Gatwick Airport Northern Runway Project

Environmental Statement
Appendix 16.9.2: Assessment of Greenhouse Gas Emissions for Airport Buildings and Ground Operations (ABAGO)

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1 Introduction

1.1 General

1.1.1 This document forms Appendix 16.9.2 of the Environmental Statement (ES) prepared on behalf of Gatwick Airport Limited (GAL) for the proposal to make best use of Gatwick Airport's existing runways and infrastructure (referred to within this report as 'the Project').

1.1.2 This document provides the Greenhouse Gas (GHG) Technical Appendix for the emissions arising from Airport Buildings and Ground Operations (ABAGO) for the Project.

1.2 Overview of Methodology

1.2.1 ABAGO emissions are those from the following sources:

- electricity use in GAL buildings and infrastructure;
- electricity use by third parties operating within the airport boundary;
- Transmission and Distribution (T&D) losses associated with electricity supplies to the airport;
- fuel use (diesel, gas, petrol) used in GAL plant and vehicles;
- fuel use (diesel, gas, petrol) in third party plant and vehicles;
- emissions associated with the supply of potable water to the airport;
- emissions associated with the treatment and disposal of wastewater arising from the airport;
- waste management from the airport;
- materials and fuels used during fire training at the airport; and
- refrigerant losses from mechanical cooling plant across the airport.

1.2.2 ABAGO emissions have been calculated through two main methods:

- Development of an energy model spanning 2017 to 2050 that models electricity use and fuel use.
- Direct use of recorded water supply, wastewater generation, waste generation, fire training material consumption, and refrigerant loss records for 2018. These values are then projected forward to 2050 based on an appropriate scaling factor reflecting typical demand growth.

1.2.3 GHG emissions are then calculated based on selecting appropriate carbon emissions factors for the consumption element being quantified.

1.2.4 The modelling of ABAGO emissions also considers the commitments made by GAL in **ES Appendix 5.4.2: Carbon Action Plan** (CAP) (Doc Ref.5.3). Interventions are modelled that replace consumption with lower-carbon alternatives and the impact of these is quantified in terms of GHG emission reductions.

2 Baseline Development

2.1 Baseline Methodology

2.1.1 Baseline emissions for 2018 are derived from two sources:

- The 2018 energy consumption estimates derived from the energy model developed to support the assessment.
- 2018 metered/recorded data for water, wastewater, waste, fire training, and refrigerant losses.

2.1.2 The energy model spans the period from 2017 to 2050. The initial modelling year for energy consumption is 2017, and then energy demand has been projected forward to 2050 based on appropriate scaling metrics. Further detail on scaling metrics is provided in Section 3.

2.1.3 Input data for the energy model was obtained from metered consumption (where available) for energy and fuel, fuels, water, waste, and refrigerants for the energy model baseline year[1]:

- Baseline electricity consumption includes GAL power usage for lighting, baggage systems, lifts and escalators, safety systems, IT and controls, ventilation systems, cooling systems, and fixed electrical ground power (FEGP).
- Baseline gas consumption is taken from metered data, integrated with benchmark data where required to allow representative baseline consumption.
- Baseline fuel consumption was collected for diesel, petrol and gas oil consumption.
- Energy and fuel consumption for third parties has been derived from metered data (where GAL has access to this), via data requests to third parties; or using benchmark consumption values where no data is available.

2.1.4 For non-energy and non-vehicle emissions the baseline has been estimated by using metered/recorded data for 2018 and combining these with appropriate carbon factors to generate the emissions estimate for each activity.

2.1.5 Further details on the assumptions and limitations within each calculation process are included in Table 2.1.1.

Table 2.1.1: 2018 Baseline Year Methodology

Activity	Methodology
Electricity use in GAL buildings and infrastructure	Consumption for the initial modelling year of 2017 was obtained from metered consumption. It includes consumption from: lighting; baggage systems; lifts and escalators; safety systems; IT and controls; ventilation systems; and cooling systems.
Electricity use by third parties operating within the airport boundary	Consumption for the initial modelling year of 2017 was derived either from metered consumption (where GAL had access to this) or through data requests to third parties located at the airport.
T&D losses associated with electricity supplies to the airport	These are derived based on the kWh consumption estimates identified through metering or through third party enquiries.
Fuel use (diesel, gas, petrol) used in GAL plant and vehicles	Gas consumption for the initial modelling year of 2017 was obtained from metered consumption. Fuel consumption for plant/vehicles was obtained from metering of on-site fuel dispensing. Well-to-tank emissions are excluded from the assessment.

[1] The energy model underpinning the assessment is based on baseline recorded data from 2017 which then provides a modelled set of consumption values for the assessment baseline year of 2018.

