SKELTON GRANGE ENERGY FROM WASTE FACILITY ENVIRONMENTAL PERMIT APPLICATION

CHP-Ready Assessment

Prepared for: WTI EFW Holdings Limited

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SLR

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1.0 Introduction

SLR Consulting Limited (SLR) has been instructed by WTI EFW Holdings Ltd to prepare a bespoke Environmental Permit (EP) application for the proposed Skelton Grange EfW Facility. The facility will be operated by WTI UK Ltd (WTI).

The Environmental Permitting (England and Wales) Regulations (EPR) 2016 (as amended) require regulated facilities to be operated in accordance with an EP. Regulated facilities include 'installations' as listed in Schedule 1 of the EPR.

WTI are applying to obtain an EP to enable them to undertake the following installation activity listed in Schedule 1 of the EPR 2018:

- Schedule 1 Part 2 Section 5.1 Part A(1)(b) – the incineration of non-hazardous waste in a waste incineration plant or waste co-incineration plant with a capacity exceeding 3 tonnes per hour.

The Environment Agency's Energy efficiency standards for industrial plants to get EP guidance dated 1 February 2016 states:

'You need to follow energy efficiency measures to get and comply with environmental permits for industrial plants listed as Part A(1) installations under Schedule 1 of the Environmental Permitting Regulations 2010 (and any subsequent amendments). This includes power plants, waste incinerators and other industrial processes.

You need to show the Environment Agency that you'll operate your installation using these energy efficiency measures in your application when you apply for an environmental permit.'

The guidance goes on to state:

'If you're planning a new power station or energy from waste plant then you will need to make sure you comply with the Environment Agency's CHP-Ready guidance.

As part of this application, the applicant is required to complete a Combined Heat and Power Readiness (CHP-R) Assessment.

You may have to carry out a cost benefit assessment for operating as a high-efficiency cogeneration plant or supplying a district heating or cooling network with waste heat if you're planning either:

- *a new combustion plant (including power stations and energy from waste plants) which has a total net thermal input of more than 20 megawatts…*

This is a requirement of Article 14 of the Energy Efficiency Directive'

The Skelton Grange EfW facility is an energy from waste plant with a total net thermal input of more than 20 MW, therefore a CHP-Ready Assessment and Cost Benefit Assessment for operating as a high-efficiency cogeneration plant is required.

SLR has been retained by WTI to prepare the Assessment.

1.1 Scope

The report has been drafted to satisfy the requirements of European Commission, Defra and EA Guidance (where applicable), most notably:

- EA - Energy efficiency standards for industrial plants to get environmental permits, February 2016;

- EA – Draft guidance on completing cost-benefit assessments for installations under Article 14 of the Energy Efficiency Directive, V0.9 April 2015;
- EA CHP Ready Guidance for Combustion and Energy from Waste Power Plants, Version 1.0, February 2013.

The assessment aims to demonstrate that the Skelton Grange EfW Facility applies Best Available Techniques (BAT) relating to energy efficiency with respect to the use of Combined Heat and Power (CHP).

The EA CHP-R Guidance document specifies three BAT tests to the use of CHP for new combustion plant or energy from waste plants. These can be summarised as follows:

1. The application of CHP where technically and economically viable but recognising that opportunities do not always exist at the outset;
2. Where CHP cannot be applied at the outset, BAT is to construct the plant as CHP-R with due regard to '*likely future opportunities'*; and
3. For CHP-R plant, to periodically review the opportunities for the supply of heat following permit issue.

1.2 Background

One of the key elements of the proposed Skelton Grange EfW Facility is the inclusion of a CHP-R plant. This enables the facility to generate electricity (for use at the facility and export to the National Grid) and heat (for use at the facility and local end users).

The realisation of the sustainable heat opportunities is heavily dependent on the location of the proposed facility in relation to potential users of the energy, whether in the form of industrial processes, new developments, existing premises or communal facilities. This report reviews the technical background to the production and use of energy, before setting out the process undertaken thus far in trying to identify the potential for its use in the local area.

2.0 CHP-R Assessment

2.1 Plant, Plant Location and Potential Heat Loads

The Skelton Grange EfW Facility is to be located on the site of the former Skelton Grange Power Station, Skelton Grange Road, Knowsthorpe, Leeds. OS Grid Reference SE 33401 31200

The facility will comprise a two-line municipal waste combustion plant, with waste combusted in two moving grate furnaces to produce a stream of high temperature combustion gases. The gases from each furnace will then be passed through a heat recovery steam generator (boiler) (per line) to generate high pressure and temperature steam, which will then be passed through a steam turbine (per line) to generate electrical energy. In the event that beneficial heat users are identified and can be connected, the turbine will be able to export medium pressure steam from an intermediate bleed point, and this will be either directly exported for high temperature users, or the heat transferred to a hot water circuit to provide heat to lower temperature users.

