Riverside Energy Park

Environmental Statement Technical Appendices

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Appendices

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1 Introduction

1.1.1 This report, prepared by Peter Brett Associates LLP (PBA), presents a qualitative greenhouse gas (GHG) emissions assessment for Riverside Energy Park (REP). The greenhouse gas emission boundaries for this assessment considers Scope 1 (direct) and Scope 2 (energy consumption) emissions, as defined within PAS 2050 and in **Chapter 3** below. This approach has been agreed with the Planning Inspectorate through the Scoping Opinion (case reference – EN010093), issued in January 2018.

1.1.2 This report has also been prepared in accordance with the Institute of Environmental Management and Assessment (IEMA) guidance document '*EIA Guidance on assessing greenhouse gas emissions and significance (2017)*.'

1.2 Site Location and Context

1.2.1 The REP site is located in Belvedere, in the London Borough of Bexley (LBB), in an area bounded to the north by the River Thames and the adjacent Thames Path long distance trail.

1.2.2 The REP site includes the existing jetty extending out into the River Thames but excludes the existing Riverside Resource Recovery Facility (RRRF) main building itself. The majority of the REP site is used for private vehicle circulation areas, the jetty access ramp, staff and visitor parking, open container storage, contractor maintenance, an electrical substation and associated landscape/habitat areas.

1.2.3 The proposed Electrical Connection route runs southwards from the REP site towards the existing Littlebrook substation, in Dartford.

1.3 The Proposed Development

1.3.1 The primary components of REP are:

- An Energy Recovery Facility (ERF);
- An Anaerobic Digestion facility;
- A Solar Photovoltaic Installation;
- Battery Storage; and
- Enabling infrastructure for Combined Heat and Power (CHP) to provide for a potential future local district heating (DH) pipe connection at the site boundary.

1.3.2 The REP site would also incorporate other infrastructure required to operate the facility including, but not limited to, ramps, parking, stores for supplies and office/welfare provision. REP would also be connected to the electricity

distribution network via a new 132 kilovolt (kV) underground electricity cable connection.

1.3.3 A full description of REP can be found within Chapter 3 of the Environmental Statement, submitted as part of the planning application.

1.4 Report Structure

1.4.1 The report is structured as follows:

- **Section 2**: Policy Context – this section presents the relevant national and local regulation and policy;
- **Section 3**: Methodology – this section outlines the method adopted in this report;
- **Section 4**: Potential Effects – this section qualitatively assesses the GHG emissions associated with REP during construction and operation; and
- **Section 5**: Summary.

2 Policy Context

2.1.1 This section outlines the key legislation and policy in relation to REP and GHG emissions. A full policy review has been undertaken within the ES.

2.2 UK Legislation, National and Local Policy

2.2.1 Relevant UK legislation, national and local policy are outlined below:

- Climate Change Act 2008;
- National Planning Policy Framework (NPPF) 2018;
- The London Plan 2016;
- London Environment Strategy (LEnvS) 2018;
- Bexley Core Strategy (2012);
- Bexley Energy Masterplan (2016);
- Dartford Borough Council Core Strategy (2011); and
- Dartford Borough Council Development Policies Plan and Policies Map (2017).

2.3 Guidance

2.3.1 IEMA has published the guidance document *'EIA Guidance on assessing greenhouse gas emission and significance*' (2017) which places the significance of GHG emissions within the context of national and sector emissions. The document also sets out proportionality of undertaking climate change assessments when considering that context.

3 Method

3.1 Introduction

3.1.1 There is no nationally adopted method for assessing GHG emissions within EIA and therefore the assessment approach utilised in this report draws upon guidance from IEMA. IEMA guidance on the assessment of the impact on climate change, within the context of an EIA, emphasises the need for proportionality in the context of national, sector and local GHG emissions.

3.1.2 The guidance recognises that qualitative assessments are acceptable, particularly where mitigation measures are agreed early on in the design stage. These are outlined within the assessment of potential effects (**Chapter 4**).

3.1.3 Emissions associated with the Proposed Development will be minimal against the national, sector and local emissions inventories, and therefore a qualitative approach has been adopted for this assessment. For the purposes of this assessment emission boundaries (i.e. scope of the emissions) have been adopted that align with the Greenhouse Gas Protocol (PAS 2050) methodology[1].

