Indaver Rivenhall IWMF DCO

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ES CHAPTER 7: CLIMATE CHANGE

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Indaver Rivenhall Ltd

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7 Climate Change and Greenhouse Gases

7.1 Introduction

7.1.1 This chapter of the ES presents an assessment of the likely significant effects of the Proposed Development on climate change. Mitigation measures are identified, where appropriate, to avoid, reduce or offset any significant adverse effects identified and/or enhance likely beneficial effects. The nature and significance of the likely residual effects are reported.

Competence

7.1.2 This assessment was prepared by Stephen Othen and reviewed by Rosalind Flavell of Fichtner Consulting Engineers Ltd. Stephen (MA MEng CEng MIChemE) is a chartered engineer and member of the Institute of Chemical Engineers, with 25 years of professional experience including undertaking carbon and climate change assessments for EfW plant facilities. Rosalind (CEnv CSci MIAQM MIEnvSc PIEMA) has an MSc in Applied Meteorology and has over fifteen years of experience in undertaking air quality and carbon and climate assessments for planning and permitting purposes including for EfW plant facilities.

7.2 Legislation, Planning Policy and Guidance

International Agreements

7.2.1 The following international agreements provide the overarching basis for reducing impacts on climate change:

- Kyoto Protocol[1] - An international agreement linked to the United Nations Framework Convention on Climate Change ('UNFCCC'), which commits its Parties by setting internationally binding emission reduction targets. Under Article 4 of the Kyoto Protocol, the EU created an Effort Sharing Regulation that requires the setting of individual binding GHG emission reduction targets for each of its Member States. The current Effort Sharing Decision ('ESD') commits the UK to a 37% reduction in GHG emissions for the period 2021 to 2030.
- Paris Agreement[2] - At the Conference of the Parties ('CoP') 21 in 2015, an agreement ('Paris Agreement') was reached under the UNFCCC and came into force in November 2016. It pledges long-term temperature goals to keep the increase in global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the increase to 1.5°C.

UK Legislative Context

7.2.2 The following legislation is relevant to the Proposed Development:

- Climate Change Act 2008[3] - this sets out the UK Government's commitment to reduce greenhouse gas (GHG) emissions in the UK to 50% of 1990 levels by 2025 and to 80% by 2050;

- The Climate Change Act 2008 (2050 Target Amendment) Order 2019[4] - this sets a binding target of "Net Zero by 2050"; and
- The Carbon Budget Orders 2009[5], 2011[6], 2016[7] and 2021[8] - these set out the first six carbon budgets. The latest Order covers the period 2033-2037.

Planning Policy Context

National

7.2.3 The following national planning policy is relevant to the Proposed Development:

- National Planning Policy Framework[9] - this sets out the Government's planning policies for England and how these are expected to be applied. Policies of relevance to climate change include those achieving sustainable development and meeting the challenge of moving to a low carbon economy. The NPPF states that the planning systems should support this transition by supporting low carbon energy and associated infrastructure.
- Overarching National Policy Statement (NPS) for Energy (EN-1)[10] - sets out national policy for energy infrastructure, including all energy generation plants with a capacity greater than 50 MW and emphasises the need for new low carbon generation.
- NPS for Renewable Energy Infrastructure (EN-3)[11] - sets out national policy for renewable energy infrastructure, including waste combustion.
- Draft: Overarching NPS for Energy (EN-1)[12] - this was first released in September 2021 for consultation, with a revised draft released in March 2023, and now includes a specific section on greenhouse gas emissions.
- Draft: National Policy Statement for Renewable Energy Infrastructure (EN-3)[13] - released at the same time as the draft NPS EN-1, this emphasises the importance of an increase in low carbon electricity generation, with most of this likely to come from renewables, including biomass and EfW.

Regional

7.2.4 The following regional planning policy is relevant to the Proposed Development:

- Essex County Council & Southend-on-Sea Borough Council Waste Local Plan[14] - this is part of the Development Plan for the Site and allocates it for waste management development in Policy 3. Appendix 3 of the Waste Local Plan provides development principles.