The plant will be designed to consume 48 tonnes per hour of municipal solid waste and generate 38.4MW of electricity (net, in electricity only mode). In CHP mode the electricity output will be reduced by a maximum of 7.6MW to a net of 30.4MW[1] but the plant will be able to recover around 35MW of heat by medium pressure extraction from the turbines for use by local businesses and/or homes, see Table 2 for details. It is anticipated that the facility will operate for approximately 8,000 hours (91.3% of the time) per annum when fully operational.

2.1.1 Factors Influencing Selection of Plant Location

Likely Potential for CHP Opportunities

There are existing and future opportunities for the supply of recovered heat.

A 10km search using the Department of Energy and Climate Change's Development Map[2] indicates that significant opportunities exist for the supply of heat within the site's surroundings. The search radius and identified heat load is presented in Figure 1 and Table 1.

Current Land Use

The site is understood to have been greenfield land until the 1940's when the coal-fired Skelton Grange A power station was built, followed in the 1950's by Skelton Grange B. Both stations were decommissioned in the late 20th Century and the site has been disused since 1998 when Skelton Grange B was demolished.

CHP Provisions Contained within Relevant Planning Documents

In SLR's experience the availability of heat networks is often uncertain at the planning stage. In this respect cognisance should be given to Paragraph 237 of the Government's Review of Waste Policy which states:

"Experience to date with CHP infrastructure has highlighted a potential difficulty in securing long term customers for heat ahead of construction of the plant."

The 2007 version of the national Waste Strategy (WS2007) states in paragraph 28 of Chapter 5 that:

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[1] To be confirmed by technology supplier once chosen

[2] BEIS – CHP Development Map - http://chptools.decc.gov.uk/developmentmap/#, accessed December 2018

"Any given technology is (where applicable) more beneficial if both heat and electricity can be recovered. Particular attention should therefore be given to the siting of plant to maximise opportunities for Combined Heat and Power".

Obviously, locating the proposed facility close to development that is planned, but not yet under construction makes the site eminently suitable for the export of heat.

Also, of note is Section 4.6 of the National Policy Statement (NPS) EN-1 (paragraphs 4.6.1 to 4.6.12 refer) which addresses CHP. The benefits, in terms of carbon reductions, are set out, along with the Government's commitment to good quality CHP. In paragraph 4.6.5 it is recognised that retrofitting a district heating network to an existing housing estate may not be efficient. Paragraph 4.6.7 recommends considering CHP at the earliest point, whilst paragraph 4.6.12 suggests that plants should be CHP ready where there is a prospect of future development in the vicinity that may be able to utilise heat from the plant.

As such the proposed site location accords with government policy, in that the facility can be readily adapted (without the need for new building works) to connect to a heat network should one be established or a nearby new development be proposed which could benefit from heat supply.

Compatibility with the Policies of the Relevant Local Plan(s) and the National Planning Policy Framework (NPPF) together with Relevant Planning Considerations

Please refer to Section 4 – Planning Policy of the Planning Statement submitted with the planning application for a description of the site's compatibility with the policies of the relevant local plan(s) and the NPPF together with relevant planning considerations.

Likely Suitability for Carbon Capture and Storage

Not applicable – the Skelton Grange EfW Facility will not exceed the 300MW threshold for determining whether the plant is Carbon Capture Ready.