3.2 Scope of Assessment

3.2.1 The GHG Protocol categorises direct and indirect emissions into three broad scopes:

- **Scope 1**: all direct GHG emissions;
- **Scope 2**: indirect GHG emissions from consumption of purchased electricity, heat or steam; and
- **Scope 3**: other indirect emissions, such as the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, electricity-related activities not covered in Scope 2, outsourced activities, waste disposal, etc.

3.2.2 The assessment qualitatively considers Scope 1 Emissions from sources that are owned and controlled by REP. Direct emissions considered in this report include:

- Emissions resulting from the combustion of fuels in the applicants owned/controlled vehicles including for the transportation of materials, products, waste and employees;
- Emissions associated with land use change (direct from soils); and

[1] http://ghgprotocol.org/about-us

- Emissions resulting from combustion of fuels in stationary sources such as boilers, furnaces or turbines for the generation of electricity, heat or steam.

3.2.3 The assessment also considers the emissions relating to energy consumed by REP during its construction and operation (Scope 2 Emissions). REP would require energy consumption to power the ERF, as well as office and welfare facilities. REP will however, utilise solar PV, battery storage and parasitic load from the ERF and will therefore be lower carbon than traditional industrial facilities. This is explained further in the operation section below.

3.2.4 All other indirect emissions (Scope 3 emissions), emissions that are a consequence of the activities of REP but occur at sources owned or controlled by another entity, such as embodied carbon in purchased building materials and employee commuting, have been scoped out of this assessment as it is not considered proportionate to REP within the context of the EIA and the sources are not owned by the applicant.

4 Potential Effects

4.1 Scope 1 Direct Emissions

Construction and Commissioning

4.1.1 The construction activities for REP are expected to take approximately 36 months to complete, while construction of the electrical connection is expected to take approximately 24 months. Once construction is complete, a 12-15-month commissioning period will commence.

4.1.2 The main source of direct GHG emissions during construction will relate to the transportation of building materials and use of construction equipment. A Code of Construction Practice (CoCP) will be agreed prior to the commencement of construction and will set out measures to manage construction works, including measures in relation to the control of construction traffic as part of a Construction Traffic Management Plan. Materials should be responsibly sourced with the use of recycled and locally sourced materials where appropriate to reduce GHG emissions associated with transportation of building materials.

4.1.3 The site consists mainly of hardstanding areas, road infrastructure, fencing, and ancillary storage which are in current use. The Electrical Connection route options include a range of highways, with some short areas potentially required outside of the carriageway, and one small section, approximately 0.4 km, crossing part of Dartford Marsh. REP will therefore make use of brownfield land and will not cause a significant reduction of land carbon sink capacity through construction and subsequent land use change. A CoCP will include mitigation measures to further reduce effects of land use change, including limiting vegetation clearance to the minimum area necessary for construction works and replacement of vegetation which will be removed to accommodate the Electrical Connection.

4.1.4 Commissioning activities include cold and hot commissioning and performance tests of the ERF and Anaerobic Digestion plant to ensure maximum efficiency and reliability is achieved in the operation of the plant. These activities will be less intense than the operation phase and scope 1 emissions are therefore not expected to be more than those assessed in the section below.

Operation

4.1.5 The proposed ERF and Anaerobic Digestion facility will enable the generation of electricity and biogas from various waste types. A carbon emission assessment has been completed for the existing Riverside Resource Recovery Facility (RRRF) adjacent to REP, which was reviewed and ratified by the Carbon Trust on 1st March 2017[2]. The study showed that RRRF provides a carbon saving of 212kg CO_2 per tonne of waste when compared to the counterfactual

[2] http://www.coryenergy.com/carbon-efficiency/less-carbon/

end waste disposal route of landfill. REP would have a similar capacity to the existing RRRF, and therefore a similar carbon saving could be expected.

4.1.6 It is proposed to deliver the majority of waste to REP by barge from Waste Transfer Stations (WTS) along the River Thames and the remainder would be delivered by road. Waterborne freight is relatively energy efficient when compared to Heavy Goods Vehicles (HGV)[3], and therefore reduces GHG emissions associated with the operation of REP.

Summary

4.1.7 Based on the above, scope 1 GHG emissions from the construction of REP are expected to be minimal against national, local and sector emissions with the implementation of a CoCP. During operation, REP is expected to contribute positively to waste related emissions from the national and local emissions inventory through the use of recovered energy from waste.

