Ford energy from waste

FORD ENERGY RECOVERY FACILITY AND WASTE SORTING AND TRANSFER FACILITY, FORD CIRCULAR TECHNOLOGY PARK

ENVIRONMENTAL STATEMENT

CHAPTER 7

CLIMATE CHANGE

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7 Climate change

Introduction

7.1 This chapter considers the potential significant effects arising from the proposed development, consisting of the energy recovery facility (ERF) and waste sorting and transfer facility (WSTF) on climate change, specifically greenhouse gas emissions (GHG emissions), and the likely significant effects of climate change on the proposed development (climate resilience).

7.2 This chapter is supported by the following technical appendices:

- Appendix D1 – Carbon Assessment
- Appendix D2 – Climate Change Assessment Detailed Methodology
- Appendix D3 – Climate Change Baseline
- Appendix D4 – Climate Change Resilience Assessment Detailed Results

7.3 The chapter follows the structure as listed below, separately considering GHG emissions and climate resilience within each section:

- Legislation, policy and guidance
- Methodology
- Baseline
- Assessment of effects
- Mitigation
- Residual effects and conclusions

7.4 The data sources and references used in the assessment are shown in tables 7.1 and 7.2.

Source	Factor
HM Government, 2020, UK local authority and regional carbon dioxide emission national statistics: 2005-2018, <Accessed at: https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-to-2018>	Local and sector carbon emissions. - values provided in Table 7.4
Committee on Climate Change website <www.theccc.org.uk>	Climate change budgets – values provided in Table 7.5
UKCP18 Key results tables. Accessed at < www.metoffice.gov.uk/research/approach/collaboration/ukcp/key-results>	
Climate averages from Shoreham Airport meteorological station Accessed at <www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages>	Climate baseline values
IPCC Guidelines for Greenhouse Gas Inventories, Vol 2, Table 2.2 Default Emissions Factors for Stationary Combustion in the Energy Industries, Municipal	N_2O default emissions factor: 0.04 kg N_2O/tonne waste
	CH_4 default emissions factor: 0.3 kg CH_4/tonne waste

Source	Factor
Wastes (non-biomass) and Other Primary Solid Biomass	
United Nations Framework for Climate Change Global Warming Potentials	GWP – N_2O to CO_2: 310 kg CO_2e/kg N_2O
	GWP – CH_4 to CO_2: 25 CO_2e/kg CH_4
DEFRA, 2019, "Greenhouse gas reporting: Conversion factors 2019"	Emissions from gasoil: 0.25 tCO_2e/MWh
DEFRA, 2019, "Fuel Mix Disclosure Table – 01/04/2018 – 31/03/2019"	Natural gas CO_2 emissions: 349 g/KWh
DEFRA, 2014, "Review of Landfill Methane Emissions Modelling (WR1908)"	Degradable decomposable organic carbon content (DDOC): 50%
	CO_2 percentage of landfill gas: 43%
	CH_4 percentage of landfill gas: 57%
	Landfill gas (LFG) recovery efficiency: 68%
	Methane captured used in gas engines: 90.9%
	Methane leakage through gas engines: 1.5%
	Landfill gas engine efficiency: 36%
Resource Futures, 2013, "Defra EV0801 National Compositional estimates for local authority collected waste and recycling in England, 2010/11" (Kerbside Residual)	Waste composition
Environment Agency Wales/SLR, 2007, "Determination of the Biodegradability of Mixed Industrial and Commercial Waste Landfilled in Wales"	

Where:

- ***CO_2e = carbon dioxide equivalent***
- ***CO_2 = carbon dioxide***
- ***N_2O = nitrous oxide***
- ***CH_4 = methane***

Table 7.1: Data sources

Ministry of Housing, Communities and Local Government, 2019, "National Planning Policy Framework"

IEMA, 2017, "Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance"

EMA, 2020, Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation,.

HM Government, 2019, The Climate Change Act 2008 (2050 Target Amendment) Order 2019

HM Government, 2019, Leading on Clean Growth; The Government response to the Committee on Climate Change's 2019 Progress Report to Parliament – Reducing UK emissions

HM Government, 2020, The Ten Point Plan for a Green Industrial Revolution
HM Government, Together for Our Planet, 2020, Energy White paper; Powering our Net Zero Future
Committee on Climate Change, 2020, The Sixth Carbon Budget; the UK's path to Net Zero
West Sussex County Council, 2020, Climate Change Strategy 2020-2030
Arun District Council, 2018, Adoption Arun Local Plan 2011-2031
Committee on Climate Change, 2019, Progress Report to Parliament
Policy Connect, 2020, No Time to Waste: Resources, Recovery and the Road to Net Zero
HM Government, 2020, The Government Response to the Committee on Climate Change's 2020 Progress Report to Parliament
DEFRA, 2014, "Energy from waste: A guide to the debate"
DEFRA 2014, "Energy recovery for residual waste – a carbon based modelling approach"
DERFA, 2011, Waste Management Hierarchy
Table 7.2: General references

Legislation, policy and guidance

GHG emissions

EIA regulations

7.5 The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (the EIA Regulations) introduced a requirement to consider climate and greenhouse gas emissions. Schedule 4(4) of the regulations relating to information for inclusion in Environmental Statements states:

> "*A description of the factors specified in regulation 4(2) likely to be significantly affected by the development: … climate (for example greenhouse gas emissions, impacts relevant to adaptation)*"

7.6 Schedule 4(5) requires:

> *"A description of the likely significant effects of the development on the environment resulting from, inter alia:*
>
> *f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change;…*
>
> *The description of the likely significant effects on the factors specified in regulation 4(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the*

project, including in particular those established under Council Directive 92/43/EEC(8) and Directive 2009/147/EC(9)."

7.7 Schedule 4 goes on to explain what information should be provided stating:

"6. A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.

7. A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.

8. A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to EU legislation such as Directive 2012/18/EU(10) of the European Parliament and of the Council or Council Directive 2009/71/Euratom(11) or UK environmental assessments may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies."

National policy

7.8 The National Planning Policy Framework (NPPF; 2019) sets out the government's planning policies for England and how they are expected to be applied. In relation to carbon and greenhouse gas emissions, section 14 of the NPPF states that:

"*The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.*"

7.9 Paragraphs 149 – 154 provide policies in relation to the need to plan for climate change. Paragraph 150 states that:

"*New development should be planned for in ways that:*

a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through

suitable adaptation measures, including through the planning of green infrastructure; and

b) can help to reduce greenhouse gas emissions, such as through its location, orientation and design."

