Gateway Energy Centre

ENVIRONMENTAL STATEMENT

Supplementary CHP Assessment

Prepared by

PARSONS BRINCKERHOFF

December 2010

CONTENTS

LIST OF ABBREVIATIONS

bar g	bar gauge
CCGT	Combined Cycle Gas Turbine
CCW	Closed Cooling Water
CHP	Combined Heat and Power
CHPA	Combined Heat and Power Association
CHPQA	Quality Assurance for Combined Heat and Power
COP	Coefficient of Performance
CPI	Confederation of Paper Industries
DECC	Department of Energy and Climate Change
EIA	Environmental Impact Assessment
ES	Environmental Statement
GEC	Gateway Energy Centre
GECL	Gateway Energy Centre Limited
GWh	gigawatt hour
HHV	Higher Heating Value
HRSG	Heat Recovery Steam Generator
HV	High Voltage
kV	Kilovolts
kWh	kilowatt hour
LG	London Gateway
LHV	Lower Heating Value
LTHW	Low Temperature Hot Water
M	Metres
MTHW	Medium Temperature Hot Water
MW	Megawatts
MWh	megawatt hour
NaTS	National Transmission System
OEM	Original Equipment Manufacturer
Yr	Year

EXECUTIVE SUMMARY

Overview

GEC will provide up to 900 megawatts (MW) of electrical generation capacity and will be constructed on land within the London Gateway Port / London Gateway Business and Logistics Park development, collectively called the LG Development. The LG Development, promoted by DP World, is currently in the early stages of construction.

In selecting the proposed site, GECL has considered from the outset the potential to facilitate the provision of Combined Heat and Power (CHP) in association with the occupation of the LG Development. GECL is committed to delivering CHP as part of the project.

Excellent UK CHP Opportunity

One of the key reasons for the selection of the location of GEC is its excellent CHP potential, in particular the:

- Supply of up to 150 MW of highly efficient electricity to the LG Development, which is expected to meet its long-term electricity requirements; and
- The ability to supply heat to customers, in particular within the London Gateway Business and Logistics Park development.

This approach is consistent with Government Energy Policy[1,2,3,] Reports[4] and Thurrock Council's Core Strategy[55] which recognise the benefits of CHP; this can supply steam directly to industrial customers and / or use waste heat more efficiently which, in a single process, can reduce the amount of fuel needed to meet energy requirements compared to the separate generation of electricity and heat.

The ability of GEC to supply electricity and heat, particularly within the London Gateway Business and Logistics Park development, affords Thurrock the potential to have a leading CHP project in the UK, at a time when Government policy is encouraging energy efficiency.

In addition, the availability of CHP offers advantages to the LG Development and to new businesses as it will afford choice and help to maximise the attractiveness of this location to prospective tenants / customers requiring access to low carbon heating.

In recognition of the national and local importance of CHP, GECL is setting out its commitments and mechanisms to encourage and facilitate the production and delivery of heat and / or steam to future tenants of the London Gateway Business and Logistics Park.

Advantages of GEC to the LG Development

GECL's commitment to supply up to 150 MW of electricity to the LG Development affords that development:

- A source of power from one of the world's most modern and efficient gas fired power stations with gas recognised as the cleanest form of fossil fuel generation (e.g. the power station emits no odours or ash);
- On-site delivery of power from GEC ensuring that transmission losses, which occur as electricity is carried over electrical connections, are minimised thereby optimising costs;
- Reduced carbon footprint from lower transmission losses which equates to a saving of

1 *Meeting the Energy Challenge. A White Paper on Energy, May 2007, Paragraphs 3.1, 3.3, 8.25*
2 *Revised Draft Overarching National Policy Statement for Energy EN-1 October 2010, Section 4.6*
3 *Revised Draft National Policy Statement for Fossil Fuel Electricity Generating Infrastructure (EN-2) October 2010, Paragraphs 1.7.3, 2.2.4, 2.3.1-3*
4 *The Potential and Costs of District Heating Networks, Poyry (for DECC), April 2009*
5 *Thurrock Core Strategy and Policies for Management of Development, Development Plan Document with "Proposed Focus Changes"*

some 25 000 tonnes per annum of carbon dioxide (CO_2); and

- Greater security of supply through on site power production of electricity vital for automated port operations and business park customers.

In demonstration of GECL's commitment to CHP, GEC will be designed and built to be 'CHP Ready' such that, when tenants of London Gateway Business and Logistics Park and / or other parties require heat (or steam), it can be delivered from GEC. GECL's commitment to deliver heat from GEC affords the London Gateway Business and Logistics Park and other prospective customers:

- Access to a heat supply which could be used in business space for efficient and low carbon heating;
- A lower marginal cost, compared to traditional heat sources (e.g. package boilers), which will be economically attractive to prospective tenants / customers;
- Enhanced security of supply of heat;
- Potential to reduce the use of traditional heat sources and carbon emissions by some 25 000 tonnes per annum (in addition to the 25 000 tonnes referred to above); and
- Provision of heat, cooling or steam for key business processes, which some prospective customers of the London Gateway Business and Logistics Park may need for their business activities (e.g. product finishing and / or refrigeration (units can be powered using heat).

Advantages to Thurrock

The delivery of CHP from GEC will provide Thurrock with a number of benefits, in particular:

- CHP will contribute to the success of the nationally and locally important LG Development (and its creation of jobs) through the likely attraction to prospective tenants of having access to lower carbon on-site power and heat supply;
- The LG Development's carbon footprint will be lower through the direct provision of power and heat, representing a potential saving of up to approximately 50 000 tonnes per annum of CO_2; and
- By the use of district heating, in particular within the London Gateway Business and Logistics Park, it contributes to meeting Government and local planning policy, namely:
    - To satisfy DECC's Guidance which requires that all combustion power station proposals demonstrate that opportunities for CHP have been seriously explored before Section 36 Consent can be granted by submitting a scheme for approval of the plant, configured to produce CHP and to enable installation of the necessary pipe-work to the site boundary;
    - In recognising that CHP is technically feasible for this thermal generating station, positive weight should be given to applications incorporating CHP; and
    - In accordance with the Thurrock Core Strategy and Policies for the Management of Development Policy CSTP 26 (Renewable or Low Carbon Energy), GEC can facilitate the delivery of a low carbon energy solution to the LG Development through the provision of CHP. The station is being built to be Carbon Capture Ready (CCR) in line with UK Government Policy such that, if Carbon Capture and Storage (CCS) equipment is retrofitted, it will be capable of capturing up to 90 % of the CO_2 generated.

Power Delivery Already Secured

GECL has committed to supply up to 150 MW of electricity to the LG Development – enough to meet its projected future power requirements once it has been fully constructed.

GEC - Facilitating the Delivery of Heat

GEC is committed to providing CHP. In order to maximise the likelihood and deliverability of heat being taken by future tenants of the London Gateway Business and Logistics Park, GECL commits to undertake the following:

- Design and then build the station such that it is capable of providing at least 3.6 MW of heat / steam to serve tenants of the London Gateway Business and Logistics Park, this being the current estimate of heat / steam demand;
- Monitor the estimated level of heat usage and amend appropriately as customers (including customers of the London Gateway Business and Logistics Park) are secured up to the point when the design of GEC is finalised. GEC's design can be altered so that it is capable of supplying heat beyond 3.6 MW (up to approximately 10 MW) to accommodate higher demand than currently forecast;
- In conjunction with London Gateway, inform tenants of the Business and Logistics Park of the potential for a heat / steam supply and when appropriate hold discussions with them with the aim of progressing their interest;
- Agreeing a 'Heat / Steam Delivery Roadmap' with Thurrock Council and TTGDC as set out at Appendix C; and
- Encourage and facilitate the use of district heating by committing to: (a) installation and use of heat / steam within the proposed GEC's administration block; (b) assist tenants of the Business and Logistics Park with their assessment of using heat in their business processes (e.g. via the provision of information); (c) enter into discussions on the commercial supply of heat; and (d) with interested tenants / customers, develop a solution to optimise delivery of heat infrastructure (e.g. pipeline connections from GEC to the tenant's site).

GECL will continue to actively progress heat supply discussions with Petroplus. It will also seek other CHP opportunities through regular discussion with Thurrock Council and TTGDC as the development of GEC progresses (e.g. district heating). CHP opportunities will need to be commercially and technically viable. GECL commits to act reasonably in CHP discussions and to establish with Thurrock Council and TTGDC a liaison group to facilitate the utilisation of heat / steam.

The final design of GEC will ensure that the plant continues to have sufficient capability to provide steam for Carbon Capture and Storage (CCS) purposes should this become a requirement, as set out in the Carbon Capture Readiness (CCR) Feasibility Study that accompanied the Section 36 Consent application lodged with DECC in February 2010.

Any steam requirement for CHP over and above that needed for CCS will be provided either by:

a) Available capacity from the CCGT; and / or

b) Appropriate back-up steam production equipment, utilising ancillary boilers, if there is insufficient capacity from the CCGT after taking account of CCS requirements. GECL's application for Section 36 Consent, lodged with DECC in February 2010, includes provision for ancillary boilers (Environmental Statement, Volume 1, Paragraph 1.1.1)

1 INTRODUCTION

1.1 Structure of Supplementary Assessment

1.1.1 The structure of this document is as follows:

- Section 1 – Introduction
- Section 2 – Structure of Supplementary Information and Summary of Environmental Statement Information
- Section 3 – Supplementary Information on Choice of Location and Identified CHP Opportunities
- Section 4 – Supplementary Information on the Potential Impact on GEC of the CHP Opportunities in the LG Development
- Section 5 – Conclusions

1.2 Section 36 Consent Application for Gateway Energy Centre

1.2.1 In February 2010, Gateway Energy Centre Limited (GECL) submitted an application for Consent under Section 36 of the Electricity Act 1989 to the Department of Energy and Climate Change (DECC) to construct a Combined Cycle Gas Turbine (CCGT) Power Plant to be known as Gateway Energy Centre or GEC. In addition, deemed planning permission under Section 90 of the Town and Country Planning Act 1990 was also sought. The Consent application was accompanied by an Environmental Statement (ES) prepared in accordance with the requirements of the Electricity Works (Environmental Impact Assessment) (England and Wales) Regulations 2000 (as amended).