Activity	Methodology
Fuel use (diesel, gas, petrol) in third party plant and vehicles	Gas consumption for the initial modelling year of 2017 was obtained either from metered consumption (where GAL had access to this) or through data requests to third parties located at the airport. Fuel consumption for plant/vehicles was obtained from metering of on-site fuel dispensing. Well-to-tank emissions are excluded from the assessment.
Emissions associated with the supply of potable water to the airport	Potable water consumption was derived from GHG reporting carried out by GAL.
Emissions associated with the treatment and disposal of wastewater arising from the airport	Wastewater volumes were derived from GHG reporting carried out by GAL.
Waste management from the airport	Waste quantities were derived from GHG reporting carried out by GAL.
Materials and fuels used during fire training at the airport	Quantities of materials and fuels using during fire training were derived from GHG reporting carried out by GAL.
Refrigerant losses from mechanical cooling plant across the airport	Quantities of refrigerant were derived from GHG reporting carried out by GAL.

2.2 Data Sources for 2018 Baseline

2.2.1 The data sources detailed in Table 2.2.1 were used to develop the 2018 baseline.

Table 2.2.1: 2018 Baseline Year Data Sources

Data	Source	Provider
London Gatwick (LGW) 2017 Corporate Greenhouse Gas (GHG) reporting	Gatwick 2017 Greenhouse Gas Assessment	GAL
London Gatwick (LGW) 2018 Corporate Greenhouse Gas (GHG) reporting	Gatwick 2018 Greenhouse Gas Assessment	GAL
EU ETS reporting for Gatwick Airport Ltd for 2017	2017 ETS Fuel Report	GAL
Third party energy consumption	Written enquiries to third parties within the airport	GAL
Consented project parameters	**ES Chapter 5: Project Description** (Doc Ref. 5.1)	GAL
GHG intensity factors	Greenhouse gas reporting: conversion factors 2018	Department for Business, Energy & Industrial Strategy (BEIS)

2.3 Baseline Year Carbon Intensity Factors

2.3.1 The 2018 baseline GHG emissions arising from activities are based on the Greenhouse gas reporting: conversion factors 2018 developed by BEIS. These factors allow for the conversion of 'activity units' into emissions of either CO_2 and/or CO_2e. The conversion factors used in this assessment are presented in Table 2.3.1.

Table 2.3.1: 2018 BEIS Conversion Factors

Activity	2018 factor	2021 factor	Unit
Grid electricity	0.28307	0.21233	$kgCO_2e/kWh$
Natural gas consumption in buildings	0.20437	0.20297	$kgCO_2e/kWh$
Diesel consumption in plant (average biofuel blend)	0.26349	0.25165	$kgCO_2e/kWh$
Potable water supply	0.344	0.149	$kgCO_2e/m^3$
Wastewater treatment	0.708	0.272	$kgCO_2e/m^3$
Waste disposal: Recycling (average construction closed loop)	1.0192	0.989	$kgCO_2e$/tonne
Waste disposal: Landfill (average construction) - assumed	1.277	1.239	$kgCO_2e$/tonne
Waste disposal: Recycling (Commercial and Industrial waste closed loop)	21.3842	21.294	$kgCO_2e$/tonne
Waste disposal: Landfill (Commercial and Industrial waste)	99.7729	467.046	$kgCO_2e$/tonne
Waste disposal: Landfill (typical, excluding soils, mineral oil, plasterboard, tyres, wood)	1.277	1.239	$kgCO_2e$/tonne
HFC-134a Refrigerant GWP	1,430	1,430	$kgCO_2e/kg$
R407C Refrigerant GWP	1,774	1,774	$kgCO_2e/kg$
R410A Refrigerant GWP	2,088	2,088	$kgCO_2e/kg$
R32 Refrigerant GWP	675	675	$kgCO_2e/kg$

3 Future Baseline Development

3.1 Future Baseline Methodology

3.1.1 Future estimated ABAGO emissions have been developed in the absence of the Project to reflect known buildings work and

incorporating a background level of improvements to energy performance across the existing airport.

1.1.1 The measures incorporated within the future baseline include:

- implementing additional solar-PV where feasible and financially viable for integration into new or existing facilities;
- implementing energy efficiency measures in existing buildings where technically practical and financially viable, including measures such as LED light replacements, installation of variable speed drives, and improvements in ventilation, insultation and heat recovery systems;
- improving heat generation and supply efficiencies as older gas boilers and heat networks are replaced;
- improving cooling efficiencies as existing chillers and cooling networks are replaced;
- some electrification of vehicles and ground support equipment;
- improved building regulations for new buildings; and
- decarbonisation of the UK electricity grid.