7.10 Paragraph 154 states that:

"When determining planning applications for renewable and low carbon development, local planning authorities should:

not require applicants to demonstrate the overall need for renewable or low carbon energy…; and b) approve the application if its impacts are (or can be made) acceptable.

Guidance

7.11 The Institute of Environmental Management and Assessment (IEMA), the largest professional body for environmental practitioners, has published guidance on the approach to EIA for carbon emissions, titled 'Assessing Greenhouse Gas Emissions and Evaluating their Significance' (2017). The guidance 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.

7.12 The 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 guidance gives detail on how to assess the significance of GHG emissions, in the context of sector, local and national carbon budgets.

7.13 IEMA has also produced guidance titled 'Environmental Impact Assessment Guide to Climate Change and Resilience and Adaption' (2020). This provides guidance on how to consider the impacts of climate change within project design.

Climate change

Climate Change Act

7.14 The UK government set a commitment to reduce GHG emissions in the UK to 50% of 1990 levels by 2025, and to 80% by 2050 through the implementation of the Climate Change Act 2008, the framework for UK climate change policy. More recent legislation (The Climate Change Act 2008 (2050 Target Amendment) Order 2019) has introduced a new binding target of "net zero by 2050".

National policy

7.15 The principal policies of the NPPF relating to climate have been set out above.

7.16 In response to The Climate Change Act 2008 (2050 Target Amendment) Order 2019, the government set out how it will tackle climate change within 'Leading on Clean Growth the Government Response to the Committee on Climate

Change's 2019 Progress Report to Parliament – Reducing UK emissions' (October 2019).

7.17 The report responds to the Committee on Climate Change (CCC) specific recommendations across the key sectors in the Clean Growth Strategy: power, buildings (domestic and non-domestic), industry (including carbon capture, usage and storage (CCUS) and hydrogen), transport, and natural resources (including agriculture, forestry, land use, waste and F-gases).

7.18 Within the report it is recognised that there is a need to divert waste from landfill, setting out that *"growth in energy from waste and alternative residual waste treatment infrastructure will divert further waste from landfill".*

7.19 In October 2020, the Government published the "Government Response to the Committee on Climate Change's 2020 Progress Report to Parliament – Reducing UK emissions" . The Government again recognises the need to divert waste from landfill. In response to the CCC recommendation to "Legislate (in England via the Environment Bill) for and implement a ban on landfilling of municipal & non-municipal biodegradable wastes from 2025", the report states "*The Government is already committed to implementing measures that will remove a large proportion of biodegradable waste from the residual waste stream, such as through implementing separate food waste collections and consistency in the recycling system through the Environment Bill. This will deliver a reduction in volumes of biodegradable waste to landfill or other residual treatments. Remaining waste will increasingly be treated by alternatives to landfill, such as energy from waste plants and waste-to-transport fuels*."

7.20 Of relevance are the National Policy Statements, which can be material planning considerations for applications made under the Town and Country Planning Act 1990. EN-1 (Energy) and EN-3 (Renewable Energy Infrastructure). In relation to carbon and GHG emissions, Section 2.2 of EN-1 sets out the road to meeting GHG emissions targets by 2050 and describes how the UK must reduce its dependence on fossil fuels, pursue its objectives for renewables and ensure that electricity consumed is almost exclusively from "low-carbon" sources. Section 1 of EN-3 identifies that a significant increase in generation from large-scale renewable energy infrastructure is necessary to meet the 15% renewable energy target. Specifically, in regards to EfW, section 2.5 states the following:

> "*The recovery of energy from the combustion of waste, where in accordance with the waste hierarchy, will play an increasingly important role in meeting the UK's energy needs. Where the waste burned is deemed renewable, this can also contribute to meeting the UK's renewable energy targets. Further, the recovery of energy from the combustion of waste forms an important element of waste management strategies in both England and Wales*"

7.21 Recommendations for the sixth carbon budget were published by CCC in December 2020. The requirements and targets recognise that EfW plants play a part of the long-term waste disposal plan for the UK. There are requirements to reduce overall recycling rates within the UK and overall residual waste volumes. The sixth carbon budget recognises that the maximum recycling rates are uncertain and none of the modelled scenarios have 100% recycling; it is expected for there to always be a level of residual waste which will require disposal.

7.22 The CCC provided its report to Ministers as an independent expert panel, as required under the Climate Change Act. The government will consider the report. The report is currently only a recommendation. Ministers must have regard to the CCC's advice when making an order setting a carbon budget. Until an order is made by government to set the budget, it does not have status as a carbon budget for the purposes of the Climate Change Act.

Local policy

7.23 West Sussex County Council (WSCC) recognise the risks of climate change and on their website state the two main actions which they will take to tackle it to be:

- To reduce carbon emissions from the county council's operations and services (mitigation)
- To strengthen the resilience of services and communities to extreme weather (adaptation), including taking advantage of any benefits of climate change

7.24 In 2019, WSCC passed a motion pledge to try to reach net zero carbon emissions by 2030 and in July 2020 approved their Climate Change Strategy for 2020-2030 which aligns with this target. Note that this zero carbon target is for the council as an organisation, rather than the total carbon emissions from the area of West Sussex.

7.25 Relevant county council commitments, as identified in the Climate Change Strategy 2020-2030 include;

- We will reduce the carbon associated with road-based transport
- We will increase the amount of renewable energy used and generated in West Sussex
- We will adapt and build resilience to extreme weather events, such as heatwaves and floods

7.26 Arun District Council (ADC) has a section addressing climate change within their local plan 2011-2031, published in July 2018. The local plan recognises the biggest challenges caused by climate change for the local communities and businesses in the district to be increased flood risk, declining water availability and increased health problems for those vulnerable to extreme temperatures. ADC recognise that it has a key role in promoting sustainable development and travel in order to achieve low carbon development and to ensure that the district continues to prepare for and adapt to the likely future effects of climate change. Climate change adaptation measures are set out in a number of policies within the local plan. Policy ECC SP1 (Adapting to climate change), and Policy ECC SP2 (Energy and climate change mitigation) all set out the considerations and actions ADC will take when considering whether to support a development. They are set out below:

7.27 Policy ECC SP1:

The Council will support development which is located and appropriately designed to adapt to impacts arising from climate change such as the increased probability of tidal and fluvial flooding; water stress; health impacts as a result of extreme temperatures and a decline in the quality of habitats and richness of

biodiversity. In order to achieve this, development must be designed to take account of the following issues:

a) Location (in relation to flood risk and vulnerability to coastal erosion);

b) Water efficiency

c) Shade, cooling, ventilation, solar gain

d) Connectivity to the green infrastructure network

e) Layout and massing

f) Resilience of buildings and building materials to extreme weather events

g) Capacity of drainage systems and incorporation of Sustainable urban Drainage Systems (SuDS).