1.2.2 GEC will be constructed on land within the London Gateway Port / London Gateway Business and Logistics Park development, collectively called the LG Development. The LG Development, promoted by DP World, is currently in the early stages of construction.

1.2.3 GEC will provide up to 900 megawatts (MW) of electrical generation capacity. This will include the provision of up to 150 MW of electricity to the LG Development, which is expected to meet its long-term requirements. Additionally, there is also the possibility for GEC to supply heat in the form of steam or hot water to facilities and / or customers in the vicinity of the site.

1.3 Description of Associated Infrastructure Connections

1.3.1 In addition to the development of GEC, there are a number of infrastructure connections required. These include:

- A new underground gas pipeline to connect to the National Grid National Transmission System (NTS);
- A new underground cable / over ground transmission line / combination of both to connect to the High Voltage (HV) National Grid System; and
- Connections for potential future Combined Heat and Power (CHP).

1.3.2 In addition, interconnections may be required in the future for the purposes of Carbon Capture and Storage (CCS) such that captured CO_2 from GEC can be exported to a suitable storage site. CCS is further discussed in the Carbon Capture Ready (CCR) Feasibility Study submitted to accompany the Section 36 Consent application. The Environmental Statement Further Information Document (Section 19) considers indirect, secondary and cumulative impacts of the gas and grid connections and the potential CHP and CCS infrastructure.

1.3.3 Consent for these infrastructure connections will be the subject of future Consent applications, as appropriate, which will include full details of the potential environmental impacts.

1.4 Requirement for this Document

1.4.1 Following submission of the ES, and consultation on the application, further information has been compiled on the CHP opportunities that were identified in the CHP Assessment. This information has been used to update the findings of the CHP Assessment, and this update is presented in this document.

1.4.2 The Environment Agency in its letter of 26 April 2010 commented that:

"*The power station is to be constructed within a development complex that would seem perfect for the exploitation of CHP; however there is no consideration given to providing a distribution network such that the Gateway Development sources all its CHP requirements from the new power station*"

1.4.3 Additionally, the (former) East of England Local Government Association stated in Appendix A of its letter of 30 April 2010 that:

"*Some of the electricity and heat produced could be directed to the London Gateway Port and Logistics Park and other users. The potential incorporation of CHP should be a significant factor in the choice of location. This does not appear to have been clearly expressed in the supporting documentation even though a major user of heat – the Petroplus refinery – is nearby*".

1.4.4 The updated findings presented in this document address the issues raised by the abovementioned Consultees.

2 SUMMARY OF ENVIRONMENTAL STATEMENT INFORMATION

2.1 Summary of Environmental Statement Information

2.1.1 The CHP Assessment presented the findings of an assessment into the potential CHP opportunities in the vicinity of the GEC site. Organisations were contacted to establish the appetite for CHP; these included:

- DECC – Electricity Developments Consents Team;
- DEFRA – Climate and Energy: Households and Markets;
- CHPQA (Quality Assurance for Combined Heat and Power);
- Government Office for the East of England; East of England Development Agency;
- CHPA (Combined Heat and Power Association);
- The Energy Saving Trust;
- East of England Strategic Health Authority;
- CPI (Confederation of Paper Industries);
- HM Prisons Service: Property Service Group;
- Petroplus; and
- DP World – London Gateway.

2.1.2 The responses from these organisations were encouraging, and a number of potential CHP opportunities were identified. These included:

- Supply of hot water / steam to the LG Development for heating or refrigeration purposes;
- Supply to Petroplus;
- Supply to Ford Motor Company at Dunton; and
- Supply to Basildon Hospital.

2.1.3 Subsequently, the CHP Assessment concluded that the detailed design of GEC will incorporate features which, with suitable modifications, will allow for the export of heat in the event that demand from a suitable user is identified.

3 CHOICE OF LOCATION AND IDENTIFIED CHP OPPORTUNITIES

3.1 Choice of Location

3.1.1 Details of alternative development sites are considered in Section 6 of Volume 1 of the ES (Alternatives) and the Combined Heat and Power (CHP) Assessment which were submitted to accompany the Section 36 Consent application. The Section 36 Consent application can be downloaded at:

http://www.gatewayenergycentre.co.uk/

3.1.2 Section 6 of Volume 1 of the ES stated that the site selection studies undertaken focused mainly on the south east, due to a number of reasons including the deficit of generation plants in the area, taking into account expected closures of existing plant coupled with a high and rising demand for more electricity in London and the south east. An iterative process led to the selection of three potential sites, which were located near to the existing CECL Power Station. These were: Site A (part of the LG Development site); Site B (45 acre brownfield site located near Canvey Island); and, Site C (location not disclosed due to land owner confidentiality requirements).

3.1.3 The three sites were then assessed against each other, for their suitability for power generation, based on a number of environmental issues, including: land use, planning context and material assets; air quality; noise and vibration; landscape and visual; ecology; geology, hydrogeology and land contamination; traffic and infrastructure; and, cultural heritage. Following this assessment, Site A was chosen as the preferred development location.

3.1.4 In addition, there are a number of additional advantages (over those offered on an environmental basis) which made it an ideal location for its main purpose of power generation. These were provided in the CHP Assessment and are:

- Close proximity of the 400 kV National Grid transmission system;
- A transmission connection date of around 2014;
- Close proximity of the National Grid Gas National Transmission System;
- Availability of sufficient land for the development of a CCGT Power Station and for the retrofitting of a carbon capture plant in the future;
- Transport infrastructure which will accommodate construction traffic;
- Close proximity of the LG Development to allow GEC to meet its expected long-term electrical power requirements of up to 150 MW;
- Appropriate visual context due to the industrial nature of the immediate area including the existing CECL Power Station, Shell Tank Farm and the Coryton Oil Refinery, and the LG Development;
- The close proximity of GEC to areas of highest national power demand;
- Availability of technical support (if required) from the existing CECL Power Station;
- Compatibility with Planning Policies and Local Development Plans; and
- Opportunities to link beneficially with local industry.

An additional advantage of Site A over Sites B and C (which is included in Section 6 of Volume 1 of the ES) was "*the close proximity of the LG Development which has the potential to off take heat from GEC*" (this heat locational advantage is in addition to the electrical locational advantage discussed above).

3.1.5 It is considered that the assessment completed for the selection of the chosen development site (for the main intended purpose of power generation) justifies its location, and that the CHP opportunities associated with this site are an additional benefit.

3.2 LG Development CHP Opportunities

3.2.1 As stated previously, GEC will be constructed on land within the London Gateway Port / LG Business and Logistics Park development. The port utilises modern automated technology including cranes which are powered by electricity. The LG Business and Logistics Park has planning permission for approximately 938,000 m^2 of warehouse / distribution, business and general industrial development with ancillary development which may include office, retail, leisure and hotel space.

3.2.2 As stated in the first CHP Assessment, discussions with potential tenants for the LG Logistics and Business Park are at an early stage and, as such, occupiers details are not known. However, in addition to the direct supply of up to 150 MW to the LG Development, there are two areas of potential for the provision of heat associated with this type of development which should be considered, namely process uses and district heating.

Electricity Supply

3.2.3 InterGen has entered into a commercial agreement with LG to supply it with up to 150 MW of electricity from GEC. This electricity will be used by the LG Port and Logistic and Business Park tenants.

3.2.4 The key environmental benefit of this direct supply is the lower transmission losses. Such losses arise primarily when power is transmitted along electrical lines over long distances, losing power in the form of heat. For example, 1000 MW of power generated in Scotland loses around 60 MW in transit to the south east of England, becoming 940 MW (a loss of around 6 %).

3.2.5 By selecting the GEC site and providing up to 150 MW to LG, an opportunity is created to effectively reduce carbon emissions by up to 25 000 tonnes per annum for the LG Development alone. This estimate is based on reduced transmission and transformer losses.

3.2.6 The supply of electricity to the LG Development from GEC (which affords the LG Development added security of supply) and the long term commercial land lease will together contribute significantly towards the regeneration of the former Shell Haven site – a project which has significant employment and strategic benefits to the local area and the UK.

3.2.7 The power will be supplied to the LG Development from around 2012, initially from InterGen's existing CECL Power Station as GEC is not planned to be operational until around 2015. The CECL Power Station is expected to remain operational until up to 2025 and to 2035, subject to environmental and economic viability. When GEC is operational, in around 2015, the power supply for the LG Development will be switched from the CECL Power Station to GEC principally as:

a) GEC has a longer operational lifetime (15 years), and thus will be able to support the LG Development for the longer term; and

b) The CECL Power Station can only provide up to 100 MW of electricity to the LG Development reflecting the physical limitations of the electrical equipment, as the space limitations at the CECL Power Station prohibit the commercial upgrading of the electrical equipment to handle more than the provision of 100 MW to the LG Development. In addition InterGen is also restricted to supplying no more than 100 MW to the LG Development as it has a supply licence constraint.