4.2 Scope 2 Indirect Emissions from Purchased Energy Consumption

Construction and Commissioning

4.2.1 During construction, temporary construction welfare and office facilities will be provided on site. Energy will be required to power these facilities however the facilities will utilise energy efficient equipment, such as energy efficient lighting, to reduce the energy demand. The expected purchased energy to operate the temporary facilities will therefore be minor compared to national, local and sector scope 2 emissions.

Operation

4.2.2 REP will utilise renewable energy from solar photovoltaic (PV) on the Main REP Building roof areas. Initial studies demonstrate that high specification PV modules would be capable of generating up to c. 1 Megawatts (MWe) for the anticipated building form. Inclusion of solar PV generation would increase renewable energy generated from REP which could also be used to offset power required to run the facility as a whole. The use of 1 MW PV could provide a carbon saving of 527.34 kgCO_2/MWh (see Appendix A for PV calculations).

4.2.3 The proposed Battery Storage would store energy produced from the ERF, solar PV installation and the Anaerobic Digestion facility during low power demand to be used during times of peak electrical demand. This would increase the operational performance and reliability of REP and provide an enhanced balance of electrical supply and demand. Furthermore, storing energy for use in peak demand times relieves pressure on the grid and avoids the use of more carbon intensive energy generation methods used to meet peak demand. The provision of battery storage will therefore make a positive contribution to scope 2 national, local and waste sector emissions during operation.

[3] Guidelines for Measuring and Managing CO2 Emission from Freight Transport Operations (Cefic and ECTA 2011)

Summary

4.2.4 Scope 2 GHG emissions from the construction of REP are likely to be minor compared to national, local and sector inventories due to the use of energy efficiency measures that could be implemented with temporary construction facilities. During operation, the use of renewable energy will reduce the amount of purchased energy required to operate REP and the provision of battery storage will contribute to reducing grid reliance on more carbon intensive energy generation during peak energy demand.

5 Conclusion

5.1.1 A qualitative GHG emission assessment has been undertaken in line with IEMA guidance and National and Local policy. The main sources of GHG emissions as a result of construction and operation of REP are expected to be as follows:

Scope 1 (direct emissions)

- **Construction and Commissioning**:
  - Transportation of building materials and use of construction equipment;
  - Land use changes mainly associated with vegetation removal in an area within Dartford Marsh to facilitate the electrical connection;
  - Activities required for the commissioning of REP;
- **Operation**:
  - Operation of the ERF and Anaerobic Digestion facility which will reduce waste sent to landfill;
  - Transportation of waste to REP;

Scope 2 (energy consumption)

- **Construction and Commissioning**:
  - Energy required for construction welfare and office facilities;
- **Operation**:
  - Energy required to operate the ERF and Anaerobic Digestion facility, with utilisation of renewable energy from solar photovoltaic panels and provision of battery storage.

5.1.2 It is recommended that REP utilises a CoCP to set out mitigation measures such as responsibly sourcing local material, limiting vegetation clearance to the minimum area necessary and replacing any vegetation lost as a result of construction works.

5.1.3 The operation of REP is expected to contribute positively to the national, local and waste sector emissions inventory through the use of recovered energy from waste, renewable energy generation and energy storage.

Appendix A PV Carbon Calculations

The predicted carbon savings for solar PV is based on the performance of gird-connected PV at the site location, shown in Table A.1. Table A.2 shows the calculation for the proposed 1MW PV provision within REP.

Table A.1 Site Specific Performance of Grid-Connected PV for 1 KWp

Fixed system: inclination=35°, orientation=0°				
Month	E_d	E_m	H_d	H_m
Jan	1.14	35.3	1.37	42.4
Feb	1.75	48.9	2.13	59.7
Mar	2.91	90.3	3.64	113
Apr	3.89	117	5.02	151
May	4.01	124	5.29	164
Jun	4.16	125	5.55	166
Jul	4.14	128	5.56	173
Aug	3.63	113	4.85	150
Sep	3.19	95.7	4.16	125
Oct	2.19	67.9	2.79	86.4
Nov	1.46	43.9	1.79	53.8
Dec	0.98	30.4	1.18	36.7
Yearly average	**2.79**	**84.9**	**3.62**	**110**
Total for year		**1020**		**1320**

Table A.2 Total CO_2 Savings for REP PV Provision

Annual average kg emissions reduction per kw PV (0.517 kg CO_2 / kWh)	Proposed REP PV provision	Total CO_2 saving kg CO2 / MWh
1020 x 0.517 = 527.34	1MW	527.34