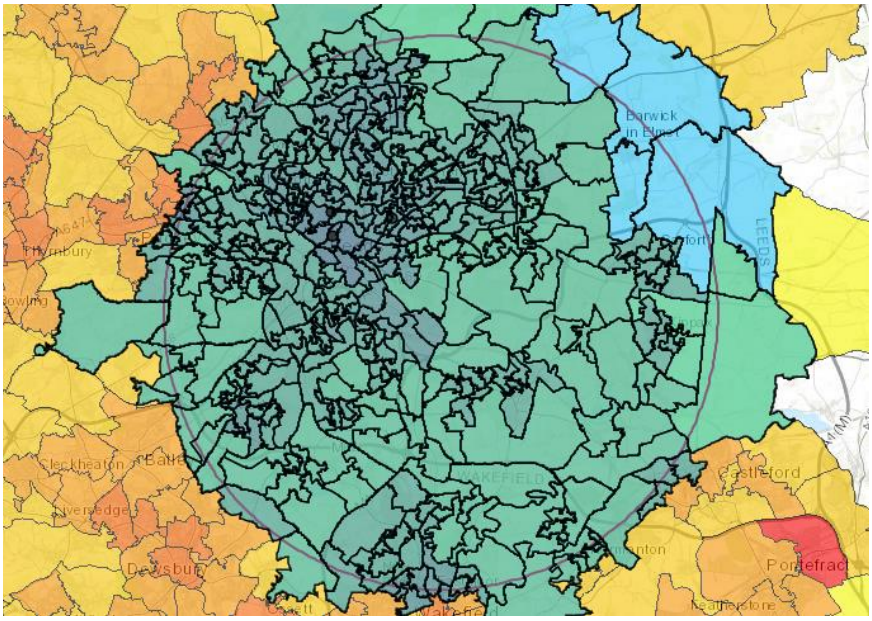

Figure 1
Indicative Current Heat Load Search Radius

Table 1
Indicative Current Heat Load within 10km of Skelton Grange Energy Recovery Facility

Sector	Share	Total MWh per annum
Communications and Transport	0.22%	8939
Commercial Offices	2.06%	82313
Domestic	73.20%	2922780
Education	2.02%	80836
Government Buildings	0.45%	17943
Hotels	0.63%	25315
Large Industrial	0.47%	18618
Health	9.88%	394364
Other	0.31%	12298
Small Industrial	4.93%	196917
Retail	0.57%	22960
Sport and Leisure	0.28%	11321
Warehouses	0.69%	27430
District Heating	4.28%	171021
Total heat load in area		3993049

2.1.2 Operation of Plant

Table 2
Plant Operational Performance

OPERATIONAL PERFORMANCE	Minimum Stable Plant Load (70%)	Proposed Operational Plant Load (100%)	Maximum Plant Load (112%)
Thermal Input (MW)	49 x 2= 98	70 x 2 = 140	78.4 x 2 = 156.8
Electricity mode net electrical output (MW)	19.6	38	42.3
Electricity mode net electrical efficiency (%)	20%	27%	27%
CHP mode net electrical output (MW)	15.7	30.4	33.8
CHP mode net thermal output (MW)	19.5	35	39
CHP mode net electrical efficiency (%)	17.4%	21.7%	21.6%

OPERATIONAL PERFORMANCE	Minimum Stable Plant Load (70%)	Proposed Operational Plant Load (100%)	Maximum Plant Load (112%)
CHP mode net thermal efficiency (%)	20%	25%	25%
CHP mode total efficiency (electricity & heat) (%)	36%	47%	46%

2.1.3 Identified Potential Heat Load

The potential users which are considered most viable are those situated within a 5km radius of the site, and which use fairly large amounts of heat, preferably with 24-hour demand. Using CHP outside of 5km becomes less viable due to factors such as cost of infrastructure for transportation, heat loss and maintaining pressure if transporting steam.

Closer local users are deemed to be more economically viable as the cost of pipeline can be up to £1000 per metre, thus short pipelines carrying large amounts of heat are most cost effective, and also cause the least disruption during the installation process as compared to a large number of smaller pipelines.

As most of the potential heat users are existing buildings, the cost and viability of retrofitting is also a major consideration. Large centrally heated buildings are considered to have better potential as retrofitting to an already existing large system is much easier and economical than to several small systems. The preferred option is integration of a CHP scheme into a new development as it is being built. As such the following types of development are deemed to be the best potential outputs:

- Industry;
- Amenity facilities (including leisure centres, swimming pools and hospitals);
- Education facilities;
- Commercial and office properties;
- Hotels and communal residences; and
- High-density residential areas.

Future developments were also investigated in terms of their potential for CHP to be integrated into their structure from new. This included reviewing relevant local plans to determine the location and nature of any planned future developments.

Finally, consideration was given to integrating the facility with the currently under-construction Leeds PIPES district heating network. This is a network which extracts heat from the existing Veolia Recycling and Energy Recovery Facility at Pontefract Lane, and distributes this to a series of mainly high-rise residential blocks and commercial facilities through the city. The network is shown in pink[3] in Figure 2 below.

Given the existing heat supplier, it is unlikely that the existing network is currently in need of additional heat supply, but as the network expands it will likely require new heat supplies, and also the provision of two major heat sources to a network provides significant resilience to provide heat during periods of downtime for one facility or the other. Much of the local suitable heat demand is likely to be in the

[3] https://www.leeds-pipes.co.uk/

region of the existing network due to its path towards the city centre, and therefore utilisation of this network for distribution of heat from Skelton Grange is likely to be the most feasible means of utilising the CHP capability of the proposed facility.