Steam / Heat Supply

3.2.8 The two predominant opportunities for the use of heat produced by GEC are:

- Potential Process Uses - Steam for product finishing and / or or absorption chilling for supply to potential light industry; and
- Heating Uses - Low temperature hot water (LTHW) for district heating, to provide space heating and domestic hot water demands.

<u>Potential Process Uses</u>

3.2.9 LG has stated that, based on early discussions with prospective tenants of the LG Logistics and Business Park, there could be some large scale refrigerated storage requirements that could utilise steam. In addition, there may be an appetite from parties to utilise steam as part of their product finishing process.

3.2.10 LG has advised that tenants with potentially high steam demands such as those discussed above would, where practicable, be directed to plots close to GEC in order that potential CHP applications can be implemented at lowest cost (both in terms of capital outlay for the likes of pipework and heat efficiency).

Estimates of Demand – Process Uses

3.2.11 As stated in the first CHP Assessment, the process demands are difficult to estimate in the absence of firm information about potential tenants and their projected heat / cooling demand. In the absence of such information, the requirement for product finishing has been estimated on PB's previous experience of this type of demand for similar developments, while the requirement for heat to supply refrigeration via absorption chilling has been estimated from published electricity bench marks for this type of storage[6].

3.2.12 The estimates used for the assessment of CHP potential are:

- Product Finishing – saturated steam at 4 barg, 1 – 4 t/hr (equivalent to 750 to 3000 kWth) with no condensate return (Process Use 1).
- Refrigeration – saturated steam at 185°C (return condensate at 165°C); duty of approximately 3 MWth with annual demand of 15 GWh. This estimate is based on the storage being for chilled rather than frozen products. Frozen storage would have a larger demand (Process Use 2).

3.2.13 The steam demand of prospective tenants is determined by the process requirements of the industry in which the tenants operate and commercial viability (e.g. cost of infrastructure versus cost savings). Consideration should be given to the possibility that not all anticipated demand will be realised and that some of the demand that does occur may not be supplied by GEC.

3.2.14 The refrigeration plant will have the option of using electrically powered compression refrigeration or thermally powered absorption refrigeration. Ultimately the life-cycle cost may determine the choice of technology, but since the intention of CHP is to reduce net energy consumption (and hence emissions), it is considered appropriate to ascertain which type of refrigeration will result in lowest net energy consumption. This analysis is carried out in Section 4.3.5 to 4.3.9.

<u>District Heating</u>

3.2.15 The LG Development OPA permits the provision of up to approximately 938,000 m^2 of floorspace, the majority of which is for warehousing (Class B8) and a significant amount of general and light industry and research and development (Classes B2, B1(b), B1(c)). However, the Secretary of State considered that the inclusion of parts

[6] *Benchmarks taken from CIBSE TM46 "Energy Benchmarks"*

of the LG Development site, namely the Refinery Expansion Land (REL) and Tongue Land was inappropriate on the grounds of visual amenity and subsequently restricted development in these areas to access and associated infrastructure. When considered alongside established density parameters, this will have the effect of reducing the floorspace deliverable under the OPA. The provision of the GEC on land within the LG Development has the potential to further reduce the floorspace area by approximately 42,000 m².

3.2.16 In relation to future district heating uses, the potential demands from warehousing / industry will depend critically on the requirements of individual tenants. Typically, warehousing is not heated; only the office element of a unit may have heating and hot water requirements. As such, the viability of district heating provision depends on having a reasonably high density of heating demand as the pipe work infrastructure required to distribute heat is expensive to install.

3.2.17 The key loads for district heating within the LG Logistics and Business Park would be the proposed offices and any hotel and leisure facilities.

3.2.18 Set out at Appendix B is a brief note on what a district heating pipe system normally comprises, some examples of such and indicative estimates of pipeline length and size.

Estimates of Demand – District Heating

3.2.19 The maximum potential annual demands for heat from district heating applications have been estimated from CIBSE Energy Benchmarks Guide TM46, and then reduced in accordance with the successive Buildings Regulations targets (1999 levels initially reduced to 2006 levels and then further reduced to 2013 levels). Likely peak demands have been estimated on PB's previous experience of typical profiles for similar developments.

3.2.20 The benchmarks used for space and domestic hot water provision are as follows:

- B1 (b) / B1 (c) (Light Industrial) – 34 kWh/yr/m^2
- B2 (General Industrial (assumed 50 % / 50 % air conditioned / natural ventilation)) – 31 kWh/yr/m^2
- B8 (Warehousing (assumed temperature controlled)) – 36 kWh/yr/m^2
- Ancillary Office Space (assumed 100 % naturally ventilated) – 29 kWh/yr/m^2
- Other (Retail / Hotel / Leisure) – 51 kWh/yr/m^2

3.2.21 This assessment indicates a maximum district heating load for the whole LG Development of:

- Annual demand – 27.5 GWh
- Peak demand – 12 MW
- LTHW flow / return temperature – 95 / 55°C

3.3 Petroplus CHP Opportunity

3.3.1 There is no change with regard to the Petroplus CHP Opportunity from that outlined in the CHP Assessment submitted to accompany the Section 36 Consent application in February 2010.

3.4 Basildon Hospital and Ford Motor Company at Dunton CHP Opportunities

3.4.1 The main potential loads identified in the original CHP Assessment outside of the LG Development and Petroplus were Basildon Hospital and the Ford Motor Company at

Dunton (a research centre). Potential links to these are shown in Figure 1 in Appendix A.

Basildon Hospital

3.4.2 The Basildon Hospital is located some 6.4 km from GEC. The main hospital heating system operates on steam at 8 barg and the published energy consumption of gas / oil for 2008 / 9 was just under 110,400 GJ[7] (30.6 GWh).

3.4.3 Any potential heat link to Basildon Hospital from GEC would need to obtain specific wayleaves from a large number of private landowners along the route. The heat link would also need to cross a variety of small waterways and the main A13 trunk route. Such a link would significantly increase the costs of capital expenditure.

3.4.4 In addition the heat link would need to provide for delivery of energy to Basildon Hospital as steam, rather than more traditional district heating supply of LTHW in order to interface with the hospital's system. The hospital's system could, in theory, be converted to LTHW, as the primary demands on the site are for space heating and hot water; however, this would involve significant cost and disruption for the Trust.

3.4.5 Additionally, the supply of steam over such long distances would be impracticable from a technical perspective. The associated pressure losses and operational issues such as significant losses of heat, condensate trapping and management of system expansion, together with health and safety issues, are more significant than those associated with normal utility transmission systems. For these reasons, long distance steam transmission is generally only considered for very large scale operations. normally within a secure industrial site.

3.4.6 An alternative would be to transmit medium temperature hot water (MTHW), perhaps at 200°C and 20 bar pressure, which could then be converted to steam at Basildon Hospital using a heat exchanger. Such a system would require specialist, costly pipe work. Therefore, such an installation is also not considered suitable for this application.

3.4.7 For the abovementioned reasons, a supply from GEC to Basildon Hospital is not considered viable primarily from the technical perspective and is disregarded from further assessment.

Ford Motor Company at Dunton

3.4.8 The Ford Motor Company site at Dunton is a further 5 km past Basildon Hospital from GEC by road and a direct route between the sites is not possible due to the built up nature of the area between them. The route would need to pass under the mainline railway.

3.4.9 Ford has advised that their current heating system operates as medium temperature hot water (MTHW) with design flow and return temperatures of 180 / 120°C. Supply of heat in this form from GEC would be subject to the same constraints as identified for the supply of MTHW to Basildon Hospital above.

3.4.10 It may be possible to convert the Ford systems to operate on LTHW but there would be a considerable cost in undertaking this conversion. Ford has stated that, while it would be interested in investigating any options that would reduce energy costs, it would be highly unlikely to invest in infrastructure to allow a change in energy supply.

3.4.11 Ford has advised that its current gas use at the site is around 50 GWh (HHV) per annum. Taking into account the losses associated with the age and operating temperature of the system, the actual heat demand of the site is likely to be around 30 GWh per annum. While this approximate annual demand equates to an average

[7] *Taken from NHS ERIC Returns for 2008 / 9 from http://www.hefs.ic.nhs.uk/Home.asp*

heat flow rate of 3.4 MW, based on load factors from other Ford sites, a peak heat flow rate of around 25 MW is likely to be required.

3.4.12 If the site were to be converted to LTHW a connection to this Ford site would require more than 13 km of district heating mains at a likely cost of over £15 million (assuming no major technical barriers are encountered). Previous experience at other Ford sites indicates an additional cost for LTHW conversion of at least £2 million, a total cost of over £17 million.

3.4.13 Previous discussion with Ford and other commercial organisations has shown that the longest potential contract for heat supply with an organisation such as this would be for approximately 15 years. Over this period, this capital cost alone would equate to around £38 / MWh delivered (excluding the cost of capital, maintenance and energy costs). From discussions with Ford, the likely all inclusive costs of energy for the site would need to be below £35 / MWh. Clearly, connection of this load would not be considered economic and is disregarded from further assessment.

4 POTENTIAL IMPACT ON GEC OF THE CHP OPPORTUNITIES IN THE LG DEVELOPMENT

4.1 Applicable Sources of Low-Grade Heat Supply

4.1.1 It is envisaged that potential users of heat within the LG Development will not be developed at the time of GEC construction contract award. Consequently, established sources of steam from the CCGT design will be considered for the external heat loads such that retrofitted extractions will have minimal impact on the CCGT plant operation. Efficiency gains through the extraction of steam from bespoke stages of the CCGT steam turbine are only realised where the exact steam requirements are known at the design stage and large steam flow rates are required.

