
# Gatwick Airport Northern Runway Project

## Supporting Greenhouse Gas Technical Notes

## Book 10

**VERSION: 1.0**

**DATE: MAY 2024**

**Application Document Ref: 10.22**

**PINS Reference Number: TR020005**

**APFP Regulations 5(2)(q)** **Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009**

# Appendix A – Greenhouse Gas Technical Note – Whole Life Carbon Considerations

# Table of Contents

# 1 Application of Whole Life Carbon methodologies within the impact assessment of GHG Emissions for Northern Runway Project

## 1.1 Purpose of this Document

1.1.1 Within the Local Impact Reports several submissions challenged whether the assessment of GHG emissions within the Environmental Statement (ES) had undertaken a whole life carbon approach within the quantification of emissions. Additionally, submissions challenged whether the materiality thresholds set out within IEMA guidance had informed what was included within the GHG quantification process, and requested clarity on exclusions from the assessment.

1.1.2 Additionally, during ISH6 the Joint Local Authorities queried whether the approach adopted within the ES was consistent with a whole life carbon approach.

1.1.3 The purpose of this document is to respond to these queries in order to clarify the approach taken within the assessment of GHG emissions with regards to guidance on the use of a whole life carbon approach[1]

## 1.2 Relevant guidance

1.2.1 Several documents provide guidance on the way in which quantification of carbon should be undertaken on a whole life basis to inform the assessment of impact.

### Airports National Policy Statement (2018)

1.2.2 The ANPS does not refer to whole life carbon. It directs that carbon impacts will fall into four areas (Construction; ABAGO; Surface access; and Aviation) and directs that the assessment should provide evidence of the carbon impacts of the project from both construction and operation. Chapter 16 of the ES provides this information under this categorisation approach.

### National policy statement for national networks (2015)

1.2.3 The previous National policy statement for national networks, in force during preparation of the Environment Statement and still in effect for the purposes of determining this application, does not refer to whole life carbon and provides

[1] Defined in PAS 2080 as “sum of greenhouse gas emissions and removals from all work stages of a project and/or programme of works within the specified boundaries”.

minimal direction of what approach should be taken to quantify GHG emissions arising from a project.

### National Networks National Policy Statement (March 2024)

1.2.4 The revised NNNPS was designated after production of the Environmental Statement. Within the NNNPS it is noted that:

*"1.16 The Secretary of State has decided that for any application accepted for examination before designation of this revised NPS, the 2015 NPS should have effect in accordance with the terms of that NPS. The revised NPS will therefore have effect only in relation to those applications for development consent accepted for examination after the designation of the revised NPS."*

*"1.17 However, any emerging draft NPSs (or those designated but not having effect) are potentially capable of being important and relevant considerations in the decision-making process. The extent to which they are relevant is a matter for the relevant Secretary of State to consider within the framework of the Planning Act 2008 and with regard to the specific circumstances of each Development Consent Order application."*

1.2.5 In this context, whilst it is the 2015 NNNPS version which has direct effect in relation to the NRP Application, the 2024 version is capable of being an important and relevant consideration and, as such, has also been considered for the purposes of this document.

1.2.6 The revised NNNPS notes that:

*Para 5.31 – "All proposals for national network infrastructure projects should include a Whole Life Carbon Assessment at critical stages in the project lifecycle, for example the submission of a major business case."*

*Para 5.33 – "A Whole Life Carbon Assessment should be conducted according to the guidance, standards and methodologies set out in Transport Analysis Guidance Unit A3."*

*Para 5.34 – "As referenced in Transport Analysis Guidance, the guiding principles of managing whole life carbon are established in PAS 2080: Carbon Management in Buildings and Infrastructure (2023). This demonstrates how the whole value chain can support infrastructure decarbonisation."*

### Transport Analysis Guidance (TAG) Unit A3

1.2.7 TAG Unit A3 notes that:

*"It is important that the impacts of proposed transport schemes on greenhouse gas emissions over their whole lifecycle are incorporated within appraisal in a consistent and transparent way. To support the consideration of schemes' WLC impacts, it is recommended that, where feasible, proportionate whole life carbon assessments are conducted in accordance with the principles of the PAS 2080 framework, which are elaborated further in the RICS professional statement Whole life carbon assessment for the built environment (2017)."*