Future energy demand will also change to reflect growth in passenger numbers and air transport movements (ATM) under existing consented growth:

- Electrical power, cooling power, and heat energy consumption have been scaled for future years based on changes in passenger numbers.
- Electrical power, cooling power, and heat energy consumption have additionally been scaled to reflect changes in building internal areas (reflecting some construction works and some reconfiguration of spaces).
- Energy for vehicle fuel use has been scaled for future years based on ATM numbers.
- Potable water, wastewater, and waste management have been scaled based on future passenger numbers.
- Emissions arising from refrigerant losses are hard to predict but have been estimated based on future cooling energy demands (actual emissions are likely to be lower than this in future years).
- Fire training fuel demands are assumed to remain constant.

3.1.2 The future baseline reflects GAL achieving existing corporate targets for reducing Scope 1 and 2 emissions across the existing airport. These commitments are for GAL to achieve net zero by 2030. In addition, the future baseline considers the likely requirement under the Jet Zero Strategy (Department for Transport, 2022) for all airport operations in England to be zero emission by 2040.

3.1.3 GAL has developed a range of future ABAGO trajectories using a range of potential measures in order to demonstrate how these commitments might be met. Potential measures will follow the energy hierarchy to support delivery of existing targets, and include:

- Energy efficiency measures in GAL buildings across the airport.
- Transitioning from centralised gas-powered heating and hot water to decentralised electrical hot water systems.
- Transitioning from centralised gas-powered heating and hot water to centralised heat pump systems.
- On-site solar power generation.
- Off-site solar power generation.
- Private wire supply from local wind farm.
- Power purchase agreements with GAL-owned or third party-owned offshore wind farm.
- Use of hydrotreated vegetable oil (HVO) for GAL owned vehicles.
- Transition from internal combustion engine vehicles to electrical GAL owned vehicles.
- Replacement of existing refrigerants with lower global-warming-potential refrigerants.

3.1.4 The precise mix of measures that will be adopted to achieve targets cannot be stated at this point. GAL has identified an indicative emissions trajectory to meet existing airport commitments, which has formed the basis of the future baseline ABAGO emissions trajectory. This has been selected as it represents the main technical scenario for progressing towards the existing commitments with the highest GHG emissions in future years (ie the most conservative future scenario to achieve existing commitments has been used). It sees an increase in electricity consumption as the airport reduces reliance on gas boilers. It also sees a portion of electricity sources from renewable energy sources (on-site, private wire, or PPA) with remaining electricity consumption being drawn from the UK National Grid. The portion of electricity supplied from renewables increases over time.

3.1.5 The assessment assumes that renewable energy (either generated on site or procured through private wire arrangements or a Power Purchase Agreement) can be considered to have a carbon intensity factor of zero. For residual grid electricity the emissions carbon intensity is assumed to be the national grid average carbon intensity.

3.2 Data Sources for Future Baseline

3.2.1 In addition to data sources for the 2018 baseline the following data sources and forecasts have informed the future baseline development.

Table 3.2.1: Future Baseline Data Sources

Data	Source	Provider
Forecast ATMs and Passengers	**ES Appendix 4.3.1: Forecast Data Book** (Doc Ref. 5.3).	GAL
Building footprints / areas, hotel capacity, car parking etc for consented development	**ES Chapter 5: Project Description** (Doc Ref. 5.1)	GAL
Water usage profile	Water usage profile	GAL
GHG intensity factors	Greenhouse gas reporting: conversion factors 2022	BEIS (2022)
Future grid electricity carbon factor	Green Book Supplementary Guidance: valuation of energy use and greenhouse gas emissions for appraisal	BEIS (2023)
Forecast decarbonisation trajectory – Do minimum	Forecast ABAGO emissions	GAL (2023)

3.3 Future Baseline Carbon Intensity Factors

3.3.1 The majority of ABAGO carbon emissions factors do not change into the future – the main exception being those relating to electricity supply from the national grid. Future assumed emissions factors for grid electricity are presented in Table 3.3.1.

Table 3.3.1: Green Book Supplementary Guidance – Table 1: Grid Average Commercial/Public Sector Consumption-Based Emissions Factors (extract)

Year	Factor ($kgCO_2e/kWh$)
2019	0.218
2020	0.194
2021	0.213
2022	0.155
2023	0.143

Year	Factor (kgCO_2e/kWh)
2024	0.149
2025	0.129
2026	0.096
2027	0.072
2028	0.062
2029	0.053
2030	0.049
2031	0.041
2032	0.032
2033	0.025
2034	0.020
2035	0.020
2036	0.019
2037	0.018
2038	0.018
2039	0.017
2040	0.016
2041	0.015
2042	0.014
2043	0.009
2044	0.008
2045	0.008
2046	0.008
2047	0.005
2048	0.005
2049	0.003
2050	0.002

4 Future With Project Development

4.1 Future With-Project Methodology

4.1.1 The future with-Project estimated ABAGO emissions are derived in the same way as for the future baseline except using updated projections for:

- ATM quantities;
- passenger numbers; and
- increased / revised building floor areas to reflect the Project.