7.28 Policy ECC SP2:

All new residential and commercial development (including conversions, extensions and changes of use) will be expected to be energy efficient and to demonstrate how they will:

a) Achieve energy efficiency measures that reflect the current standards applicable at the time of submission

b) Use design and layout to promote energy efficiency

c) Incorporate decentralised, renewable and low carbon energy supply systems, for example small scale renewable energy systems such as solar panels.

All major developments must produce 10% of the total predicted energy requirements from renewable or low carbon energy generation on-site, unless it can be demonstrated that this is unviable. Energy efficiency measures will be taken into consideration when the total predicted energy requirements are calculated. The Council will consider 'allowable solutions' where it is clearly demonstrated that the provision of on-site renewable or low carbon energy generation is unviable or not feasible.

Guidance

7.29 As referred to previously, the CCC published a progress report in 2019 which sets out recommendations to the UK government on how to achieve the target of net zero carbon emissions by 2050. The CC Report sets out how key biodegradable waste streams should be diverted from landfill within the UK alongside an increase in recycling. To achieve this and deliver substantial emissions reductions in the waste sector, the report advises that key investment is required in alternative waste treatment facilities (such as anaerobic digestion, mechanical-biological treatment and EfW). The report acknowledges that a lack of investment in these areas may encourage the export of waste.

7.30 The Waste Management Hierarchy ranks waste management options in order of sustainability, with more sustainable waste management options placed higher in the Waste Management Hierarchy. The thermal treatment of residual waste in

an efficient EfW plant is a recovery operation, meaning it should be favoured over the disposal of waste in a landfill.

Methodology

7.31 This climate change chapter has been prepared in accordance with the EIA Regulations. It provides the information as required by Schedule 4 of the EIA Regulations and is in line with the requirements of the NPPF. In lieu of any statutory methodologies, this assessment has followed the appropriate methodologies from the IEMA guidance for GHG emissions and climate change resilience.

Assessment methodology and significance criteria

GHG emissions

7.32 Although the quantification of GHG emissions for an EIA may vary in methodology and approach between projects, it is expected that in almost all cases, a calculated (not measured) approach is taken because these are completed in advance of a project commencing development. The assessment has been undertaken in line with IEMA (2017) guidance, which recommends the following structure to calculate GHG emissions:

$$GHG\ emission/removal\ = GHG\ emission\ factor\ \times Activity\ data$$

7.33 The detailed methodology for calculating GHG emissions from the ERF, including equations, is presented within Technical Appendix D1, and is in line with the methodology presented in both the IEMA guidance and the UK government guidance document 'Energy recovery for residual waste – A carbon based modelling approach'.

7.34 With regard to GHG emissions, the IEMA (2017) guidance defines the baseline as a reference point against which the impact of a new development can be compared (sometimes referred to 'business as usual', where assumptions are made on current and future greenhouse gas emissions). The baseline can be in the form of either of the below:

a) *GHG emissions within the agreed physical and temporal boundary of a project but without the proposed project*
b) *GHG emissions arising from an alternative project design and assumptions*

7.35 The main assessment of the GHG emissions from the proposed development focused on the ERF.

7.36 The ERF is a 'new project'. Therefore, a current baseline cannot be established in relation to emissions from the site boundary of the ERF prior to commencement of development. In this instance, there are zero GHG emissions to report. Furthermore, as the impact of GHG emissions from the development will be worldwide, a physical boundary to their impact cannot be defined. Therefore, option b) has been chosen to establish the baseline.

7.37 For this assessment, the principal 'alternative project design and assumptions' for the ERF will be sending the waste to landfill as this is currently the most likely

alternative destination for the waste, and generating electricity via gas-fired power stations, as this is the current 'marginal' technology. This is supported by the DEFRA guide 'Energy from Waste - A guide to the debate' which 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*". However, a number of sensitivity scenarios have been considered.

7.38 The carbon assessment also takes into account the carbon emissions from transportation associated with the proposed development and the carbon savings associated with metals recovery. These are further detailed within the corresponding sections of Technical Appendix D1.

7.39 Future baselines should capture both operational and transportation GHG emissions. This has been reflected by the assessment of transport emissions (indirect) in addition to direct emissions. In addition, a sensitivity analysis has been undertaken. This accounts for any variation in landfill gas (LFG) capture rates across different sized landfill sites, and variation grid displacement factors, which may occur dependent on the source of electricity which is being displaced by the ERF.

7.40 The resulting emissions from the ERF have been assessed for their significance in the context of UK carbon budgets and local emissions.

7.41 The emissions associated with the existing waste transfer station (WTS) are considered to be the baseline for assessing the impact of the new WSTF against. Waste from the surrounding area is currently transferred to the existing WTS, where it is then bulked and transferred off-site, mostly to either the Lakeside Energy from Waste facility in Slough or the Brockhurst Wood Landfill in Horsham. A number of other facilities also receive waste from the existing WTS (albeit less frequently), including the Bishop's Cleeve landfill in Cheltenham, Sutton Courtenay Landfill near Didcot, the Riverside EfW facility and the Redhill Landfill in Surrey. The transport of waste to the existing WTS and the subsequent transfer of waste off-site will have associated greenhouse gas emissions. A qualitative analysis of the carbon impact associated with the operation of the proposed WSTF against the baseline has been undertaken.

7.42 In the absence of any significance criteria or a defined threshold, it might be considered that all GHG emissions are significant. Climate change has the potential to lead to significant environmental effects on all topics in the EIA directive (population, fauna, soil etc.) The IEMA (2017) guidance states that:

> *"When evaluating significance, all new GHG emissions contribute to a significant negative environmental effect; however; some projects will replace existing development that have higher GHG profiles. The significance of a project's emissions should therefore be based on its net impact, which may be positive or negative."*

7.43 To provide some context for this significance, the net impact of emissions has been assessed in relation to local carbon emissions and sector carbon emissions. The data is sourced from UK local authority and regional carbon dioxide emissions national statistics for the latest available data, 2018. The values have been sourced from the 2005 to 2018 UK local and regional CO2

emissions data tables. In lieu of any results for waste as an individual sector, the Industrial and Commercial Other Fuels sector has been used, within which waste is included amongst other fuels. This sector has been looked at on a national and local scale. A summary of these baseline figures is provided in the baseline section.