Heat Loads

For the purposes of this assessment, a small number of potentially significant heat loads have been identified. Those that have been considered include:

- Arla Stourton Dairy;
- Leeds General Infirmary;
- St. James University Hospital;

Each of these loads is described below.

Leeds General Infirmary;

Leeds General Infirmary is one of two significant healthcare facilities within a 5km radius of the Skelton Grange EfW facility, and has a total annual heat load of 292,000MWh/annum[4], equivalent to an average load of $33MW_{th}$ although it is likely that the load would vary quite substantially between summer and winter. Despite this, the hospital is likely to have an appreciable heat demand year round.

It is not known whether the hospital is heated centrally from a single boiler room, or whether this is by steam distribution or hot water. If the former then it is unlikely that the costs of modifying the system to operate on hot water would be justifiable, and if the building is not centrally heated then the costs to provide a network connection to each building would also be likely to be prohibitive.

If, however, the hospital is heated currently by hot water distributed from a central boiler house, then connection to a network from the Skelton Grange site would be relatively straightforward. The hospital lies almost 5km from the Skelton Grange site, but the existing Leeds Pipes heat network covers a significant portion of this distance, and it is likely that only 3.3km of pipework would be required to connect this heat user to the facility at Skelton Grange.

There does remain a question though of why the Infirmary has not already been connected to the Leeds PIPES network, which suggests that potentially there is an incompatibility between the type/grade of heat required by the hospital and that which can be recovered from an EfW facility. This may present a problem for connection of this heat load.

St James University Hospital;

The St. James University Hospital has a heat demand of circa 85,000MWh per annum, equating to 9.7MW, and lies around 4km from the Skelton Grange site, but also directly adjacent to the existing Leeds PIPES heat network, such that a network connection between these two sites would require in the region of 2.1km of pipework to be laid. The same issues would need to be resolved as for the Infirmary above, but the potential for significant heat utilisation here also exists.

Arla Stourton Dairy;

The dairy at Stourton, operated by Arla would require circa 1900m of pipework to facilitate a heat connection from Skelton Grange. The dairy processes circa 250 million litres of milk per annum, as well as other dairy products, and is likely to be a significant heat user as a result of the pasteurisation

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[4] Reference BEIS National Heat Map

and other thermal treatment process being undertaken. Significant amounts of chilling will also be required by the site, and chilling can be undertaken using absorption chillers which use hot water to generate cooling. This may also be a potential option for the site. It is not clear what the site's energy usage is but according to the Carbon Trust's Energy Efficiency report[5] the most efficient dairy processing plants use around 32kWh/m^3 of milk processed. The Stourton dairy is described as Arla's "Flagship" dairy, was built in 2007 and has undergone significant investment over recent years, so is likely to be close to this figure. Thus, energy usage on the site may be 10,000MWh/annum, equivalent to 1.2MW, although not all of this will be heat energy.

As with the hospital sites, the specific arrangements for heating and cooling on the site would need to be confirmed to be compatible with the heat which could be provided from the Skelton Grange site.

Summary of Identified Heat Loads

For the potential existing heat users mentioned above, it is not clear if these sites would be capable of utilizing a district heating network without costly modifications. Some of the sites identified also sit several kilometres from the Skelton Grange site and therefore significant investment would be required to make a connection via a heat network, and thus certainty around heat loads and availability will be required before serious consideration of these options can be made.

The most promising sites identified are the two hospital sites, due to their significant heat loads, as well as their proximity to the existing heat network, which would also be able to provide resilience in terms of heat supply from two EfW facilities if a connection between this and the Skelton Grange facility were to be implemented.

[5] https://www.carbontrust.com/media/206472/ctg033-dairy-industrial-energy-efficiency.pdf