4.1.2 The future with-Project appraisal reflects the commitments set out in the Carbon Action Plan (CAP), contained in **ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref. 5.3):

- to achieve net zero for Scope 1 and 2 emissions by 2030; and
- to achieve zero emissions for Scope 1 and 2 emissions by 2040.

4.1.3 Similar to the future baseline modelling, the precise mix of measures that would be employed by GAL to achieve the committed outcomes of the DCO (as contained in the CAP) are not known at this time. Again, GAL has developed a range of future ABAGO trajectories using a range of different measures that demonstrate how the CAP commitments under the DCO might be met. These draw on the same list of potential technical measures set out in paragraph 3.1.3 above.

4.1.4 GAL has identified an indicative emissions trajectory to meet the committed outcomes. This draws on a range of potential future scenarios but has been selected as it represents the main technical scenario for progressing towards the outcomes with the highest GHG emissions in future years (ie the most conservative future scenario to achieve committed outcomes has been used).

4.2 Data Sources for Future With-Project

4.2.1 In addition to data sources for the 2018 baseline, and sources for the future baseline, the following data sources and forecasts have informed the future with-Project development.

Table 4.2.1: Future With-Project Data Sources

Data	Source	Provider
Building footprints / areas, hotel capacity, car parking etc for the Project	**ES Chapter 5: Project Description** (Doc Ref. 5.1)	GAL
Forecast decarbonisation trajectory – with-Project	Forecast ABAGO emissions	GAL (2023)

5 Evaluation of ABAGO GHG Emissions

5.1 2018 Baseline Emissions

5.1.1 The 2018 baseline for ABAGO emissions is set out in Table 5.1.1.

Table 5.1.1: 2018 Baseline ABAGO emissions

Activity	2018 Baseline Emissions (ktCO_2e)
Electricity consumption – GAL	35.029
Electricity consumption – third parties	3.678
Electricity – Transmission and Distribution	3.286
Natural gas consumption – GAL	10.518
Natural gas consumption – third parties	3.382
Other fuel use – GAL	1.075
Other fuel use – third parties	6.615
Water supply	0.237
Wastewater treatment	0.450
Waste management	0.294
Fire training combustible materials	0.034
Refrigerant losses	0.778
TOTAL	**65.377**[2]

5.2 Future Baseline Emissions

5.2.1 The future baseline emissions reflect the existing commitments by GAL to achieve net zero for Scope 1 and 2 by 2030, and zero emissions for Scope 1 and 2 by 2040.

5.2.2 Future baseline emissions from energy consumption for operation of airport buildings and third party buildings within the study area are set out in Table 5.2.1.

[2] Throughout the chapter, and associated appendices, tables present the calculated values for that datum. These are frequently simplified to a specific number of decimal places or significant figures. In several cases disparities in rounding lead to tallies of summary values, and presented total values, being inconsistent.

Table 5.2.1: Future Baseline Emissions from ABAGO Energy Use

Year	Future Baseline Emissions from ABAGO Energy Use ($ktCO_2e$)				
	Grid Electricity (GAL)	Grid Electricity (Third Parties)	Trans-mission and Distri-bution Losses	Natural Gas (GAL)	Natural Gas (Third Parties)
2019	32.820	4.545	3.172	9.811	4.176
2020	2.694	4.368	0.600	0.835	4.175
2021	20.610	4.181	2.105	6.645	4.174
2022	23.119	3.983	2.301	7.795	4.172
2023	24.462	3.773	2.397	8.673	4.171
2024	22.768	2.533	2.148	9.395	4.170
2025	16.682	2.211	1.604	6.720	2.779
2026	10.323	1.903	1.038	3.553	1.389
2027	8.083	1.609	0.823	<0.001	<0.001
2028	5.015	0.768	0.491	<0.001	<0.001
2029	2.108	-	0.179	-	-
2030	1.448	-	0.123	-	-
2031	0.880	-	0.075	-	-
2032	0.474	-	0.040	-	-
2033	0.192	-	0.016	-	-
2034	-	-	-	-	-
2035	-	-	-	-	-
2036	-	-	-	-	-
2037	-	-	-	-	-
2038	-	-	-	-	-
2039	-	-	-	-	-
2040	-	-	-	-	-
2041	-	-	-	-	-
2042	-	-	-	-	-
2043	-	-	-	-	-
2044	-	-	-	-	-
2045	-	-	-	-	-
2046	-	-	-	-	-
2047	-	-	-	-	-
2048	-	-	-	-	-
2049	-	-	-	-	-
2050	-	-	-	-	-