7.2.5 The Essex Climate Action Plan[15] was published in November 2022, following work by the Essex Climate Action Commission. It includes a broad range of commitments by Essex County Council to assist with delivering net zero across the county. For waste, the primary commitment is for the Essex County, Borough and District Councils to develop a new Joint Municipal Waste Management Strategy; work is underway on this Strategy.

Local

7.2.6 The following local planning policy is relevant to the Proposed Development:

- The Braintree Local Plan 2033[16] – this contains 2 sections; Section 1 is a strategic plan for North Essex and Section 2 is specific to Braintree District. They contain planning policies that are relevant to all development in the District, specifically for this chapter Policy LPP 71.

7.2.7 The Braintree Climate Change Initial Action Plan September 2021 - March 2023[17] was adopted in September 2021. This sets the foundations for delivery of the objectives set out in the Climate Change Strategy.

Guidance

7.2.8 The following guidance is relevant to the Proposed Development:

- IEMA's Assessing Greenhouse Gas Emissions and Evaluating their Significance'[18] ('IEMA Guidance') - this sets out areas for consideration at all stages of the assessment to assist EIA practitioners in taking an informed approached to the treatment of GHG emissions within an EIA. The IEMA Guidance mentions the legally binding GHG reduction targets and states that an EIA must give due consideration to how a project will contribute to the achievement of these targets. The IEMA Guidance also refers to the Greenhouse Gas Protocol suite of documents[19].
- Department for Business, Energy & Industrial Strategy's ('BEIS') 'Green Book supplementary guidance - this provides a valuation of energy use and greenhouse gas emissions for appraisal'[20].

7.3 Consultation

EIA Scoping Study

7.3.1 A request for a Scoping Opinion was submitted by the Applicant to the Planning Inspectorate on 25th April 2023 (**ES Volume 2, Appendix 5.1: EIA Scoping Report (Doc Ref. 6.2)**). An EIA Scoping Report accompanied the request (Appendix 5.1). A Scoping Opinion was issued by the Planning Inspectorate on 6th June 2023 (**ES Volume 2, Appendix 5.2: Planning Inspectorate Scoping Opinion (Doc Ref. 6.2)**) which included comments from statutory consultees. Table 7.1 summarises key comments raised by consultees of relevance to this assessment during the EIA Scoping study and how the assessment responds to them.

Table 7.1: EIA Scoping Response Summary

Consultee and Comment	Response
Planning Inspectorate (6th June 2023)	
The scoping report states that the assessment will use the Institute of Environmental Management and Assessment (IEMA) guidance: Assessing Greenhouse Gas Emissions and Evaluating their Significance (2022); and that this guidance suggests a threshold of 5% of the budget is used as an indicative threshold for which carbon impacts above this level are likely to be significant, but also states that *'any GHG emissions or reductions from a*	The IEMA threshold has been applied. This is addressed in section 7.6 of this chapter.

Consultee and Comment	Response
project might be considered to be significant'. The ES should confirm if the suggested 5% threshold has been applied for the purposes of the assessment.	

PEI Report Consultation

7.3.2 Responses to the PEI Report which raised issues of relevance to this assessment were received from Essex County Council (ECC) and Braintree District Council (BDC). These comments are summarised in Table 7.2, with a response as to how they have been addressed in this ES chapter. Full details on the PEI Consultation is provided in **ES Volume 2, Appendix 5.4: Schedule of Statutory Consultee Comments and Responses (Doc Ref. 6.2)**.

Table 7.2: PEI Report Response Summary

Consultee and Comment	Response
ECC (23rd August 2023)	
ECC is committed to taking action on climate change and as part of this supports proposals that seek to increase the amount of renewable energy generated in Essex and reduce carbon emissions from the electricity grid subject to other planning considerations such as landscape and visual impact and impact on local communities, provided there are no significant adverse environmental impacts that cannot be managed and/or mitigated.	The Proposed Development would increase the amount of renewable energy generated in Essex and so reduce carbon emissions from the electricity grid.
[The PEIR] omits to mention is that ECC has set up the Essex Climate Action Commission to advise [ECC] about tackling climate change. It was launched in May 2020 for an initial term of two years and has since been extended for a further three years. The commission will run until 2025. The recommendations of the commission were set out in the commission's report "Net Zero: Making Essex Carbon Neutral report", published in July 2021. The recommendations form the basis of ECC's Climate Action Plan produced in November 2021. The applicant is requested to both make reference to the as published Essex Climate Action Plan, and to comment on the scheme's implications for the same.	The Action Plan is now referenced in this ES chapter.
ECC internally were unable to provide technical comments on Climate Change and GHG and therefore have relied upon those gathered by Braintree District Council.	See responses below.
BDC (22nd August 2023)	

