

An aerial photograph of Gatwick Airport's northern runway and taxiway. The runway is a long, straight concrete strip with white markings, including the number '26' and the letter 'L'. Several aircraft are visible on the taxiway and runway. In the foreground, a large white Airbus A380 is taxiing. To its left, a smaller white aircraft is also taxiing. Further up the runway, another white aircraft is visible. In the bottom left corner, a red and white easyJet aircraft is taxiing. The surrounding area includes green grass, taxiway lights, and airport buildings in the distance. The text 'YOUR LONDON AIRPORT' is written in white, uppercase letters, and 'Gatwick' is written in a white, cursive font below it.

YOUR LONDON AIRPORT  
*Gatwick*

*Our northern runway: making best use of Gatwick*

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## 1 Introduction and Purpose

### 1.1 Introduction

- 1.1.1 This document forms Appendix 5.4.1 of the Preliminary Environmental Information Report (PEIR) prepared on behalf of Gatwick Airport Limited (GAL). The PEIR presents the preliminary findings of the Environmental Impact Assessment (EIA) process for the proposal to make best use of GAL's existing runways (referred to within this report as 'the Project'). The Project proposes alterations to the existing northern runway which, together with the lifting of the current restrictions on its use, would enable dual runway operations. The Project includes the development of a range of infrastructure and facilities which, with the alterations to the northern runway, would enable the airport passenger and aircraft operations to increase. Further details regarding the components of the Project can be found in the Chapter 5: Project Description.
- 1.1.2 This document provides a draft energy strategy for the Project.
- 1.1.3 This draft energy strategy also supports Chapter 15: Climate Change and Carbon of the PEIR and provides an evidence base for a subset of the operational greenhouse gas (GHG) emissions that are assessed in that chapter, specifically the operational GHG emissions resulting from the operation of airport buildings, assets and vehicles, including energy use (heating/cooling/power), fuel consumption in vehicles and mobile plant, and fixed electrical ground power (FEGP).
- 1.1.4 The Project would involve the construction of buildings and other facilities. These buildings and facilities are described in Chapter 5: Project Description of the PEIR. These developments are likely to increase the demand and consumption of energy.
- 1.1.5 GAL has demonstrated its commitment to operating and developing the airport in a sustainable way and has communicated this through the publication of its 2<sup>nd</sup> Decade of Change sustainability policy (DofC), released in June 2021 (GAL, 2021). The strategy sets ten-year goals (2021 – 2030), including for direct GHG emissions from energy and fuel. The goals take into account the Project and confirm new targets, such as an 80% reduction on 1990 emissions by 2030 and GAL's commitment to reach net zero emissions before 2040.
- 1.1.6 GAL seeks to achieve its aims by investing in energy efficient buildings and technologies, improving the energy and GHG performance of its existing assets, and expanding its sourcing of energy from renewable sources.
- 1.1.7 The recently published 2<sup>nd</sup> Decade of Change sustainability policy sets a 2030 goal for Scope 1 & 2 emissions that is slightly more ambitious than the pathways contained within this draft energy strategy (which was prepared prior to publication of the latest DofC). As such, the CO<sub>2</sub> emissions pathway to 2040 that is demonstrated through the interventions, which form the basis for the strategy, do not, at the present time, fully align with those now represented in the latest DofC document. However, the draft

energy strategy CO<sub>2</sub> pathway does demonstrate a progressive reduction of CO<sub>2</sub> emissions over time to 2050.

- 1.1.8 It is intended for the draft energy strategy work to be revisited and revised prior to submission of the application for development consent, both to set out the measures and actions needed to support delivery of the greenhouse gas emissions targets proposed within the second DofC policy and to provide the technical basis for the relevant parts of GAL's detailed Carbon and Climate Change Action Plan. This updated energy strategy will form part of the Environmental Statement.

### 1.2 Purpose

- 1.2.1 The aim of this appendix is to provide a summary of GAL's draft energy strategy. This draft energy strategy supports a pathway to net zero carbon for emissions associated with the airport's ground operations by 2050<sup>1</sup>. The estimated consumption of energy and fuel and the corresponding GHG emissions are extrapolated out from a baseline year of 2018 to 2050.
- 1.2.2 This draft energy strategy sets out the following.
- A summary of the policy context, drawing on the GHG policy context in the Climate Change and Carbon chapter of the PEIR and highlighting the implications for energy systems.
  - A summary of GAL's achievements so far in its DofC sustainability policy related to direct GHG emissions and energy consumption, prior to the release of its second DofC sustainability policy.
  - An outline description of GAL's existing energy infrastructure.
  - Estimates of GAL's energy consumption and GHG emissions for a 2018 baseline year.
  - An energy strategy for the future baseline scenario and for the Project, taking into account proposals for the development of the airport and predicted levels of aircraft operations and passenger throughputs in the future baseline and with Project scenarios.
  - A summary of the estimated energy consumption and GHG emissions for the two scenarios out to 2050.
  - Conclusions and next steps for GAL to develop a robust energy strategy to support its DCO application.
- 1.2.3 There are some important groupings and designations for energy systems, energy consumption and GHG emissions within this appendix:
- GAL infrastructure: refers to buildings owned and operated by GAL and third-party occupied buildings that are supplied with energy via GAL-owned electricity and gas infrastructure.
  - GAL infrastructure emissions: refers to emissions from this system expressed as CO<sub>2e</sub>. GAL has direct control over its own emissions and influence over third party emissions from GAL infrastructure.
  - Airport stand-alone third parties: this refers to buildings operated by third parties that are supplied with energy by electricity and gas infrastructure that is not owned by GAL. GAL does not have direct control over these emissions.

<sup>1</sup> This will be updated to include changes to align the pathway with net zero carbon for 2040 in line with the latest DofC

- Airport or Gatwick: refers to the entire airport ie the combination of GAL and third parties described above.

### 1.3 Policy Context

1.3.1 The policy context for GHG is set out in the Climate Change and Carbon chapter of the PEIR (Chapter 15) and it sets much of the context for GAL's developing energy strategy. Key policy drivers for GAL's energy strategy (in addition to its own sustainability policy and practices) are summarised below.

1.3.2 The GHG policy context in the PEIR notes the amendment to Section 1 of the Climate Change Act 2008 and the UK's national commitment to ensuring the net UK carbon account is 100% lower than the 1990 baseline by 2050. This is likely to result in tighter interim carbon targets for all sectors of the economy, including aviation.

1.3.3 To ensure progress is achieved towards meeting the national climate change target by 2050, the Committee on Climate Change (CCC) sets five-yearly carbon budgets, which currently run through until 2037 and set out budgets by sector.

