USKMOUTH POWER STATION DEVELOPMENT

ENVIRONMENTAL STATEMENT

Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017

On behalf of SIMEC Uskmouth Power Ltd.

APPENDIX 13.1: GHG EMISSION CALCULATIONS

Quality Management

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GLOSSARY

Term	Definition
ACT	Advanced Conversion Technology power plant
ADMS	Atmospheric Dispersion Modelling System
AOD	Above Ordnance Datum
APC	Air Pollution Control
AQMA	Air Quality Management Areas
BAT	Best Available Technique
BGS	British Geological Survey
BS	British Standard
BSI	British Standard Institute
CCGT	Combined Cycle Gas Turbine
CERC	Cambridge Environmental Research Consultants
CIEEM	Chartered Institute of Ecology and Environmental Management
CRTN	Calculation of Road Traffic Noise
DCLG	Department for Communities and Local Government
DMRB	Design Manual for Roads and Bridges
EcIA	Ecological Impact Assessment
EIA	Environmental Impact Assessment
EfW	Energy from Waste
EMF	Electromagnetic Fields
EPUK	Environmental Protection UK
ES	Environmental Statement
FEED	Front End Engineering Design
FGT	Flue Gas Treatment
FRA	Flood Risk Assessment
GGAT	Glamorgan Gwent Archaeological Trust
GHG	Greenhouse Gasses
HER	Historic Environment Record
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
IEA	Institute of Environmental Assessment
IED	Industrial Emissions Directive
IEFs	Important Ecological Features
LAQM	Local Air Quality Management
LCP	Large Combustion Plant
LDP	Newport Local Development Plan
LHV	Lower Heating Value
LVIA	Landscape and Visual Impact Assessment
NCC	Newport City Council
NLCAs	National Landscape Character Areas
NOx	Oxides of Nitrogen
NRW	Natural Resources Wales
NSR	Noise Sensitive Receptors
PROW	Publics Rights of Way
SRF	Solid Recovered Fuel
SUP	Simec Uskmouth Power Limited
ZTV	Zone of Theoretical Visibility
ZVI	Zone of Visual Influence

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APPENDIX 13.1: GHG EMISSION CALCULATIONS

Introduction

1.1 This appendix provides additional details of the calculation of greenhouse gas (GHG) emission impacts reported in **Chapter 13: Climate Change** of the Environmental Statement (ES). It sets out the boundary of the assessment, data inputs or assumptions, and the output of the calculations.

1.2 It should be read together with **Chapter 13**, which provides the policy context, explains the with- and without-development scenarios assessed, and characterises the significance of effects due to the net change in GHG emissions attributed to the Uskmouth Conversion Project.

Overview of calculations

1.3 As described in **Chapter 13**, The Uskmouth Power Station Conversion Project proposes to convert the existing coal fired power plant at Uskmouth (B) Power Station to operate as a plant which would generate electricity through the combustion waste derived fuel pellets.

1.4 The operational Uskmouth Conversion Project would combust waste derived fuel pellets delivered primarily by rail and would generate electricity for supply to the national grid. Ash left after combustion would be transported to a facility for recycling. Operation of the Uskmouth Conversion Project would replace the future operation of the existing Uskmouth B power station co-firing coal and biomass, and would avoid the GHG emissions from production of primary materials where recycled ash is substituted.

1.5 The net GHG emissions due to the operational Uskmouth Conversion Project are calculated as the balance of these factors, i.e. the emissions caused by its operation compared to the emissions avoided in the baseline.

1.6 Production of the waste derived fuel pellets and the baseline for alternative waste management (absent pellet production) has been excluded from the assessment boundary as the pellets are regarded as a commercially available fuel that would be produced and used in any event, with the primary purpose of the development being power generation rather than as a waste management facility.

1.7 Design operating parameters for the facility have been provided by the Applicant: these are a net calorific value (NCV, the energy content) of the pellets of 22 MJ/kg, gross and net electrical outputs of 242 MWe and 220 MWe respectively, a net thermal efficiency of 33.4% and an annual uptime (referred to as load factor) of up to 90%. With these parameters, the Uskmouth Conversion Project would combust 849,443 tonnes per annum (tpa) of waste derived fuel pellets.