Consultee and Comment	Response
In terms of comments on the PEIR, Braintree District Council is of the opinion that whilst the documentation states that there will be no increase in direct greenhouse gas emissions from the facility, this statement could be misleading (Para 7.1 to 7.4 PEIR Non-Technical Summary). It doesn't cite the scope 1, scope 2 or scope 3 emissions of the plant despite the fact it will be overall positive from a carbon emissions point of view.	Paragraph 7.4.19 of the main PEI Report explains why there will be no increase in direct greenhouse gas emissions so the Applicant does not consider that the statement in the non-technical summary is or could be misleading. References to scope 1, 2 and 3 emissions have now been added into this ES chapter for clarity.
At paragraph 7.3 it is suggested that it should state that carbon emissions shall be recorded and published and offset against the positive carbon impact for the environment and that these would be nominal in relative to the positive effects of the site upon carbon emissions.	The DCO will not change the carbon output of the Consented Scheme. Therefore, carbon monitoring of the Proposed Development would be unable to illustrate the positive effects, as this is derived from the displacement of energy from the grid.

Non-Statutory Consultation

7.3.3 Table 7.3 provides a summary of other non-statutory consultation that has been carried out with stakeholders throughout the pre-application process.

Table 7.3: Non-Statutory Consultation Summary

Consultee and Comment	Response
ECC and BDC (18th October 2023)	
BDC requested that the ES chapter reference the BDC Climate Change Strategy.	The BDC Climate Change Strategy and Action Plan are now referenced in the ES chapter.
ECC stated that it would be helpful for the ES Chapter to note the operational outputs of the IWMF.	This chapter assesses the potential effects of the DCO, which does not affect the operational outputs of the IWMF. The scope of the ES does not consider potential effects that are outside of the scope of the Proposed Development, i.e., the megawatt uplift displacing energy derived from the grid, as confirmed through the Scoping Opinion.
ECC queried if the additional output requires additional input.	It is confirmed that the additional energy output does not require additional input [to the EfW plant]. The DCO only involves a mechanical change that increases efficiency of the plant. There would be no increase in

Consultee and Comment	Response
	carbon or other emissions as a result of the DCO.

7.4 Assessment Methodology

Summary of Assessment Scope

7.4.1 The scope of the assessment within this chapter is limited to the following assessment of effects:

- change in direct and indirect emissions of greenhouse gas emissions; and
- change in displacement of greenhouse gas emissions from other forms of power generation.

Non-Significant Effects

7.4.2 All other climate change effects were agreed to be scoped out of further assessment within this ES as agreed by the Planning Inspectorate within the Scoping Opinion (**ES Volume 2, Appendix 5.2: Planning Inspectorate Scoping Opinion (Doc Ref. 6.2)**). Specifically, the Proposed Development will have no effect on the resilience and vulnerability of the Consented Scheme to climate change effects and has been scoped out of the ES.

Study Area

7.4.3 GHG emissions have a global impact, rather than a national or local impact. Therefore, the GHG assessment considered the impact of the Proposed Development on net global emissions, including the displacement of other power generation plants.

7.4.4 wThe GHG Protocol categorises GHG emissions as scope 1, scope 2 and scope 3.

- Scope 1 emissions: released directly by the entity being assessed, e.g., from combustion of fuel at an installation;
- Scope 2 emissions: caused indirectly by consumption of imported energy, e.g., from generating electricity supplied through the national grid to an installation; and
- Scope 3 emissions: caused indirectly in the wider supply chain, e.g., in the upstream extraction, processing and transport of materials consumed or the downstream disposal of waste products from an installation.

7.4.5 The Proposed Development will only affect the proposed EfW plant of the Consented Scheme and will allow it to generate additional electricity without changing the quantity of waste which is received. Therefore, there will be no changes to scope 3 emissions and the assessment only considered direct and indirect emissions associated with the EfW plant.