1.3.4 These target reductions (all relative to 1990 levels) are:

- 3<sup>rd</sup> carbon budget (2018 to 2022) - 37% reduction by 2020;
- 4<sup>th</sup> carbon budget (2023 to 2027) - 51% reduction by 2025;
- 5<sup>th</sup> carbon budget (2028 to 2032) - 57% reduction by 2030; and
- 6<sup>th</sup> carbon budget (2032 to 2037) - 78% reduction by 2035.

1.3.5 The UK's economy-wide goal to reach net zero GHG emissions by 2050 was set out in July 2019 following the CCC's 'Net Zero' report (CCC, 2019).

1.3.6 The Airports National Policy Statement (NPS) (Department for Transport, 2018)( paragraph 5.70) sets out the GHG assessment requirements for airport development and states that:

*'the Government's key objective on aviation emissions is to ensure that the aviation sector makes a significant and cost-effective contribution towards reducing global emissions'*

Related to an airport's energy strategy, the Airports NPS (paragraph 5.78) notes that:

*'the Secretary of State will need to be satisfied that the mitigation measures put forward by the applicant are acceptable, including at the construction stage.'*

1.3.7 Mitigation measures noted in the Airports NPS that are relevant to GAL's energy strategy include:

- zero or low-emission hybrid or electric vehicle use, charging and fuel facilities; and
- reduced emissions from airport buildings (for example from lower carbon heating).

1.3.8 The National Planning Policy Framework (NPPF) (MHCLG, 2021) supports and advises on the transition to a low carbon future. Paragraph 154 states that:

*'new development should be planned for in ways that ... can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the government's policy for national technical standards'*

1.3.9 Paragraph 155 states that:

*'To help increase the use and supply of renewable and low carbon energy and heat, plans should:*

*(a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);*

*(b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and*

*(c) identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.'*

1.3.10 Paragraph 157 of the NPPF also states that;

*'In determining planning applications, local planning authorities should expect new development to:*

*(a) comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and*

*(b) take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption'*

1.3.11 The Project is a Nationally Significant Infrastructure Project and therefore, an application for development consent will be made under the Planning Act 2008 and determined in accordance with the relevant National Policy Statement(s). As such, the local development plan is not the starting point for the consideration of an application for development consent. Nevertheless, local policy has been considered through the EIA process where relevant.

1.3.12 Plans and policies relevant to GHGs for all adjacent local authorities have been considered in the Climate Change and Carbon chapter of the PEIR. In this appendix, however, only appropriate policies from Crawley Borough Council are included as this is the local authority in which the airport is located.

1.3.13 In July 2019, Crawley Borough Council declared a climate emergency and made a commitment to reduce emissions from its activities by at least 45% by 2030 and achieve net zero carbon by 2050. The relevant planning policies in its Local Plan to 2015-2030 (Crawley Borough Council, 2015) for new developments related to energy are as follows.

- Policy ENV6: Sustainable Design and Construction – this sets the requirement for new non-domestic buildings to achieve BREEAM Excellent (for water and energy credits) where technically and financially viable, together with a range of other requirements relating to using renewable and low carbon energy technologies, improving existing buildings and establishing district energy networks within heat priority areas or near potential sources of waste energy, with futureproofing developments for new connections.

- Policy ENV7: District Energy Networks – sets requirements for the development of district energy networks, including connections to existing networks and the establishment of new ones, together with the need to provide alternative approaches to decentralised low carbon energy where district networks are not viable.

1.3.14 The Department for Transport’s Decarbonising Transport plan (Department for Transport, 2021) will be considered in the development of this draft energy strategy and ahead of the submission of the application for development consent.

## 1.4 Gatwick’s Decade of Change

1.4.1 GAL has strong and effective leadership and governance structures in place that are delivering positive change and improvements for energy and GHG emissions across the airport. GAL’s overarching vision is ‘to be an airport of the future and a model for sustainable growth’.

1.4.2 The DofC sustainability policy, first established in 2010, set ten-yearly goals including for the reduction of carbon emissions and energy consumption in airport ground operations. The goals and progress against them for carbon and energy in the first and second DofC strategies for 2020 and 2030 respectively are summarised in Table 1.4.1.

1.4.3 Since 2010, the airport’s annual passenger throughput has increased from 31 million passengers per annum (mppa) to over 46 mppa (in 2019). Despite this, GAL has achieved a 11.7% reduction in airport energy consumption, and a 40% reduction in energy consumption per passenger.

1.4.4 As of 2019, GAL has also achieved a 54.5% reduction in its direct carbon emissions from fuel and energy, compared to a 1990 baseline, and over 70% decrease in fuel and energy carbon emissions per passenger. It has also obtained and retained a level 3+ ‘Neutral’ airport carbon accreditation since 2017. This is achieved by continuing to reduce direct emissions, continuing to purchase 100% renewable electricity via a power purchasing agreement (PPA) and offsetting remaining direct emissions with gold standard carbon offsets.

1.4.5 Energy efficiency continues to be a priority focus to reduce carbon emissions from operations within GAL’s direct control, such as the airfield, car parks, terminals and administration buildings. GAL has used its business-wide capital investment plan to invest in energy efficiency so that improvements are built into all new developments, refurbishments and maintenance driven asset changes. A summary of investments in energy efficiency over the last decade is provided below.

1.4.6 Since 2010 significant investment has been made in lighting efficiency through the use of light emitting diode (LED) technology and improved lighting control. On the airfield, GAL’s runway, many taxiways and all aircraft stands have LED lighting. New lighting has been provided to all GAL’s long-stay surface and multi-storey car parks. Within the terminal and admin buildings significant areas have been upgraded to LED lighting with centralised lighting control systems as part of refurbishment and maintenance programmes.