1.8 A 50:50 biogenic:fossil carbon content[1] ratio for the fuel has been provided by the Applicant. It is understood that this value, as well as the NCV, can be provided with some certainty given the

[1] Biogenic carbon is that in plant-derived material (such as food waste) whereas fossil carbon is that in material derived from fossil fuels, such as plastics. Only fossil carbon is regarded as causing a net increase in atmospheric CO_2 concentration, having been

processing of waste into waste derived fuel pellets to a contractual specification, in contrast with facilities that combust mixed residual municipal waste.

1.9 The Applicant has stated that if the Uskmouth Conversion Project were not to go ahead, it is expected that the existing Uskmouth facility would operate as a combined coal- and biomass-fired facility in the future. In that future baseline, all three generating units of Uskmouth Power Station would operate. Each unit would generate the same power (110 MWe net) as the units in the operational Uskmouth Conversion Project. Emissions from Uskmouth Power Station operation as combined coal- and biomass-fired have therefore been estimated as a baseline against which to compare the emissions of the operational Uskmouth Conversion Project.

1.10 The government has set out plans to limit the GHG emissions from existing coal-fired generation plant to an emissions intensity of 0.45 tCO_2e/MWh from 2024 or 2025 (BEIS, 2018) and this intensity has been used to calculate emissions from power generation at the Uskmouth Power Station operation as a combined coal- and biomass-fired facility. For the purpose of comparison, emissions associated with fuel transport and management of ash have been assumed to be similar to the operational Uskmouth Conversion project but scaled to the estimated fuel throughput of the three units of Uskmouth Power Station operation as a combined coal- and biomass-fired facility.

Assessment boundary

1.11 The assessment boundary encompasses GHG emissions from operation of Uskmouth Conversion Project, from use and management of its outputs, and from electricity generation in a baseline scenario without the proposed development. This includes scope 1, scope 2 and scope 3 emissions where applicable[2]. The main emission sources assessed are:

- combustion of waste derived fuel pellets in the proposed development;
- nitrous oxide (N_2O) emitted by the air pollution control system;
- recycling of bottom ash and fly ash;
- transport of waste derived fuel pellets to the proposed development and ash from it to the point of recycling; and
- future baseline operation of the three-unit Uskmouth B facility.

released from long-term geological storage. Biogenic carbon was drawn down from the atmosphere by the plants during growth prior to being released again by combustion, so over this short cycle does not change the net atmospheric concentration, provided that the C content is released as CO_2 and not as CH_4 from e.g. a decomposition process.

[2] GHG emissions caused by an activity are often categorised into 'scope 1', 'scope 2' or 'scope 3', following the guidance of the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) Greenhouse Gas Protocol suite of guidance documents (WRI and WBSCD, 2004). Scope 1 emissions are those released directly by the entity being assessed, e.g. from combustion of material at an installation. Scope 2 emissions are those caused indirectly by consumption of imported energy, e.g. from generating electricity supplied through the national grid to an installation. Scope 3 emissions are those caused indirectly in the wider supply chain, e.g. in the upstream extraction, processing and transport of materials used or the downstream disposal or recycling of waste products.

Exclusions

1.12 In some cases where data is not readily available, *de minimis* sources have been screened and excluded from the emission calculations. A materiality threshold of 5% of waste combustion emissions has been used to screen *de minimis* sources.

1.13 Uskmouth Conversion project construction-stage GHG emissions have been screened as non-material, as explained in the Assessment of Construction Effects section of **Chapter 13**. Decommissioning-stage emissions are also screened out as these are considered unlikely to exceed construction-stage emissions.

1.14 Production of the waste derived fuel pellets or alternatives for waste management in the absence of pellet production are not within the assessment boundary, as discussed above. These are viewed as a commercially available fuel, with only the transport from the location of production to the proposed development being attributable to its operation.

Allocation and attribution

1.15 All calculated net GHG emissions within the assessment boundary are allocated and attributed to the proposed development, for the purpose of assessing its net impacts. No differential allocation or attribution based on operational control, ownership or equity share has been required.

Uskmouth Conversion Project

1.16 Calculation of GHG emissions from waste derived fuel pellet transport, combustion and recycling of ash has been based on design information provided by the applicant or reasonable assumptions where necessary. The four main items of data are:

- the calorific value of waste derived fuel pellets to achieve the target electricity generation at the design throughput and efficiency;
- the carbon content of waste derived fuel pellets at the calorific value and proportion that is biogenic or fossil;
- the proportion of waste derived fuel pellets left as ash after combustion and the potential recycling uses of that ash;
- the rate of N_2O emissions due to ammonia slip from the air pollution control system;
- the distances and transport modes for waste derived fuel pellet inputs and ash outputs.