Establishing Baseline Scenarios

7.4.6 The Site is currently a formerly excavated quarry, with enabling and construction works underway associated with the Consented Scheme. Carbon emissions from

these construction works are expected to be minimal and a meaningful comparison to the existing baseline conditions cannot be undertaken.

7.4.7 The baseline for the GHG assessment is the 2025 Future Baseline Scenario ('Future Baseline') (see paragraph 6.3.5). This is defined as the future date when the EfW plant in the Consented Scheme is constructed and operational.

7.4.8 The information required to define the baseline was gathered from the planning applications for the Consented Scheme and from design information provided by the Engineering, Procurement and Construction ('EPC') contractor Hitachi Zosen Inova ('HZI').

7.4.9 Any additional power generated would reduce the need for power to be generated elsewhere in the UK. In the case of an EfW plant, such as the part of the Consented Scheme affected by the Proposed Development, the displaced electricity would be the marginal source which is currently gas-fired power stations. DEFRA's 'Energy from Waste – A Guide to the Debate 2014'[21] states that, *'A gas fired power station (Combined Cycle Gas Turbine – CCGT) is a reasonable comparator as this is the most likely technology if you wanted to build a new power station today'* (footnote 29, page 21). Therefore, the assessment of grid offset uses the current marginal technology (i.e. CCGT) as a comparator. The displacement factor used is 0.371t CO_2e/MWh, which is taken from the DEFRA publication "Fuel Mix Disclosure Table – 01/04/2022 - 31/03/3023"[22].

7.4.10 It is considered that the operation of an EfW plant will have little or no effect on how nuclear, wind or solar plants operate when taking into account market realities, such as the phase-out of old nuclear plants and the planned construction of new plants, and the subsidies often associated with the development of wind and solar plants.

7.4.11 Current energy strategy uses nuclear power stations to operate as baseload stations run with relatively constant output over a daily and annual basis, with limited ability to ramp up and down in capacity to accommodate fluctuations in demand. Power supplied from existing nuclear power stations is relatively low in marginal cost and has the benefit of extremely low carbon dioxide emissions. Wind and solar plants also have very low marginal operating costs and are supported by subsidies in many cases. This means that they will run when there is sufficient wind or sun, and that this operation will be unaffected by the Proposed Development.

7.4.12 CCGTs are the primary flexible electricity source. Since wind and solar are intermittent, with the electricity supplied varying from essentially zero (on still nights) to peak generations of 19.6 GW (UK wind generation record, February 2022) and 9.7 GW (UK solar generation record, April 2020) on particularly windy or sunny days, CCGTs supply a variable amount of power depending on demand. However, there are always some CCGTs running to provide 'baseload' power to the grid.

7.4.13 Gas engines, diesel engines and open cycle gas turbines also make a small contribution to the grid. These are mainly used to provide balancing services and to balance intermittent supplies. As they are more carbon intensive than CCGTs, it is more conservative to ignore these in a GHG assessment.

7.4.14 In addition, recent bidding of EfW plants into the capacity market means that they are competing primarily with CCGTs, gas engines and diesel engines. It is considered that CCGT is the correct comparator for the assessment and may possibly be a conservative comparator.

7.4.15 It is acknowledged that the UK grid mix will change and decarbonise over time. It is not disputed that the carbon benefits of the Proposed Development will change over time. However, for the main assessment, it is considered reasonable to assess the benefits using the marginal technology at the time (CCGT) as the comparator. This has been confirmed by the SoS on several recent decisions as the correct approach.

7.4.16 Notwithstanding, the effect of changing the grid offset was considered as a sensitivity in the assessment.

7.4.17 The UK carbon budget figures were taken from the Carbon Budget Orders.

7.4.18 Baseline carbon emissions from the local authority and the sector (Industrial and Commercial Other Fuels) values were sourced from the most recent UK local and regional carbon dioxide emissions data tables.