*"The whole life carbon (WLC) impacts of a scheme include* ***capital carbon*** *(emissions associated with scheme construction),* ***operational carbon*** *(emissions associated with scheme operation and maintenance), and* ***user carbon*** *(emissions associated with scheme users, such as changes in emissions due to mode shift)."*

*"Please note that the level of detail and data required in a WLC assessment should be commensurate to the development stage of a project."*

### IEMA guidance on Assessing Greenhouse Gas Emissions and Evaluating their Significance (February 2022)

1.2.8 IEMA guidance directs (in section 5.2) that:

*"The assessment should seek to quantify the difference in GHG emissions between the proposed project and the baseline scenario (the alternative project/solution in place of the proposed project). Assessment results should reflect the difference in whole life net GHG emissions between the two options."*

*"The assessment must include all material emissions (defined by magnitude…) … during the whole life of the proposed project. The boundary of the assessment should be clearly defined, in alignment with best practice."*

1.2.9 With regards to temporal boundaries the IEMA guidance directs that:

*"a reference study period shall be chosen as the basis for the GHG emissions assessment, and this should be based on the expected service life of the construction asset. Additional assistance is available in ISO 15686-1, RICS Whole life Carbon Assessment, and TAG GHG Assessment guidance.*

1.2.10 While the guidance provides direction to a reference period for the purposes of considering whole life carbon, it later directs that the assessment of effects should be considered in the context of alignment with the UK's carbon budgets, and the 2050 commitment to Net Zero.

1.2.11 The guidance then provides a framework for determining inclusions and exclusions noting that:

*"Activities that do not significantly change the result of the assessment can be excluded where expected emissions are less than 1% of total emissions, and where all such exclusions total a maximum of 5% of total emissions; all exclusions should be clearly stated."*

RICS (2021) Whole Life Carbon Assessment for the Built Environment, 1st Edition[2]

1.2.12 The RICS guidance provides more detailed information on the mechanics and assumptions that should inform a whole life carbon assessment. While it is intended to provide guidance across both buildings and infrastructure the 1st edition contains more substantial guidance with regards to buildings (in which whole life carbon best practice is generally more mature), with the 2nd edition that is forthcoming providing a more balanced level of information across both buildings and infrastructure projects.

1.2.13 The RICS guidance directs the use of the modular approach for the assessment of whole life carbon emissions[3].

1.2.14 In the context of the NRP, module B8 is specifically relevant as it incorporates emissions from the Users of infrastructure. For the NRP, User emissions are those attributable to passengers travelling to Gatwick via road and public transport, and aircraft making use of Gatwick Airport.

[2] Note that the second Edition has been published and enters into force on 1st July 2024
[3] Modules A1-A5 reflecting construction processes; Modules B1-8 reflecting operational emissions; Module C reflecting End of Life; and Module D reflecting emissions beyond the study boundary of the whole life carbon assessment.

1.2.15 RICS also provides direction on typical study periods for different built environment projects: 60 year study period for buildings, and 120 year study period for infrastructure.

## 1.3 Application of whole life carbon accounting guidance within the ES

1.3.1 The approach to whole life carbon within Chapter 16 of the ES [App-041] has sought to reflect the requirements of ANPS and NPSNN in a proportionate manner, and following the approach set out in IEMA guidance that is intended to reflect the limitations on project data availability typically available during the preparation of an ES.

1.3.2 As noted in Chapter 16, the appraisal of GHG emissions broadly considers two types of input:

- Quantities of activity / materials
- Carbon factors for those activities / materials

1.3.3 With regards to quantities of activity, for built elements of the Project covering Modules A1 to A5 the information sources are drawn from:

- Bills of quantities, or data sources used for developing costs; and
- Broad building parameters as set out in the Project Description.

1.3.4 This aligns with RICS 1st Edition that states:

*"A complete whole life carbon assessment should cover all items listed in the project's Bill of Quantities (BoQ), cost plan or as identified in other design information (drawings, specifications, etc.)…".*

1.3.5 RICS acknowledges that data is limited in early design stages and that "Early stage assessments are recommended to establish a baseline carbon estimate for the project" and specifies, as a minimum, that a whole life carbon assessment be carried out at technical design (RIBA Stage 4 or equivalent). The project parameters available for the GHG assessment within Chapter 16 are not yet at RIBA Stage 4, which inevitably compromises to some degree the extent to which the full RICS guidance can be followed.