Electricity generation

1.17 The Uskmouth Conversion Project will operate two of the three power station units, each generating 122 MWe gross of electricity and exporting 110 MWe to the grid (the difference being on-site power demands, ‘parasitic load’). It will operate for up to 90% of the year, which is 7,884 operating hours. Total annual gross and net power generation will therefore be up to 1,907,928 MWh and 1,734,480 MWh respectively. The net thermal efficiency of the facility will be 33.4%, therefore requiring 5,191,041 MWh of thermal input from fuel.

Waste derived fuel pellet properties and consumption

1.18 The waste derived fuel pellets are produced from waste that has been processed to meet a contractual fuel specification. The applicant has provided expected values for NCV, total carbon content and biogenic to fossil carbon ratio[3] for the waste derived fuel pellets. The NCV is expected to be typically 22 MJ/kg, or 6.1 MWh/t and the total carbon content is expected to be 48% (on a mass basis, as received). A 50:50 biogenic:fossil carbon content ratio for the fuel has been specified.

1.19 The contractually acceptable range for the NCV of the waste-derived fuel pellets is between 19-25 MJ/kg, with the middle of this range (22 MJ/kg) expected in practice as an annual average. The NCV of the fuel directly affects the level of throughput necessary for the target electricity generation and is linked to the carbon content in the fuel.

1.20 Due to the processed nature of the fuel and defined specification (unlike the greater variability of raw municipal and commercial waste), it is considered reasonable for the assessment to use these values as consistent annual averages.

1.21 To generate 1,734,480 MWh of electricity at the net thermal efficiency defined above, 849,443 tpa of fuel at 6.1 MWh/t NCV will be required.

1.22 The total carbon content and NCV specified for the waste derived fuel pellets are each a little more than twice that of typical values for municipal solid waste (MSW) in the UK (as calculated from data in Defra, 2014; Golder Associates, 2005 and 2014; and Resource Futures, 2012). A high carbon content would be expected for a high NCV in processed waste pellets that have undergone drying and removal of non-combustible material (such as metal and glass) from raw waste. The 50:50 biogenic:fossil carbon content ratio is broadly consistent with what is typical for MSW.

1.23 One hundred percent oxidation (combustion) of available carbon to CO_2 has been assumed. This is conservative (i.e. potentially slightly over-estimating total GHG emissions) as the applicant considers that around 5% of combustible carbon may be left unburned in the ash residue[4].

1.24 The applicant has indicated that up to 1% of the total fuel throughput may be biomass, not waste derived fuel pellets. For the assessment this has not been specifically considered, as 100% waste derived fuel pellets would be the more conservative (higher-emitting) assumption.

N_2O emissions

1.25 The Uskmouth Conversion Project will use a selective non-catalytic reduction (SNCR) system as part of its air pollution control, with urea as the reagent. This can lead to N_2O emissions from reagent slip. The final draft Best Available Techniques (BAT) Reference Document (BREF) for Waste

[3] Biogenic carbon is that in plant-derived material (such as food waste) whereas fossil carbon is that in material derived from fossil fuels, such as plastics. Only fossil carbon is regarded as causing a net increase in atmospheric CO_2 concentration, having been released from long-term geological storage. Biogenic carbon was drawn down from the atmosphere by the plants during growth prior to being released again by combustion, so over this short cycle does not change the net atmospheric concentration, provided that the C content is released as CO_2 and not as CH_4 from a decomposition process.

[4] and the Best Available Techniques Reference Document (BREF) for Waste Incineration (European Commission Joint Research Centre, 2018) range is 1–3% of ash as unburned carbon on a dry weight basis, which would be approximately consistent after adjusting for moisture content.

Incineration (European Commission Joint Research Centre, 2018) suggests a typical range of 10–35 mg/Nm^3 N_2O in the stack exhaust stream. The high end of the range has been assumed for this assessment. However, data available to RPS from other operating facilities suggests that emissions at or below the bottom of the range are achievable, and this is discussed as a mitigation measure in **Chapter 13**.