Table 1.4.1: Decade of Change Targets

Topic	1st DofC Target (to 2020)	2nd DofC Target (to 2030)	1990 Baseline	Progress (to 2019)
Energy	20% reduction in airport energy consumption (against 1990 baseline) by 2020  Benchmark metric <b>4 kWh</b> per passenger  25% of airport energy from renewables	Sourcing <b>50% of airport network electricity</b> and <b>50% of heat network</b> from UK <b>renewable</b> sources (onsite generation and PPAs) by 2030	Total Energy (gas & electricity combined) <b>240GWh</b>	Total Energy (gas & electricity combined) <b>212 GWh</b>  Represents a <b>11%</b> reduction (from 1990 baseline)  <b>4.55 kWh</b> per passenger
Carbon	Reduce GAL scope 1 & 2 carbon emissions by 50% (relative to 1990 baseline)	Reduce GAL scope 1 & 2 carbon emissions by further 25% by 2030 (-80% relative to 1990 baseline) as part of the goal of reaching net zero by 2040	15,001 tCO <sub>2e</sub> (Scope 1)  67,842 tCO <sub>2e</sub> (Scope 2)  82,843 tCO <sub>2e</sub> (Total)	<b>37,666 tCO<sub>2e</sub></b> (Total)  <b>54.5%</b> reduction on baseline
				100% renewable electricity (70% of airport energy use) purchased to run the airport since 2013; backed by Renewable Energy Guarantee of origin certificates

1.4.7 In 2016, GAL devised a strategy to replace life expired centralised gas fired boilers serving its South Terminal heat network with ‘local’ low temperature high efficiency gas boilers. The replacement programme has started and 30% of the heating requirement previously provided by the heat network is now served by local boilers. This replacement programme will be reviewed in light of the DofC emissions targets.

1.4.8 GAL has a large asset base and asset replacements provide an ideal opportunity to introduce energy efficiency solutions to the airport as a whole entity. Over the last decade there has been significant investment in new baggage and security systems, lifts and escalators, HVAC systems and system controls.

- 1.4.9 Where terminal or administration buildings are being refurbished GAL has also taken the opportunity to upgrade its assets. Examples include the North Terminal & Pier 5 redevelopment projects, the replacement of South Terminal Pier 1, the Airline Moves programme and more recently a full mechanical and electrical refurbishment of its airfield maintenance base and fire station.
- 1.4.10 Through its Capital Investment Programme, GAL is also investing in electric vehicle infrastructure for airport operations and public transport services. There are presently around 200 sockets and charge-points on the airfield, and GAL is working with its airfield partners to develop additional provision.
- 1.4.11 Almost 40% of airfield ground services equipment (GSE) at the airport is already electric, including baggage tugs and a growing number of pushback tugs and high-loaders. The conversion of GAL fleet vehicles to electric or ultra-low emission equivalent has commenced. Gatwick expects that by 2030 all light and medium duty vehicles used on the airfield will be electric or ultra-low equivalent, as required by the 2<sup>nd</sup> DofC.
- 1.4.12 GAL has provided rapid-charging infrastructure for the official airport taxi provider, upgraded existing charge-points in short-stay car parks and introduced electric charging as part of the valet parking service. Metrobus, which serves the local Fastway 10 and 20 routes to and from the airport, have invested £10M in ultra-low and zero emissions buses in the last year and have secured partnership funding for 20 hydrogen buses. Moreover, GAL is collaborating with GRIDSERVE to provide an Electric Vehicle Charging forecourt at Gatwick in 2021, which will be the first of its kind at any UK airport.
- 1.4.13 All new developments at the airport must align with GAL's 2<sup>nd</sup> DofC objectives and targets and consider social, economic and environmental impacts in equal measure. This includes considering the embodied carbon emissions and the wider impact of material selection and procurement. The sustainability of projects is reviewed at all key phases.
- 1.4.14 In 2019 GAL's long-standing Section 106 agreement with Crawley Borough Council and West Sussex County Council was extended for the period to 2022. This continues to define how GAL's operation, growth and environmental impacts should be managed. The agreement also helps to ensure that GAL's approach to sustainable development is aligned with those of its local authority partners. This alignment included initiatives to reduce GAL's emissions impact, such as the provision of fixed electrical ground power (FEGP) units to supply any new aircraft stands and to ban the use of diesel-powered ground power units in any circumstances where FEGPs are available.
- 1.4.15 In 2018, with 46.1 million passengers, GAL's combined Scope 1 and 2<sup>2</sup> emissions were 50.3% lower than the 1990 baseline, when Gatwick had 20.4 million passengers a year. This means that GAL achieved its 1st DofC emissions goal before 2020.
- 1.4.16 GAL is continuing to build on this progress and has developed further goals in its second DofC strategy. An ambitious energy strategy that is reviewed and updated as new technologies emerge at scale will contribute to delivering on further emission reduction targets over the next decade and beyond.

## 1.5 Existing Energy Infrastructure and Usage

- 1.5.1 Energy is currently delivered to the airport via grid supplied electricity and gas as well as from a small amount of on-site generated renewable energy.

### Electricity Infrastructure

- 1.5.2 UK Power Networks (UKPN) is the Distribution Network Operator (DNO) that operates the off-site electricity network around the airport. The airport is supplied from two 132 kV UKPN substations: Three Bridges and Smallfield. Both are supplied from a National Grid 400 kV substation at Bolney.
- 1.5.3 GAL has a long-term agreement with UKPNS for UKPNS to own, maintain and operate defined electrical infrastructure. Any on-airport electrical infrastructure development is undertaken in conjunction with UKPNS. Within the site boundary, all GAL facilities and the majority of on-airport third parties are supplied by the airport's HV and LV networks.
- 1.5.4 GAL recently undertook a review of power requirements to meet current and future demand. The site's capacity was recently increased to provide 'firm' supply serving current demand. GAL proposes to increase this proportionally to meet future demand, accounting for both baseline growth and the Project.
- 1.5.5 GAL will continue to undertake regular reviews of the power requirement to ensure alignment with the Capital Investment Programme, draft energy strategy (moving to Energy Strategy) and the Project Programme.

### Gas Infrastructure

- 1.5.6 Within the site boundary, gas is supplied direct to multiple GAL and third party owned/leased airport buildings from national gas distribution networks operated by SGN. Gas is primarily used for heating, hot water generation and commercial catering. GAL operates numerous gas fired boiler plant that feeds district and local heat networks to its buildings; these operate at high, medium and low temperatures.
- 1.5.7 The heat networks feed a broad range of plant & equipment used for heating GAL's buildings. GAL also operates a number of small private gas networks to supply third party commercial catering facilities and local boiler houses.
- 1.5.8 In South Terminal, GAL has adopted a 'boiler decentralisation programme' to replace life expired large, centralised boiler plant feeding a high temperature network with smaller boiler houses housing high efficiency boilers feeding local plant at low temperature.

### On-site Renewables

- 1.5.9 There is a 300m<sup>2</sup> photovoltaic (PV) ground mounted array installed at the north west corner of the airport<sup>3</sup>, with a capacity of 50 kW peak. The airfield operations building, which is an exemplar in terms of a practical, low carbon building, also has a PV array and solar water heating installation. In addition, the

<sup>2</sup> GHG Protocol Scope 1 and 2 emissions refer to those emissions from GAL fuel and energy use. Indirect emissions, including airport third parties' use of fuel and energy, travel by passengers and airport staff to the airport, and GAL business travel, are reported in Scope 3.

