Viridor Transforming waste™

Permit: EPR/LP3030XA
Cardiff Energy Recovery Facility

Review of Combined Heat and Power (CHP) opportunities at Trident Park ERF

Prepared by:
Viridor Energy
Cardiff ERF
Trident Park
Glass Avenue
Cardiff
CF24 5EN

Version: 1.0

Quality Assurance

This report has been prepared with all reasonable skill, care and diligence. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

Report Details

Report Title:	Review of Combined Heat and Power (CHP) opportunities at Trident Park ERF
Report Date:	11 January 2022
Version:	1

Report Generated By

Name:	[redacted]
Position:	EHS Manager – Cardiff ERF

1. Introduction

Cardiff Energy Recovery Facility is located immediately north of Cardiff Docks. The facility has an annual throughput of up to 425,000 tonnes per year of residual municipal and C&I waste and has the capability of exporting in excess of 30 MW of electrical power from the process.

The combustion of waste will result in the release of heat, which is used to raise steam. The high-pressure steam is transferred to a turbo-generator set that generates electricity.

As well as electricity generation there is the potential to extract heat from the steam, either before or from the turbine. In order for this to occur the extracted steam is converted back into hot water for use in industrial processes or for heating buildings.

It is recognised that the overall efficiency of the energy recovery process can be improved by operating as a combined heat and power (CHP) plant; reducing carbon dioxide emissions attributable to the heat consumer and making better use of the energy available in the waste.

To this end efforts have been made prior to construction and commissioning the Plant; and continue to be made to secure outlets for residual heat produced by Trident Park ERF.

2. Combined Heat and Power

The concept of CHP is relatively simple; steam is extracted from a turbine (for Trident Park it would be at two locations from the installed turbine) and transferred via a dedicated pipeline to a primary heat exchanger unit.

A return pipeline coming from the primary heat exchanger runs parallel to the steam line and transports condensate back to the ERF. Back-up boilers installed in the heat station would supply extra heat to the system when demand exceeds the ERF's capacity, or the ERF is offline.

Feasibility of a CHP scheme relies on a regular market for the heat supplied by the facility. Five key considerations need to be taken into account when assessing a CHP scheme. They are as follows:

a) Potential heat users
b) Retrofitting
c) Feasibility of obtaining planning permissions for connection
d) Potential costs
e) Disruption

The most viable heat users are those situated within close proximity to the site and which use fairly large amounts of heat, preferably with a constant 24-hour annual demand. Short pipelines carrying more heat are generally more cost effective and cause the least disruption during installation compared to large numbers of pipelines. The cost and ease of retrofitting are also important considerations. Large centrally heated buildings are often better placed for retrofitting as it is easier and cheaper to install into an existing large central heating system compared to several smaller heating systems. Although, installation into a new development as it is being built remains the preferred option. The following list ranks the more favourable heat users in order.

1. Industry
2. Educational facilities
3. Amenity facilities (including leisure centres, swimming pools and hospitals)
4. Commercial properties and Offices
5. Hotels and communal residences
6. High density residential areas

Although it must be noted that there are very few, if any, successful examples of retrofitting terraced residential properties.

3 Current status

The turbo generator unit (TGU) is a Siemens SST 400 model, whose function is to convert thermal energy produced by the two steam boilers into electrical power. The TGU is also designed with three separate bleed extraction points that can provide steam at required pressures to defined plant consumers. Two out of the three bleed extraction points have the additional capability for heat export, in that steam extraction from these bleeds could supply heat to a heat station.

Since the last CHP Report Viridor and Cardiff County Council have had numerous discussions on a district heating network.

During 2021, attendees of the Community Liaison Group meetings heard two presentations (one from Viridor and one from Cardiff County Council). The information contained within each presentation was not classed as commercially sensitive and permission has been granted circulate the information within the minutes of the Community Liaison Group minutes. Selected slides are submitted as attachments.

At a recent Community Liaison Group meeting those present noted that discussions between Viridor and Cardiff County Council were ongoing and investigative engineering works may take place 2022.

It is anticipated that the estimated time required to develop the necessary infrastructure for the district heating network, which would take approximately 18 - 24 months to complete.

4 Summary

The provision of a District Heat Network to serve part of Cardiff are looking positive and the aim of this report is to discharge Viridor's obligations under Condition 1.2.3 of Environmental Permit EPR/LP3030XA.