1.26 **Chapter 12: Air Quality** has specified a normalised volumetric stack exhaust flow (dry, 0°C, 6% O_2) of 286 m^3.s^{-1} in total for both combustion lines. This would result in an annual stack efflux of 8,117,366,400 Nm^3/annum at 7,884 operating hours. It is understood that this value has been established by the Applicant based on annual combustion of circa. 1,036,184 tpa of waste-derived fuel, due to a highly conservative scaling of higher short-term fuel consumption of low-CV fuel to an annual average. The Applicant has specified that this is not an expected or commercially realistic scenario for operation of the facility, and therefore for the climate change assessment, the volumetric flow has been scaled down linearly based on the expected fuel throughput of 849,443 tpa, yielding 6,654,455,258 Nm^3/annum. A GWP of 298 for N_2O has been used, from the IPCC Fifth Assessment Report (including carbon-climate feedbacks) (Myhre et al., 2013).

Ash recycling

1.27 GHG emission reductions due to recovery and recycling of ash after combustion have been calculated based on the amount of ash the Applicant expects to be generated, the proportion of ash that can be recovered for recycling, and factors for GHG emissions from production of virgin materials that are avoided by recycling. The applicant estimates that the equivalent of up to 17% of the mass of input waste derived fuel pellets will be left as fly ash (including air pollution control residue, APCR) and up to 3% of the mass of input waste derived fuel pellets will be left as bottom ash.

1.28 The ash is expected to have similar properties to the pulverised fuel ash (PFA) generated when the power station used coal fuel. PFA is routinely used in the cement industry. Bottom ash from other energy-from-waste facilities is also routinely used as an aggregate substitute, and although fly ash with APCR has been regarded as a hazardous waste requiring landfill disposal, it is now increasingly processed and used as a cement substitute.

1.29 This report assesses two possible scenarios with regard to ash recycling: a conservative scenario in which the fly ash and bottom ash is recycled as aggregates, and a more optimistic scenario where the recovered fly ash (with its lime content) can be substituted for ordinary Portland cement (OPC) in the production of concrete.

1.30 For recycling of ash as aggregates, the GHG emissions factor of 0.0067 tCO_2e/t for primary aggregate production published in the environmental product declaration (EPD) for generic aggregate (Tarmac, 2016) has been used to calculate the emissions avoided. Carbonation of the ash during storage and processing has not been assumed, to be conservative for the assessment[5].

[5] This would in any case not materially affect total emissions, with likely absorption values being minor (CO_2 equivalent to 1-3% of ash dry mass potentially absorbed from atmosphere (N. Nolan, pers. comm., 2012).

1.31 For recycling of fly ash as OPC substitute, a Mineral Products Association technical datasheet (2019) regarding embodied CO_2e values for UK cement and cementitious materials indicates that pulverised fly ash (PFA) can be used to substitute for 6-35% of the cement used in concrete production. The GHG emissions factor published in this datasheet of 0.82 tCO_2e/t has been used to calculate the emissions avoided. This is very similar to the value published in an earlier EPD for primary Portland cement production in the UK (MPA, 2019).

Transport

1.32 GHG emissions from the transport of the waste derived fuel pellets to the site have been calculated using a tCO_2e/tonne.km emissions factor for train freighting. The Applicant has stated that at least 99% of fuel will be delivered by rail. The assumed distance is based on the applicant's intentions to source the fuel from either Rotherham, Birmingham or London. The GHG emissions calculations for the transport of the fuel to site assumes that 99% of the fuel will consist of waste derived fuel pellets delivered by rail, whilst the remaining 1% will consist of biomass delivered by HGV. In order to calculate GHG emissions from the delivery of biomass to site, a tCO_2e/km emissions factor for a large heavy goods vehicle (HGV) with a >17 tonne payload has been used, using the same assumed distance for waste derived fuel delivery.

1.33 GHG emissions from transport of ash to the point of processing have been calculated using a tCO_2e/km emissions factor for an HGV with a >17 tonne payload for bottom ash delivery and a tCO_2e/km emissions factor for an articulated HGV with a >3.5-33t payload for fly ash delivery. The one-way 74 km distance used for ash transport is an assumption based on an average of distances for previous ash sales from Uskmouth B as a coal-fired plant, provided by the Applicant.

1.34 All vehicle emissions factors are the sum of scope 1 and scope 3 emissions factors published by BEIS (2019a).

1.35 The Applicant's logistics strategy has informed these calculations, by providing the number of HGV/train movements per day, and tonne per delivery figure for the respective transport methods.

