VITAL ENERGi

CASE STUDY

Liverpool Waters

DISTRICT HEATING NETWORK & MULTI-PHASE ENERGY CENTRE

PROJECT SUMMARY:

CLIENT
Peel L&P

PROJECT
Liverpool Waters

TIMESCALE:
Ongoing

PROJECT OVERVIEW

Peel L&P's Liverpool Waters is a 30-year vision to transform the city's northern docks, bringing the 60-hectare site to life once again, creating a bustling, lively, attractive place to live and work across five different neighbourhoods.

Regeneration business, Peel L&P has embedded sustainability across its the £5bn waterfront scheme and appointed us to a development agreement which will see us conceive, design and create the heat energy infrastructure.

The project, when finished, will create a seamless extension to Liverpool's City Centre which extends over 2km along the banks of the River Mersey and will account for 20 million square foot of mixed-use development and include 9,000 residential units. Heat and hot water will be provided via the Mersey Heat district heating network served by an innovative Water Source Heat Pump energy centre.

VITAL SOLUTION

We began at the pre-concept stage, helping the client to understand their energy demands by creating a model from their masterplan accommodation schedule. Once this model was complete, we were able to design a technical solution, whilst supporting the ESCo to develop their commercial model.

As the development agreement process is collaborative in nature, we worked in partnership with Peel NRE to ensure the solution met their needs, including their carbon reduction ambitions. As our designers progressed the project through the RIBA stages our team produced cost plans, financial models and construction schedules, all of which were discussed and modified in consultation with the client. The result of this was that the RIBA Stage 4 design and construction programme integrated seamlessly into the larger development.

Phase 1 will deliver approximately 11 gigawatt hours of heat energy to existing buildings on the Liverpool Dock Waterfront and this will be supplied by a temporary energy centre using boilers. Once demand increases, heat will be delivered via the permanent energy centre which has been designed to expand alongside the development build out.

RIBA Stages of Work

Our project team had been assembled to develop a deeper understanding of the project and create a comprehensive turnkey energy infrastructure which would meet the long-term needs of the client. With the understanding that the 30-year masterplan would be revised numerous times throughout the build our pre-construction and design team wanted to create an agile, responsive and creative culture which could best serve a constantly evolving project.

James Hadfield, Development Manager for Peel NRE, part of Peel L&P, explains, "The Vital team have very good technical

THE BENEFITS:

- Scheme will serve approximately 9,000 residential units at full build out.
- £5 billion water front development scheme.
- Energy system designed to evolve alongside the client's 30-year masterplan and meet demand at each phase of build out.
- Development agreement saw us work with the client to progress project from pre-concept to completion.

The £5bn development will stretch 2km along the city's northern docks, transforming the 60-hectare site into a sustainable, vibrant community.

"Stakeholder engagement is a particular challenge, but Vital have been very good and their attendance at the meetings and co-ordination with us has been appreciated. The team are all really good to work with - great people, great team."

JAMES HADFIELD, DEVELOPMENT MANAGER - PEEL LAND AND PROPERTY

knowledge and they understand the scheme and the objectives we want to achieve. It's a challenging scheme with many stakeholders on site and so far they have brought solutions to match the complexity of the site."

We began by working with the client to assess their business case and build a clearer picture of their strategic ambitions. Even in these early stages we were looking to produce indicative cost plans and construction schedule to ensure collaboration and that the energy infrastructure integrated into their larger site and business case.

Once the client's needs had been fully formalised, we were able to finalise a brief and begin creating a solution which would meet the client's ambitious carbon reduction targets, be demonstrably technically and commercially viable and meet all planning legislation and requirements.

Our involvement at this early stage was advantageous and allowed us to have input into core elements of the project, such as site selection and issue design guidance for the new build component of the development.

Whilst the site chosen was problematic in that it was bordered on three sides by the Leeds and Liverpool Canal, a railway line, the main arterial road into Liverpool and surrounded by existing services, its proximity to the canal allowed us to explore Water Source Heat Pump technology as an alterative the original CHP solution which was part of the masterplan at the time.

Developing the Energy Model as the Foundation for Future Decisions

The first core challenge we faced was to create a comprehensive energy model for the client which formed the basis for the technical design, cost planning, construction programme and commercial modelling of the ESCo.

Creating an accurate model was therefore a crucial step in the success of the project as it would influence decisions as wide-ranging as choosing and sizing the plant and equipment, sizing the district heating pipework and setting tariffs.

The standard approach to creating an energy model of this type is to use industry benchmarks, but because we operate 32 district heating sites for residential customers, and have access to the metered data, we can use this to create a more accurate model which brings more budget certainty for both the ESCo and the developer.

Supporting Our Clients Through the Planning Phase

One of the fundamental ways we can support our clients in the pre-construction period is by supporting them through the planning process. On Liverpool Waters we were able to provide calculations which demonstrated our design met the planning requirements, which included 85% of heat being supplied from sustainable heat.

We also co-ordinated with the client to ensure they had the materials and resources they needed throughout the planning process. James Hadfield, Development Manager for Peel NRE praised us for the standard of our pre-construction services by saying, "During pre-construction wherever there was a problem, Vital have found a solution and sometimes they have been quite novel. At the outset, there was very good modelling showing the full system, with key themes detailed on the change management summary which really helped deliver the design solution."

Delivering Creativity and Flexibility in the Face of Change.

It was essential to adopt an agile, responsive approach to Liverpool Waters as it was a commercially driven development, had a fluid element to it and, as the client stated, "The site was constantly changing."

As the timescale for the project was over 30-years it was likely that the build out schedule would change, which could drastically alter the energy demands of the project and all financial aspects of delivering the energy infrastructure.

Our involvement from such an early stage of the project meant that we had a full understanding of Liverpool Waters and could confront many of the problems at the earliest stage. These included the location for the energy centre, crossing a main arterial road with the district heating and dealing with extensive existing services.

Planning a Long-term District Heating Network

The district heating network is Series 3 pre-insulated steel pipework for most of the installation, with small sections of conventional carbon steel where it is routed above ground.

Our designers worked with the client to facilitate their long-term plan. The solution was the installation of an initial district heating spine which would connect the energy centre to the Tobacco Warehouse and Titanic Hotel. This network had valves integrated at strategic points to enable easy expansion to connect future phases without the need to shutdowns.

Creating an Energy Centre to Meet the Needs of the Master Plan

The interim energy centre was designed to be constructed in a phased manner, initially containing four 1.8MW gas boilers and can meet the demand for Phase 1. The 16m x 14m module has been pre- fabricated at Vital Energi facility in Blackburn.

Further phases see the energy centre expanded to include two 3MW water source heat pumps which will take water from the nearby Leeds and Liverpool Canal. The energy centre will also have two thermal stores capable of holding 260 cubic metres of hot water which will contribute to the 85% of renewable heat requirement. When fully completed this facility can meet a peak load of 36.7MW, with the gas boilers providing resilience at times of exceptional peak demand.

Digitalisation of Heat

During the development agreement we have worked closely with Peel NRE to consider the customer journey and selection of products with the resident's property. We wanted to ensure that the Liverpool Waters development had the benefit of the Vtherm°e & Glass products and agreed with the Peel team that these should be incorporated into the design solution.