1.3.6 Notably the new RICS guidance provides more clarity noting that:

*"During the strategic design and concept design phases, where detailed data is not available for certain elements, assumptions can be made using the methods outlined in this section".*

1.3.7 It then directs that impacts should be assessed using benchmark information (e.g. per m2 for buildings, or per km for linear infrastructure). It directs to use of the Building Environment Carbon Database (BECD) as one source of benchmark information, although the NRP Assessment has instead used benchmark data from LETI for buildings.

1.3.8 Benchmarks for airfield infrastructure and for highways elements within the NRP have not been used, as Bill of Quantity / Cost build-up data was available and provides greater accuracy of project-specific quantities.

1.3.9 With regards to Carbon Factors - Table 5 of RICS directs on the recommended use of different data types, noting that at work stages of 'Strategy, Brief and Concept', and 'Design' that it is appropriate to use:

- Generic data reflecting the types of component and/or material, or
- Average data based on different manufacturers or product lines.

1.3.10 The assessment within Chapter 16 has primarily used generic data, drawn from data sources as set out in the relevant appendices to Chapter 16.

1.3.11 The sources of information used to inform the quantification of activities, and the selection of carbon factors for conversion into GHG emissions, are considered proportionate and appropriate for the assessment.

## 1.4 Application of the modular approach within the assessment of NRP

1.4.1 The assessment of GHG emissions within Chapter 16 has followed the requirements set out in the IEMA guidance, and has adopted the modular approach as specified within RICS guidance.

1.4.2 The following table illustrates how the modular approach has been applied to the assessment.

| Lifecycle stage | Whole life carbon modules | Inclusion within the assessment for ES | Reference within GHG Assessment |
|---|---|---|---|
| Pre-construction | A0 | Excluded from assessment as these do not meet the IEMA materiality threshold for decision making. | N/A |
| Product | A1 Raw material supply<br>A2 Transport<br>A3 Manufacturing | Raw material supply; material and waste transport; manufacturing of | Appendix 16.9.1 [App-191] |

| | | | |
|---|---|---|---|
| | | materials/components are captured within the Construction assessment for airport buildings, airfield, and highways infrastructure | |
| Construction | A4 Transport<br>A5 Construction and Installation | Transport of materials and wastes, and energy use for construction processes are captured within the Construction assessment for airport buildings, airfield, and highways infrastructure | Appendix 16.9.1 [App-191] |
| Operation | B1 Use | Included with regard to fugitive refrigerant emissions within the ABAGO assessment. Material emissions and removals are assumed to be minimal and are not included within the assessment. | Appendix 16.9.2 [App-192] |
| | B2 Maintenance<br>B3 Repair<br>B4 Replacement<br>B5 Refurbishment | Excluded from assessment as these do not meet the IEMA materiality threshold for decision making. | N/A |
| | B6 Operational energy | Operational energy is included within the ABAGO assessment. | Appendix 16.9.2 [App-192] |
| | B7 Operational water | Operational water is included within the ABAGO assessment. | Appendix 16.9.2 [App-192] |
| | B8 User Activities not covered in B1-B7 | User activities are captured within:<br>The inclusion of passenger and staff transport within the surface access assessment<br>The inclusion of aircraft emission within the aviation assessment. | Appendix 16.9.3 [App-193]<br>Appendix 16.9.4 [App-194] |
| End of Life | C | End of life has been excluded from the | N/A |

| | | | |
|---|---|---|---|
| | | assessment on the basis that there is no effective end date for operation of new infrastructure delivered under this Project. | |
| Benefits and loads beyond the system boundary | D | Module D is largely excluded from the assessment as it is outside the system boundary and emissions falling under this module are expected to be minimal.<br><br>Land use change impacts have been considered as set out in Appendix 16.9.1 [App-191] of the ES. It concluded that land use change impacts can be excluded from the assessment on the basis of minimal net impact. | Appendix 16.9.1 [App-191] |

1.4.3 The approach taken to consider emissions sources within the modular framework is considered proportionate and appropriate for the assessment.

## 1.5 Temporal considerations within whole life carbon

1.5.1 As noted above, IEMA guidance directs the assessor to establish a reference study period for the GHG emissions assessment. A typical study period for a whole life carbon assessment is typically 60 years for buildings, and 120 years for infrastructure.