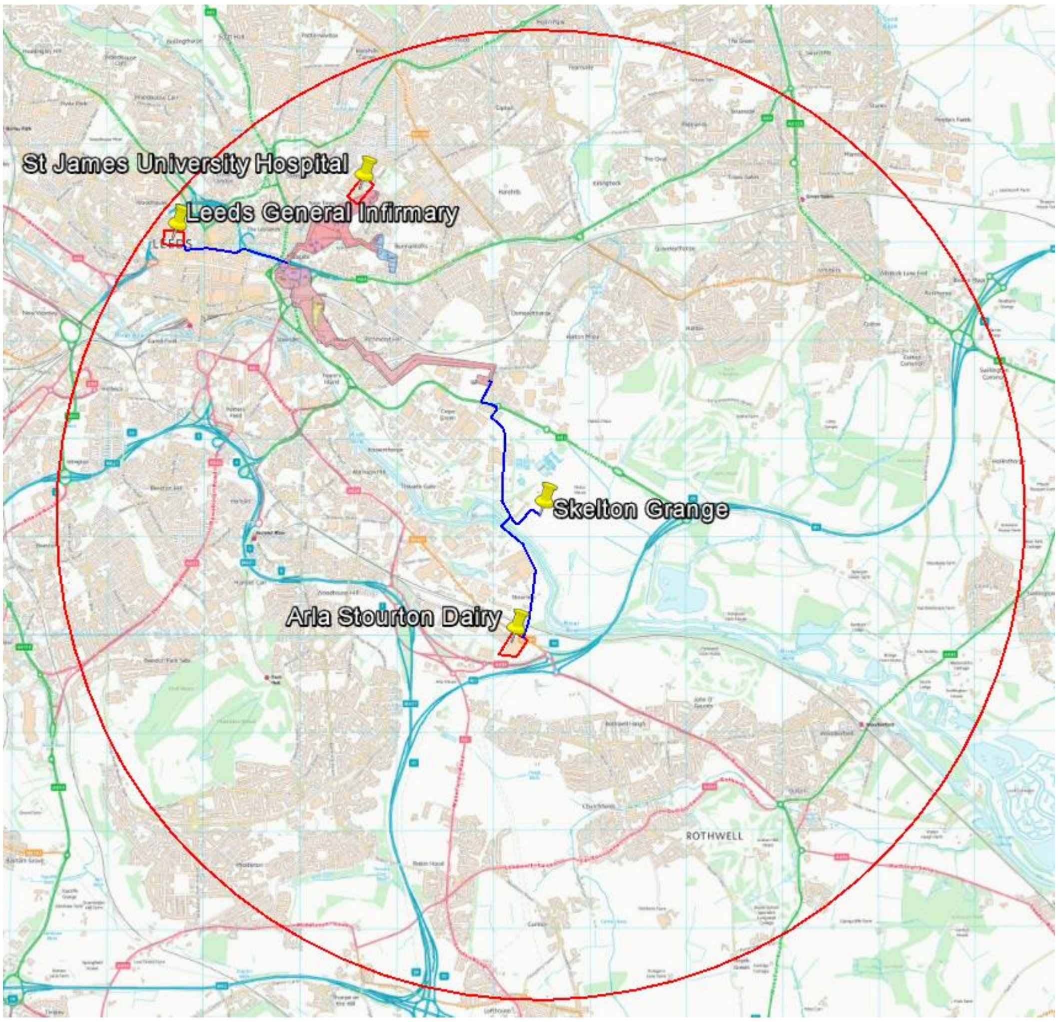

Figure 2 Potential Heat Users within 5 Km[6]

It should be noted that Figure 2 only shows indicative routes for a heat network (in blue) with the prospective heat users in red and the existing Leeds PIPES heat network in pink. The actual position of any piping piping/heating network would be dependent on a number of factors including the local infrastructure, planning constraints etc.

Table 3 Projected Heat Users Demand

Facility	Annual Energy Demand (MWh/annum)
Leeds General Infirmary	292,000
St James University Hospital	85,000
Arla Stourton Dairy	10,000

[6] Open Data Mapping

2.1.4 Export and Return Requirements of Heat Load

Heat would be supplied to the hospital and industrial property by a district heating network. Indicative export and return requirements for the identified heat load are presented in Table 4.

While peak loads are not known for the sites, these have been estimated as follows based on limited data available for commercial/industrial and healthcare sites:

- Commercial/industrial sites with large heating loads, including chilled warehousing, 24/7 processes and heat consuming processes – peak at 1.8 x average load;
- Hospital sites with continuous heating requirement – peak at 1.5x average load;

It is also assumed that the peaks of all the users could potentially occur at the same time (a very cold morning in winter) and thus the sum total of all peak loads has been used as the peak. It is likely that the Skelton Grange site would not be able to provide all of the demanded heat for the sites identified, but inclusion of the site with the existing heat network and Veolia ERF would mean that sufficient heat should be available at all times, with backup systems (either central or local to each site) employed as necessary (potentially the existing heating equipment on each site). For the cost-benefit analysis it is assumed that for the largest load, only 90% of the annual heat demand could be supplied by the Skelton Grange EfW as the remainder of the load would exceed the heat supply capacity and would need to be made up by either the hospital's own heat generator or by the other EfW plant on the heat network or the backup heat station.

