

## Appendix One

### Background - Extending District Heating & Combined Heat & Power (CHP) in Leicester

#### District Heating and Combined Heat and Power (CHP):

District heating comprises underground pipes carrying hot water to a number of buildings from a boiler house. A district heating system brings efficiencies and security of supply and a system has been installed in some of our Council Housing Estates since the 1950's - originally coal fired, then converted to gas.

Installing Combined Heat and Power (CHP) gives further efficiencies by obtaining a bigger energy output from a given amount of fuel. The CHP unit, which is usually a reciprocating engine, generates electricity. In conventional power stations the heat is deliberately "wasted" (via a cooling tower) and further electrical energy is also lost during transmission, whilst in CHP the heat created by the engine is used for central heating and domestic hot water. The electricity can also be used locally, displacing electricity produced by central power stations and thus reducing loss in transmission.

- Energy Efficiency - It is expected that a gas fired CHP scheme will need around 37% less energy to produce the same amount of heat and electricity as a normal power station and central heating boilers (source: Combined Heat and Power Association).
- Robustness - The robustness of a CHP system is increased by having multiple heat centres and ideally the completion of a distribution ring allowing isolation of faults with a little or no effect on customers.
- Security of Supply - Once a district energy/gas-fired CHP network is installed, the fuel source can be changed in the future. Renewable fuels could be used as they become available, offering more carbon reductions and giving potentially more energy security. An installed CHP network would therefore give additional resilience.
- Reductions in CO<sub>2</sub> Emissions - CHP provides the foundation for an ongoing and increasing reduction of CO<sub>2</sub> over time. Firstly, carbon emissions will reduce in line with the system efficiencies, and in the future, where renewable fuels are used there will be significantly larger carbon savings.

#### The Leicester Project:

To procure for Leicester City Council and other users the provision of controllable and reliable warmth to a group of buildings at an affordable price, minimising CO<sub>2</sub> emissions and using Combined Heat & Power, with waste heat converted to hot water for distribution via a District Heating System as described in report to Leicester City Council 14<sup>th</sup> July 2008.

#### The Scheme:

An extension of the existing district heating network currently supplying heat to four inner city estates – St Matthews, St Marks, St Peters and St Andrews – and to incorporate the University of Leicester, HM Prison Leicester, other City Council corporate and public buildings (with the potential to include many private buildings), phased over a number of years. With the first installation phases planned for early 2011 it is anticipated that the scheme will be split into two, with the Initial Project/Core Scheme covered by the Project Agreement and an overarching Partnering Agreement covering future projects across the City.

Although satellite schemes, Aikman Avenue and Beatty Avenue boiler houses along with the associated heat consumption are included as part of the Initial Project/Core Scheme.

#### Initial Project/Core Scheme

With an expected construction period of around 18 months and an anticipated design commencement date early in 2011, the Core Scheme is based on existing energy users with identifiable and predictable needs - essentially the City Council (supplying c.2800 tenants and potentially upwards of 40 buildings), the University of Leicester and HM Prison on Welford Road. It includes:

- Separating the city district heating schemes/network into zones (Leicester North, City Centre & Leicester East, Aikman Avenue and Beatty Avenue).
- Linking existing community heating schemes at St Marks and St Matthews (Leicester North) and introducing new CHP plant. This includes a school, community buildings and other LCC properties on the estates.
- Introducing new CHP plant at St Peters (City Centre & Leicester East) and linking new buildings - includes two schools, Moat Community College, community buildings and other LCC properties.
- Connecting these with the main University of Leicester campus where new CHP plant would be hosted; with additional City Council and other properties where available; St Andrews estate community heating system; and HM Prison Leicester.
- Installing a biomass boiler at Beatty Avenue.
- Installing new CHP plant at Aikman Avenue with heat/hot water supplied to residents and supplying both heat and electricity to the college and leisure centre.

#### Potential Future Projects under the Partnering Agreement

Originally envisaged to start in 2015 with a 4 year construction period, predicted users are currently uncertain although the scheme could supply c.3000 residential occupiers/tenants and potentially in excess of 50 buildings. Potential users could include:

- New Community (St Georges West); Wolsey Island residential and Abbey Meadows Science and Technology Park; Office Quarter; Waterside (all partially qualified users only).
- Additional connections along the route may include planned and anticipated development along Burleys and Vaughan Way; the Highcross area new development; the retail core; and De Montfort University.

In addition, the Preferred Bidder is committed to connecting existing buildings to the networks and working towards the introduction of renewable fuels with a view to achieving further reductions in carbon emissions.

#### **Scheme Capital Cost:**

The Core Scheme (excluding meters) – requires a £15m capital investment – and was put out to tender via an OJEU notice issued in August 2009, with the proposal to integrate Combined Heat & Power (CHP) to serve the Project including the Council's existing district heating system.

#### **Key Points:**

The installation of meters - allowing tenants and leaseholder to manage how much they pay for heat - was included as part of the overall scheme specification as a mandatory variant. As indicated during soft market testing at an early stage of the Project, the additional cost of installing individual residential meters (estimated at approximately £6 million) would render the Project unviable and, as such, recommendations have been made for a metering strategy to be implemented as the next phase in reducing carbon emissions and ensuring affordable, reliable and controllable heat for users in the City.