Identifying Likely Significant Effects

7.4.19 The net GHG emissions from the Proposed Development compared to the Future Baseline were calculated in line with the methodology presented in both the IEMA Guidance and UK Government guidance 'Energy recovery for residual waste - a carbon based modelling approach'[23]. In particular, the IEMA Guidance states:

"When evaluating significance, all new GHG emissions contribute to a negative environmental impact; however; some projects will replace existing development or baseline activity that has a higher GHG profile. The significance of a project's emissions should therefore be based on its net impact over its life time, which may be positive, negative or negligible".

7.4.20 Most of the quantities, which are normally considered in GHG assessments for plants which generate power from waste, would not change as a result of the Proposed Development, as the same waste would be combusted as for the Consented Development. The following would not change:

- the emissions from the waste to be combusted;
- the emissions associated with the transport of the waste to EfW plant;
- carbon savings from any additional metals recovery at the EfW plant;
- offset of the emissions which would be generated by the waste being disposed in landfill;
- offset of the emissions which would be generated by the transportation of the waste to landfill; and
- offset of the emissions generated from the grid electricity for the power which would have been generated by waste in landfill.

7.4.21 Therefore, the calculation only considered the offset of emissions generated from the grid electricity for the additional power generated compared to the Consented Scheme. These are considered scope 2 emissions.

7.4.22 The calculation was carried out for the opening year (2025) and for the period from 2025 to 2049 to take account of potential changes in the baseline marginal power source.

Determining Effect Significance

7.4.23 According to the IEMA Guidance, the crux of significance is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a science-based 1.5°C transition towards net zero which the UK government has committed to achieve by 2050. The IEMA Guidance sets out the significance criteria as *'major adverse'*, *'moderate adverse'*, *'minor adverse'*, '*negligible*', and '*beneficial*', with examples to distinguish significance listed as follows:

- **Major adverse**: the project's GHG impacts are not mitigated or are only compliant with do-minimum standards set through regulation, and do not provide further reductions required by existing local and national policy for projects of this type. A project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK's trajectory towards net zero.
- **Moderate adverse**: the project's GHG impacts are partially mitigated and may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals for projects of this type. A project with moderate adverse effects falls short of fully contributing to the UK's trajectory towards net zero.
- **Minor adverse**: the project's GHG impacts would be fully consistent with applicable existing and emerging policy requirements and good practice design standards for projects of this type. A project with minor adverse effects is fully in line with measures necessary to achieve the UK's trajectory towards net zero.
- **Negligible**: the project's GHG impacts would be reduced through measures that go well beyond existing and emerging policy and design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050. A project with negligible effects provides GHG performance that is well *'ahead of the curve*' for the trajectory towards net zero and has minimal residual emissions.
- **Beneficial**: the project's net GHG impacts are below zero and it causes a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the without-project baseline. A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact.

7.4.24 Major or moderate adverse effects and beneficial effects are considered to be significant. Minor adverse and negligible effects are not considered to be significant.

7.4.25 The IEMA Guidance sets out '*good practice*' approaches to contextualising a projects carbon emissions by comparing to sector-based, local, and/or national carbon budgets, policy goals and/or performance standards. This comparison was undertaken whereby the net impact of emissions was assessed in relation to local carbon emissions and sector carbon emissions. The data is sourced from UK local authority and regional GHG emissions from national statistics for the latest available data, 2020, which also includes a waste management category. This sector was considered at a national and local scale.

7.4.26 The emissions associated with the Proposed Development were also compared to the UK carbon budgets for the periods 2023-2027, 2028-2032 and 2033-2037. It is noted that the Sixth Carbon Budget only reaches 2037. Future continuation in the reduction of these budgets is expected to reach net zero by 2050.

Assumptions and Limitations

7.4.27 The EfW plant is assumed to operate in accordance with its design (see **ES Volume 1, Chapter 3: Proposed Development and Construction (Doc Ref: 6.1)** generating 49.9 MWe.

7.4.28 There is uncertainty around the type of power station which would be displaced by the additional power generated by the EfW plant. The sensitivity of the result to the assumption that CCGT would be displaced was considered and the results are shown in paragraph 7.6.6).

7.5 Baseline Conditions

Future Baseline Scenario

7.5.1 The future baseline scenario is that the Consented Scheme continues to operate.

7.5.2 Due to the UK government's target to achieve net zero by 2050, and its recently announced policy to decarbonise the electricity generation sector by 2035, it is anticipated that in the operational lifetime of the EfW plant, there will be an increased reliance on renewable forms of electricity generation and on gas-fired generation plant equipped with carbon capture and storage.