4.1.2 Due to the lower flow rate and the higher pressure and temperature requirements of the heat extractions for the identified process uses (product finishing and the refrigeration plants), steam could be extracted from the intermediate pressure evaporator. The design of this extraction could be incorporated within that of the CCGT's Heat Recovery Steam Generators (HRSGs); alternatively, the extraction is universally retro-fittable for all the Original Equipment Manufacturers (OEMs).

4.1.3 For the potential district heating for the LG Development, the heat source selected for ease of retrofit and minimal impact on the operation of the CCGT plant is the low pressure superheated steam. This steam can be letdown in pressure and de-superheated to the appropriate conditions for the district heating heat exchanger.

4.1.4 The steam turbine pipework, typically the cold reheat pipe at the high pressure turbine exhaust and the low pressure turbine inlet, are other suitable and usual locations for steam extraction if required for future identified heat users. The use of the higher pressure cold reheat steam usually allows higher heat export, but impacts the output more.

4.2 Viability of Waste Heat Sources

4.2.1 The applicable heat sources selected in Section 4.1 are not pure waste heat sources since the extracted steam would still have done useful work in the steam turbine generator had it not been extracted, producing electrical power. However, as with most CHP applications, utilising the extracted steam in a process, or for heating, avoids wasting the majority of the steam's latent heat in the condenser. Comparing CHP to the alternative of supplying the heat demand with a gas boiler say, the reduced electrical output of the CCGT plant is significantly less than the proportion of electrical power that could have been produced in a large CCGT plant from the gas consumed by the boiler. This benefit is more pronounced the lower the grade of steam extracted. If only 35°C heat was required, pure waste heat in the form of steam turbine exhaust could potentially be utilised, but the heat requirements identified in Section 3.2 preclude this potential.

4.2.2 Other theoretical sources of pure waste heat considered were the flue gas stack and the closed cooling water system.

- ***Flue Gas Stack*** – the temperature of the flue gas in a typical large CCGT ranges from 80 to 100°C when running on natural gas. The OEMs attempt to design the HRSGs such that this temperature is as low as possible without causing any corrosion issues that may arise as a result of the sulphur dew point of the flue gas being reached. It could be that a stack water heater (effectively an additional low temperature economiser that is not linked to the steam cycle) installed at the back end of the HRSG could safely extract more heat from the flue gas. However, this depends on the natural gas composition and this cannot be predicted for the lifetime of the CCGT. In addition, a stack water heater requires a large additional section in the HRSG and it would either be very disruptive to retrofit the tube bank or it would be risky to install the tube bank without the guarantee that the heat demand would remain for the lifetime of the CCGT. For these reasons, a stack water heater has not been considered further.

- ***Closed Cooling Water System –*** the closed cooling water (CCW) system is used to cool the lubrication oil systems as well as the generators. The temperatures developed in the lube oil systems and generators may be sufficient for some space heating requirements, but bespoke heat exchangers would have to be employed in addition to the CCW heat exchangers since the CCW system itself operates at temperatures too low for district heating. The CCW system would have to remain on standby at all times because the lube oil systems and generators are critical, so a bespoke automatic switchover would be required. As such, it is considered that the complexity and additional risk of such an arrangement does not warrant its further consideration.

4.3 Impacts of Heat Extractions on GEC

4.3.1 The purpose of thermodynamically modelling the heat extractions identified in Section 4.1 is to confirm their technical viability and to determine the impacts on power output from GEC.

4.3.2 Figure 2 in Appendix A contains a typical heat and mass balance diagram of a CCGT design, shown purely as the basis from which the likely differential impacts of the potential heat extractions are determined.

Impact on GEC of Steam to Possible Product Finishing Works (Process Use 1)

4.3.3 The maximum potential steam off-take from the product finishing works is expected to be 4 t/h at approximately 4 barg. No steam condensate is returned to the CCGT plant. Adequate provisions for additional demineralised water supply have been made should the demand be realised. Space allocation for a demineralised water tank capable of supplying 4 t/h for 50 days has been provided. The space set aside for the water treatment plant has allowed for demineralised water output of 35 t/h, where the normal maximum requirement of GEC will be 5 t/h.

4.3.4 The technically viable extraction is shown in Figure 3 in Appendix A and the impact on the power output of GEC would be a reduction of approximately 700 kW.

Impact on GEC of Steam to Possible Absorption Refrigeration Plant (Process Use 2)

4.3.5 The peak potential heat demand of 3 MW for use in the absorption refrigeration plant was modelled, supplying saturated steam at 185°C (extracted at 190°C to allow for heat lost from the pipeline) with the return at 165°C. The extraction flow rate required would be 5.2 t/h.

4.3.6 The technically viable extraction is shown in Figure 4 in Appendix A and the impact on the power output of GEC would be a reduction of approximately 850 kW.

4.3.7 Based on the reasoning in Section 3.2.14, a sensitivity analysis is now carried out to inform the decision of using electrically power compression refrigeration or thermally powered absorption refrigeration. For electrically powered compression (mechanical) refrigeration, the energy input is electricity for the refrigerant compressor, so the coefficient of performance (COP) is defined as Cooling Capacity over Electrical Input. For thermally powered absorption refrigeration, the energy input is heat for the generator (i.e. the refrigerant vaporiser), so the COP is defined as Cooling Capacity over Heat Input. The COP's of both compression refrigeration and absorption refrigeration systems vary with the cooling medium available and the temperature required for the cooling load. In addition, there is also scope for a range of COPs based on heat exchanger approach temperatures, equipment efficiencies and (in the case of) absorption refrigeration, the properties of the refrigerant mixture. Many of these aspects affecting COP would have a cost implication and so a typical range of COPs has been selected for the sensitivity analysis. For compression refrigeration, a COP of 5 and 3 will be used. For absorption refrigeration, a COP of 1.4 and 1.1 will be used.

4.3.8 From paragraphs 4.3.5 and 4.3.6 (and Figure 4 in Appendix A), for 850 kW of electricity, 3000 kW of heat is supplied.

- For the absorption refrigeration COP of 1.4, this equates to 4200 kW of cooling and thus an effective electrical COP of 4.9. The compression refrigeration system with a COP of 5 is comparable (4250 kW of cooling), but if compared with a COP of 3 (2550 kW), the absorption refrigeration would be better from a net energy consumed perspective.
- For the absorption refrigeration COP of 1.1, this equates to 3300 kW of cooling and thus the effective electrical COP drops to 3.9. In this case, a compression refrigeration system may well prove to consume less energy from the holistic perspective.

4.3.9 Further work on the appropriateness of absorption refrigeration versus compression refrigeration will be carried out once detailed requirements are confirmed from any tenant with a refrigeration end use locating to the LG Development.

Impact on GEC of Hot Water to Possible LG Development District Heating System

4.3.10 The peak potential heat demand of 12 MW, with district heating water supply / return temperatures of 95 / 55°C, is achieved using a condensing heat exchanger in the District Heating Distribution House shown in Figure 1 in Appendix B. The condensing heat exchanger is supplied by 2 bara saturated steam extracted from the low pressure superheated steam line via a letdown and de-superheating station. The condensate is returned to the steam cycle at 98°C.

4.3.11 The use of district heating supplied from GEC would reduce the carbon emissions related to the conventional provision of heating to a building. As such, a district heating connection could allow designers of individual buildings to meet their requirements to reduce carbon emissions under Building Regulations Part L, or other planning conditions, more cost effectively than stand alone low and zero carbon energy supplies. Provided connection to a district heating system is taken into account during building designs, it is likely that a district heating network designed to supply the main heat users on site would be economically viable.

4.3.12 The technically viable extraction is shown in Figure 5 in Appendix A and the impact on the power output of GEC would be a reduction of approximately 2.0 MW.

Combined Potential Impact on GEC

4.3.13 If all the potential LG Development heat demands are met by GEC (Process Use 1, Process Use 2 and District Heating), the combined reduction in power output of GEC would be approximately 3.6. MW. The technically viable extractions are shown on the heat and mass balance diagram in Figure 6 in Appendix A. As GECL is committed to CHP, the station's design can be altered such that it can facilitate the provision of approximately 10 MW of steam / heat (greater than the current demand estimate of approximately 3.6 MW).

4.3.14 Whilst there would be a net power output reduction from GEC as a result of the heat extractions, the heat supplied to the potential users may otherwise have been supplied by package boilers. Assuming the package boilers would have been fired on natural gas, then using a typical efficiency of 90% (LHV) the package boilers would have consumed up to approximately 20 MW of gas (LHV). If the heat is supplied by

GEC instead, then assuming that the reduction in electrical power was made up by a CCGT plant that was as efficient as GEC, a reduction of up to approximately 25 000 tonnes per year of CO_2 emissions is achieved.

4.3.15 For security of supply to potential heat customers, provisions for back-up package boilers have been made by GEC. The GEC site plan includes ample space for package boilers capable of exceeding the current potential heat export requirements. If the heat supply to potential users is realised, package boilers will be installed and kept on standby, ready to maintain the heat export should the CCGT plant be out of operation.

4.3.16 As explained in the "Carbon Capture Ready (CCR) Feasibility Study", the proposed GEC is CCR. This would require a supply of steam, which may be extracted from the steam cycle at the power station for use in the carbon capture process. It is considered that the steam supply required for CCR will have no impact on the ability of GEC to supply heat and steam for CHP occupiers of the LG Development. and .