1.5.2 IEMA then directs that the assessment of significance should rely on contextualisation against relevant carbon budgets and sector trajectories. IEMA notes within Section 6.2 that:

*"The specific context for an individual project and the contribution it makes must be established through the professional judgment of an appropriately qualified practitioner, drawing on the available guidance, policy and scientific evidence."*

1.5.3 Further it then directs – in Section 6.3 – that different levels of significance must consider compatibility with the UK's net zero trajectory (which extends only up to 2050).

1.5.4 The approach adopted, therefore, was to consider the whole life carbon emissions for the assessment of the project against the relevant national and sector budgets/trajectories to 2050.

1.5.5 The approach taken to the use of project study periods for both understanding materiality, and then contextualisation within the assessment process, are considered proportionate and appropriate for the assessment.

## 1.6 Exclusions from the whole life carbon assessment

1.6.1 The following lifecycle modules were excluded from the assessment of GHG emissions within the ES.

1.6.2 **Module A0 is an optional module**[4]: It is typically small in the context of general whole life carbon assessments as it reflects processes before construction and so typically includes the impacts arising from the activities of designers, surveyors etc.

1.6.3 **Modules B2-B5 comprise:** B2: Maintenance; B3: Repair; B4: Replacement; B5: Refurbishment.

1.6.4 For the purposes of the ES assessment these B modules were excluded as the expectation was that these would be small to the extent that they did not materially affect the assessment of impact.

## 1.7 Update to the assessment of whole life carbon

1.7.1 Following challenge during ISH6, and reflecting issues raised by the Joint Local Authorities, an assessment has been undertaken to verify the materiality assumption relating to B2-B5.

1.7.2 The materiality assessment has considered the scale of B2-B5 emissions over a 60 year period as a preliminary exercise. This is considered an appropriate Reference Study Period (RSP) as the majority of emissions associated with construction of the Project arise from construction of buildings (rather than of wider infrastructure elements).

[4] Module 0 captures "Nonphysical process before construction, preliminary studies, tests and design".

1.7.3 Key assumptions for the materiality exercise are informed by the RICS Guidance 2nd Edition (which provides more comprehensive guidance on appropriate benchmarks than the first edition).

1.7.4 Key assumptions are:

- **B2 Maintenance**: is estimated as 1% of A1-5 across all project elements (from RICS 2nd Ed.);
- **B3 Repair**: is estimated as being 25% of B2, plus 10% of A1-3 for MEP elements in buildings (from RICS 2nd Ed.);
- **B4 Replacement**[5]: is estimated as comprising:
  - 1 full replacement of building facades;
  - 2 full replacement of internal superstructure;
  - 2 full replacement of MEP systems;
  - 1 full replacement of asphalt and pavement concrete for airfield infrastructure;
  - 1 full replacement of all highways elements except for earthworks and structures.
- **B5 Refurbishment**: is estimated as comprising:
  - two full refurbishments over the 60 year study period for treated buildings (i.e. excluding multi-storey car parks).
  - emissions from other sources (ABAGO, surface access, aviation) remain at 2050 levels for the remainder of the study period.
- No decarbonisation of material supply for B2-B5 has been modelled within this preliminary study.

1.7.5 The materiality exercise has compared the 60 year B2-B5 emissions to the 60 year Project GHG emissions. B2-B5 have been calculated as 2.12% of Project emissions across the 60 year period. Within this:

- B2 and B3 in aggregate are less than 0.01% of Project emissions over 60 years.
- B4 is estimated as 1.53% of Project emissions over 60 years.
- B5 is estimated as 0.5% of Project emissions over 60 years.

1.7.6 Applying IEMA thresholds would indicate that while the 5% total exclusion threshold (as set out in Para 1.5.8 above) is not met for Modules B2-B5, then the 1% ‘Activity specific’ threshold is met when Module B4 is considered.

1.7.7 However, this approach is based on considering the scale of B4 emissions averaged across the 60 year study period. In practice the majority of emissions

[5] These values are based on typical service life periods for project elements as set out in the RICS guidance.

arising from B2-B5 will occur after the first typical replacement cycle for major elements which is taken to be after 30 years.

- Decarbonisation impacts are likely to have provide some benefit to these emissions, and by the point of replacement after 30 years the actual GHG associated with these would be expected to be lower than have been estimated above.
- When these are contextualised within the 2050 policy framework then it can be considered likely the majority of B4 impacts would arise beyond the contextualisation timescale that extends to 2050.

1.7.8 Given the relatively small scale of B2-B5 emissions above the 1% threshold, and consideration of likely decarbonisation trends, the inclusion of B2-B4 emissions does not impact upon the conclusions of the overall assessment of significance for the GHG assessment.