Electricity generation projections

1.36 BEIS publishes projections of the carbon intensity of long-run marginal electricity generation and supply that would be affected by small (on a national scale) sustained changes in generation or demand (BEIS, 2019b). BEIS's projections over the Uskmouth Conversion Project operating lifetime (2024 to 2043) are based on an interpolation from 2010's assumed marginal generator (a combined cycle gas turbine (CCGT) power station) to a modelled energy mix in 2030 consistent with energy and climate policy and predicted demand reduction scenarios by that point. A grid-average emissions factor is projected by BEIS for 2040 and the marginal factor is assumed to converge with it by that date, interpolated between 2030 and 2040; both factors are then interpolated from 2040 to a national goal for carbon intensity of electricity generation in 2050 and assumed to be constant after that point.

1.37 National Grid publishes 'Future Energy Scenario' projections (National Grid, 2019) of grid-average carbon intensity under several possible evolutions of the UK energy market, which have also been reviewed. The BEIS grid-average projection sits broadly in the middle of the National Grid range, and as stated above, the marginal factor is assumed by BEIS to converge with it (and hence with National Grid's scenarios) over time.

1.38 Graph 13.1.1 illustrates the projected carbon intensity factors for displaced electricity generation and Table 13.1.1 lists the BEIS grid-average and marginal factors for the 20 years of the Uskmouth Conversion Project operation.

1.39 These projections provide a useful guide to the expected decarbonisation of electricity generation in the UK over the Uskmouth Conversion Project operating lifetime. In this instance, as the future baseline scenario (set out below) is operation of Uskmouth Power Station as a coal- and biomass-fired generator, this is the marginal generation source that is being displaced by the Uskmouth Conversion Project and it has not been necessary to use projections of marginal generation carbon intensity in the assessment. However, the projection of grid-average generation intensity has been used, as this informs an estimation of the GHG emissions associated with generating electricity that would otherwise have been generated by Uskmouth Power Station as a coal- and biomass-fired generator but will not be generated by the Uskmouth Conversion Project (as it has a lower capacity).

Graph 13.1.1: Projected carbon intensity of electricity generation

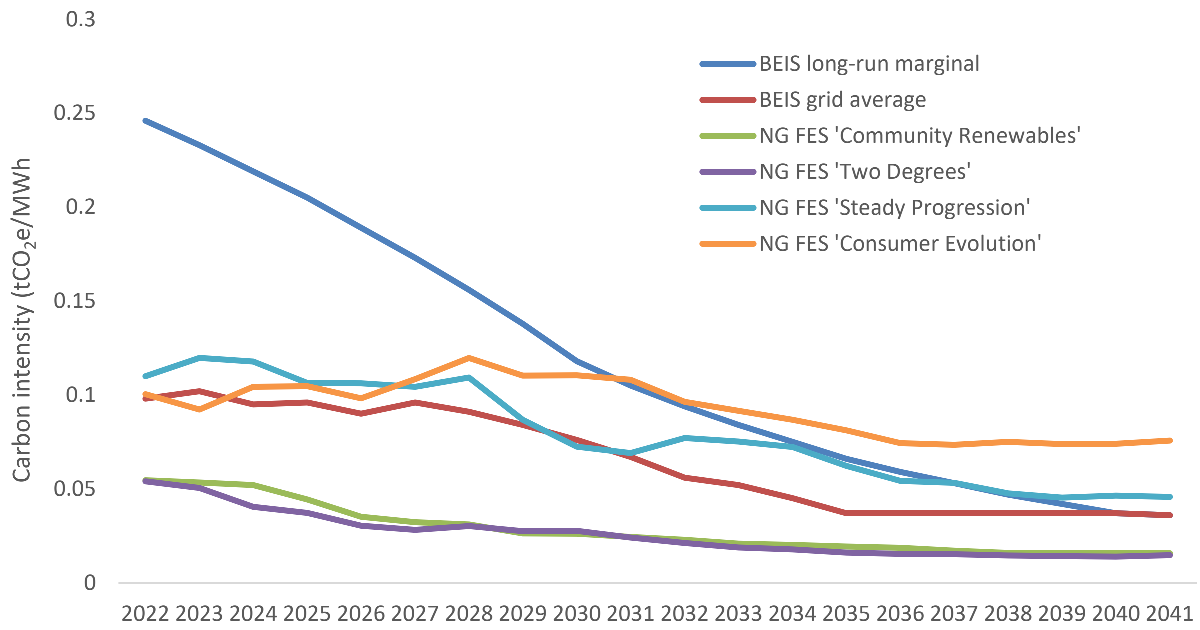

Table 13.1.1: Projected carbon intensity of marginal and grid-average electricity generation