7.5.3 Therefore, although the baseline assumes that the EfW plant would displace power generated by CCGT, two alternative future baseline marginal power sources have been established using the BEIS publication "Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal"[24].

7.5.4 The first assumes that the long run marginal emission factors, generation-based, should be used.

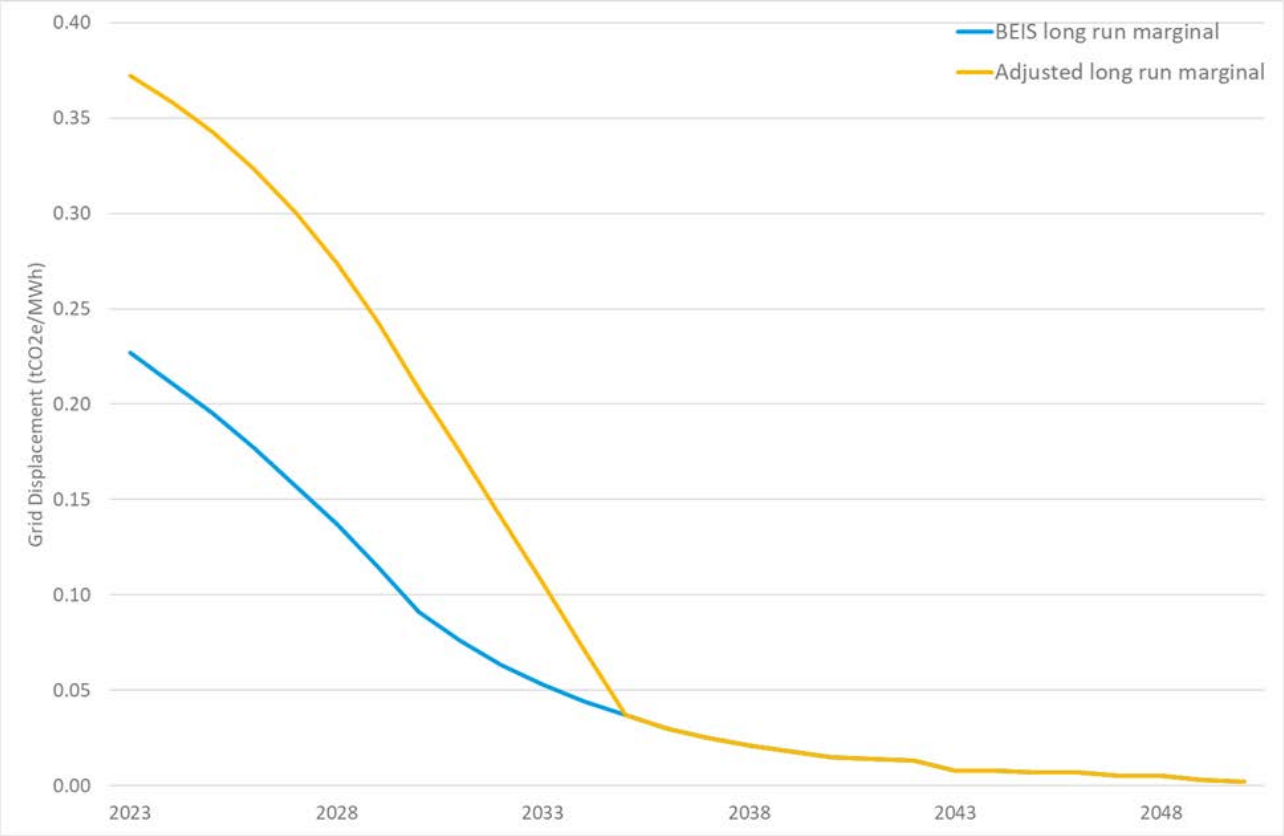
7.5.5 The second assumes that the power displaced by an EfW plant will decarbonise less quickly than the long run marginal emissions factor because, as explained earlier, power generated from an EfW plant operating at baseload will not displace other renewable power sources such as wind and solar until there is an excess of such power on the grid. The long run marginal emissions factor for 2023 is 0.227 tCO_2e/MWh, but it is considered that the current power source being displaced by EfW plants remains CCGT with an emissions factor of 0.371

tCO2e/MWh. Therefore, an alternative future baseline displacement factor curve has been calculated, as follows:

- For 2023, the CCGT figure was used.
- For 2035 and later, the BEIS figure was used.
- Between these two dates, the displacement factor was gradually reduced, coming closer to the BEIS figure.

