VITAL ENERGi

CASE STUDY

Leeds PIPES Network (Design)

ENERGY CENTRE AND DISTRICT HEATING

PROJECT OVERVIEW

Leeds City Council have ambitions to improve air quality in Leeds and reduce the City's carbon emissions, whilst also providing their council tenants with more reliable and lower cost heating.

With funding assistance from West Yorkshire Combined Authority, Leeds City Region Enterprise Partnership and the European Regional Development Fund (ERDF), the council have invested £35m into connecting 1,983 properties and numerous businesses to an efficient district heating network. We are providing the design and build services for the solution, and the operation and maintenance services for the HIUs within the multi storey flats for 5 years and the district heating network and energy centres for 12 years. Our solution will reduce carbon emissions by 22,000 tonnes per year, and reduce fuel bills by between 10-25%.

VITAL SOLUTION

We designed a solution whereby an energy centre at Cross Green would harness steam from the Veolia operated Recycling and Energy Recovery Facility (RERF), converting it into low temperature hot water and feeding it through a 16.5km district heating network to supply heat and hot water for 26 apartment blocks and businesses. The scheme also includes the construction of an additional energy centre at Saxton Gardens that will act as an energy top-up and back-up to provide additional resilience for the network.

Performing value engineering to identify efficiency improvements

The project was initially procured as two separate schemes, and as the winning tenderer for both, we were able to create a hybrid solution. We analysed the concept design created by the client's design team which initially consisted of two independent district heating networks with an energy centre at Cross Green containing equipment to utilise the waste steam from the RERF and with additional equipment to function as back-up, along with various satellite back-up boiler houses along the networks.

PROJECT SUMMARY:

CLIENT
Leeds City Council

PROJECT
Leeds PIPES Network

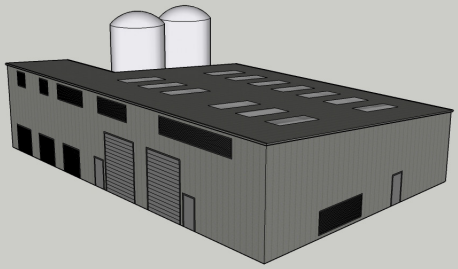
TIMESCALE:
March 2017 - Present

CONTRACT VALUE:
£35 million

THE BENEFITS:

- Design of an efficient and financially beneficial solution
- 3D modelling and ground surveys to ensure a comprehensive design
- Future-proofed for additional connections and growth
- Giving residents greater control over their energy consumption
- Reducing initial capex by 12.5% through intuitive design

3D modelling of the Cross Green Energy Centre (below) and the same energy centre during the construction process (right)



We looked at the two proposals together to identify areas to generate greater network efficiency and financial savings.

Once under contract, we agreed design changes that combined the two networks into one singular network. This featured a main energy centre at Cross Green and a resilience energy centre at Saxton Gardens, taking away the need to include additional plant rooms. This reduced the capex of the project by 12.5%.

Impressing the client with a high quality tender proposal

The quality scoring of the tender was at a ratio of 60% design and 40% pricing meaning that there was preference to a strong design over the lowest cost bid. A scoring ratio like this allows for higher quality designs to prevail, resulting in an overall more beneficial and reliable solution.

Additional network resilience through a fully equipped back-up energy centre

The Cross Green energy centre will act as the interface between the RERF and the Leeds PIPES heat network and is equipped with distribution pumps, two 100,000 litre thermal stores and associated controls systems. It will convert the 20MW of steam from the RERF into Low Temperature Hot Water which will be pumped along the transmission line, passing through to the Saxton Gardens energy centre.

The Saxton Gardens energy centre will provide resilience to the network. The location of the Saxton Gardens energy centre is further along the network than some of the identified future connections, so we devised a system to allow a back-feed to serve these future zones should the Cross Green energy centre go offline.

We completed a load analysis of the minimum and peak energy demands to ensure the Saxton Gardens energy centre is fully equipped to manage the peak 33MW of consumption, and provide spare equipment should there be any failures. The equipment includes four 11MW gas-fired boilers, two 750kW modular gas boilers, four expansion vessels, four distribution pumps and a 20m high multi-core chimney.

Our design has been developed using specialist collaborative 3D modelling of the two energy centres to identify and resolve any issues with the operation of the equipment prior to construction.

One of the largest district heating networks in the UK

The Leeds PIPES scheme will connect 1,983 properties and businesses in Leeds over 16.5km of pipe making it one of the largest district heating networks in the UK. This is the first phase of a potentially larger network with the ability to expand and make additional connections. We sized the energy centre equipment to cater for additional loads and provided capped pipe ends to ease future extensions.

The council has adopted Local Development Order 3 (LDO), which gives district heating permitted development rights over certain parcels of council and partner owned land. We routed the pipework in LDO designated land to decrease timescales as planning permissions were not required. We completed ground radar and buried surveys which highlighted any areas to avoid, allowing us to design a pipework path that could be implemented as smoothly as possible.

Collaborating with local planning consultants assisting in the progression of project planning

We worked with planning consultants, Turley to assist in the smooth attainment of planning permissions, and organising engagement events with the local community. Due to the scheme being partially funded by the ERDF, we have to abide by specific timescales agreed with the funding body and so it is essential that we meet these goals.

Engaging with residents to streamline the project design and installation

We held multiple consultation days for residents to help with their understanding of the scheme. We undertook individual surveys of each property to ensure the new internal heating systems would be compatible. This would help with the efficiencies of the system installations.