Operating year	Calendar year	Marginal carbon intensity (tCO_2e/MWh)*	Grid-average intensity (tCO_2e/MWh)*
1	2022	0.246	0.098
2	2023	0.233	0.102
3	2024	0.219	0.095
4	2025	0.205	0.096
5	2026	0.189	0.090

6	2027	0.173	0.096
7	2028	0.156	0.091
8	2029	0.138	0.084
9	2030	0.118	0.076
10	2031	0.105	0.067
11	2032	0.094	0.056
12	2033	0.084	0.052
13	2034	0.075	0.045
14	2035	0.066	0.037
15	2036	0.059	0.037
16	2037	0.053	0.037
17	2038	0.047	0.037
18	2039	0.042	0.037
19	2040	0.037	0.037
20	2041	0.036	0.036

** excluding scope 3 emissions, which are not provided in the BEIS projection*

Future baseline

1.40 As described in **Chapter 3**, the Applicant has shown that in the absence of the Uskmouth Conversion Project , the likely evolution of the future baseline at the application site is for all three units of Uskmouth Power Station to be re-energised as a coal- and biomass-fired generator and to generate electricity over the lifetime of the Uskmouth Conversion Project. The Applicant has specified that the generation capacity, thermal efficiency and annual uptime would be equivalent to the proposed development per unit (as specified in paragraph 1.16). Uskmouth Power Station as a coal- and biomass-fired generator in the future baseline would therefore generate 2,864,892 MWh/annum of electricity and export 2,601,720 MWh/annum to the grid.

1.41 The government has set out plans to limit the GHG emissions from existing coal-fired generation plant to an emissions intensity of 0.450 tCO_2e/MWh from 2024 or 2025 (BEIS, 2018). This is considered likely to be measured on a gross generation basis, consistent with the approach to the Emissions Performance Standard applied to new fossil-fuelled generators, although that is not confirmed until legislation has been introduced (BEIS, 2018 and D. Panzeri (BEIS), pers. comm. 10/03/20).

1.42 The Applicant has stated, as discussed in **Chapter 3**, that Uskmouth Power Station as a coal- and biomass-fired generator in the likely future baseline would achieve this emissions standard by co-firing biomass with coal. GHG emissions from fuel combustion at Uskmouth Power Station as a coal- and biomass-fired generator in the future baseline have been calculated from the emission rate of 0.450 tCO_2e/MWh.

1.43 Fuel transport and ash recycling for the future baseline are assumed for this assessment to be broadly similar to the Uskmouth Conversion Project but scaled in proportion to the greater coal and biomass fuel consumption estimated for Uskmouth Power Station B with three units operational.

1.44 Uskmouth Power Station as a coal- and biomass-fired generator in the future baseline with three units operational would export more electricity than the Uskmouth Conversion Project with two units: 2,601,720 MWh/annum compared to 1,734,480 MWh/annum. The assessment therefore accounts for the GHG emissions associated with generating the difference of 867,240 MWh/annum at other grid-connected sources, using the BEIS projected grid-average emissions factors for power generation as set out above.

Summary of assessment parameters

1.45 Table 13.1.2 summarises the parameters, values and data sources used in the GHG emission calculations.

Table 13.1.2: Summary of parameters, values and data sources

Parameter	Value	Unit	Source
Annual operating hours	7,884	hours	Applicant
Waste derived fuel pellet throughput	849,443	tpa	Applicant
Total carbon in waste derived fuel pellets	48	%, t/t basis	Applicant
Biogenic:fossil carbon ratio	50:50	ratio	Applicant
Waste derived fuel pellet NCV	22	MJ/kg	Applicant
Net thermal efficiency	33.4%	%	Applicant
Net electrical export	220	MW	Applicant
Net electrical export	1,734,480	MWh	Applicant
Gross electrical export	242	MW	Applicant
Gross electrical export	1,907,928	MWh	Applicant
Grid-average electricity generation carbon intensity	See Table 13.1.1	tCO_2e/MWh	BEIS, 2019b
Future baseline net electrical export	330	MW	Applicant
Future baseline net electrical export	2,601,720	MWh	Applicant
Future baseline gross electrical export	363	MW	Applicant
Future baseline gross electrical export	2,861,892	MWh	Applicant
Future baseline carbon intensity of generation	0.450	tCO_2e/MWh (gross)	BEIS, 2018
Bottom ash (% input waste derived fuel pellets)	3	%	Applicant
Fly ash (% input waste derived fuel pellets)	12	%	Applicant
Lime injection (% input waste derived fuel pellets)	17	%	Applicant
Bottom ash	25,483	tpa	Applicant

