Birmingham
District Energy Company

BIRMINGHAM DISTRICT ENERGY

DELIVERING LOW CARBON ENERGY

The Birmingham District Energy Scheme is playing a pivotal role in Birmingham City Council's climate change strategy, which aims to reduce CO_2 emissions by 60% by 2025.

The Birmingham District Energy Scheme is owned and operated by COFELY District Energy working in partnership with Birmingham City Council – under the name of Birmingham District Energy Company Ltd (BDEC). The scheme features tri-generation, producing heat, electricity and chilled water.

The scheme makes extensive use of highly efficient large-scale combined heat and power (CHP) technologies, and uses conventional boilers for 'top up', standby and increased resilience.

BDEC's three core schemes initially involved the supply of energy to 10 prestigious users from both the public and private sectors. However, due to the scheme's significant delivery of financial and carbon savings to its consumers, it has already expanded to supply several third party private developments.

What is District Energy?

District energy systems produce low/zero carbon (LZC) energy from a central energy centre. The steam or water is distributed via insulated pipework, often laid with a cooling and electricity network, to individual buildings. As a result, buildings served by a district energy system do not require their own boilers or chillers. District Energy is widely recognised as a sustainable, cost-effective solution to the provision of heating, cooling and power. District Energy scores highly in environmental assessments such as Code for Sustainable Homes, BREEAM and LEED. It also facilitates compliance with Building Regulations Part L requirements.

Increased use of District Energy coupled with Combined Heat and Power (CHP) is a cornerstone of the Government's strategy for reducing carbon emissions.

What is an Energy Centre?

At the heart of every District Energy scheme is an Energy Centre serving a range of buildings through a network of underground pipes and cables. In most District Energy schemes the Energy Centre includes CHP plant, which may be combined with chilling (Tri-generation) where there is a cooling requirement. Schemes may also incorporate other low and zero carbon (LZC) technologies such as fuel cells, biomass, solar thermal, heat pumps and high efficiency gas-fired boilers.

What are CHP & Tri-generation

CHP plants simultaneously produce heat and electrical power. For much of the year the heat output is used for heating and hot water in the buildings served by the District Energy scheme, while the power meets local or national electrical requirements. In summer, when heating requirements are lower, the surplus heat may be used to drive an absorption chiller to generate chilled water for cooling in these buildings. Tri-generation delivers significant energy savings compared to conventional methods of providing heating, cooling and power.

Birmingham District Energy

The Birmingham District Energy Scheme

The Birmingham District Energy Scheme was conceived in 2003 and the first 25 year energy supply agreement with Birmingham District Energy Company Ltd (a wholly owned subsidiary of COFELY District Energy) was signed in 2006.

The first phase (the Broad Street scheme) encompassed a range of buildings in the central business district served by an Energy Centre at the International Convention Centre (ICC), and was launched in October 2007. Further phases began operation at Aston University during 2009 and Birmingham Children's Hospital in 2010. The schemes are also being extended into several regeneration areas across the city and, ultimately, all of these 'sub-schemes' will be linked together to improve resilience and maximise energy saving opportunities.

Key facts and figures

- Over 41,000MWh of heat per annum
- 6,700MWh of electricity from the CHP plant
- More than 4,900MWh of chilled water
- 4km of insulated distribution pipe
- Electricity supplies synchronised with the National Grid
- Just 0.5°C temperature loss per km of pipe
- Hot water flow/return temperatures of approximately 100°C/60°C
- Over 12,000 tonnes of CO_2 saved per annum

The Birmingham District Energy scheme has enjoyed rapid growth since its inception, enabling the on-going expansion of the scheme and its combined low carbon plant capacity, as more customers have come on stream. As the scheme evolves, COFELY District Energy's innovative approach ensures that low carbon technologies are applied to maximum effect.

For example, the Birmingham Children's Hospital scheme (which includes a connection to Birmingham City Council's Lancaster Circus) features a low carbon energy centre housing a 1.6MWe CHP, designed and built by BDEC and is expected to save 3,500 tonnes of CO_2 emissions per annum. Overall, the Birmingham scheme is saving over 12,000 tonnes of CO_2 per annum compared to traditional systems.