5.2.3 Future baseline emissions from vehicle use, fire training, and refrigerant losses are set out in Table 5.2.2.

Table 5.2.2: Future Baseline Emissions from Other Fuels and Refrigerants

Year	Future Baseline Emissions from Other Fuels and Refrigerants ($ktCO_2e$)		
	Vehicle Fuels	Fire Training	Refrigerants
2019	7.147	0.034	1.269
2020	0.917	0.034	0.109
2021	5.234	0.034	1.306
2022	5.636	0.034	1.526
2023	2.221	0.034	1.690
2024	2.066	0.034	1.821
2025	1.908	0.034	1.618
2026	1.738	0.034	1.288
2027	1.543	0.034	0.954
2028	1.373	0.034	0.928
2029	1.141	0.034	0.854
2030	0.919	0.034	0.795
2031	0.755	0.034	0.734
2032	0.596	0.034	0.674
2033	0.441	0.034	0.613
2034	0.289	0.034	0.551
2035	0.251	0.034	0.491
2036	0.214	0.034	0.437
2037	0.178	0.034	0.381
2038	0.088	0.034	0.325
2039	<0.001	0.034	0.268
2040	<0.001	0.034	0.211
2041	<0.001	0.034	0.212
2042	<0.001	0.034	0.213
2043	<0.001	0.034	0.215
2044	<0.001	0.034	0.216
2045	<0.001	0.034	0.218
2046	<0.001	0.034	0.219
2047	<0.001	0.034	0.221
2048	<0.001	0.034	0.222
2049	<0.001	0.034	0.224
2050	<0.001	0.034	0.225

5.2.4 Future baseline emissions from water use, wastewater, and waste generation are set out in Table 5.2.3.

Table 5.2.3: Future Baseline Emissions from Water, Wastewater and Waste Management

Year	Future Baseline Emissions from Water, Wastewater and Waste Management ($ktCO_2e$)		
	Water Supply	Wastewater	Waste
2019	0.243	0.462	0.302
2020	0.108	0.182	0.311
2021	0.111	0.187	0.319
2022	0.114	0.192	0.328
2023	0.117	0.197	0.336
2024	0.120	0.202	0.344
2025	0.123	0.207	0.352
2026	0.126	0.211	0.361
2027	0.131	0.220	0.376
2028	0.136	0.229	0.391
2029	0.141	0.238	0.406
2030	0.143	0.240	0.410
2031	0.144	0.243	0.414
2032	0.146	0.245	0.418

Year	Future Baseline Emissions from Water, Wastewater and Waste Management ($ktCO_2e$)		
	Water Supply	Wastewater	Waste
2033	0.147	0.248	0.422
2034	0.148	0.250	0.426
2035	0.150	0.252	0.430
2036	0.151	0.255	0.434
2037	0.153	0.257	0.439
2038	0.154	0.259	0.443
2039	0.154	0.259	0.443
2040	0.154	0.259	0.443
2041	0.154	0.259	0.443
2042	0.154	0.259	0.443
2043	0.154	0.259	0.443
2044	0.154	0.259	0.443
2045	0.154	0.259	0.443
2046	0.154	0.259	0.443
2047	0.154	0.259	0.443
2048	0.154	0.259	0.443
2049	0.154	0.259	0.443
2050	0.154	0.259	0.443

5.3 Future Project Emissions

5.3.1 The future with-Project emissions reflect the committed outcomes for ABAGO included in **ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref.5.3), ie to achieve net zero for Scope 1 and 2 by 2030, and zero emissions for Scope 1 and 2 by 2040.

5.3.2 Future with-Project emissions from energy consumption for operation of airport buildings and third party buildings are set out in Table 5.3.1.