Fly ash w/ APCR	144,405	tpa	Applicant
N_2O slip	35	mg/Nm^3	EC, 2018
Volumetric stack exhaust flow (EfW)	6,654,455,258	Nm^3/annum	Applicant
N_2O GWP	298	ratio to CO_2 (as 1)	Myhre et al, 2013
Ash processing transport dist. (one way)	74	km	Assumed
HGV payload	20	t	Applicant
HGV emissions factor (50% laden)	0.00115	tCO_2e/v-km	BEIS, 2019a
Artic HGV payload	28	t	Applicant
HGV emissions factor (50% laden)	0.00115	tCO_2e/v-km	BEIS, 2019a
Artic HGV emissions factor	0.00099	tCO_2e/v-km	BEIS, 2019a
Freight train emissions factor	0.00004	tCO_2e/tonne-km	BEIS, 2019a
Aggregates production emissions factor	0.0067	tCO_2e/t	Tarmac, 2016
Portland cement production emissions factor	0.82	tCO_2e/t	MPA, 2019

Calculation outputs

1.46 Graph 13.1.2 shows the net total emissions calculated in year one of the Uskmouth Conversion Project’s operation and Table 13.1.3 shows the emissions breakdown. In subsequent years it is likely that factors such as GHG emissions from transport and from the other grid-connected generation making up the shortfall between the Uskmouth Conversion Project and future baseline electricity export would decrease, meaning year one is the likely maximum assessment year.

1.47 Graph 13.1.3 and Table 13.1.4 show the difference in net emissions with the assumption that fly ash is not recycled as a Portland cement substitute.

Graph 13.1.2: Year 1 emissions breakdown (tCO_2e) (high recycling benefit)

