Leicester District Energy
Delivering Low Carbon Energy
ENGIE, has signed a 25 year contract with Leicester City Council (LCC) to link and extend four existing district heating schemes across the City of Leicester.

The work is being delivered through a new subsidiary company - Leicester District Energy Company (LDEC) - with an investment of £14m by ENGIE and additional funding from the Community Energy Saving Programme (CESP).

The project realises a long-held ambition of LCC to optimise the performance of its existing district heating schemes and has significantly broaden the use of low carbon heating within Leicester. The low carbon energy schemes serves 3,000 dwellings across six housing estates, as well as a number of civic buildings, through 13km of insulated pipework. The schemes use a combination of over 5MW of low carbon gas-fired Combined Heat & Power (CHP) and biomass boilers to achieve CO2 emission savings of 7,000 tonnes per annum.

The City’s district energy networks are 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.

ENGIE assumed operational responsibility for the original schemes in early 2011, and the new links and extensions from autumn 2012.
WHAT IS DISTRICT ENERGY?

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 (CFSH), 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 in urban areas.

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 a 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 & TRIGENERATION?

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, the surplus heat may be used to drive an absorption chiller to generate chilled water for cooling in these buildings (Tri-generation). In the correct situation, this can deliver significant energy savings compared to conventional methods of providing heating, cooling and power.
Leicester City Council (LCC) has taken the lead in realising the potential for district energy in Leicester and is the main driving force behind the Leicester Partnership. The procurement route taken by LCC was a competitive dialogue process under the Official Journal of the European Union (OJEU). LCC procured the 25 year contract not only on its own behalf, but also on behalf of other public sector authorities in the city.

One of the requirements of the original OJEU notice is the expansion of the district heating scheme to users from both the public and private sector not currently identified by LCC at the time of the publication of the OJEU notice including:

- Government Departments and Agencies
- Educational Establishments
- National Health Service
- Other publicly funded bodies
LEICESTER CITY COUNCIL

LDEC delivers low carbon heat to 3,000 dwellings on six housing estates. The Leicester District Energy (LDE) scheme will also service a number of civic buildings around the city centre, including:
- Phoenix House
- Central Library
- Town Hall Square
- Municipal Library
- Pilot Library
- 16 New Walk
- New Walk Museum
- Sovereign House
- Leicester Adult Education Centre
- Attenborough House
- De Montfort Hall
- St Marks
- St Matthews
- St Andrews
- St Peters
- Aikman Avenue
- Beatty Avenue

UNIVERSITY OF LEICESTER

The University of Leicester together with the council are the core consumers for the LDE scheme. The University had considered installing its own CHP plant but decided that joining the city-wide scheme would prove more cost effective, freeing up funds for teaching, learning and research. It also enabled the size of the CHP to be increased at the University due to the larger heat loads of the district network than if they had installed their own individual plant - making a greater contribution to minimising carbon footprint.

Cost savings and decreased levels of emissions were key considerations as the University has the challenging target of achieving a 60% reduction in its carbon footprint by 2020, compared to 2004/2005 figures. Linking to the District Energy scheme is expected to contribute 12-15% of this and there are many other initiatives under way, including the application of Passivhaus principles to new buildings. Work on connecting the University’s buildings to the district heating network was carried out during summer 2011, with the assistance of Salix/HEFCE funding.

COMMUNITY ENERGY SAVING PROGRAMME

The Community Energy Saving Programme (CESP) targets housing in areas of low income across the UK. The aim is to improve energy efficiency standards, and reduce fuel bills. The LDE scheme used over £1m of CESP funding to link LCC housing to the district energy networks enabling it to benefit from significant carbon and energy cost savings.