Table 5.3.1: Future With-Project Emissions from ABAGO Energy Use

Year	Future With-Project Emissions from ABAGO Energy Use ($ktCO_2e$)				
	Grid Electricity (GAL)	Grid Electricity (Third Parties)	Trans-mission and Distri-bution Losses	Natural Gas (GAL)	Natural Gas (Third Parties)
2019	33.042	4.536	3.190	9.714	4.182
2020	2.725	4.352	0.601	0.817	4.187
2021	20.904	4.159	2.128	6.416	4.191
2022	23.551	3.956	2.335	7.440	4.195
2023	25.025	3.742	2.442	8.185	4.198
2024	23.311	2.500	2.191	8.767	4.202
2025	17.210	2.186	1.647	6.202	2.804
2026	10.802	1.887	1.077	3.246	1.403
2027	8.309	1.603	0.841	-	-
2028	5.070	0.852	0.503	-	-
2029	2.102	-	0.178	-	-
2030	1.491	-	0.127	-	-
2031	0.930	-	0.079	-	-
2032	0.513	-	0.044	-	-
2033	0.206	-	0.018	-	-
2034	-	-	-	-	-
2035	-	-	-	-	-
2036	-	-	-	-	-
2037	-	-	-	-	-
2038	-	-	-	-	-
2039	-	-	-	-	-
2040	-	-	-	-	-
2041	-	-	-	-	-
2042	-	-	-	-	-
2043	-	-	-	-	-
2044	-	-	-	-	-
2045	-	-	-	-	-
2046	-	-	-	-	-
2047	-	-	-	-	-
2048	-	-	-	-	-
2049	-	-	-	-	-
2050	-	-	-	-	-

5.3.3 Future with-Project emissions from vehicle use, fire training, and refrigerant losses are set out in Table 5.3.2.

Table 5.3.2: Future With-Project Emissions from Other Fuels and Refrigerants

Year	Future With-Project Emissions from Other Fuels and Refrigerants ($ktCO_2e$)		
	Vehicle Fuels	Fire Training	Refrigerants
2019	7.147	0.034	1.269
2020	0.917	0.034	0.109
2021	5.234	0.034	1.306
2022	5.636	0.034	1.526
2023	2.221	0.034	1.690
2024	2.066	0.034	1.821
2025	1.908	0.034	1.618
2026	1.738	0.034	1.307
2027	1.543	0.034	0.988
2028	1.373	0.034	0.972
2029	1.212	0.034	1.034
2030	1.025	0.034	1.052
2031	0.880	0.034	1.040
2032	0.719	0.034	1.019
2033	0.531	0.034	0.930
2034	0.348	0.034	0.840
2035	0.302	0.034	0.749
2036	0.257	0.034	0.668
2037	0.213	0.034	0.586
2038	0.105	0.034	0.501

Year	Future With-Project Emissions from Other Fuels and Refrigerants ($ktCO_2e$)		
	Vehicle Fuels	Fire Training	Refrigerants
2039	<0.001	0.034	0.415
2040	<0.001	0.034	0.327
2041	<0.001	0.034	0.330
2042	<0.001	0.034	0.332
2043	<0.001	0.034	0.335
2044	<0.001	0.034	0.338
2045	<0.001	0.034	0.341
2046	<0.001	0.034	0.343
2047	<0.001	0.034	0.346
2048	<0.001	0.034	0.349
2049	<0.001	0.034	0.352
2050	<0.001	0.034	0.354

5.3.4 Future with-Project emissions from water use, wastewater, and waste generation are set out in Table 5.3.3.

Table 5.3.3: Future With-Project Emissions from Water, Wastewater and Waste Management

Year	Future With-Project Emissions from Water, Wastewater and Waste Management ($ktCO_2e$)		
	Water Supply	Wastewater	Waste
2019	0.243	0.462	0.302
2020	0.108	0.182	0.311
2021	0.111	0.187	0.319
2022	0.114	0.192	0.328
2023	0.117	0.197	0.336
2024	0.120	0.202	0.344
2025	0.123	0.207	0.352
2026	0.126	0.211	0.361
2027	0.134	0.226	0.385
2028	0.143	0.240	0.410
2029	0.151	0.255	0.435
2030	0.155	0.261	0.446
2031	0.159	0.268	0.457
2032	0.163	0.275	0.468
2033	0.167	0.281	0.480
2034	0.171	0.288	0.491
2035	0.175	0.294	0.502
2036	0.179	0.301	0.513
2037	0.183	0.307	0.525
2038	0.187	0.314	0.536
2039	0.187	0.314	0.536
2040	0.187	0.314	0.536
2041	0.187	0.314	0.536
2042	0.187	0.314	0.536
2043	0.187	0.314	0.536
2044	0.187	0.314	0.536
2045	0.187	0.314	0.536
2046	0.187	0.314	0.536
2047	0.187	0.314	0.536
2048	0.187	0.314	0.536
2049	0.187	0.314	0.536
2050	0.187	0.314	0.536

6 Mitigation

6.1.1 **ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref.5.3) includes commitments to achieving certain performance improvements in terms of GHG emissions from ABAGO (relating specifically to GAL Scope 1 and 2 emissions) for the Project.

6.1.2 As discussed in previous sections, at this stage the range of measures that would be implemented across the airport are not confirmed although preliminary work has been carried out to develop potential scenarios under which this would be achieved. GAL continues to evaluate the preferred options for decarbonising operations of airport buildings and infrastructure, and the strategy to deliver this will continue to change over time.