7.44 The emissions from the ERF have also been compared to the UK carbon budgets for the periods 2023-2027, 2028-2032 and 2033-2037. As there are no local or sector carbon budgets, the significance cannot be assessed at these levels. It is also noted that the sixth carbon budget only reaches 2037. Future continuation in the reduction of these budgets is expected in order to reach net zero by 2050. A summary of the future baseline figures for the currently published UK carbon budgets is provided in the future baseline section.

7.45 The significance of the emissions is defined based on a >1% difference to the future UK carbon budget being considered significant, and a <1% difference being insignificant. In lieu of any specific guidance, the 1% value has been chosen as a screening criteria as it would only be a small contribution to the total. This aligns with other disciplines such as air quality.

7.46 When considering the future baseline, it is important to acknowledge that the UK government's aim is for net zero emissions overall. It will not be possible to eliminate all emissions of carbon, but we will need negative emissions to counter carbon emissions. In order to achieve net zero it is important to reduce emissions from certain sectors including waste, even though emissions from this sector may not be completely removed.

Climate change resilience

7.47 The EIA Regulations include the requirement to include information on the vulnerability of the proposed development to climate change. Therefore, a review of climate change resilience for the proposed development has been conducted. The review follows the IEMA (2020) guidance as follows.

7.48 The baseline climate data has been sourced from the nearest meteorological site to the proposed development, using Met Office climate averages from the period 1981-2010, which are published on the Met Office website.

7.49 The future baseline has been defined using UK Climate Projections 2018 (UKCP18) to determine the changes in climate which the proposed development will be at risk to. UKCP18 are a set of climate projections and tools to access climate data. The data used within this assessment has been extracted from the UKCP18 key results spreadsheet for the scenarios as detailed in Table 7.3.

Projection	Emissions scenario	Percentile	Area	Baseline time period	Time horizon
UKCP18	RCP8.5	50%, 10 and 90% (where appropriate)	South East England	1981-2000	2040-2059

Table 7.3 Future climate change data scenario summary

7.50 The identified changes have then been incorporated to the current baseline from Shoreham Airport to give a local prediction of future climatic conditions.

7.51 Receptors associated with the proposed development which are vulnerable to climate change have been identified. For each receptor, the impact of each predicted climatic effect has been assessed. This has incorporated the mitigation contained in the design.

7.52 The sensitivity of a receptor is the degree of response of a receiver to a change and its capacity to accommodate and recover from a change if it were to be affected. The susceptibility and vulnerability to climate change are considered when determining the resulting sensitivity of a receptor to the impacts of climate change. As stated in the IEMA (2020) guidance, susceptibility is "*the ability of the receptor to be affected by a change*, vulnerability is *the potential exposure of the receptor to a change* and sensitivity is *the degree of response of a receiver to change and a function of its capacity to accommodate and recover from a change if it is affected*." The susceptibilities and vulnerabilities have been selected for each impact of climate change for each receptor using the 'susceptibility of receptor' and 'vulnerability of receptor' thresholds as set out in the IEMA (2020) guidance. In summary:

Scale	Susceptibility	Vulnerability
High	receptor has no ability to withstand/not be substantially altered by the projected changes to the existing/prevailing climatic factors (e.g. lose much of its original function and form).	receptor is directly dependent on existing/prevailing climatic factors and reliant on these specific existing climate conditions continuing in future (e.g. river flows and groundwater level) or only able to tolerate a very limited variation in climate conditions
Moderate	receptor has some limited ability to withstand/not be altered by the projected changes to the existing/prevailing climatic conditions (e.g. retain elements of its original function and form).	receptor is dependent on some climatic factors but able to tolerate a range of conditions (e.g. a species which has a wide geographic range across the entire UK but is not found in southern Spain).
Low	receptor has the ability to withstand/not be altered much by the projected changes to the existing/prevailing climatic factors (e.g. retain much of its original function and form).	climatic factors have little influence on the receptors (consider whether it is justifiable to assess such receptors further within the context of EIA – i.e. it is likely that such issues should have been excluded through the EIA scoping process).

Table 7.4 Susceptibility and vulnerability scale

7.53 In addition to the susceptibility and vulnerability, the value / importance of the receptor has been used to reach a reasoned conclusion on sensitivity using professional judgement. The greater the susceptibility, and/or vulnerability of the receptor, the greater the likelihood that receptor would also be of higher sensitivity. For instance, a high-value receptor that has very little resilience to change in climatic conditions is considered to be more likely to have a higher sensitivity than a high-value receptor that is very resilient to changes in climatic conditions.

7.54 The susceptibility, vulnerability, and value of receptor have been considered to determine a sensitivity descriptor of low, medium and high for each receptor. These descriptors have been determined based on professional judgement. Examples of these are provided within Technical Appendix D2.

7.55 For each receptor and each identified change in climate, the magnitude of effect has been identified. As stated in the IEMA (2020) guidance, magnitude is the degree of a change from the relevant baseline conditions which derives from the construction and operation of a development. This is based on a combination of probability, which would take into account the chance of the effect occurring over the lifespan of the development, and consequence, which would reflect the scale or complexity of the effect, considering degree of harm, duration, frequency and reversibility of effect. A combination of probability and consequence has been used to reach a reasoned conclusion on the magnitude of effect using professional judgement. Where a probability and /or consequence of the effect is high then the magnitude of effect would also be high. Descriptors of negligible, small, medium and large have been used to define the magnitude of impact. Examples of these are provided within Technical Appendix D2.

7.56 The basis for assigning the significance is in line with IEMA (2020) methodology and uses professional judgement. The significance of effect has been determined, taking into account the sensitivity for each receptor and the magnitude for each climate change effect. The following matrix provides an example of how the sensitivity of receptor and magnitude of change can be used to determine the effect and it's significance.