7.5.6 The values used are shown in Figure 7.1.

Figure 7.1: Grid Displacement Factors



7.5.7 A summary of the baseline figures of local and sector carbon emissions, used for the assessment of significance, is provided in Table 7.4.[25]

Table 7.4: Baseline Figures – Local and Sector GHG Emissions Summary

Item	Units	Value
UK Waste Management Sector 2021	kt CO2e/y	18,813
Essex Total – 2021	kt CO2e/y	8,151.7
Essex Total – Waste Management Sector 2021	kt CO2e/y	1,077.5

7.5.8 A summary of the future UK carbon budgets, used for the assessment of significance, is provided in Table 7.5.

Table 7.5: Future Baseline Figures – Carbon Budgets Summary

Item	Units	Value
UK carbon budget 2023 – 2027	Mt CO2e	1,950

Item	Units	Value
UK carbon budget 2028 – 2032	Mt CO_2e	1,725
UK carbon budget 2033 – 2037	Mt CO_2e	965

7.6 Assessment of Operational Effects

Calculation of Net Emissions

7.6.1 The EfW plant in the Consented Scheme would generate 49.9MW of power from the combustion of waste. It is expected to operate for 8,000 hours a year, so the total power generated would be 399,200MWh per year.

7.6.2 The EfW plant in the Proposed Development would generate 60-65MW of power when operating at full capacity, depending on the time of year. For this assessment, it has been assumed that the EfW plant would generate 62.37MW of power on average throughout the year, being the design point of the EfW plant as amended by the Proposed Development. This is equivalent to 498,960MWh per year. Therefore, the effect of the Proposed Development would be to increase power generation by 99,760MWh per year.

7.6.3 A small amount of this power would be used to operate the EfW plant and other parts of the Consented Scheme, and so not all the generated power would be exported to the national grid. However, as the Proposed Development would not affect the power used to run the EfW plant or the remainder of the Consented Scheme, the net change to exported power would be the same as the net change to generated power.

7.6.4 The additional power exported by the EfW plant following the Proposed Development would displace power generated by other sources. As explained above, the carbon intensity of a CCGT plant is 0.371 tCO_2e/MWh. Therefore, an additional 37,011 tCO_2e would be displaced in the opening year as a result of the Proposed Development.

7.6.5 An alternative approach would be to use the long run marginal generation-based emission factor for 2025 (the expected first full year of operation) from the Green Book Supplementary Guidance, which is the lowest credible figure for current generation but assumes that the EfW plant displaces other renewable sources of electricity (which is not considered to be the case). This value is 0.195 tCO_2e/MWh. Using this figure, an additional 19,453 tCO_2e would be displaced in the opening year as a result of the Proposed Development.

7.6.6 The lifetime benefit (from 2025 to 2049) has been calculated using the two grid displacement profiles discussed earlier.

- Using the BEIS long run marginal emissions factors, the lifetime benefit would be an additional benefit of 132,082 tCO_2e.
- Using the adjusted factors, the lifetime benefit would be an additional benefit of 238,983 tCO_2e.

Assessment of Significance

7.6.7 The net emission reduction associated with the Proposed Development in the opening year has been compared with the Future Baseline, with the results displayed in Table 7.6.

Table 7.6: Comparison against Future Baseline: Local and Sector GHG Emissions

Item	Future Baseline (kt CO_2e)	Benefit as % of Future Baseline
UK Waste Management Sector 2021	18,813	0.20%
Essex Total – 2021	8,152	0.45%
Essex Total – Waste Management Sector 2021	1,078	3.43%

7.6.8 The net reduction in emissions from the Proposed Development is below 5% of the UK Waste Management sector total and is not considered a significant contribution on a national scale. As there is a net benefit compared to the Future Baseline, this reduces the potential contribution of carbon emissions to the UK Waste Management sector.