4.3.17 Provision for appropriate back-up steam production equipment (e.g. dedicated auxiliary boilers) has been included in the Section 36 Consent application submitted to DECC in February 2010 (Environmental Statement, Volume 1, Paragraph 1.1.1). Therefore, should a greater demand for heat supply arise in conjunction with the high steam demand for carbon capture equipment, the design of GEC will be able to accommodate this demand.

5 CONCLUSIONS

5.1.1 In February 2010, GECL submitted an application for Consent under Section 36 of the Electricity Act 1989 to the DECC to construct a CCGT Power Plant to be known as GEC.

5.1.2 GEC will be constructed on land within the LG Development. The LG Development, promoted by DP World, is currently in the early stages of construction.

5.1.3 GEC will provide up to 900 megawatts of electrical generation capacity. This will include the provision of up to 150 MW of electricity to the LG Development, which is expected to meet its long-term requirements. Additionally, there is also the possibility for GEC to supply heat in the form of steam or hot water to facilities and / or customers in the vicinity of the site as well as steam requirements for CCS.

5.1.4 In addition to the development of GEC, there are a number of infrastructure connections required. These include:

- A new underground gas line to connect to the National Grid National Transmission System (NTaS);
- A new underground cable / over ground transmission line / combination of both to connect to the High Voltage (HV) National Grid System; and
- Potential connections for future Combined Heat and Power (CHP).

5.1.5 Following submission of the ES, and consultation on the application, further information has been compiled on the potential CHP opportunities that were identified in the CHP Assessment. This information has been used to update the findings of the CHP Assessment, and this update is presented in this document. In addition, this document has presented details concerning the choice of location in response to one Consultee comment. In summary:

- Of all potential development sites considered, the selection of the chosen GEC site is justified following an assessment of its suitability for the main intended purpose of power generation. An additional benefit is the direct supply of up to 150 MW of electricity and the potential to supply heat economically to the LG Development;
- The direct supply of electricity to the LG Development will reduce CO_2 emissions by up to 25 000 tonnes per annum based on reduced transmission and transformer losses;
- There are two potential CHP opportunities related to process use on the LG Development and a potential CHP opportunity related to district heating. These are summarised further below in terms of their impacts on GEC;
- There is no change with regard to the Petroplus CHP Opportunity from that outlined in the CHP Assessment submitted to accompany the Section 36 Consent application in February 2010. Discussions will continue with Petroplus with regard to steam supply; and
- The potential for CHP supply to Basildon Hospital and the Ford Motor Company at Dunton were further evaluated. Further studies on these cases were discontinued due non viability due to technical and economic reasons.

5.1.6 In terms of the impact on GEC due to the potential heat supplies to the LG Development, thermodynamic modelling was undertaken. In summary:

- Supply for Process Use 1 purposes (Product Finishing Works) will be technically viable and is most likely to be economically feasible. A reduction in power output from GEC of up to 700 kW will achieve this;

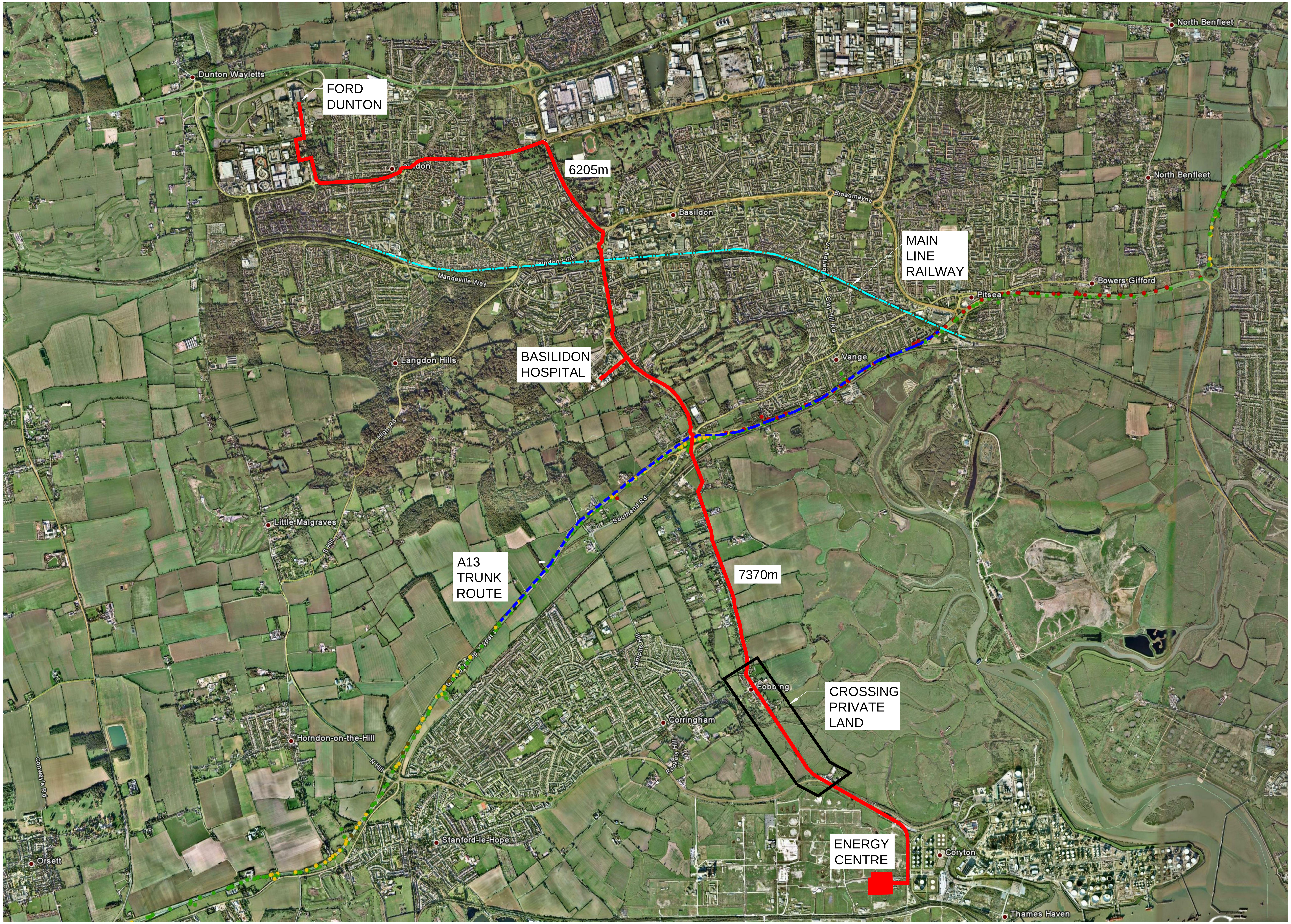
- Supply for Process Use 2 purposes (Absorption Refrigeration Plant) will be technically viable and may be economically feasible. A reduction in power output from GEC of approximately 850 kW will achieve this;
- Supply for district heating purposes in the LG Development will be technically viable and is most likely to be economically feasible. A reduction in the power output from GEC of up to 2.0 MW will achieve this; and
- The combined heat supply for all three above purposes will be technically viable. A total reduction in the power output from GEC of approximately 3.6 MW will achieve these goals and result in a reduction in CO_2 emissions by up to 25 000 tonnes per year compared with supplying the heat by package boilers.

5.1.7 GECL is committed to providing heat. In order to maximise the likelihood and deliverability of heat being taken by future tenants of the London Gateway Business and Logistics Park, GECL will undertake the following:

- Design and then build the station such that it is capable of providing at least 3.6 MW of heat / steam to serve tenants of the London Gateway Business and Logistics Park, this being the current estimate of heat / steam demand;
- Monitor the estimated level of heat usage and amend appropriately as customers of the heat / steam supply (including customers of the London Gateway Business and Logistics Park) are secured up to the point when the design of GEC is finalised. GEC's design can be altered so that it is capable of supplying heat beyond 3.6 MW (up to approximately 10 MW) to accommodate higher demand than currently forecast;
- In conjunction with London Gateway, inform tenants of the Business and Logistics Park of the potential for a heat / steam supply and when appropriate hold discussions with them with the aim of progressing their interest;
- Agree a 'Heat / Steam Delivery Roadmap' with Thurrock Council and TTGDC set out at Appendix C; and
- Encourage and facilitate the use of district heating by committing to: (a) installation and use of heat / steam within the proposed GEC's administration block; (b) assist tenants of the Business and Logistics Park with their assessment of using heat in their business processes (e.g. via the provision of information); (c) enter into discussions on the commercial supply of heat; and (d) with interested tenants, develop a solution to optimise delivery of heat infrastructure (e.g. pipeline connections from GEC to the tenant's site).

5.1.8 GECL will continue to actively progress heat supply discussions with Petroplus. It will also seek other CHP opportunities through regular discussion with Thurrock Council and TTGDC as the development of GEC progresses (e.g. district heating). CHP opportunities will need to be commercially and technically viable. GECL commits to act reasonably in CHP discussions and to establish with Thurrock Council and TTGDC a liaison group to facilitate the utilisation of heat / steam.