BUILDING ON SUCCESS

LDE has been developed under an award-winning framework based on the successful Birmingham and Southampton District Energy schemes. Financial savings for the schemes are developed on a whole life costing basis and maintained throughout the contract by indexing charges to national fuel prices, the retail price and labour indices.
CUTTING CARBON WITH BIOMASS

Included in the energy-efficient mix of heat sources serving LDE are biomass boilers, using locally sourced wood pellets. Biomass is considered to be near carbon-neutral. This is because, although carbon dioxide is released when biomass fuel is burned, this is carbon that was absorbed by the biomass just a few years earlier. Thus it forms part of a natural carbon cycle.

Consequently, while there are some additional carbon emissions associated with the harvesting, processing and transportation of biomass, this is minimal compared to fossil fuels. In the case of burning vegetation-based biomass fuels, the carbon emitted is absorbed by the new growth of plant material that will be used to generate more fuel in future years.

Many biomass fuels also generate lower levels of atmospheric pollutants, such as sulphur dioxide, than fossil fuels.

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**Carbon released back into the atmosphere**

Atmospheric carbon dioxide, water and sunlight

Carbon Cycle

Converted into new plant material through photosynthesis

Harvested and burnt

Useful Energy (eg. Heat & Electricity)
THIRD PARTY CONSUMERS

Considerable financial, environmental and planning benefits make joining the LDE network an extremely attractive proposition for building owners and developers.

A connection to the LDE scheme would eliminate the requirement of any future boiler maintenance or replacement for new & existing buildings and developments.

RESILIENCE OF THE SCHEMES

ENGIE’s district energy schemes are designed to be at least as resilient as conventional supplies. For example, in the unlikely event of a CHP engine being offline, sufficient top-up and back-up plant is in place within the energy centres to meet the demands of the energy network. This extra resilience also ensures there is no disruption to services during routine maintenance.

FUTURE PROOFING AND RENEWABLES

The inherent flexibility of the modular design of the energy centres also enables the scheme to expand with growing demand, while taking advantage of emerging energy efficient technologies as these become financially viable.

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

University of Leicester Campus
Who is the LDE scheme open to?

The LDE scheme is open to both public and private sector consumers. The primary energy service is for heating and domestic hot water purposes. The exact suitability of each client depends on the whole life cycle assessment. This, in turn, is based on the energy needs, the location to the existing District Energy system and the current age and condition of the existing boiler plant.

What is involved in connecting to the LDE scheme?

The complexity and size of a connection will vary depending on the heat load, size of the building, location of the building to the District Energy pipework and also in the wider context of the District Energy scheme.

As a minimum, this will involve underground pipework connections into the building (flow and return) and also a small metering station and heat exchanger system inside the building normally in the place where the current boiler system is installed. For larger buildings and multiple site locations, this could involve installing a CHP engine which will supply heat and power to the building and potentially export to the District Heating network and grid.

What capital savings can be expected from connecting to the LDE scheme?

Capital cost savings are achieved in two ways. Firstly, it will provide a capital cost saving against a conventional stand-alone solution. Secondly, there are significant savings on plant room space.

Do existing heating and cooling systems need to be changed?

Not usually. The temperatures and pressures used by the scheme are the same as those typically used in heating and cooling systems. Heat exchangers are generally installed to ensure that the customer and client systems remain separate.

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.

Can connecting to the scheme help meet local planning obligations?

Leicester City Council’s own guidance planning states: “Wherever feasible, development should include decentralised energy production or connection to an existing Combined Heat and Power or Community Heating System”.

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.
ENGIE: DISTRICT HEATING EXPERTISE YOU CAN RELY ON

ENGIE operates over 180 District Energy schemes throughout Europe, many of which were also financed, designed and constructed by ENGIE. EDE operates some of the largest and most technically demanding District Energy schemes in the UK.

With over 30 years’ experience, EDE has the expertise to provide a comprehensive turnkey service for encompassing:

- Initial feasibility/financial viability studies
- Provision of finance for projects
- System design
- Installation & commissioning
- Project management of associated works
- On-going operation and maintenance
- Contract energy management including utilities procurement

We are also one of the few UK-based companies to offer true Tri-generation experience, delivering low cost, highly efficient air conditioning and comfort cooling alongside heat and power generation. Crucially, EDE is independent of all equipment manufacturers and is free to offer the best technical and financial solution for each project.