<sup>3</sup> This array may be removed as part of future airport development. However, the current energy strategy proposes large-scale deployment of PV across building roof and ground areas.

recently completed Boeing hangar has incorporated a roof-mounted PV array, ground source heat pumps and rainwater harvesting technology to achieve a BREEAM excellent standard.

#### Vehicle Fuel

- 1.5.10 There is an on-site petrol and diesel fuel storage and dispensing facility for provision of GAL and third-party operational vehicles, including hybrid-electric and ultra-low emission fuel vehicles.

## 2 Baseline Assessment

### 2.1 Current Energy Consumption

- 2.1.1 An energy baseline has been developed for energy consumption on the airport for the 2018 calendar year (January to December). The energy baseline includes the following consumption for GAL and for airport third parties.

#### Baseline Electricity Consumption

- 2.1.2 Gatwick's baseline energy consumption has been calculated based on metered data when available and was integrated with estimates from benchmarks.
- 2.1.3 GAL's electricity data include for provision of power for lighting, baggage systems, lifts and escalators, safety systems, IT and controls, ventilation systems and cooling system.
- 2.1.4 Fixed electrical ground power (FEGP) used for aircraft group operations has been included in the baseline assessment, while pre-conditioned air (PCA) has not been included in the assessment.
- 2.1.5 Electricity generation from the existing on-site PV array is around 52,000 kWh annually, which makes a small contribution to the total airport energy consumption.
- 2.1.6 Gatwick's baseline year electricity consumption (including FEGP) is estimated at approximately 150 GWh.

#### Baseline Natural Gas Consumption

- 2.1.7 For natural gas, Gatwick's baseline energy consumption was calculated based on metered data when available and was integrated with estimates from benchmarks.
- 2.1.8 The baseline natural gas consumption has been adjusted using degree days.
- 2.1.9 Gatwick's (GAL and third parties) baseline year natural gas consumption is estimated at approximately 70 GWh.

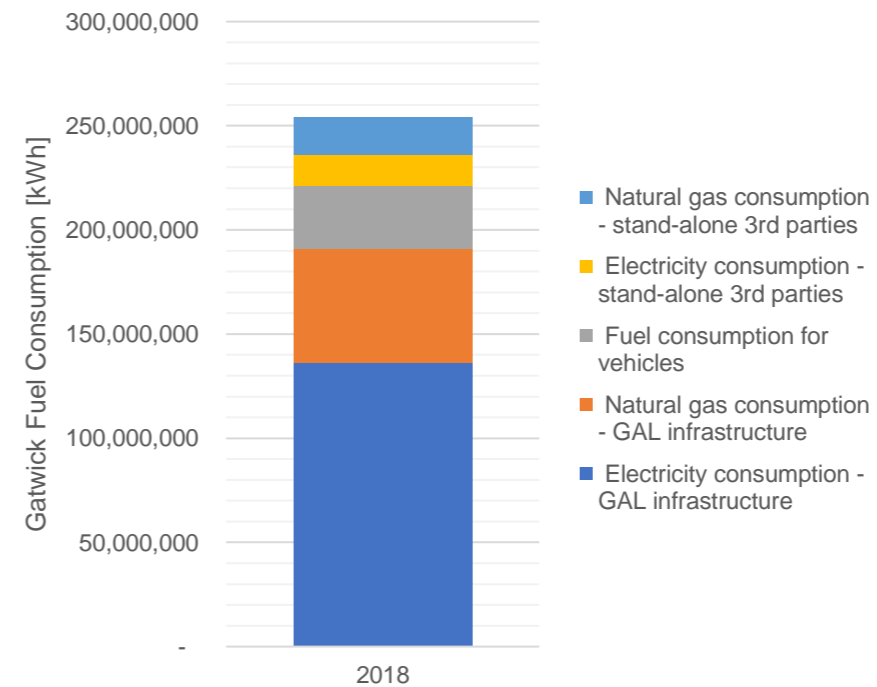
#### Baseline Fuel Consumption for Airside Vehicles

- 2.1.10 Fuel consumption data for airport operations vehicles were gathered as part of the baseline assessment. This includes diesel, petrol and AdBlue fuel consumption for airside vehicles.
- 2.1.11 Gatwick's baseline fuel consumption for airside vehicles is estimated at approximately 30 GWh.

### Baseline Energy Summary

- 2.1.12 Gatwick's total baseline energy consumption for 2018 is estimated to be approximately 250 GWh (Diagram 2.1.1).

Diagram 2.1.1: Gatwick's Baseline Energy Consumption



## 3 Energy Strategy

### 3.1 Overview

- 3.1.1 GAL aims to continue to reduce its direct scope 1 and scope 2 emissions, including from the power and energy used on site and in its operational vehicle fleets and equipment, in line with its commitment to be net zero before 2040. GAL's energy strategy will continue to evolve and respond to local and national changes to energy infrastructure and to future improvements in the efficiency of energy systems. GAL is planning to carry out regular reviews of the energy strategy, so it continues to support delivery of GAL's carbon emission targets.
- 3.1.2 In parallel with its plans for the airport, GAL recognises that the UK's energy infrastructure is going through a fundamental transition as the electricity grid continues to decarbonise and options are sought nationally and locally to decarbonise heat. This transition, the rate of progress and the nationally significant decisions along the way, such as the potential for hydrogen to replace natural gas across the UK, have profound implications for heating in the UK, not just GAL's energy strategy. GAL's energy strategy must therefore be adaptable to the inevitable changes that are coming, both in its demand for energy and the way this is generated and supplied.

3.1.3 Irrespective of the Project, GAL is committed to continuing to explore ideas and taking practical steps to investing in efficient energy technologies, improving the energy performance of existing assets and sourcing energy from renewable sources.

3.1.4 The draft energy strategy is based on the following hierarchy.

- **Energy efficiency** - in design, construction and operation through highly efficient building envelopes, passive design to reduce heat gains and losses, widespread use of heat recovery, efficient plant and systems, LED lighting and smart building management systems.
- **Efficiency of energy supply** – through on-site generation and use of power and heat, with low-carbon heat exported to other users, including the potential for district heating initiatives and the use of smart technology in the electricity and heat networks to support demand management and the matching of supply to demand.
- **Renewable energy** – generated from locally produced biogas from on-site waste and photo-voltaic systems, heat pumps and other low and zero carbon sources integrated into the design of new facilities.