Table 4
Indicative Export and Return Requirements of Heat Load

Facility	Leeds General Infirmary	St James University Hospital	Arla Stourton Dairy	Total
Annual Energy Demand (MWh)	292,000 MWh/annum 262,800 supplied	85,000 MWh/annum	10,000 MWh/annum	386,000 MWh/annum
Maximum Heat Load Extraction Requirement	50MW	14MW	2MW	66MW
Average Heat Load Extraction Requirement	33MW	10MW	1.1MW	44MW
Description of Heat Load Extraction	Hot Water	Hot Water	Hot Water	Hot Water
Description of Heat Load Profile	Variable	Variable	Variable	Variable
Export Pressure	5 Bar	5 Bar	5 Bar	5 Bar
Export Temperature	90 C	90 C	90 C	90 C
Export Flow	399 l/s	115 l/s	14 l/s	527 l/s
Return Pressure	3 Bar	3 Bar	3 Bar	3 Bar
Return Temperature	70 C	70 C	70 C	70 C
Return Flow	399 l/s	115 l/s	14 l/s	527 l/s

The key equipment installed as part of a district heating scheme would consist of the following:

- Heat exchanger;
- Water circulation pumps;
- Pressurisation system;
- Level control;
- Heat meter;
- Relief valve;
- District heating water loop line valve and strainer;
- Pressure instrumentation;
- Temperature Instrumentation;
- Motor control centre (MCC); and
- Local control panel.

A simplified overview of the district heating process is shown in Figure 3. The closed district heating network would circulate water between the EfW facility and the external customers' facilities. The process loop starts at a heat exchanger (primary heat exchanger) where the cool water in the network absorbs the heat from the identified extraction points. The heated water then leaves the EfW facility and transfers the heat to a secondary closed water network (the customer's network). The heat transfer to a customer's network will be achieved via heat exchangers (secondary heat exchanger). The water in the district heating network would return to the EfW facility at a reduced temperature. The cool water would be fed back to the primary heat exchanger and the process loop closed.

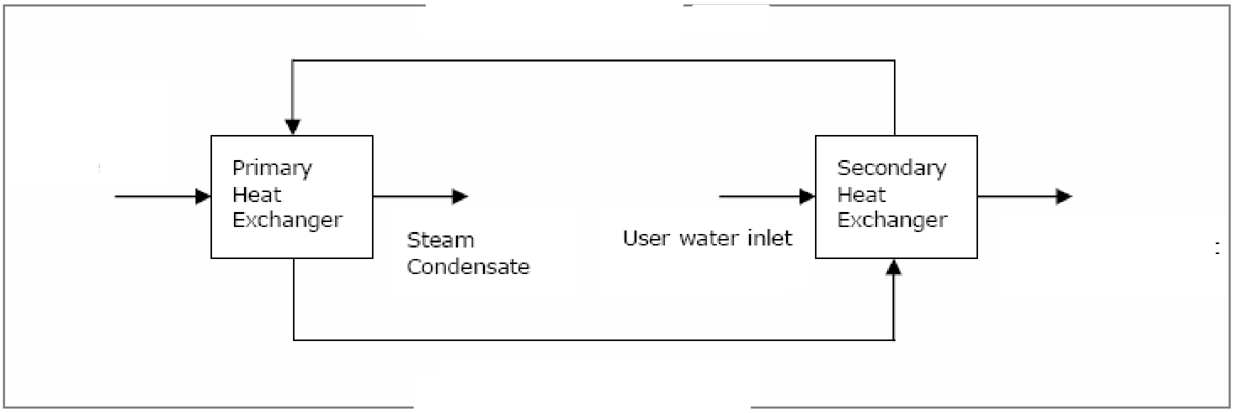

Figure 3
District Heating Process Overview

Primary Heat Exchanger

Steam extraction from the steam turbine would be controlled based on the demand from the heat network, such that only the quantity of steam required would be extracted, and the remainder would be utilised for power generation. This would enable the plant performance to be optimised regardless of district heating demand and to continue in its primary objective for production of energy.

Piping

The district heating network water will be carried from the EfW to the customers' network through pre-insulated carbon steel pipes. This type of pipe is typically used in district heating applications. The main flow and return pipes will run side by side in a single trench that will lead from the heat export point through the main path of the heat network. Individual user's sites will be reached by taking smaller branches off from the main trunk flow and return water lines. The diameter of the main flow and return lines will generally be smaller at the furthest away points on the network with the largest diameter pipe being near to the EfW's export point where the water flow rate is at a maximum. Figure 4 shows a cross section of a typical pipe. In addition to the insulation, the pipe also contains copper wires which are used to identify and pinpoint the location where any leaks occur in order for maintenance work to be undertaken.