6.1.3 The assessment is based on future decarbonisation trajectories that reflect a selected pathway based on a range of measures. The scenarios adopted throughout the assessment are those which progress GAL to meeting its outcomes, but which adopt a conservative (ie higher emission) trajectory towards that end point.

6.1.4 The Airport National Policy Statement (ANPS) seeks quantification of the scale of mitigation of GHG emissions. In order to illustrate this the ABAGO emissions in the absence of CAP commitments for the with-Project scenario are presented below in Table 6.2.1 to Table 6.2.3.

6.1.5 ABAGO emissions including the CAP commitments have been presented earlier in Section 5.3.

6.1.6 In addition, a comparison of aggregate ABAGO emissions with and without CAP commitments for the with-Project scenario is presented in Table 6.2.4.

6.2 Future With-Project Emissions in the Absence of CAP

6.2.1 Future with-Project emissions from energy consumption for operation of airport buildings and third party buildings within the study area **without the commitments in place under the CAP** are set out in Table 6.2.1.

Table 6.2.1: Future With-Project Emissions from ABAGO Energy Use in the Absence of CAP

Year	Future With-Project Emissions from ABAGO Energy Use ($ktCO_2e$)				
	Grid Electricity (GAL)	Grid Electricity (Third parties)	Trans-mission and Distri-bution Losses	Natural Gas (GAL)	Natural Gas (Third Parties)
2019	32.943	4.702	3.196	9.786	4.063
2020	2.711	4.517	0.614	0.828	4.063
2021	20.760	4.322	2.129	6.528	4.063
2022	23.297	4.116	2.327	7.648	4.063
2023	24.672	3.897	2.426	8.491	4.063
2024	25.279	3.667	2.457	9.169	4.063
2025	25.460	3.423	2.452	9.800	4.063
2026	25.165	3.166	2.405	10.209	4.063
2027	24.415	2.894	2.318	10.466	4.063
2028	23.062	2.919	2.206	10.663	5.005
2029	21.762	2.909	2.094	10.244	5.452
2030	19.849	2.503	1.898	10.139	5.452
2031	16.899	2.025	1.607	10.139	5.452

Year	Future With-Project Emissions from ABAGO Energy Use ($ktCO_2e$)				
	Grid Electricity (GAL)	Grid Electricity (Third parties)	Trans-mission and Distri-bution Losses	Natural Gas (GAL)	Natural Gas (Third Parties)
2032	14.297	1.743	1.362	10.139	6.080
2033	11.644	1.410	1.108	10.139	6.080
2034	9.483	1.141	0.902	10.139	6.080
2035	7.709	0.923	0.733	10.139	6.080
2036	6.281	0.747	0.597	10.139	6.080
2037	5.119	0.604	0.486	10.139	6.080
2038	4.172	0.489	0.396	10.139	6.080
2039	3.402	0.396	0.322	10.139	6.080
2040	2.771	0.320	0.262	10.139	6.080
2041	2.313	0.266	0.219	10.139	6.080
2042	2.208	0.252	0.209	10.139	6.080
2043	2.175	0.247	0.206	10.139	6.080
2044	2.055	0.232	0.194	10.139	6.080
2045	1.755	0.197	0.166	10.139	6.080
2046	1.602	0.179	0.151	10.139	6.080
2047	1.486	0.165	0.140	10.139	6.080
2048	1.418	0.157	0.134	10.139	6.080
2049	1.326	0.146	0.125	10.139	6.080
2050	1.311	0.143	0.123	10.139	6.080

6.2.2 Future with-Project emissions from vehicle use, fire training, and refrigerant losses are set out in Table 6.2.2.

Table 6.2.2: Future With-Project Emissions from Other Fuels and Refrigerants in the Absence of CAP

Year	Future With-Project Emissions from Other Fuels and Refrigerants ($ktCO_2e$)		
	Vehicle Fuels	Fire Training	Refrigerants
2019	7.147	0.034	1.269
2020	0.917	0.034	0.109
2021	5.234	0.034	1.306
2022	5.636	0.034	1.526
2023	5.886	0.034	1.690
2024	6.100	0.034	1.821
2025	6.358	0.034	1.941
2026	6.648	0.034	2.061
2027	6.922	0.034	2.159
2028	7.119	0.034	2.235
2029	7.448	0.034	2.343
2030	7.719	0.034	2.452
2031	7.954	0.034	2.538
2032	8.135	0.034	2.625
2033	8.015	0.034	2.612
2034	7.896	0.034	2.598
2035	7.776	0.034	2.580
2036	7.656	0.034	2.597
2037	7.535	0.034	2.615
2038	7.414	0.034	2.633
2039	7.292	0.034	2.652
2040	7.170	0.034	2.668
2041	7.178	0.034	2.683
2042	7.186	0.034	2.697
2043	7.194	0.034	2.712
2044	7.202	0.034	2.726
2045	7.210	0.034	2.741
2046	7.218	0.034	2.755
2047	7.226	0.034	2.769
2048	7.234	0.034	2.784
2049	7.242	0.034	2.798
2050	7.250	0.034	2.813