3.1.5 The sections below describe GAL's draft energy strategy in broad principle for the baseline scenario and the Project. This is followed by a summary of the estimated GHG emissions that support the GHG assessment in the Climate Change and Carbon chapter of the PEIR.

## 4 Future Baseline

### 4.1 Overview

4.1.1 The future baseline scenario represents the future for the airport without the Project. In this scenario some building work is planned, but this is far less significant than is planned for the Project. The future baseline scenario is described in full in the Chapter 4: Existing Site and Operation of the PEIR.

4.1.2 The draft energy strategy for the future baseline scenario incorporates the following energy interventions for existing buildings / areas.

- Continue with 100% procurement of renewable electricity via supply agreements, gradually increasing the % sourced from 'natural' renewable sources. Investigate purchasing electricity through power purchase agreements (PPAs) to support the growth of 'additional' renewable electricity capacity in the UK and the region.
- Implement additional on-site PV where feasible and financially viable to integrate into new or existing facilities.
- Continue to implement energy efficiency measures in existing buildings where technically practical and financially viable. These could include a range of energy retrofits (such as LED light replacements, installation of variable speed drives and improvements in insulation, ventilation and heat recovery improvements and upgrades) as well as optimisation of building management systems (BMS) and controls.
- Improve heat generation and supply efficiencies as older gas boilers and heat networks are replaced with the latest technology.
- Improve cooling efficiencies as existing chillers and cooling networks are replaced with the latest technology and demand-based controls are implemented (through additional variable speed secondary pumps).

- Continue electrification programme of vehicles and ground support equipment. This would be particularly applicable for light duty vehicles, and common types of ground support equipment as electric versions are readily available on the market, while some large vehicles including buses may require ultra-low fuels as a bridge to electrification.

4.1.3 In addition, GAL will implement and/or influence a range of energy interventions for new buildings that are part of the baseline. These will include:

- Designs will be driven to improve the inherent energy efficiency performance of new buildings, using sensible and practical approaches to passive design and the appropriate incorporation of technology.
- The building regulations are anticipated to change over time, and they will set the minimum standards for buildings. GAL will continue to seek to go beyond the legal minimum, aspiring to achieve high energy performance standards that will enable long term efficient use of energy as well as supporting, from an energy perspective, high ratings of wider environmental standards such as BREEAM, where economically and practicably feasible.
- The decarbonisation of the national grid is expected to make a major contribution to reducing GHG emissions from the direct use of electricity, in electric based cooling systems and in electric based heating via air source heat pumps.

4.1.4 Based on the forecast increase in passengers and air traffic movements in the future baseline scenario and the implementation of the measures described above, the aggregated effect on future baseline energy demand and consumption is expected to be as follows.

- Increase in electricity requirements for buildings. This is due to the increase in passenger numbers and air traffic movements and the associated increased requirements for functions such as lighting, ventilation, baggage, vertical transport, cooling and FEGP. This also includes the development of new buildings already planned as part of Gatwick's Capital Investment Programme (CIP). This increase is only marginally mitigated by the energy efficiency measures.
- Increase in electricity requirement for airside vehicles and decrease in diesel/petrol requirements, due to gradual electrification of light and medium duty vehicles and equipment used airside.
- Decrease in overall carbon emission (using BEIS carbon factors) mainly due to the grid decarbonisation, from around 1.0 kgCO<sub>2</sub>e per PAX in 2018 to around 0.2 kgCO<sub>2</sub>e per PAX in 2050. This includes GAL emissions as well as emissions from stand-alone third parties such as hangars and hotels.

4.1.5 GHG emissions have been estimated for the future baseline scenario and are summarised in Diagrams 5.2.1 to 5.2.4, below.

## 5 The Project

### 5.1 Overview

5.1.1 The Project would involve alterations to the existing northern runway and the development of a range of infrastructure and facilities, including terminal extensions, a new pier, hotels, offices, car parks, a hangar, and the replacement of facilities displaced by alterations required to the airfield, as described in Chapter 5: Project Description of the PEIR.



- 5.1.2 The Project would bring cost efficiencies and investment that would support a more ambitious level of energy interventions to support GAL's aims and pathway to zero carbon by 2050 at the latest.
- 5.1.3 Analysis of projections of GHG emissions for the future baseline scenario and the Project indicates that the Project would deliver accelerated reductions in GHG emissions. Summary graphs of this analysis are shown in Diagrams 5.2.1 to 5.2.4, below. Diagram 5.2.5 compares the estimated GHG emissions in 2050 for the future baseline and Project scenarios and shows that the Project is predicted to result in a net decrease of 10,000 tonnes of GHG emissions compared to the baseline.
- 5.1.4 In addition to applying the future baseline interventions outlined in 4.1.2 and 4.1.3 to the Project, GAL will explore interventions that go beyond those in the future baseline scenario.
- A greater implementation of PV compared to future baseline scenario.
  - A higher number of energy efficiency measures in existing buildings as part of the terminal extension and retrofit works involved in the Project.
  - Additional improvements in cooling efficiencies as compatible cooling systems are combined, integrating the existing cooling systems with the new ones required for the expansion of new buildings.
  - Evaluate available and financially viable options for provision of heating/cooling to aircraft on stand, to reduce and over time eliminate use of aircraft auxiliary power unit (APU) for this purpose.
  - Notwithstanding the potential for hydrogen (combined with carbon capture, utilisation and storage) to decarbonise the UK's primary thermal energy vector (currently served by 100% natural gas), the draft energy strategy includes a transition of GAL's heating systems from a reliance on natural gas to electric heat pumps (using a variety of heat sources, including air, water and sewage), retaining some of the most recent gas boilers as back-up/peaking plant. Given the complexity and existing temperature regime of GAL's heat generation, distribution and delivery systems, this transition presents a significant technical and financial challenge.
  - GAL will also explore the potential to implement an additional district heating network or networks (DHN) for the provision of thermal energy for space heating and hot water (DHW) to several buildings from existing and new energy centres drawing on a variety of technologies and heat sources. Understanding the linear heat density, technical feasibility and economics of potential networks; including the capital costs, demand, consumption quantum and patterns and the potential for operational disruption, will inform their potential.
  - An accelerated rate of electrification for airside vehicles and equipment by requiring all airside vehicles and equipment to meet ultra-low emission standards by 2030 and achieve at least 50% electrification for larger vehicles, buses and GSE by 2038.
  - In addition, GAL will explore energy interventions for new buildings like those in the future baseline scenario (4.1.2), with some changes to improve efficiencies, such as the use of ground source (GSHP) and water source heat pumps (WSHP) prioritised over air source heat pumps (ASHP) to achieve higher seasonal performance factors.
- 5.1.5 Based on the passengers and air traffic movement forecasts, the aggregated impact on future energy demand, consumption and GHG would be as follows.
- Increase in electricity requirements for buildings. This is due to the increase in passenger numbers and the associated increased requirements for functions such as lighting, ventilation, baggage, vertical transport, cooling and FEGP. This is only marginally mitigated by the energy efficiency measures.