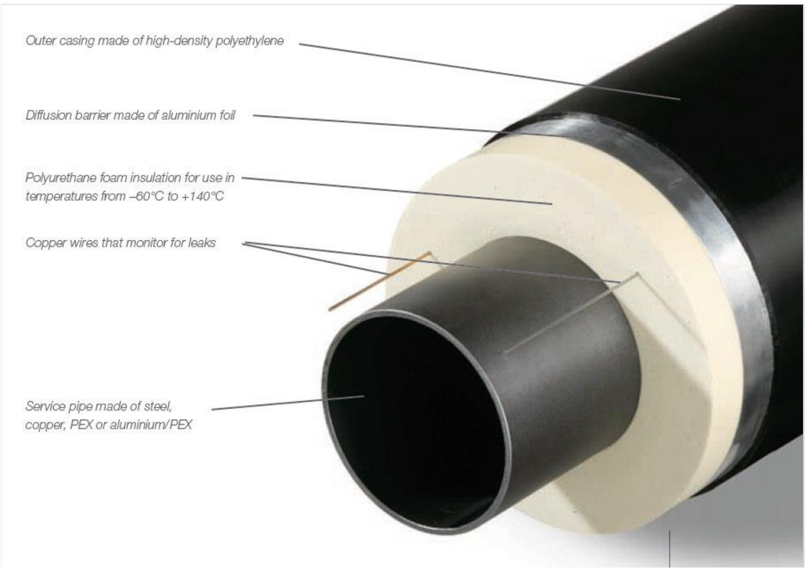

Figure 4
Cross section of pre-insulated pipe

Technology at the Customer's Network End

The main equipment that will be required at the heat user's end may include:

- Secondary heat exchanger which will transfer the heat from the district heating network to the customers network;
- Isolating ball valves and strainers on the incoming and outgoing water lines;
- Control valves and pressure/temperature instrumentation; and
- Heat meter.

2.1.5 Identification of CHP Envelope

Table 5
CHP Envelope

	Minimum Stable Plant Load (70%)	Proposed Operational Plant Load (100%)	Maximum Plant Load (112%)
Maximum Heat Extraction	19.5 MW	35MW	39MW
Reduction in Primary Usage for CHP Mode	The plant would experience a reduction in electrical output of circa 20% compared to electricity-only mode for maximum heat load extraction. The plant could be designed to produce less electricity and more heat, up to 100% heat provision, but this would require significant change to the overall plant design, not anticipated at this stage.		

Can the Plant Supply the Selected Potential Heat Load

Based on the information in Table 4 and Table 5, it is anticipated that the plant would not be able to supply all of the identified users, but the potential interconnection between the site and the existing heat network would mean that heat from the existing Pontefract road RERF could also be used and potentially meet the full demands of the users. The data utilised to estimate the heat loads would need to be verified and the grade and profiles of heat use by the various heat users identified determined in order to confirm this though.

Given the location of the existing heat network and the proximity of the two largest identified potential users to this network, it would appear that the greatest potential for utilisation of heat from Skelton Grange lies in connecting to the existing heat network as this expands and the provision of heat from the existing Veolia EfW becomes the limiting factor for the network. This would enable connection to the largest heat loads in the area with relatively low investment costs in additional network piping, pending confirmation that the existing network would have capacity to provide significantly more heat than is currently supplied.

The approximate lengths of pipework required to be added to the existing network to supply the three loads identified are as follows:

Table 6 Heat Main lengths to network connections

User	Locations	Pipe Main Length
1	Leeds General Infirmary	3300m (2100m of which common to user 1 and 2)
2	St James University Hospital	2100m (common to user 1 and 2)
3	Arla Stourton Dairy	1900m

2.1.6 Technical Provisions and Space Requirements

Description of Likely Suitable Extraction Points

The likely suitable extraction point for the Skelton Grange EfW Facility are identified in Table 7.

Table 7
Heat Extraction Points

Heat Extraction Points	Minimum Stable Plant Load (70%)	Proposed Operational Plant Load (100%)	Maximum Plant Load (112%)
Bleed Steam from MP section of Turbine	15.7	27.9	31.4

Description of Potential Options which could be Incorporated into the Plant to Supply Heat Outside of CHP Envelope

As the most promising option for heat supply is via the existing heat network, the existing heat provider to the network, and/or the existing backup heating station at Pontefract road would be able to supply additional heat to users if this exceeded the capacity of the Skelton Grange EfW facility for short periods. If the heat network further exceeded the capacity of the heat generators including Skelton Grange on a long term basis, then it may be possible to reduce the electrical generating capacity further through turning off one or both of the steam turbines and passing all of the steam/heat generated from one or both lines into the heat network. This option would likely require some engineering re-design to accommodate, and is considered very unlikely within the life of the plant.