	Magnitude of change descriptor			
Sensitivity descriptor	Negligible	Small	Medium	Large
Low	Negligible	Negligible	Negligible	Slight
Medium	Slight	Slight	Moderate	Substantial
High	Moderate	Moderate	Substantial	Substantial

Table 7.5 Significance matrix

7.57 Where the overall effect is greater than slight adverse the effect is likely to be considered significant.

Limitations and assumptions

GHG emissions

7.58 When considering the GHG emissions from the ERF, the following assumptions have been made:

- As a conservative assumption it has been assumed that there will be 10 start-ups a year at the ERF where the auxiliary burners will be in operation. It is likely that this would be lower, reducing the overall GHG emissions.
- Recent bidding of EfW plants into the capacity market means they are competing primarily with combined cycle gas turbines (CCGT), gas engines and diesel engines. CCGT has been used as the comparator for displaced electricity and may possibly be conservative compared to the other options providing balancing services.
- There is uncertainty in literature surrounding the amount of biogenic carbon that is sequestered in landfill. A sequestration rate of 50% for biogenic carbon in landfill has been applied for the purpose of this assessment.

Combined with high landfill gas capture rates, this is considered to be conservative. It is not considered appropriate to give additional credit for sequestered carbon as this would result in an overly conservative assessment.

- There is uncertainty over the landfill gas capture rate, this has been accounted for by including a sensitivity analysis using a low and high capture rate.
- There is uncertainty over the future of the UK electricity grid mix, with the expectation for a dramatic increase in renewable technologies. This assessment has used the current 'marginal' comparator as it is not expected for the ERF to displace renewable sources of energy. Nevertheless, a sensitivity analysis of lower grid displacement factors has been included.
- There is uncertainty in the potential change in waste composition. This has not been considered within this assessment because it cannot be confirmed what these future changes will be.
- Some of the transportation distances of the waste and reagents had not been confirmed at time of writing. Therefore, the distances used have been assumed based on existing suppliers and may be conservative if closer suppliers are confirmed at a later date.
- The generation assumptions are based on operating at the nominal net calorific value (NCV) of 10.5 MJ/kg for 8,462 hours. It may be that the ERF generates more electricity at the upper end of the NCV range and may operate for more hours if there are limited periods of shutdown/outages.
- The assessment has conservatively assumed that the ERF will not export heat. The ERF is designed as a combined heat and power plant (CHP) and if heat is exported this would significantly increase the carbon benefits of the ERF.

Climate change resilience

7.59 When considering resilience of the proposed development to climate change the following assumptions have been made:

- The specific impact to climate change and associated events on construction has not been considered as the risks of these events are already well mitigated within the standard methods of working. The standard methods of working take into account the current climate and it is not likely that significant changes in climate would occur within the construction period. Measures are in place to deal with extreme events and allowances made within the construction programme.
- There may be some uncertainty over the climate change projections. Being projections, they are in their nature not definite. However, they are taken from UKCP18, which provide the most up to date assessment of how the UK Climate may change in the future and are supported by BEIS and DEFRA. This assessment has used projections for 2050 for a 'high emissions scenario'. This is considered to be conservative. However, any under or over estimations altered by the emissions scenario will not impact the outcome of the assessment, as significance assumptions are based on the impacts which the climate changes cause, for which small differences in the magnitude of change will not impede on.

- The assessment has used the 50th percentile of the projected change for the chosen scenario which provides a central estimate. However, some predictions vary when the 10th and 90th percentiles are considered. For example, mean summer precipitation is predicted to decrease at the low (10th percentile) and medium (50th percentiles) projections, but is predicted to increase at the high (90th percentile) projection. Therefore, this has been considered further in the assessment.

Baseline

GHG emissions

Current baseline

Waste alternative: landfill baseline

7.60 As detailed within section 3.2 of Technical Appendix D1, the baseline for the alternative treatment route available for residual waste is landfill.

7.61 Landfill is justified as the most appropriate alternative for waste management to the ERF because the UK does not have enough EfW capacity to treat all residual waste. This position is also relevant on a more local scale, where waste is still sent to various landfill sites as detailed within Technical Appendix D1. Therefore, the ERF can offer an alternative treatment for this residual waste. If a new EfW facility is built, this means that less waste overall will be sent to landfill and therefore, at both a national and local level, the correct comparator is landfill.

7.62 As set out in chapter 1 of the ES, the proposed development will help to meet the need for sustainable waste management infrastructure and to divert waste away from disposal to re-use, recycling or recovery. This is in line with national and local policy. The proposed development will provide for recycling and recovery as set out in the Waste Hierarchy and will therefore take waste away from disposal in landfill, for treatment at a higher level in the hierarchy.

7.63 For waste which is disposed of in landfill, the biogenic carbon degrades and produces LFG. LFG is comprised of methane and carbon dioxide, so has a significant carbon burden. Some of the methane in the LFG can be recovered and combusted in a gas engine to produce electricity, therefore creating some offset. There is also carbon release associated with the transport of waste to landfill. Section 3.2 of Technical Appendix D1 presents the assumptions and calculations for the emissions associated with landfill which form the baseline. This is based on the same annual waste going to landfill rather than the ERF. These are summarised in Table 7.6.

Item	Units	Value
Releases to atmosphere from landfill gas	tCO_2e p.a.	112,732
Indirect transport emissions from landfill	tCO_2e p.a.	1,944
Offset through grid displacement from the export of electricity from landfill gas engines	tCO_2e p.a.	-16,106
Total	tCO_2e p.a.	98,571

Table 7.6 Baseline landfill GHG emissions summary

7.64 An alternative baseline scenario could be export for recovery (exporting the waste abroad for processing). However, this is an unlikely baseline for the waste to be processed at the proposed development. Whilst the export of waste is permissible, the energy recovered from this waste would not contribute towards UK renewable energy targets and would effectively be a lost resource to the UK. The UK government is keen to support domestic markets where they can provide better environmental outcomes, to ensure that the UK benefits from the energy generated from UK waste. Recent estimates indicate that over the past few years the UK has been reducing the amount of waste exported ('UK Energy from Waste Statistics 2018', Tolvik, 2019).

7.65 Should waste export for recovery be considered as an alternative baseline, it is expected that the conclusions of the assessment will remain the same and that the ERF would have a net benefit. This conclusion has been reached as the transport emissions associated with the export of waste abroad would be significantly greater than the transport emissions associated with processing the waste within the UK.

7.66 Taking the above into consideration, landfill is considered to be a suitable baseline comparator for the purposes of the assessment.