- Increase in electricity requirement for airside vehicles and decrease in diesel/petrol requirements, due to gradual electrification of cars, buses and other vehicles used airside.
- Decrease in natural gas requirements and increase in electricity requirements for space heating and domestic hot water, due to partial electrification of heat supply in existing buildings and total electrification of heat supply in new buildings.
- Decrease in overall carbon emission (using BEIS carbon factors) mainly due to the grid decarbonisation, from around 1.0 kgCO<sub>2e</sub> per PAX in 2018 to around 0.2 kgCO<sub>2e</sub> per PAX in 2050. This includes GAL emissions as well as emissions from stand-alone third parties such as hangars and hotels.

## 5.2 Summary of Estimated GHG Emissions

- 5.2.1 Drawing on the proposals in the future baseline and the Project scenarios (as set out in the Project Description in Chapter 5 of the PEIR) and the anticipated interventions identified in this draft energy strategy, estimates of the consumption of electricity, natural gas and vehicle fuel have been extrapolated from the 2018 baseline year to 2050. These estimates have been used to calculate corresponding GHG emissions over the same timeline, using BEIS and market-based grid carbon factors (Annex 1).
- 5.2.2 These estimates of fuel consumption and GHG emissions provide the basis of some of the GHG assessment in Chapter 15: Climate Change and Carbon of the PEIR. Summary graphs of this analysis for fuel consumption and GHG emissions, reported as kgCO<sub>2e</sub> per year, are set out in Diagrams 5.2.1 to 5.2.4, below.

Diagram 5.2.1: Estimated Fuel Consumption for the Future Baseline Scenario

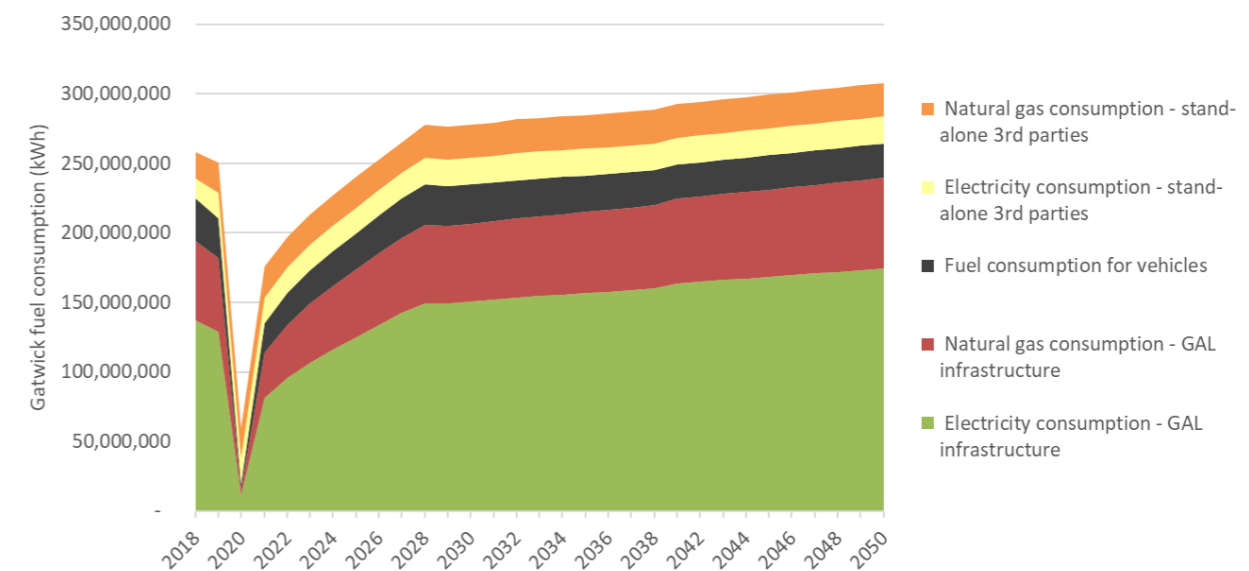


Diagram 5.2.2: Estimated Fuel Consumption for the Project

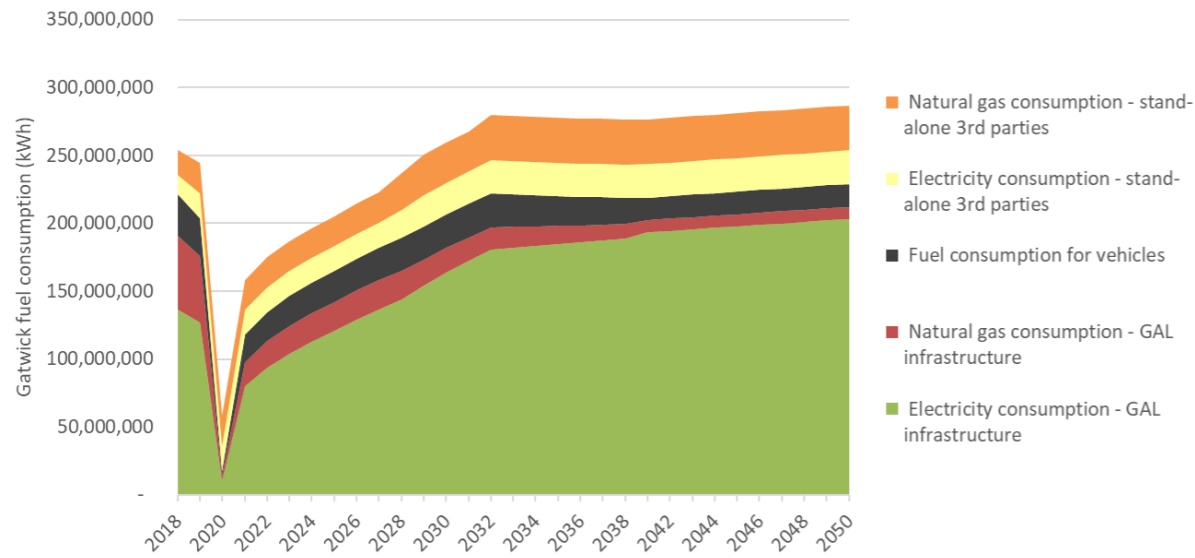


Diagram 5.2.4: Estimated Emissions Expressed as kgCO<sub>2e</sub>/year for the Project