APPENDIX A - FIGURES



LEGEND

- DISTRICT HEATING NETWORK
- A13 TRUNK ROUTE
- MAIN LINE RAILWAY

REV.	DETAILS	DRN	CHK	APPR	DATE
A	ISSUED FOR COMMENT	SM	BJG	BJG	02.07.10

CLIENT: GATEWAY ENERGY CHP

PROJECT: GATEWAY ENERGY CENTRE

TITLE: BASILDON HOSPITAL AND FORD DUNTON DH ROUTE

DATE: 01/07/10

SCALE: 1:20,000 @ A1

CAD REF

DRAWN BY

PRODUCED BY

CHECKED

APPROVED

PARSONS BRINCKERHOFF

Energy and Sustainable Solutions - Infrastructure

6 Devonshire Square, London EC2M 4YE, UK
Tel: 44-(0)20-7337-1700 Fax: 44-(0)20-7337-1701

DRAWING NUMBER: 64003A-2.1-M002 | A

00/00/00

FIGURE 2 – TYPICAL HEAT AND MASS BALANCE DIAGRAM FOR A CCGT DESIGN

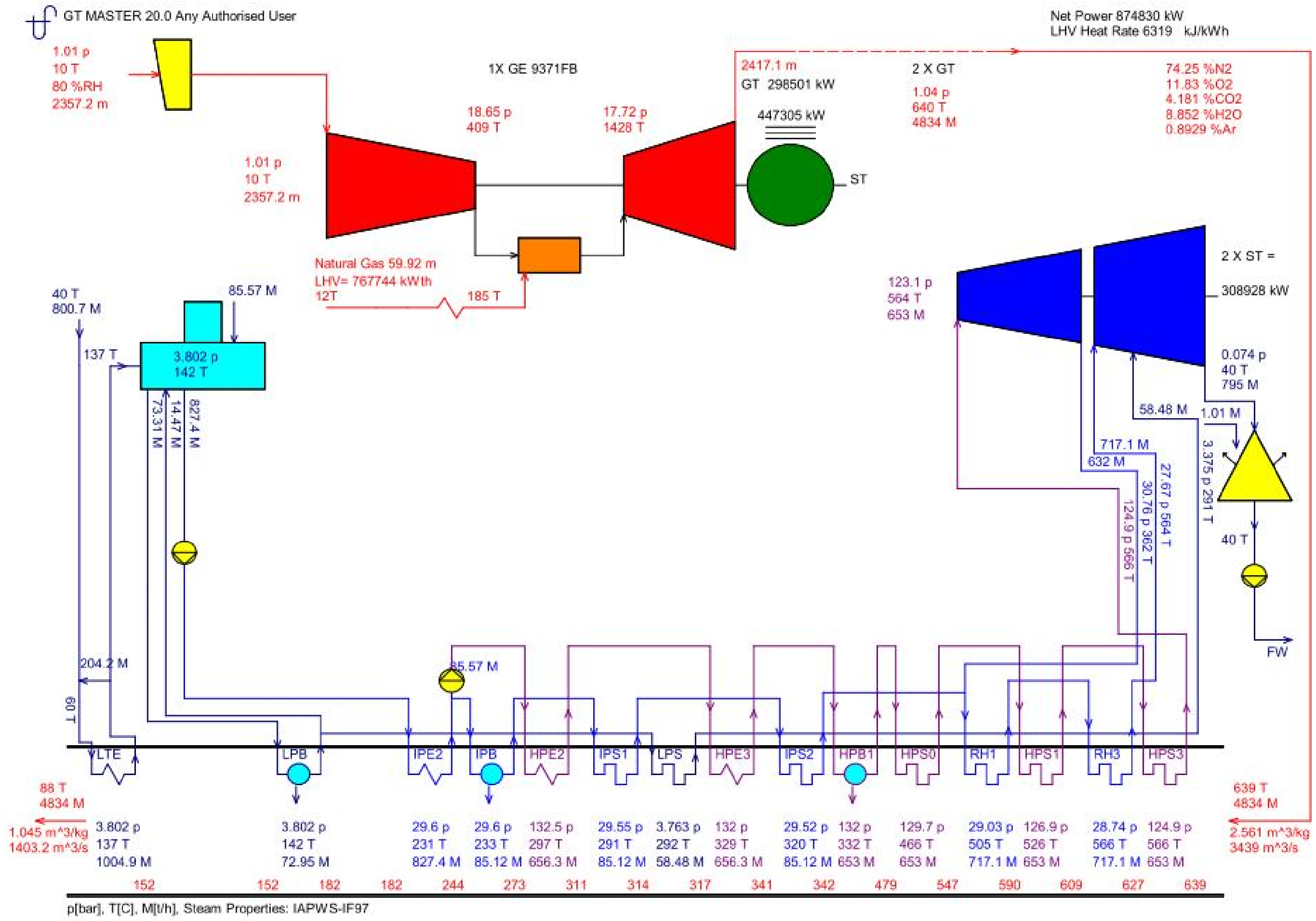


FIGURE 3 - HEAT AND MASS BALANCE DIAGRAM SHOWING IMPACT ON THE POWER OUTPUT OF GEC DUE TO PROCESS USE 1

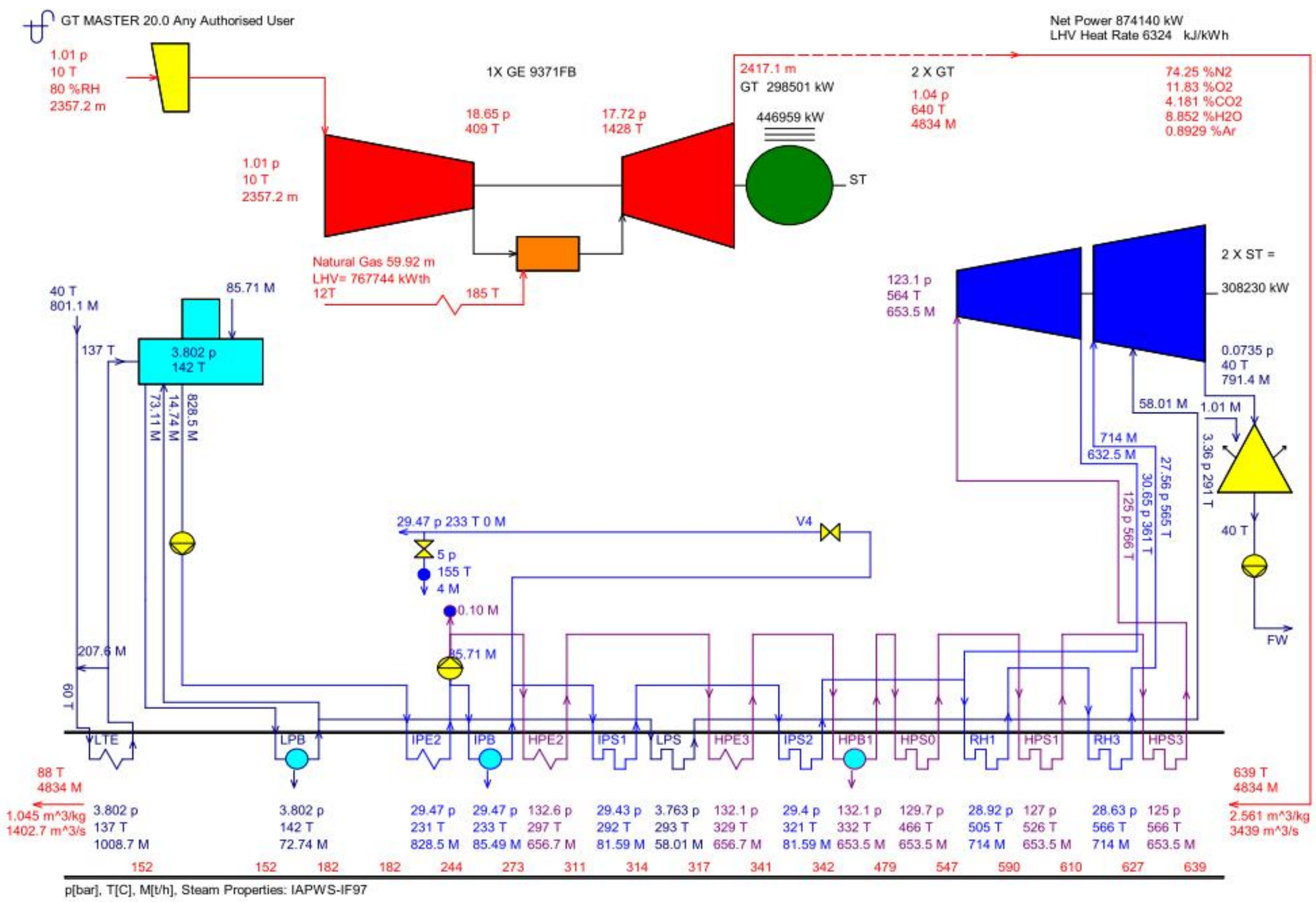


FIGURE 4 - HEAT AND MASS BALANCE DIAGRAM SHOWING IMPACT ON THE POWER OUTPUT OF GEC DUE TO PROCESS USE 2

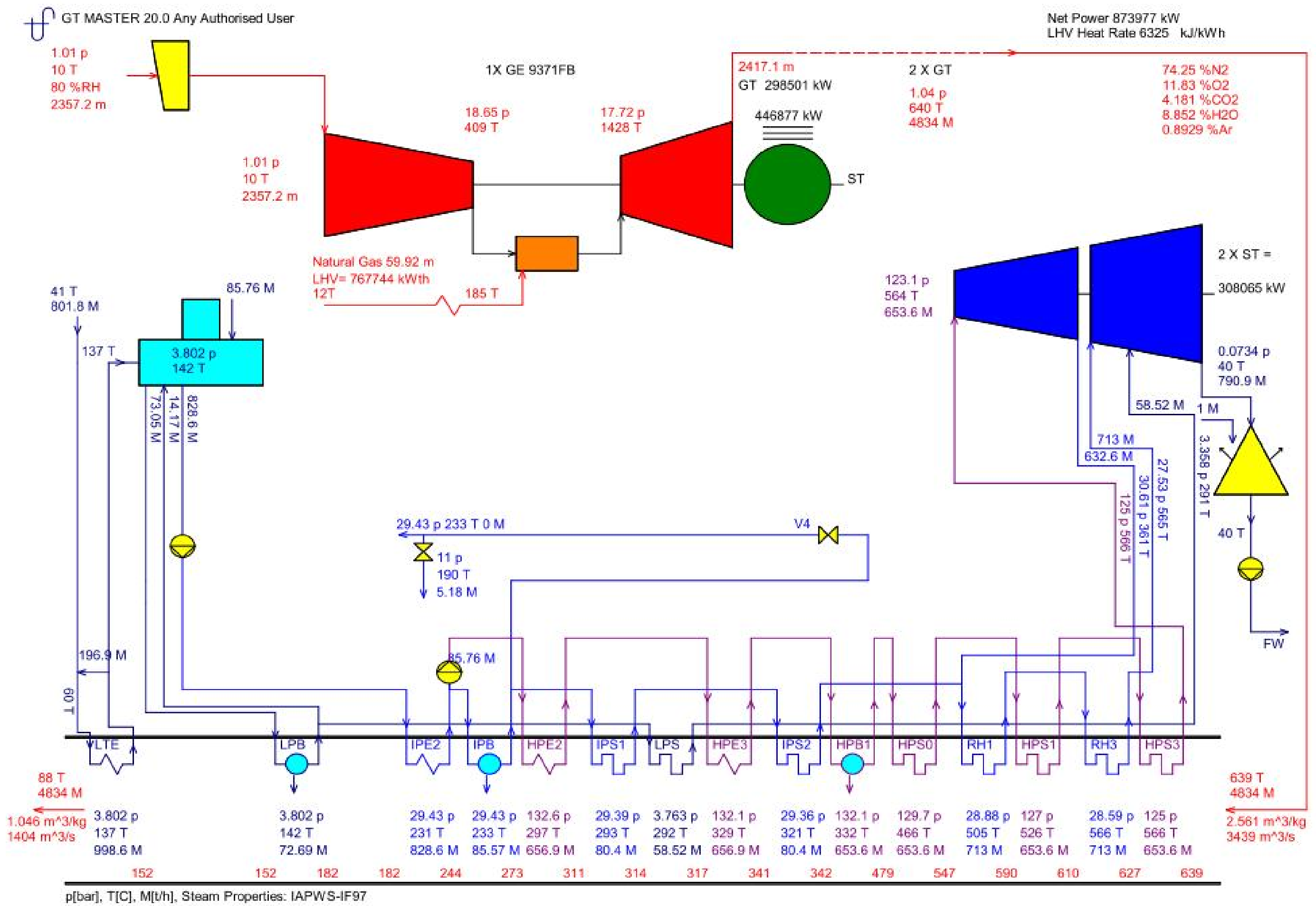


FIGURE 5 - HEAT AND MASS BALANCE DIAGRAM SHOWING IMPACT ON THE POWER OUTPUT OF GEC DUE TO POSSIBLE LG DEVELOPMENT DISTRICT HEATING SCHEME

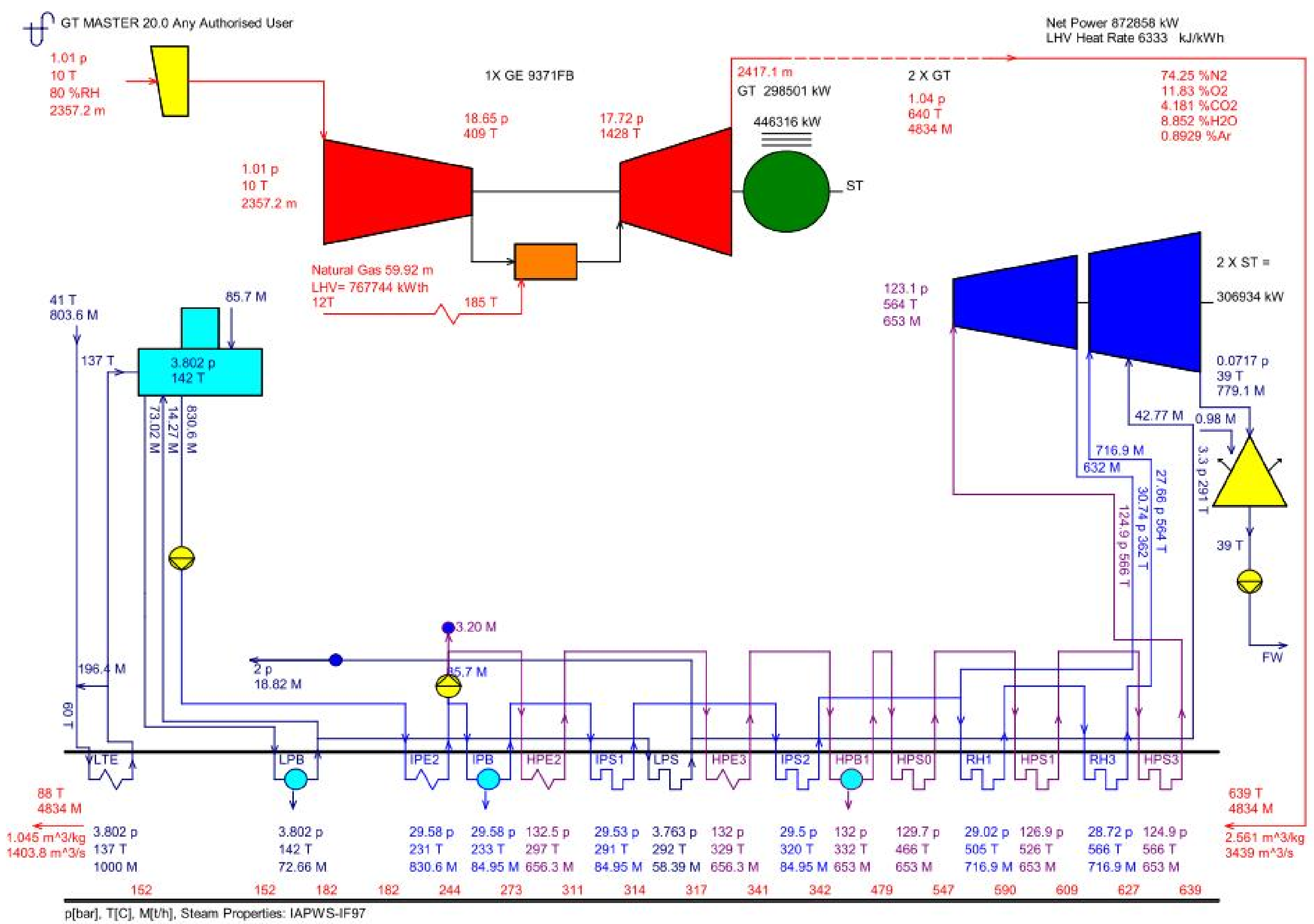
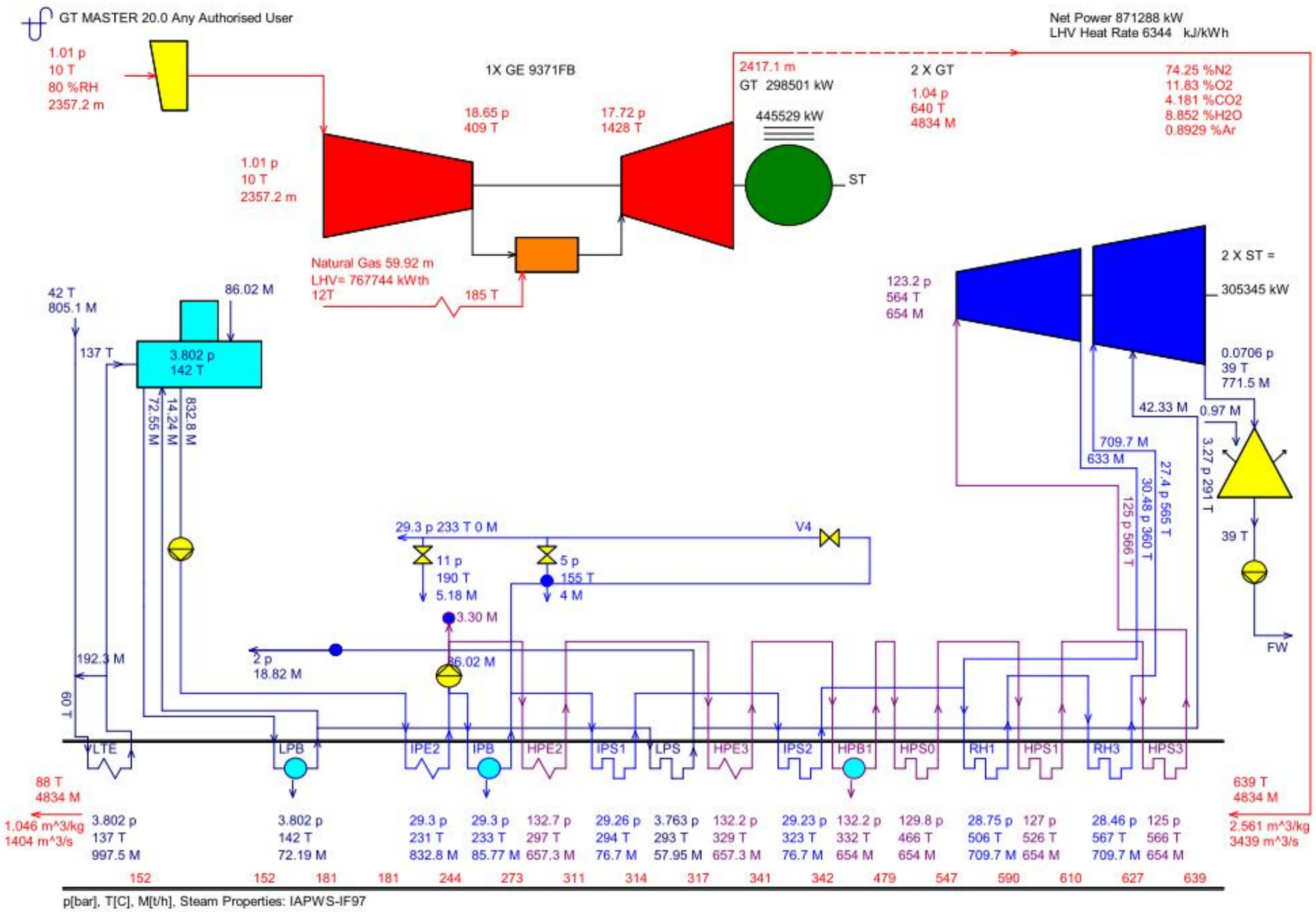