7.67 Grundon Waste Management Limited currently operates a waste transfer station (WTS) at the site. The waste, primarily from commercial and industrial (C&I) sources, is delivered to the existing WTS in refuse collection vehicles (RCVs). The waste is then bulked at the WTS before being loaded into articulated vehicles for transport off-site.

Electricity production alternative: CCGT baseline

7.68 The assumed export of electricity of 31.3 MWe from the ERF to the electricity distribution network would displace electricity otherwise produced. Therefore, the Carbon Assessment (Technical Appendix D1) has included this offset within its calculations. As justified in section 3.1.3 of Technical Appendix D1 the most likely source of electricity which the ERF will be displacing is that from combined cycle gas turbines (CCGTs). This is because in the UK CCGTs operate under the concept of the marginal generating unit and they are the most likely form of electricity generation to be used to balance demand. Other electricity sources such as wind and solar, are intermittent, with varying electricity supplies dependent on the weather conditions and time of year. As the ERF will be displacing regular energy generation, CCGTs are considered the most appropriate comparative technology.

7.69 A summary of the results as reported in Technical Appendix D1 is presented in Table 7.7.

Item	Units	Value
Net electricity export	MW	28.2
Net electricity exported	MWh	238,614
Total CO2 offset through export of electricity	tCO2e p.a.	88,526

Table 7.7 Baseline electricity offset summary

7.70 A summary of the baseline figures of local and sector carbon emissions, used for the assessment of significance, is provided in Table 7.8 below.

Item	Units	Value
West Sussex County Council Total 2018	$ktCO_2e$	3,610.0
UK Industrial and Commercial Other Fuels Sector 2018	$ktCO_2e$	16,900.1
West Sussex Industrial and Commercial Other Fuels Sector 2018	$ktCO_2e$	242.8

Table 7.8 Baseline carbon dioxide emissions summary

Future baseline

7.71 The proposed development is expected to have at least a 25 year lifetime. Therefore, for all assessments, the future baselines must be considered.

Waste alternative: landfill baseline

7.72 UK government strategy emphasises the aim to reduce the amount of both plastics and food waste in residual waste. The reduction in either of these would have opposing impacts on the waste composition. A decrease in plastic waste would create a higher biogenic waste composition and so decrease the carbon emissions and increase the net carbon benefit. Whereas a decrease in food waste would create a lower biogenic waste composition and so increase the carbon emissions and decrease the net carbon benefit. Therefore, the impacts to some extent cancel each other out.

Electricity production alternative: CCGT baseline

7.73 Due to the UK government's target to achieve net zero by 2050, it is anticipated that in the lifetime of the ERF, there will be an increased reliance on renewable forms of electricity generation. However, it is considered that the construction of the proposed development will have little or no effect on how nuclear, wind, or solar plants operate and will not restrict or impede their development. This is due to the intermittency of renewables and the long term need remaining for reliable power sources. Nevertheless, there may be improvements in technologies and the storage of power within the lifetime of the proposed development. Therefore, alternative grid displacement factors, which would be relevant if the ERF were to displace renewable sources of energy, have been considered in the sensitivity analysis within Technical Appendix D1.

7.74 A summary of the future carbon budgets, used for the assessment of significance, is provided in Table 7.9 below.

Item	Units	Value
UK carbon budget 2023 - 2027	MtCO2e	1,950
UK carbon budget 2028 - 2032	MtCO2e	1,725
UK carbon budget 2033 - 2037	MtCO2e	965

Table 7.9 Future baseline carbon dioxide emissions summary

Climate change resilience

Current baseline

7.75 The information on current climate is sourced from historical climate averages data from the period 1981-2010, as set out on the Met Office website. Trends are as described in the Met Office regional profile for Southern England and data taken from the closest meteorological station to the proposed development, Shoreham Airport, approximately 20 km to the east. Full details of the baseline climate are provided in Appendix D3 and summarised in Table 7.10.

Future baseline

7.76 As described in the methodology section, the future baseline is calculated from the current Shoreham baseline using the predicted changes in South East England climate as provided by UKCP18. This assessment uses the UKCP18 predictions as set out in Table 7.3. The predicted changes to baseline climate are detailed within Appendix D3.

7.77 In summary, the current baseline and future baselines used for the purpose of this assessment are provided in Table 7.10. It is also qualitatively assumed that there will be increases in both the intensity rainfall and speeds of winds in winter.

Item	Units	Baseline (Shoreham 1981-2010)	Predicted change (UKCP18)	Future baseline (At Shoreham 2050)
Central (50thpercentile) estimate				
Mean annual temperatures	ºC	10.5	+1.9	12.4
Mean winter temperatures	ºC	5.1	+1.7	6.8
Mean summer temperatures	ºC	16.1	+2.5	18.6
Mean in winter precipitation	mm	67.9	+13.0%	76.8
Mean summer precipitation	mm	47.5	-22.0%	37.0
High (90th percentile) estimate				
Mean summer precipitation	mm	47.5	+5.0%	49.9

Table 7.10 Future baseline climate conditions

Assessment of effects

GHG emissions

Incorporated mitigation

7.78 The proposed development has been through a detailed design process which has considered measures to minimise the impact to GHG emissions. These are listed in full within the mitigation section of this chapter. The assessment of GHG emissions has considered the incorporated mitigation measures.

Construction phase

7.79 As a proportion of overall emissions from the proposed development, construction emissions are only estimated to be between 3 and 4% of annual emissions[1] and have therefore been regarded as minor compared to the carbon impacts over the lifetime of the proposed development and not assessed any further. This is supported by the IEMA guidance which states that a balance should be "*struck between the amount of GHG emissions emitted by the project and the effort committed to the actual GHG assessment".*

Operational phase

7.80 A detailed Carbon Assessment is included in Technical Appendix D1. A summary of the key results from the assessment are provided in Table 7.11.

Parameter	Emissions (t CO2e per annum)
Releases from landfill gas	112,732
Transport of waste and outputs to landfill	1,944
Offset of grid electricity from landfill gas engines	-16,106
Total baseline emissions	98,571
Transport of waste to and outputs from the ERF	2,121
Offset of grid electricity with ERF generation	-88,526
Emissions from the ERF	136,874
Total proposed development emissions	**50,469**
Net benefit of ERF	**48,102**

Table 7.11 Summary of the key results from the GHG assessment

7.81 As shown, there will be a net carbon benefit of approximately 48,102 tCO2e per annum from the ERF when compared to the baseline.