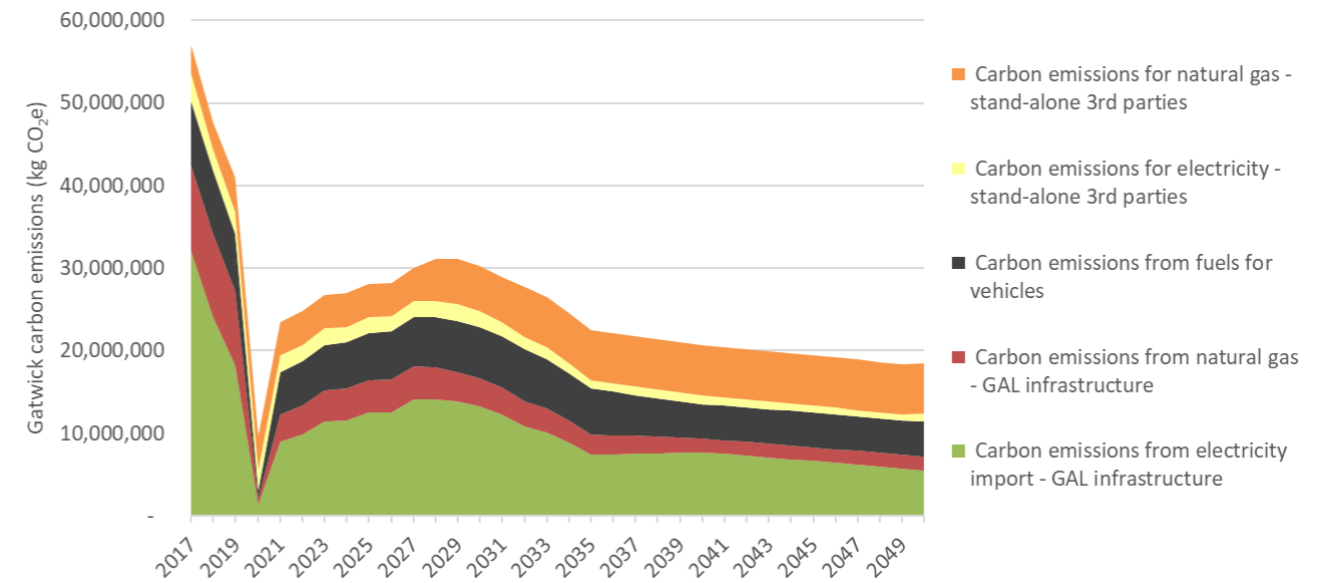


Diagram 5.2.3: Estimated Emissions Expressed as kgCO<sub>2e</sub>/year for the Future Baseline Scenario

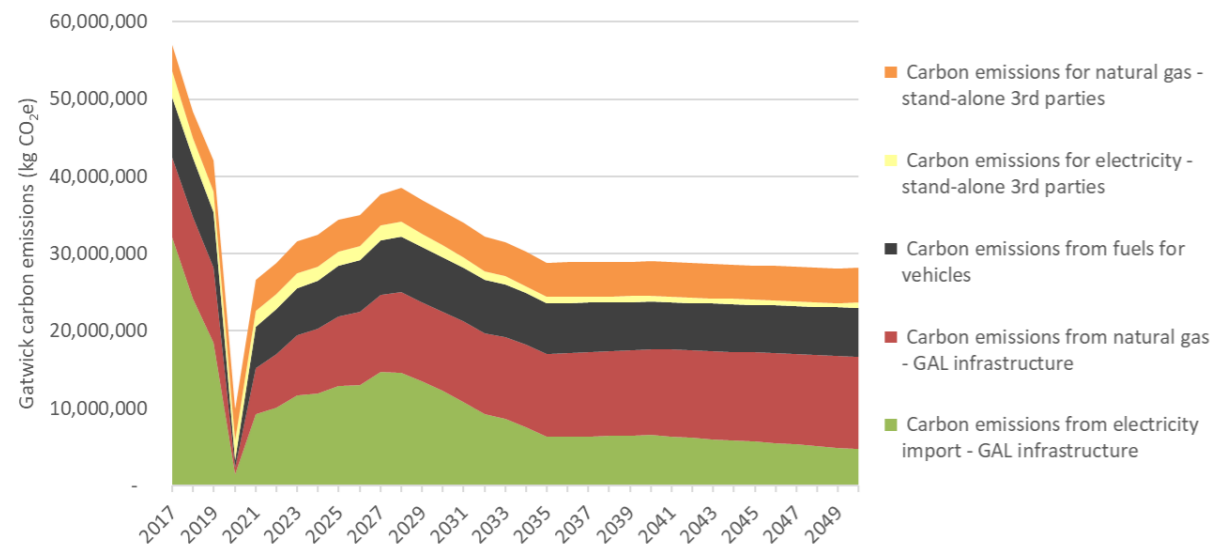
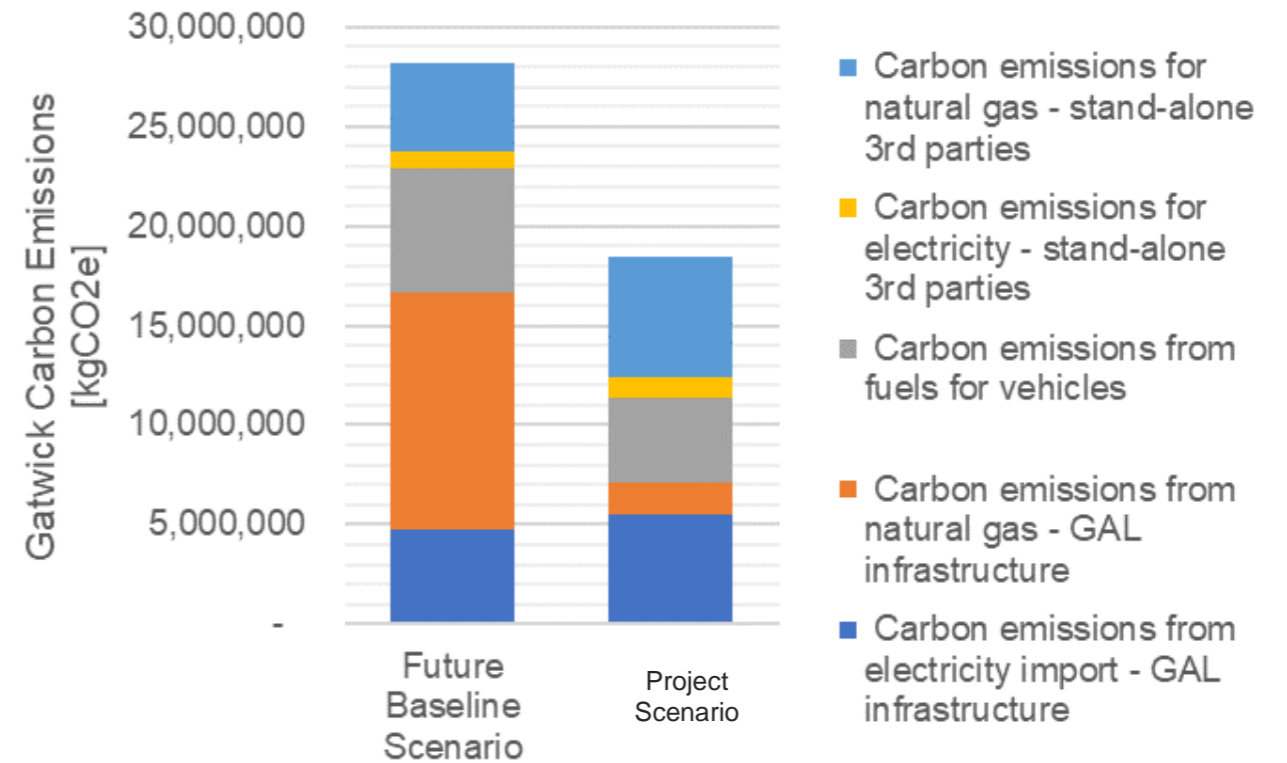