COFELY District Energy, Aston University and Birmingham City Council officials greeting Aston University's new 3.0MWe CHP in 2009.

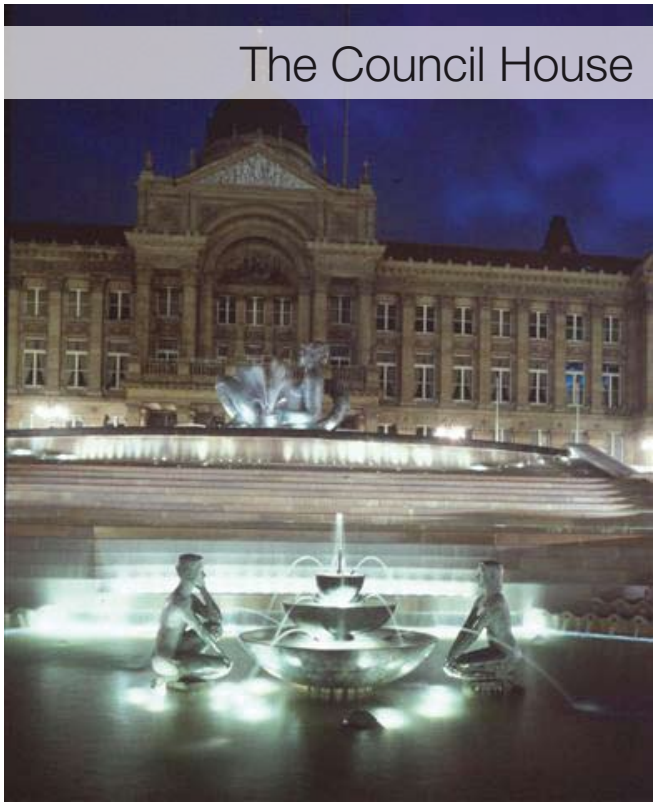
Broad Street District Energy Scheme

Broad Street District Energy Scheme is a large, commercial district tri-generation energy scheme which features a 1.6MWe CHP unit. The scheme's low carbon generation plant was originally only based at the International Convention Centre (ICC) but a further 600kW CHP engine was installed at the National Outdoor Arena (NIA) in 2008. The low carbon energy is then used to heat the buildings connected to the scheme through thermal networks laid under the streets of Birmingham which interconnect the schemes buildings. This includes a large heating main laid by BDEC down Broad Street.

The Broad Street Scheme's consumers include:

- The Town Hall
- The Council House
- Hyatt Regency Hotel
- The REP Theatre
- ICC
- NIA
- Paradise Circus

The Broad Street Scheme saves over 3,800 tonnes of CO_2 per annum, a figure which will increase as new consumers are added to the network such as the New Library of Birmingham project.


The Council House

The ICC Energy Centre

This building houses the energy generation plant which provides heating, power and cooling to the consumers on the Broad Street District Energy scheme. Built at the same time as the ICC and NIA it was ideally suited to be adapted to house the first BDEC CHP unit.

As the Broad Street scheme expands, this Energy Centre will be supplemented with further satellite energy centres (such as the new NIA CHP) in strategic developments connecting to the scheme. These additional Energy Centres will thermally link into the networks serving the core buildings along Broad Street.


The Town Hall

Eastside Schemes

The Eastside schemes are split into two phases. Phase one is the Aston University Scheme and phase two is Birmingham Children's Hospital (BCH) Scheme. There is also a large urban regeneration area which the Eastside schemes are planned to expand into. The Eastside scheme consumers include:

- Aston University Main Campus
- Lancaster Circus (Birmingham City Council)
- Birmingham Children's Hospital
- HMCS – Magistrates Court
- Masshouse
- Woodcock Street Administration (BCC)
- Cosmopolitan Birmingham Student Homes

BDEC commenced its delivery of low carbon sustainable energy to Aston University in 2009. A total of 3MWe of CHP capacity has been installed within BDEC's Jennens Road energy centre.

The scheme is initially delivering CO_2 emission reductions of 5,300 tonnes per annum, with further contracts for third party connections placed to receive heat from the scheme before the CHP construction project had even been completed.