FIGURE 6 - HEAT AND MASS BALANCE DIAGRAM SHOWING IMPACT ON THE POWER OUTPUT OF GEC DUE TO ALL POTENTIAL LG DEVELOPMENT HEAT DEMANDS



APPENDIX B – DISTRICT HEATING

DISTRICT HEATING

District Heating Pipe Systems

District Heating (DH) pipes are normally specified as a bonded system in accordance with BS EN253, in which the carrier pipe, insulation and outer casing are moulded together to form a solid unit.

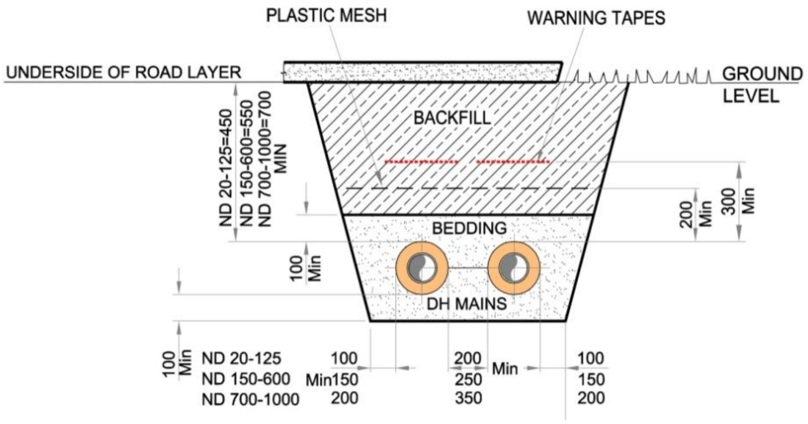
Plastic (PEX) carrier pipes are sometimes used in small community heating networks, but systems with steel carrier pipes are required for larger district heating networks where larger diameter pipes are needed, and higher system pressures and temperatures are required. Steel pipe systems incorporate copper wires in the insulation layer which detect and signal the presence of water following damage to the outer casing or failure of a welded joint in the carrier pipe.

Pre-insulated DH pipe systems are normally supplied in 12 m lengths. The carrier pipes are joined by arc welding or oxy-acetylene welding and the outer PDPE casings and various techniques are employed to maintain the continuity of the thermal insulation layer, the leak detection cables and the outer pipe casing at pipe joints.

DH pipes are designed to be buried directly in the ground such that expansion movements in the network as a result of temperature variations are constrained by friction resulting in axial stresses in the carrier pipes and / or reduced movements.

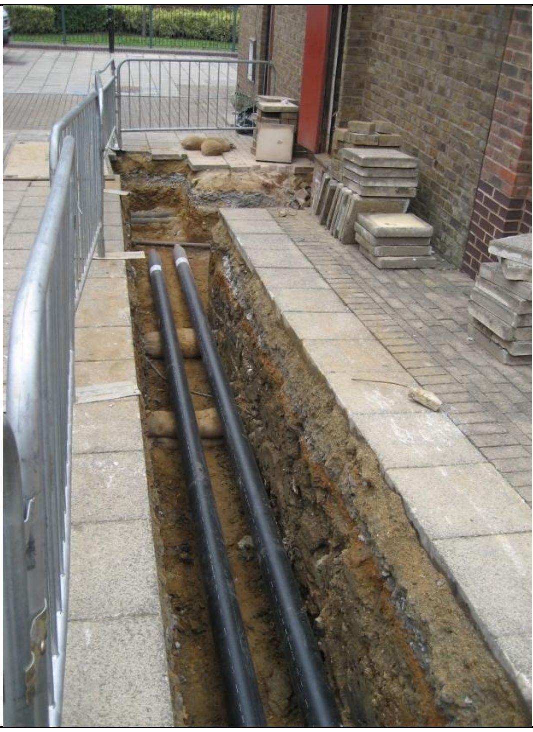
The Inserts below set out an illustration of the normal depths DH networks are usually installed and some photographs of large and small scale district heating pipework installations (please note that the four pipe systems shown are for heating and cooling distribution).

INSERT: ILLUSTRATION OF THE NORMAL DEPTHS DH NETWORKS



TYPICAL TRENCH DETAIL FOR
BURIED PRE-INSULATED PIPES

INSERT: PHOTOGRAPHS OF LARGE AND SMALL SCALE DH PIPEWORK INSTALLATIONS



Potential LG Development DH Pipe System Layout

The layout of any DH pipeline system within the London Gateway Logistics and Business Park would be subject to detailed consideration of the final layout of the LG Development, its requisite infrastructure and the appetite for such a system by each of the individual tenants (which are not yet in place).

For illustrative purposes, it is assumed that there would be two main DH pipeline systems serving the London Gateway Logistics and Business Park (the Park):

- Western DH Route.
  Running from GEC to the western edge of the Park.
- North-Western DH Route.
  Running to the north of GEC, before turning to run to the western edge of the Park.

Both pipeline networks would be wholly within the Park.

Pipe Sizes

The sizing of DH pipes is normally set by modelling to establish the lowest whole life cost taking into account the capital costs and pumping and heat loss costs. For illustration, the pipe sizing within the Park has been estimated using a normally applied rule of thumb that the pressure drop at peak flow should be no more than 100 Pa/m.

The load assessment assumes that all Park warehouses are treated, to control temperature, and the indicative maximum dimensions of a pipe network to serve the Park has been established from this. However it should again be noted that the need for a DH pipe network is subject to detailed consideration of the final layout of the Park and overall LG Development, its requisite infrastructure and the appetite for such a DH system by each of the individual tenants (which are not yet in place).

Based on the above assumptions, it is likely that the pipes serving the western DH route would start as 250 mm nominal bore (NB) from GEC to a point mid way across the Park where they would reduce to 200 mm NB.

The pipes serving the north-western DH route would likely start at 200 mm NB, reducing to 150 mm NB from a point mid way across the Park.

Should the warehouses not have a significant heat load then there would probably be a need for only the western DH route serving warehouse offices and ancillary uses. In this case the pipes would be sized at 200 mm NB throughout.

The typical dimension for individual connections would be 100 mm NB on average, with 32 mm NB for warehouse office connections only.

Pipeline Network Lengths

The Tables below show indicative lengths for the two DH pipeline systems that could serve the London Gateway Logistics and Business Park once constructed.

TABLE 1 – WESTERN DH ROUTE

Description	***Diameter (mm NB)***	***Length (m)***
GEC to Mid Point	250	760
Mid Point to ¾ Point	200	1060
¾ Point to End	150	340
Individual Unit Connections	100	1200

TABLE 2 – NORTH-WESTERN DH ROUTE – MAXIMUM LOAD

Description	***Diameter (mm NB)***	***Length (m)***
GEC to Mid Point	200	990
Mid Point to End	150	880
Individual Unit Connections	100	1000

APPENDIX C – SUGGESTED HEAT / STEAM DELIVERY ROADMAP

APPENDIX C - SUGGESTED HEAT / STEAM DELIVERY ROADMAP

The following 'Heat / Steam Delivery Roadmap' will be refined through discussions with Thurrock Council and TTGDC.

LG enters into an agreement with a tenant	• LG has confirmed that it will inform its tenants, in conjunction with GEC, of the heat / steam supply opportunity
↓ GECL writes to the tenant and phones them to offer heat / steam supply plus meeting	• Letter from GECL to tenants to set out key benefits of heat / steam to tenant. The letter will be supported by a brief report which will provide the tenant with potential cost and CO2 savings • The letter will also contain suggestions as to the process for progressing the supply opportunity • GEC copies Thurrock Council on letter
↓ GECL to assist parties with assessing the benefits of heat / steam supply	• GECL to provide information to and respond queries from potential heat / supply customers • GECL to meet with tenants to explore the opportunity and offer to hold a workshop • GECL to keep Thurrock Council abreast of progress
↓ GECL to agree contracts with tenants for heat / steam supply	• GECL to agree head of terms with the tenant • To negotiate and agree heat / steam supply contracts, which will require to be commercially and technically viable

- GECL is to submit an annual update report to Thurrock Council setting out progress on delivering CHP
- The first report is to be submitted to Thurrock Council on the first anniversary of the Section 36 award