Diagram 5.2.5: Estimated Emissions Expressed as kgCO<sub>2e</sub>/year in 2038 for the Future Baseline Scenario and the Project



## 6 Conclusions

### 6.1 Energy Strategy Summary

- 6.1.1 The UK's energy infrastructure is going through a process of rapid and fundamental change and the recent amendment to the Climate Change Act 2008, which sets a net zero carbon target for the UK by 2050, has provided further emphasis to the need for immediate action to decarbonise.
- 6.1.2 Government has adopted the Climate Change Committee's recommended carbon budgets out to 2035 and the 2050 economy-wide goal of net zero GHG emissions by 2050. However, post-2035 carbon budgets and Government policy roadmaps are not yet in place across all sectors to drive the transition that is required at the pace necessary to hit the 2050 target.
- 6.1.3 GAL is committed to achieving net zero carbon before 2040 for direct emissions from ground operations. It has demonstrated its intent and capability to improve its sustainability performance across a range of topics, including energy efficiency and GHG emissions, through its 1<sup>st</sup> DofC sustainability policy. These intents are carried forward through its 2<sup>nd</sup> DofC policy, which aims at achieving net zero before 2040. GAL achieved its target of reducing its scope 1 & 2 carbon emissions by 50% (relative to a 1990 baseline) in 2018, two years in advance of the target year 2020.
- 6.1.4 Gatwick Airport is a highly complex, operational site. Its energy infrastructure for both electrical and thermal energy is complex, with myriad systems of varying age, condition, energy and carbon efficiency and ease of replacement or retrofit.
- 6.1.5 GAL is committed to developing a very progressive energy strategy in support of the application for development consent for the Project. This strategy needs to be adaptable to the national energy transition and must be able to respond to local changes and technological improvements. This strategy will be refined and finalised for the DCO submission, and with a view to it being regularly reviewed thereafter.
- 6.1.6 The analysis behind the development of draft energy strategies for the future baseline scenario and the Project has demonstrated that there are opportunities across new buildings and infrastructure and the retrofit of existing buildings and energy systems to make substantial carbon savings for GAL and to put it on a largely decarbonised emissions pathway before 2050.
- 6.1.7 A comparison of the analysis for the future baseline scenario and Project shows that the consumption of energy for the Project is predicted to be lower than for the future baseline and that the greater displacement of natural gas by electricity leads to an accelerated reduction and an overall smaller quantity of GHG emissions for the 'with Project' scenario. This is a function of the greater capacity for change in the Project, together with higher levels of investment and assumptions around improved and lower carbon systems.

### 6.2 Next Steps

- 6.2.1 This draft energy strategy sets out a pathway of decarbonisation to 2050 and a supporting evidence base for the GHG assessment in the Carbon and Climate Change chapter of the PEIR.
- 6.2.2 The current draft energy strategy does not provide a carbon emissions pathway that fully aligns with GAL's new emissions targets in its 2<sup>nd</sup> DofC sustainability policy, but further work will now be undertaken

to review and revise the draft energy strategy to understand how this will align with the aims and ambitions of the 2<sup>nd</sup> DofC sustainability policy.

- 6.2.3 The options for energy efficiency and other low or zero carbon energy interventions set out in this draft energy strategy will now be investigated in more detail and be updated for the submission as part of the application for development consent.
- 6.2.4 The next stages of analysis will also test in more detail the assumptions behind the differences in rate of change of GHG reductions in the future baseline scenario and the Project.

## 7 References

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Annex 1

BEIS electricity and gas carbon factors

A1.1 Electricity carbon factors from 2018 to 2050 were taken from the “UK Government Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal”, lastly updated in March 2020. This includes an electricity grid decarbonisation projection. The natural gas carbon factor was taken from the 2019 BEIS greenhouse gas reporting conversion factors. It is assumed that this would remain constant throughout the study period.

Year	Electricity carbon factor (kgCO <sub>2</sub> e/kWh)	Natural gas carbon factor (kgCO <sub>2</sub> e/kWh)
2018	0.177	0.184
2019	0.143	0.184
2020	0.138	0.184
2021	0.113	0.184
2022	0.105	0.184
2023	0.110	0.184
2024	0.102	0.184
2025	0.103	0.184
2026	0.097	0.184
2027	0.103	0.184
2028	0.098	0.184
2029	0.090	0.184
2030	0.081	0.184
2031	0.072	0.184
2032	0.060	0.184
2033	0.056	0.184
2034	0.048	0.184
2035	0.040	0.184
2036	0.040	0.184
2037	0.040	0.184
2038	0.040	0.184

Year	Electricity carbon factor (kgCO <sub>2</sub> e/kWh)	Natural gas carbon factor (kgCO <sub>2</sub> e/kWh)
2039	0.040	0.184
2040	0.040	0.184
2041	0.039	0.184
2042	0.038	0.184
2043	0.036	0.184
2044	0.035	0.184
2045	0.034	0.184
2046	0.032	0.184
2047	0.031	0.184
2048	0.030	0.184
2049	0.028	0.184
2050	0.027	0.184