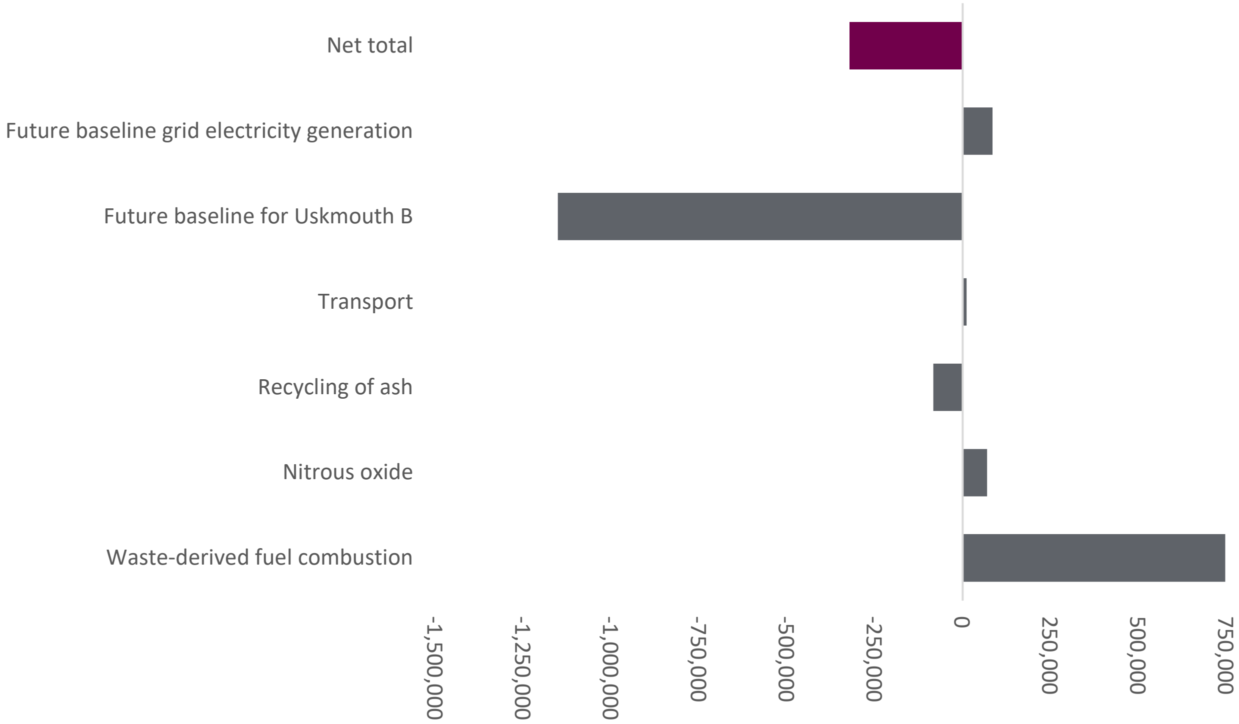

Table 13.1.3: Year 1 GHG emissions breakdown (high recycling benefit)

Item	tCO_2e
Waste-derived fuel combustion	747,510
Nitrous oxide	69,406
Recycling of ash	-83,416
Transport	11,609
Future baseline for Uskmouth B	-1,066,904
Future baseline grid electricity generation	84,990
Net total	**-321,795**

Graph 13.1.3: Year 1 emissions breakdown (tCO_2e) (low recycling benefit)

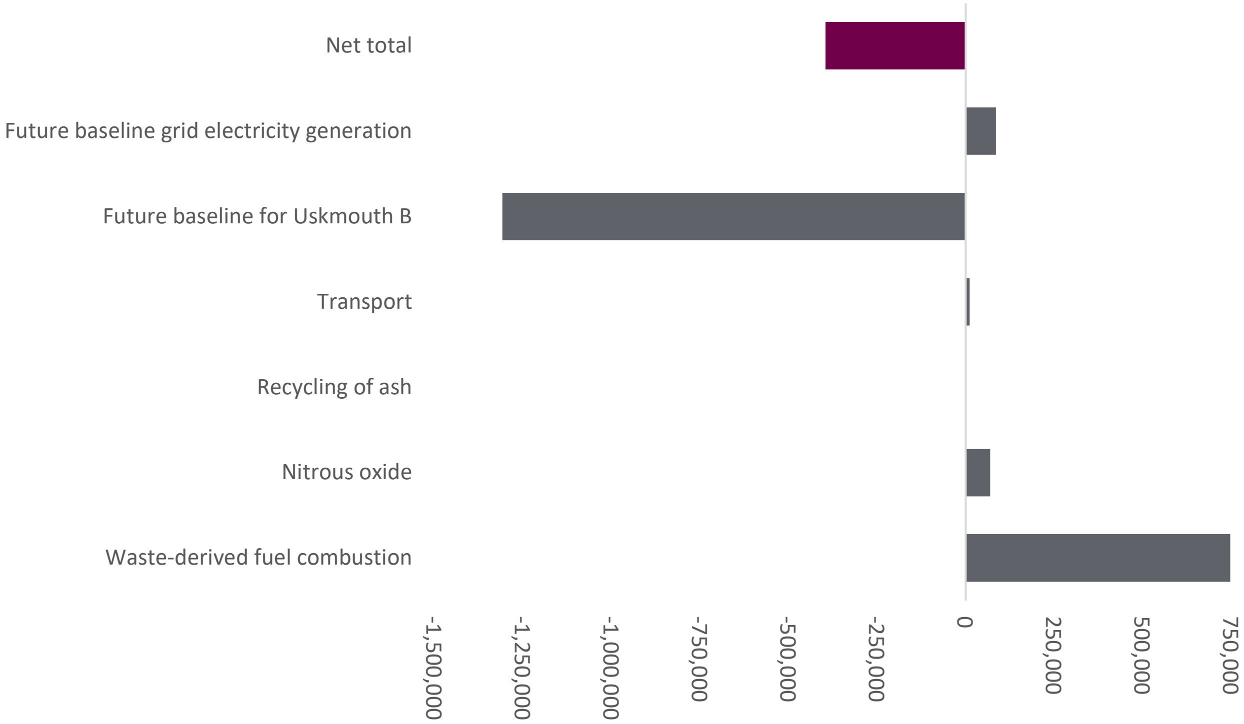

Table 13.1.4: Year 1 GHG emissions breakdown (low recycling benefit)

Item	tCO_2e
Waste-derived fuel combustion	747,510
Nitrous oxide	69,406
Recycling of ash	-515
Transport	11,609
Future baseline for Uskmouth B	-1,223,867
Future baseline grid electricity generation	84,990
Net total	**-395,857**

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