7.82 Another way to express the benefit of the ERF is to consider the additional power generated by the ERF as compared to the landfill counterfactual and calculate the effective net carbon emissions per MWh of additional electricity exported. This is referred to as the effective carbon intensity and is calculated to be -0.125 tCO2e/MWh. These calculations are displayed in further detail within Technical Appendix D1.

7.83 It is also anticipated for there to be a carbon benefit associated with the development of the WSTF when compared to the existing WTS, due to the reduced transport and the recovery of recyclates from the incoming waste. This is qualitatively assessed further within Technical Appendix D1.

7.84 In addition, the fitting of 4,500 m^2 of photovoltaic panels across the south facing roofs of both the ERF and WSTF buildings will contribute to the renewable energy production of the proposed development.

[1] *Assumption estimated using reference data calculated using the WRATE (Waste and Resources Assessment Tool for the Environment) life cycle assessment tool from similar projects.*

7.85 To determine the significance of the calculated annual carbon emissions these have been compared to the current baselines as displayed in Table 7.12. These values are based only on the quantitative values for the assessment of the ERF emissions.

Parameter	Landfill emissions as a % of background	ERF emissions as a % of background	Net benefit as a % of background
West Sussex 2018	2.73%	1.40%	1.33%
UK Industrial and Commercial Other Fuels Sector 2018	0.58%	0.30%	0.28%
West Sussex Industrial and Commercial Other Fuels Sector 2018	40.60%	20.79%	19.81%

Table 7.12 GHG significance compared to baseline values summary

7.86 As these emissions are positive, they will be contributing to the carbon emissions of the region and UK. However, IEMA (2017) guidance recognises that it is important to consider the 'net' effects of the emissions, when compared against the likely alternative.

7.87 Therefore, as the ERF will be replacing landfill and will have a net positive impact, this will help contribute to the achievement of the GHG reduction targets. The significance of the difference could be considered as being a significant (>1%) positive impact for total West Sussex emissions and West Sussex Industrial and Commercial Other Fuels Sector. Although there is a positive net impact for UK Industrial and Commercial Other Fuels Sector, it is not above 1% and is therefore not considered to be significant.

7.88 It is acknowledged that when considered at a local level, the ERF will contribute over 1% of carbon dioxide equivalent emissions, and this may be considered significant. However, as above, the significance of the difference should be the focus of the assessment.

7.89 The contribution of emissions from the ERF has been compared to UK carbon budgets to assess the significance of the net carbon benefit. These results are detailed in Table 7.13 below.

Parameter	Value (tCO_2e)	As a % of carbon budget		
		2023-2027	2028-2032	2033-2037
Emissions from landfill	98,571	0.005%	0.006%	0.010%
Emissions from ERF	50,469	0.003%	0.003%	0.005%
Net benefit	48,102	0.002%	0.003%	0.005%

Table 7.13 GHG significance compared to carbon budgets summary

7.90 The net contribution of emissions from the ERF are well below 1% of all carbon budgets to 2037 and are therefore not considered a significant contribution. Although there is a net benefit of the ERF the values are below 1% and therefore not considered to make a significant contribution to reducing carbon emissions.

Sensitivity analysis

7.91 The Carbon Assessment (Technical Appendix D1) has included sensitivity analyses for LFG capture rates to account for a range of capture rates from 52% to 75% (to account for varying values within literature), and for grid displacement factors from 0.371 to 0.28 t CO2e/MWh (to account for varying values of different technologies). Full details and results of the sensitivities are displayed within section 4.2 of Technical Appendix D1. The results are all a net benefit, ranging between 5,558 and 105,672 28 t CO2e.

Climate change resilience

7.92 The climate change resilience has been assessed for the following vulnerable receptors:

- Plant buildings and operational equipment
- Vehicular access to site (for workers and waste)
- Grid connection and local users
- On-site workers

7.93 For each receptor, the impact of each predicted climatic effect is assessed. This has taken into account the design mitigation measures embedded into the proposals. The susceptibility and vulnerability to climate change have been considered to determine the resulting sensitivity to the impacts of climate change. Magnitude and then overall significance of the effects have then been determined. Full details of the assessment can be found in Appendix D4. Table 7.14 provides a summary.

Predicted change in climate	Impact	Susceptibility	Vulnerability	Resulting sensitivity	Magnitude of effect considering mitigation	Overall significance
Plant buildings and operation						
Increase in temperatures	Over -heating	Low	Moderate	Low	Small	Negligible
Increase in rainfall	Surface water flooding	Low	Moderate	Low	Small	Negligible
	Fluvial flooding	Moderate	Moderate	Medium	Small	Slight
	Groundwater flooding	Moderate	Moderate	Medium	Small	Slight
Decrease in summer rainfall	Drought	Low	Moderate	Low	Small	Negligible
Extreme events	Building damage from high winds	Low	Moderate	Medium	Small	Slight
Vehicular access to site						
Increase in winter rainfall	Flooding of access roads	Moderate	Low	Low	Small	Negligible
Extreme events	Trees and branches blocking access roads	Low	Moderate	Low	Small	Negligible
Grid connection and local users						
Increase in winter rainfall	Infrastructure damage due to flooding	Moderate	Low	Low	Small	Negligible

Predicted change in climate	Impact	Susceptibility	Vulnerability	Resulting sensitivity	Magnitude of effect considering mitigation	Overall significance
On-site workers						
Increase in temperatures	Discomfort or very mild health effects	Moderate	Low	Low	Small	Negligible
Increased winter precipitation	On-site Flooding (fluvial, groundwater or surface water)	Moderate	Low	Low	Small	Negligible
Extreme events	Surges in wind and effects on worker safety	Low	Moderate	Medium	Small	Slight

Table 7.14 Summary of climate impacts on receptors

7.94 In summary, the overall significance of climate change on the proposed development is assessed to be negligible to slight. This is not a significant effect.