Description of how the Future Costs and Burdens have been Minimised through the Implementation of an Appropriate CHP-R Design

The design of the Skelton Grange plant incorporates an appropriately selected extraction condensing steam turbine, which allows for a continuous controlled bleed of medium pressure steam for heat use as well as for in-plant uses (deaeration of feed water). The amount of steam bled can be varied up to the maximums given above to enable use of heat as and when this facility is required, without significantly affecting electrical efficiency for the plant running in "electricity only" mode. Pipes for this bleed have been sized appropriately to cater for the maximum flows given above, and blanked connections have been incorporated into the design to allow connection with minimal site works. Space has also been allocated within the turbine hall for the steam-water heat exchangers required to convert the heat into usable hot water for the network.

Provision of Space at the Skelton Grange EfW facility

Pending detailed design drawings, it has been confirmed by WTI that sufficient space will be allowed in the turbine hall for the required heat exchangers and pumps for any network connection required to supply heat to the identified loads and/or heat network.

2.1.7 Economic Assessment of CHP-R

Cost Benefit Assessment

A cost-benefit assessment was undertaken for each of the users identified above. The cost benefit assessment for each phase indicates a Nominal Project Internal Rate of Return (before financing and tax) over 31 years and a Nominal Net Present Value (before financing and tax) over 31 years.

The results of the cost-benefit analysis are as follows:

Table 8 Results of cost-benefit analyses for CHP provision

User	Heat Users	Internal Rate of Return (IRR)	Net Present Value at 31 Years (NPV)
1	Leeds General Infirmary	160.6%	£42.58M
2	St James University Hospital	62.5%	£10.4M
3	Arla Stourton Dairy	-2.0%	-£2.2M

It can be seen from Table 8 that there is a business case for the connection of each of the hospitals into the existing heat network, along with connection to the Skelton Grange EfW, if this is technically feasible based on the grade of heat required by each hospital. The dairy however does not generate a positive rate of return or NPV on its own as a result of the lower heat load and the inability to utilise any of the existing network.

3.0 BAT Assessment

3.1 Is the New Plant a CHP Plant at the Outset?

No, given that the most promising opportunities for connection to heat users are via the existing heat network which at present has a greater heat supply than demand, it is not likely to be beneficial to connect the Skelton Grange facility to this network in the immediate future.

3.2 If not, is the new plant a CHP-R Plant at the Outset

Yes, as demonstrated in Section 2.0, the site's design incorporates appropriate heat extraction and has consideration to the supply of heat to the identified heat load. The site will be ready to supply heat in the future to the identified heat loads or other potential heat supply opportunities which present with minimum modification of the original plant/equipment.

3.3 Once the New Plant is CHP-R, is it BAT?

Yes, WTI have engaged a consultant to lead on discussions with local heat users above and the operators of the Leeds PIPES network relating to the potential for future connection to the network and/or other users in the future.

4.0 Conclusion

In summary, the Skelton Grange EfW Facility is considered to represent BAT with respect to being CHP-R. Whilst WTI are unable to confirm that immediate opportunities are available at this moment due to ongoing discussions with third parties, the facility will be CHP-ready should agreement be reached, or other suitable heat supply opportunities present and agreed. It appears from this CHP-R assessment that the greatest potential for heat supply from the Skelton Grange EfW facility would be via a connection with the existing Leeds PIPES heat network, to be completed once the network has expanded to the point where it becomes limited by the available heat supply from the existing Veolia Pontefract Road EfW facility. This is unlikely to occur in the immediate future but is likely to take place during the planned operational life of the Skelton Grange facility, as more and more new developments connect to the existing network over the coming years.

This CHP-R assessment demonstrates that BAT for energy efficiency is met as described in the EA's CHP-R guidance and includes:

- A basic description of the plant;
- A description of the identified heat load;
- A justification of the degree to which the new plant will be CHP-R through the provision of:
    - A CHP Envelope;
    - A comparison of the identified heat load against the plant's CHP envelope;
    - The effect of the selected heat load on the proposed operation of the plant; and
    - A high level economic assessment.

Following issue of the environmental permit for the facility, WTI will periodically review opportunities for the supply of heat to realise CHP, primarily via discussions with the operators of the Leeds PIPES network; but also through other sites in the locality.

APPENDIX 01

Cost Benefit Analysis Spreadsheets for Skelton Grange EfW Facility CHP Readiness Assessment

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