Additionally, a new purpose built Energy Centre, consisting of a 1.6MWe CHP now serves the Birmingham Children's Hospital and Birmingham City Council's Lancaster Circus Offices with low-carbon energy. The scheme, operational from August 2010, delivers a further 3,500 tonnes of CO_2 emissions each year.

The geographical positioning of the Eastside schemes means that both networks can expand into regeneration areas of Birmingham, as well as potentially using the Eastside redevelopment of Birmingham New Street Station as a hub for interconnecting the Broad Street and Eastside schemes.

Third Party Consumers

Considerable financial, environmental and planning benefits make joining the Birmingham District Energy Network an extremely attractive proposition to building owners, developers and residents.

The reinvigoration of Birmingham City Centre coupled with the considerable gains associated with a connection to the scheme has resulted in the rapid expansion of BDEC's District Energy networks to third party consumers. These third party connections are made possible through a mixture of public and private connection agreements and grants. Contracted third party connections to the scheme currently include:

- Her Majesty's Court Services (new BREEAM "Excellent" Development)
- Library of Birmingham
- Masshouse Block M
- Bagot Street Student Accommodation

- Birmingham City Council's New Administration Centre
- Birmingham's Aquatic and Leisure Centre
- Cambridge and Crescent Towers
- Code for Sustainable Homes (CFSH) Level 4

Resilience of the Schemes

Birmingham's district energy schemes are designed to be at least as resilient as conventional supplies. In the unlikely event of a CHP engine being offline, sufficient top-up and back-up plant is in place to meet the energy demands of the energy network.

BDEC achieves this by linking and installing additional boiler/chilling plant, and ensuring there is a grid connection. There is also a need to ensure there is sufficient energy generation and supply capacity during the planned maintenance of major plant, such as CHP.

– – – Potential future energy links

Future Proofing and renewables

The City's district energy networks have also been designed to integrate the use of new, emerging technologies such as fuel cells and renewable heat sources into the network, as the overall energy demands and improved efficiencies makes these technologies financially viable.

BDEC expects to add substantial renewable energy generation to the schemes as new consumer connections are made. This will not only reduce emissions but also help to future proof the scheme against fossil fuel shortages.

Developers' Guidance

The scheme is open to both public and private sector consumers. The primary energy service is for heating and domestic hot water purposes. Chilled water is also available in limited proximity to the network. Electricity is available at local Energy Centres, generally where consumers are able to accommodate an on-site CHP unit, subject to there also being sufficient overall heat load.

A Developer's Guide to Connection

What savings can be expected from connecting to the scheme?

Savings are typically achieved in two ways, Firstly, capital costs are reduced by around 20%. Secondly, there are significant savings on plant room space.

What ongoing savings can tenants expect?

The inherent efficiency of District Energy schemes means that most consumers can expect to save 5-10% on their overall energy bills, compared to traditional methods.

Do existing heating and cooling systems need to be changed?

No. The temperatures and pressures used by the scheme are the same as those typically used in heating and cooling systems.

What is the typical contract period?

Contracts are typically for at least 20 years. Crucially, the value of the initial cost saving is maintained, in real terms, over the life of the contract through a transparent system of annual indexation.

Frequently asked questions

What energy services are available?

COFELY District Energy can provide hot water for building space heating and domestic hot water purposes. Chilled water is also available in some areas. Electricity can generally be provided if a CHP unit can be installed within the site or building. A thermal connection will then be made to the wider network.

Does electricity from the schemes substitute grid reinforcement from the regional electricity companies?

No. The scheme's power generation (where available) only offsets a proportion of electricity from the grid and does not substitute grid reinforcement.

Can connecting to the scheme help meet local planning obligations?

Yes. Many local authorities are choosing to address their climate change obligations by encouraging development of energy efficient, low carbon and sustainable energy schemes.

Can the scheme facilitate compliance with energy legislation?

Yes. As the scheme is inherently efficient it helps to reduce energy consumption and carbon emissions, thus assisting with obligations under the Building Regulations, the CRC Energy Efficiency Scheme, Display Energy Certificates and Energy Performance Certificates.

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