Southampton District Energy scheme

The Southampton District Energy scheme is a Tri-generation system saving over 11,000 tonnes of carbon dioxide emissions per annum. It utilises heat from a geothermal spring 1.7km below ground, supplemented by large scale CHP, biomass and conventional boilers. It also incorporates a district cooling system. Users include private, public and residential buildings.

Key facts
- Over 38 GWh of heat p.a.
- 23 GWh of electricity from the CHP plant
- More than 10 GWh of chilled water
- 12km of insulated distribution pipe
- Serves buildings within a 2km radius of the energy centre
- Just 0.5°C temperature loss per km of pipe

Queen Elizabeth Olympic Park & Westfield Stratford City, London

The Energy Centres for the Olympic Park & Stratford City, built and operated by ENGIE, include a 3MW wood chip biomass boiler and Combined Cooling, Heat and Power (CCHP) plant to generate heating, cooling and electricity. Hot and chilled water are distributed through a district energy network to the Olympic Park and Westfield Stratford City. It also extends to businesses in Stratford City and through to Stratford High Street.

Key facts
- Design, build, finance, operate and maintain contract
- Two integrated Tri-generation energy centres
- Over 16km of distribution pipework
- 12 GWh of heat from biomass
- A key element of the Olympic legacy for London
- Plant housed in low energy building, making extensive use of recycled materials
Coventry District Energy scheme

Coventry District Energy utilises recovered heat from the local Energy from Waste (EfW) facility. A range of Coventry’s buildings are connected to the low carbon scheme including: the prominent Cathedral, Herbert Art Gallery and Museum, Council buildings, and the Sports and Leisure Centre.

This pioneering scheme has incorporated innovative technology for added resilience. A thermal heat store was opened in 2015, this in addition to the scheme’s back-up plant, was commissioned to ensure there is no disruption to services in the unlikely event of the low/zero carbon generation plant being offline.

Key facts
- 6.6km of network installed
- Over 44MW of EfW capacity
- 77MW of total plant capacity
- Total scheme carbon emissions are significantly less than conventional heat carbon emissions

Birmingham District Energy scheme

Serving local authority buildings and commercial properties in the centre of Birmingham, Broad Street District Energy scheme is a total design, finance, own and operate Tri-generation network.

The consumers include notable building such as the International Convention Centre, Library of Birmingham, Barclaycard Arena and the Hyatt Hotel. To the eastern side of the city, the scheme incorporates the Aston University and Birmingham Children’s Hospital district heating networks.

Key facts
- 56 GWh of heat p.a.
- 51 GWh of electricity p.a.
- 8 GWh of chilled water p.a.
- Saves more than 15,000 tonnes of CO₂ emissions p.a.

Whitehall District Heating scheme

EDE is responsible for the operation, maintenance and management of two Energy Centres, distribution of heat and power and procurement of gas and diesel. We are also extending the existing district heating network and optimising of power plant performance.

The Whitehall District Heating scheme generates and distributes high temperature hot water (HTHW) to the Whitehall Estate, which includes the Houses of Parliament and a wide range of central government departments. As part of the contract, ENGIE sells heat and power to Government Procurement Service at an agreed unit rate.

Key facts
- 4 x 6 MW High Temperature Hot Water boilers
- 4.9 MWe Gas turbine CHP
- Power exported to the grid
- ENGIE assumes financial risk relating to heating and power plant

An award winning Partnership

ENGIE’s approach to partnering with Birmingham City Council was recently recognised at the 2011 Premises & Facilities Management (PFM) Partnership Awards where it won not only the Partners in Expert Services Award, but was also voted Overall Winner 2011 (‘best of the best’) by the judges.