VITAL ENERGi

CASE STUDY

The Glenrothes Energy Network

ENERGY CENTRE & DISTRICT HEATING SCHEME

OVERVIEW

The Glenrothes Energy Network is an exciting public private partnership between Scottish Government, Fife Council and RWE which utilises steam generated as a by-product of electrical generation at the Markinch Biomass CHP Plant to deliver low-carbon heat to houses, businesses and public sector buildings within the Glenrothes town centre. The project makes a significant contribution to reducing carbon emissions in Scotland and received funding from the Scottish Government's Low Carbon Infrastructure Transition Project (LCITP).

Vital Energi won the contract to deliver the detailed design, and construction of the energy centre and district heating network, creating an ambitious and challenging delivery programme which would see the "Heat On" date achieved in advance of the funding deadline.

This project saw us work with the clients' professional team to design, supply and deliver the energy centre, 6.2km district heating network and High Voltage Ring Main HV ducts only cabling to follow in future phase. The solution needed to fully integrate with the 55MWe biomass CHP plant and connect a range of buildings which included businesses and blocks of housing in the town centre.

THE SOLUTION

By working closely with all stakeholders, we devised a detailed 63 week, fully integrated procurement, construction and commissioning programme which met all essential milestones.

It was clear from initial conversations that the Council prioritised an approach of keeping disruption to a minimum. Through careful traffic management plans this can be minimised. We worked with one of our long-standing traffic management specialists and the council and were able to create a plan which gave confidence to all stakeholders that much of the potential disruption could be mitigated. We explored all opportunities for the highways affected and options included road closures and diversions, temporary traffic regulation methods such as traffic lights and give way systems. To ensure this plan was carried out effectively our traffic management partners were on call when required and attended site on all days where temporary traffic management measures were being implemented. (During peak hours of 7am-9pm and 3pm-6pm.)

One of the stipulations of Planning was that we would not be able to close a busy roundabout leading to a popular local supermarket and we were able to plan alternative routes to ensure that this road stayed open throughout the project.

A big contribution to meeting the extremely tight programme came

PROJECT SUMMARY:

CLIENT
Fife Council

PROJECT
The Glenrothes Energy Network

TIMESCALE:
June 2018 – April 2019

CONTRACT VALUE:
£12.9m

THE BENEFITS:

> Programme delivery to achieve the required LCITP funding criteria.

> Integrated turnkey design and construction approach to deliver performance obligations and value for money

> Detailed stakeholder engagement and coordinated bid/ project management to integrate the design works, energy centre works and the infrastructure package to meet the project deliverables.

The system has been designed to take up to 4MW of heat from the RWE biomass plant with the option of increasing this by a further 2MW in the future.

Whilst new-build project offer a "blank canvas", retrofit projects often present more technical hurdles as you are working with existing buildings which have live utilities. It is, therefore essential to minimise downtime during the switchover and ensure that any down time is during a period when it causes the least disruption for customers.

from our Pre-fabrication Department in Blackburn which was able to create all building connection skids. Additionally, connecting pipework was prefabricated where possible to minimise hot works in occupied council buildings.

The Glenrothes Energy Network takes steam from the 55MWe RWE CHP biomass scheme which uses recovered wood and a small amount of virgin wood to generate steam, driving a turbine and generating electricity. This facility generates carbon savings of approximately 250,000 tonnes per year. The new energy centre we built is capable of taking up to 4MW of heat for the heat network, with futureproofing measures in place to take a further 2MW in the future. In addition to this the scheme also has a backup heating system for added resilience and to ensure continuity of supply.

One of the issues the project presented was that we would have to "break into" the existing power station services (steam, gas, condensate, demineralised water and trade effluent) to create the connection between the existing RWE power station and the new energy centre. This could only be done during the power stations bi-annual maintenance shut down periods when the power station was not operating. The most challenging of these connections being the break-in to the DN500 fluid category 3 steam line which included extensive planning and verification by a third party notified body inspector. This phase of the project involved cutting a section out of the existing steam pipework and replacing it with a T section which would direct steam towards the energy centre. As this was a particularly important process, all welds were undertaken by a Class 1 welder and performed to American Society of Mechanical Engineers (ASME) standards.

This meant we would not only have to deliver an accelerated programme, but would also rearrange the order of delivery to take advantage of this twice-a-year opportunity. By liaising with the client and relying on our long-standing supply chain, we were able to re-order our project delivery schedule and perform all connecting works within the accelerated timescale.

The steam from the biomass CHP plant is transported via pipework to the energy centre and run through a de-superheater which lowers the temperature so that it can be converted into low temperature hot water. The condensate generated during this process is then pumped back into the biomass CHP plant.

We worked with the client's professional team to enhance the energy centre, changing the structure from a post beam design to a steel portal structure. By doing this we were able to make significant cost savings by reducing the amount of steel used and the system proved quicker to install, which was a significant benefit given the challenging "heat on" date. One issue facing the project delivery team was that the ground conditions were poor and necessitated an enhanced ground engineering piling solution which required implementation within the original project key dates.

Before beginning the multi-utility network it was essential that the route created by our designers was suitable and to do this we undertook extensive research and surveys. We performed a detailed ground radar survey of the network route to ensure there were no undocumented existing utilities and that the route was practical. We then created trial holes at critical points to identify and document existing services. To ensure the building connections could be carried out without major issues we also compiled a dilapidation report to assess the condition of the current internal building connections and our specialist engineers performed surveys for all connected buildings.

To guarantee progress, and flexibility of programme we have developed a delivery method which utilises working zones. By creating between 5-8 simultaneous constructions civil teams, working with multiple district heating installation teams we can ensure constant progress and should there be a delay in one zone, the team can move to another and works continue.

Due to this comprehensive approach which focussed on early engagement and long-term planning we were able to meet all deadlines for all elements of the work and, in some instances, far exceed these. The overall project was completed a full week ahead of the completion date, despite the challenging timeframe.

On this project there was a stringent testing procedure to follow to prove the heat and flow delivery prior to handover to satisfy the conditions of the Low Carbon Infrastructure Transition Programme funding.