7.6.9 Although the Proposed Development would be considered a project of national (and international) importance (as the impact of GHG emissions are worldwide and a physical boundary to their impact cannot be defined), the reduction in carbon emissions has also been compared to the local baseline emissions of Essex. When compared to the total Essex emissions, the reduction in carbon contributions associated with the Proposed Development is 0.45%. As this is less than 5%, in accordance with the IEMA Guidance, this is considered to be not significant.

7.6.10 The reduction in carbon emissions is 3.43% of the carbon emissions associated with the Waste Management sector for Essex. Therefore, this emissions reduction is a benefit to the Essex Waste Management sector emissions, although as the benefit is less than 5%, it is not significant.

7.6.11 The total net emission reduction associated with the Proposed Development have been calculated for each 5-year period corresponding to the national carbon budgets, set out in Table 7.7. These values have used the annual values taken from the lifetime assessment, totalled for each 5-year period. As the first carbon budget only goes up to 2027, this value only includes the total of estimated emission reductions for 2026 to 2027. They are displayed against the UK carbon budgets for each period, with the percentage contribution towards the budget also displayed.

Table 7.7: Comparison against future carbon budgets

Item	Carbon Budget ($MtCO_2e$)	Reduction from Proposed Development (BEIS emission factors)		Reduction from Proposed Development (adjusted emission factors)	
		tCO_2e	% of carbon budget	tCO_2e	% of carbon budget
2023 - 2027	1,950	52,773	0.0027%	96,152	0.0049%
2028 - 2032	1,725	48,084	0.0028%	103,601	0.0060%

Item	Carbon Budget ($MtCO_2e$)	Reduction from Proposed Development (BEIS emission factors)		Reduction from Proposed Development (adjusted emission factors)	
		tCO_2e	% of carbon budget	tCO_2e	% of carbon budget
2023 - 2027	1,950	52,773	0.0027%	96,152	0.0049%
2033 - 2037	965	18,855	0.0020%	26,860	0.0028%

7.6.12 For each carbon budget period, the net benefit from the Proposed Development is well below 5% of the carbon budget. Therefore, the contribution is considered to be not significant.

7.6.13 To determine whether the Proposed Development contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050, the Proposed Development's emissions should be based on its net impact over its lifetime according to the IEMA Guidance. Although all new GHG emissions contribute to a negative environmental impact, some projects will replace existing development or baseline activities that have a higher GHG profile.

7.6.14 As described above, the cumulative carbon benefit associated with the Proposed Development over 25 years operation has been estimated to be 132,082 - 238,983 tCO_2e.

7.6.15 The Proposed Development results in the avoidance of GHG emissions to the atmosphere, compared to the baseline. This can be described in accordance with the IEMA Guidance as having a beneficial effect that is significant. However, the IEMA Guidance continues to state that *'only projects that actively reverse (rather than only reduce) the risk of severe climate change can be judged as having a beneficial effect'.*

7.6.16 In accordance with the IEMA Guidance:

- a beneficial project can be described as '*the project's net GHG impacts are below zero and it causes a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the without-project baseline. A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact*'; and
- a negligible project can be described as *'the project's GHG impacts would be reduced through measures that go well beyond existing and emerging policy and design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050. A project with negligible effects provides GHG performance that is well 'ahead of the curve' for the trajectory towards net zero and has minimal residual emissions'.*

7.6.17 Therefore, the significance would be described as beneficial because the change in carbon emissions compared to the baseline is negative. However, as the Proposed Development does not actively reverse the risk of climate change, as it does not remove carbon from the atmosphere (such as utilisation for Carbon Capture, Usage and Storage technology would), as a conservative measure, it has been concluded that the Proposed Development is of negligible significance, with reference to the Net Zero trajectory.

Mitigation, Monitoring and Residual Effects

7.6.18 As the Proposed Development is considered to have a negligible beneficial effect, no mitigation or monitoring is considered necessary. Residual effects are as stated above.

Table 7.8: Summary of Residual Effects

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Magnitude of Impact	Mitigation and Monitoring	Residual Effect
Operational Development						
GHG Emissions	N/A	Global, National and Local	Permanent	Negligible	None required	Negligible Beneficial

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