process full circle and moving firmly into the next generation of utility provision, the CHP engines will now be used to provide cooling, in addition to the local generation of heat and electricity. This is rather like a giant fridge, with electricity from the CHP engine used to drive cooling plants. The result is tri-generation of electricity, heat and cooling, with huge implications for new levels of carbon efficiency.

Fuel-cell technology and evolution

Metropolitan and the development partnership also are committed to installing one of the UK's first fuel cells, to produce electricity and heat. The fuel cell converts gas into hydrogen and then into carbon dioxide and water. It is a highly efficient (up to 90%) electricity generator and emits no particulate emissions.

Along with the installation of PV panels in some areas of the site, King's Cross is a showcase for all renewable technology, in a commercial environment, in the middle of London.

Superfast fibre

Metropolitan is providing superfast, end-to-end, Fibre To The Home (FTTH) technology to the development. This FTTH solution brings fibre optic cables not just to the nearest street cabinet but right into every home (and business) in the development.

Fibre optic cables bring unlimited capacity and offer infinite network potential. While many providers are still installing and utilising copper cables for the 'last mile' of the network, FTTH ensures that the same superfast service is provided all the way to every home and business.

The government's targets are to provide superfast broadband, in excess of 24Mbps, for 90% of the UK, in 2015. Ofcom states that currently, although most customers purchase a package of 20Mbps, the actual average received is only 14.7Mbps. With FTTH currently offering reliable speeds of 300Mbps and higher, it is clear why this utility is so in demand from homeowners.

Metropolitan's end-to-end, fibre-based broadband gives King's Cross future-proof technology. It delivers the fastest broadband speeds available anywhere in the UK and the best possible online experience. With unlimited capacity and infinite network potential, it will also continue to meet growing demand from the householders and businesses on site, one such business being Google itself.

Glossary

CHP Combined heat and power (CHP) generates electricity whilst also capturing usable heat that is produced in this process.

District Heat is a network of pipes to efficiently deliver locally generated heat. Heat, which is currently often wasted in the power generation process, is harnessed and delivered to homes and businesses. It allows for economies of scale, using one large plant rather than individual boilers.

Energy Service Company (ESCo) is an organisation specifically created to manage the production and supply of local energy to a 'whole site' development.

Full package

At King's Cross, Metropolitan offered the major advantage of being able to deliver the total energy and utility infrastructure from initial design to the final connections. One project manager had the overview of the designs for all utilities - electricity, heat, water, fibre and gas.

The initial focus at King's Cross was on providing a cost-effective heat network and designing an energy supply system that would fit into the available space. It soon became clear, however, that there were huge benefits in integrating the heat solution with delivery of the whole utility infrastructure - electricity, fibre, water, gas and wastewater.

As Metropolitan is a one-stop shop from design to installation of networks and connection of buildings, this was a straightforward assignment. Such complete integration delivers benefits in spatial planning, use of the available capacity from each network and ease of delivery. In particular the heat network is delivering a 50% saving in carbon - and at a fair cost to residents. The fibre-to-the-home network further future proofs the community, providing flexibility and fantastic access speeds, with unlimited capacity so can expand as required over time.

Metropolitan manages the connection to each of the upstream utility grids, enabling the whole project to be completed by just one company, without the involvement of the incumbent utility provider. This also enables connection costs to be kept to a minimum for the developer. This development is also the only known site where the same company provides and owns the infrastructure for all of the utilities on the development, ensuring a smooth process throughout.

The ownership of the infrastructure at King's Cross is a long-term partnership. The lead developer, Argent, has maintained a strong interest in the project, retaining a majority share in the ownership of the ESCo, where the CHP is based and the district heat network begins. The remaining share of the ESCo is owned by Metropolitan, continuing the long-term relationship. The ESCo owns the energy and utility infrastructure right up to each front door of every building. This means that they will both continue to have a great interest in the success of the development, managing the customers' needs, long after the construction phases have been completed and both will be keen to ensure that everything continues to run smoothly and efficiently.

Truly multi-utility

The multi-utility solution provided by Metropolitan at King's Cross comprises:

District heat

An energy centre consisting of 3 x 2MWe CHP, 3 x 10MW gas boilers and 2 x 75m thermal stores.

ESCo

A fully managed ESCo for the local delivery of de-centralised energy including professional customer services activities to the householder.

Electricity

A 40mVA 132kV site connection from UKPN. Primary Substation 11kV board and all site networks. All owned by metropolitan under an Ofgem-regulated distribution licence.

Fibre

An open access fibre to the home network, taking fibre into every single property. Residential superfast speeds of 300Mbps and commercial speeds of 1Gbps.

Water

Site bulk-water connection to Thames Water and a new potable water network, owned under Ofwat regulated licence.

Wastewater

Site bulk-discharge connection to Thames Water sewer. New site waste water network, owned under Ofwat licence.

Gas

Site connection and new gas network to supply the energy centre and commercial buildings. Network owned under Ofgem regulated licence.

For further information on Metropolitan's solutions, call **01359 758757** or visit www.met-i.co.uk

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