Mitigation measures

7.95 The proposed development has been through a detailed design process which has considered the measures to minimise the impact to GHG emissions and improve the resilience of the development to climate change:

- The proposed development will require an Environmental Permit (EP) to operate. In accordance with the EP requirements, the applicant will be required to ensure the proposed development is designed with a high level of energy efficiency and to use energy and water efficiently, including maintaining records of their consumption within the process.
- The provision of a sustainable drainage system. This includes reuse of waste process water generated from site activities. The drainage system provides surface runoff disposal to the ground (infiltration) and there is also attenuation storage provided to restrict surface water run off generated across roofs and hardstanding. It includes a 40% allowance for climate change. The attenuation storage also includes a 40% allowance for climate change.
- Considerations of groundwater risk have been considered within the design. The only elements of the design that could interact with groundwater is the installation of supporting structural piles and bunker. Local surface ponding of water will be allowed to occur in extreme events in managed hardstanding areas. These areas will be at marginally lower elevations and would also allow for the ponding of groundwater, should a groundwater flood event occur. There is also managed overland flow path within the site boundary which directs water through site and down an existing flow path towards the local watercourse.
- The consumption of water within the process will be recorded as a requirement of the EP.
- The heat export capacity of the proposed development ensures that as soon as there are heat offtake agreements in place, the proposed development can be a provider of heat to the local community and further offset carbon emissions from alternative heat sources. The export of heat in the form of

hot water or steam, and periodic reviews of the viability of CHP implementation are requirements of the EP.

- The proposed development will be operated to ISO 14001 certification. This is the international standard for environmental management systems (EMS), which will provide the proposed development with a framework for making policy and process changes that help improve its environmental performance. The EMS will require the applicant to set objectives and targets to reduce the environmental impacts associated with operation of the proposed development.
- The design includes an electric vehicle charging point for each car parking space on site. This encourages and provides the opportunity for staff or visitors to use electric vehicles.
- The south-facing roofs of the ERF and WSTF buildings will be fitted with 4,500m^2 of photovoltaic panels. Such an array is expected to generate approximately 663-745 MWh per annum and will therefore make a further contribution to renewable energy generation at the site.
- The lighting scheme adopts LED luminaires, which offer significant energy savings and provide a high degree of optical control.
- Bottom ash from the ERF will be used to make aggregates suitable for construction and road projects, while the flue gas treatment residues (FGT residues) will be recycled into carbon negative aggregate (or Manufactured LimeStone (M-LS)) that can be used to make carbon negative building blocks.
- The proposed development has been designed to withstand increases in temperature; The main process building is required to be well ventilated to deal with the heat generated within certain process areas and the buildings and process systems are designed with movement joists, which account for expansion and shrinkage in fluctuating temperatures.
- The building would be designed structurally to tolerate increasing storm patterns, including higher winds. Part of the structural design for the building wind loading studies will be carried out which include a safety factor which is sufficient to allow for these strong winds.
- Preventative measures including regular inspections of the buildings will occur to identify and fix any damage to the buildings before it can develop onto a hazard.
- National health and safety standards will be followed and the Risk Assessment Method Statement (RAMS) will developed for all works around site.
- To mitigate risk to workers who are required to climb one of the stacks, wind speeds will be checked prior to activities to ensure they are not at dangerous levels. and workers will be required to be within a hooped ladder and be connected with a safety harness.
- The proposed development has a five day contingency plan, to account for any halt in feedstock availability. The waste bunker has the capacity for five days' worth of waste storage; there are over five days of APCr residues maintained on site; and there is sufficient storage capacity for over five days of IBA and APCr storage. Therefore, the proposed development will be able to continue normal operations for five days.

- The proposed development has been designed so that the grid connection and associated cables are underground. This protects them from any above ground damage from storm or wind events and the cables are designed to be resilient to water and so would not be impacted by any flooding events.

7.96 The potential for additional mitigation through the use of CCUS technologies may become available during the life of the plant. CCUS and its implementation within the UK is a relatively new technology, so the infrastructure of the process, such as regulatory frameworks and available markets for recovered carbon dioxide, are not yet established. The recently published UK government report Ten Point Plan for a Green Revolution outlines the government's ambitions to capture 10 Mt of carbon dioxide a year by 2030. The government aims to incorporate CCUS in up to four industrial clusters in areas such as the North East, the Humber, the North West, Scotland and Wales (due to their proximity to the North Sea), with CCUS developed primarily alongside hydrogen plants. It is anticipated that these four sites will kick start the development and validity of CCUS technologies, infrastructure and establishment within the UK. Although the Ten Point Plan does not make specific reference to the incorporation of CCUS with EfW (and does not identify the South of England as an area of specific interest), the 2020 Policy Connect report ('No Time to Waste'), states the following with regards EfW with CCUS:

"Carbon Capture and Storage (CCS) technology is increasingly being trialled for different industries across the world."

7.97 Taking this into consideration, the applicants will continue to review the feasibility of retrospectively installing a CCUS system as these technologies develop, subject to commercial and economic feasibility.

7.98 The Ten Point Plan also states that a consultation on the phase out of new diesel HGVs will be launched in 2021. It states there will be £20 million invested in freight trials to pioneer hydrogen and other zero emission lorries, to support industry to develop cost-effective, zero-emission HGVs in the UK. Upon the advance and success of these technologies, the applicants will consider the viability of adopting low emission HGVs for waste delivery and will consider the addition of associated infrastructure as required.

7.99 In addition, current mitigation measures will be constantly under review; the EP will require that records of energy and water consumption are maintained, the EP will require that there are periodic reviews of heat export viability; the uses of IBA and APCr will be periodically reviewed; and the EMS will require the applicants to set objectives and targets to reduce the environmental impacts associated with operation of the proposed development.

Residual effects and conclusions

GHG emissions

7.100 In line with national and local policy the carbon emissions from the proposed development have been calculated and demonstrate that the proposed development will contribute to the achievement of the GHG reduction targets. This has been carried out in line with the requirements of the EIA Regulations. This assessment has shown that the proposed development will have a net

carbon benefit when compared to the baseline. In addition, when comparing a range of sensitivities to account for varying grid displacement factors and landfill gas capture rates there remains a net benefit associated with the proposals. This net benefit is considered to be significant when compared to the total carbon emissions in West Sussex from 2018 and the Industrial and Commercial Other Fuels sector within West Sussex from 2018.

7.101 Therefore, it can be concluded that the proposed development will have a positive effect to reducing carbon emissions when compared to the baseline and contribute to the achievement of the GHG reduction targets.

Climate change resilience

7.102 In line with national and local policy, the resilience of the proposed development to climate change has been assessed. The assessment has concluded that the projected climate change effects over the lifetime of the proposed development would have a negligible to slight effect and therefore there will be no significant effects on key vulnerable receptors. The proposed development provides additional resilience to the local electrical distribution grid and end users to deal with outages across the generation and distribution network. As such the proposed development is considered to be appropriately designed to adapt to impacts arising from climate change and there are no significant residual effects.