6.2.3 Future with-Project emissions from water use, wastewater, and waste generation are set out in Table 6.2.3.

Table 6.2.3: Future With-Project Emissions from Water, Wastewater and Waste Management in the absence of CAP

Year	Future With-Project Emissions from Water, Wastewater and Waste Management ($ktCO_2e$)		
	Water Supply	Wastewater	Waste
2019	0.243	0.462	0.302
2020	0.108	0.182	0.311
2021	0.111	0.187	0.319
2022	0.114	0.192	0.328
2023	0.117	0.197	0.336
2024	0.120	0.202	0.344
2025	0.123	0.207	0.352
2026	0.126	0.211	0.361
2027	0.134	0.226	0.385
2028	0.143	0.240	0.410
2029	0.151	0.255	0.435
2030	0.155	0.261	0.446
2031	0.159	0.268	0.457
2032	0.163	0.275	0.468
2033	0.167	0.281	0.480
2034	0.171	0.288	0.491
2035	0.175	0.294	0.502
2036	0.179	0.301	0.513
2037	0.183	0.307	0.525
2038	0.187	0.314	0.536
2039	0.187	0.314	0.536
2040	0.187	0.314	0.536
2041	0.187	0.314	0.536
2042	0.187	0.314	0.536
2043	0.187	0.314	0.536
2044	0.187	0.314	0.536
2045	0.187	0.314	0.536
2046	0.187	0.314	0.536
2047	0.187	0.314	0.536
2048	0.187	0.314	0.536
2049	0.187	0.314	0.536
2050	0.187	0.314	0.536

6.2.4 Table 6.2.4 shows the out-turn emissions for the with-Project scenario both with and without CAP.

Table 6.2.4: Comparison of With-Project ABAGO emissions With and Without CAP Commitments in place

Year	Out-turn GHG ABAGO Emissions (ktCO2e)		
	Future With-Project No CAP	Future With-Project With CAP	Difference
2019	65.387	65.387	-
2020	64.148	64.123	0.025
2021	14.393	14.343	0.050
2022	44.993	44.987	0.006
2023	49.282	49.307	-0.025
2024	51.809	48.187	3.622
2025	53.256	45.558	7.698
2026	54.214	34.290	19.924
2027	54.449	22.192	32.257
2028	54.016	14.063	39.953
2029	54.037	9.597	44.440
2030	53.128	5.402	47.726
2031	50.909	4.590	46.319
2032	47.532	3.847	43.685
2033	45.320	3.236	42.084
2034	41.971	2.647	39.324
2035	39.223	2.173	37.050
2036	36.945	2.056	34.889
2037	35.125	1.952	33.173
2038	33.628	1.848	31.780
2039	32.394	1.677	30.717
2040	31.355	1.486	29.869
2041	30.482	1.398	29.084
2042	29.949	1.401	28.548
2043	29.842	1.403	28.439
2044	29.823	1.406	28.417
2045	29.700	1.409	28.291
2046	29.359	1.412	27.947
2047	29.196	1.414	27.782
2048	29.077	1.417	27.660
2049	29.016	1.420	27.596
2050	28.928	1.423	27.505

6.2.5 In aggregate the with-CAP scenario is estimated to generate lower GHG emissions in the period 2019-2050 totalling 845.8 $ktCO_2e$ compared to the without-CAP scenario.

7 References

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Gatwick Airport Limited (2023) *Forecast ABAGO emissions.*

8 Glossary

8.1 Glossary of Terms

Table 9.1.1: Glossary of Terms

Term	Description
ABAGO	Airport Buildings and Ground Operations
ANPS	Airport National Policy Statement
ATM	Air Traffic Movement
BEIS	UK Government Department for Business Energy and Industrial Strategy
CAP	Carbon Action Plan
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
DCO	Development Consent Order
ES	Environmental Statement
EU ETS	European Union Emissions Trading Scheme
FEGP	Fixed Electrical Ground Power
GAL	Gatwick Airport Ltd
GHG	Greenhouse Gas
HVO	Hydrotreated Vegetable Oil
kWh	Kilowatt hour
LGW	London Gatwick
T&D	Transmission & Distribution