1.7.9 Consideration of the impacts of assuming a 120 year study period for infrastructure elements has also been undertaken. The underlying assumption is that patterns of emissions from all sources beyond 2050 remain similar to those in 2050, and that these are dominated by aviation emissions. The overall contribution of B2-B5 would be expected to follow a similar pattern as is seen within the 60 year study period. No major additional whole life carbon emissions would be expected to arise when a period of 120 years is considered compared to a 60 year study period.

1.7.10 **Module C: End of Life** has been excluded. Typically this accounts for significantly less than 1% of whole life carbon emissions for buildings projects. The expectation is that the majority of elements considered within the Project will extend beyond a 60 lifetime.

1.7.11 It should be noted that the Carbon Action Plan (CAP) [APP-091] includes a commitment for the Applicant to become certified under PAS 2080. This certification process, and the maintenance of certification, requires the Applicant to carry out a full life carbon assessment of each project within the NRP as it is brought forward (as specified within Section 7 of the updated PAS 2080:2023[6]). The requirements set out within PAS 2080 will necessitate a significantly more detailed and comprehensive approach to consideration of whole life carbon, and importantly decision making, than has been possible at the time of the ES due to the relatively early design stage for most Project elements. This will provide the effective mechanism for mitigation of whole life carbon emissions throughout the

[6] https://www.bsigroup.com/en-GB/insights-and-media/insights/brochures/pas-2080-carbon-management-in-infrastructure-and-built-environment/

design and delivery of the Project. On this basis it is concluded that the inclusion of Modules B2-B5 within the whole life carbon appraisal process would not alter the assessment of significance presented within the Environmental Statement.

## 1.8 Conclusions

1.8.1 The assessment process has followed the principles of whole life carbon as set out in guidance and has sought to align with the detailed methodologies specific within RICS guidance to the extent that project information allows.

1.8.2 This process is considered proportionate and appropriate to align with the guidance set out in IEMA to the extent that a whole life carbon assessment process has informed the assessment of significance.

1.8.3 The examination of the scale of Modules B2-B5 has determined that the 1% materiality threshold specified within IEMA guidance is likely to be met by consideration of B4 emissions. However, there is no indication that the aggregate 5% threshold is breached by the exclusions from the whole life carbon assessment set out above.

1.8.4 Were B2-B5 emissions to be included in the time-series for operational emissions, then the majority of these emissions would fall beyond the 2050 contextualisation – and as such the scale of the Project impacts prior to 2050 would be expected to change by less than 1% as a result of their inclusion.

1.8.5 The conclusion of the assessment of significance remains unchanged given the scale of B2-B5 emissions, and the PAS2080 commitments contained within the CAP.

# Appendix B – Greenhouse Gas Technical Note – Well-to-Tank Emissions

# Table of Contents

# 1 Well-to-tank Emissions within the GHG Assessment for NRP

## 1.1 Purpose of this Document

1.1.1 This document is intended to provide an update on the GHG assessment with regards to the inclusion of Well-to-tank (WTT) emissions.

1.1.2 Several submissions from Interested Parties have raised the omission of WTT from the assessment of greenhouse gases set out in Chapter 16 of the Environmental Statement.

1.1.3 WTT was omitted from the quantification of GHG presented in the Environmental Statement. This was considered appropriate at the time of production of the Environmental Statement for several reasons:

- The exclusion of these emissions sought to avoid inconsistency in the reporting of GHG emissions across the four emissions topics (Construction, ABAGO, Surface Access and Aviation). Due to the extent to which Aviation WTT emissions (as set out below) fall outside the scope of contextualisation exercises it was considered reasonable to exclude these. Following this principle, for consistency, WTT was then omitted from other assessment.
- Comparison was made with guidance on the evaluation of emissions associated with road traffic as provided within the Design Manual for Roads and Bridges (DMRB), which does not include for the estimation of WTT within the calculation of emissions impacts.
- Beyond contextualisation against the UK carbon budgets, other sectoral contextualisation's (against Jet Zero, and against CCC trajectories), exclude WTT emissions.
- A review of methodologies from other airport applications concluded that WTT emissions were frequently excluded, or included only for some aspects of assessment (e.g. Construction). This was considered sub-optimal in that it would lead to inconsistency in the reporting methodology for the NRP Environmental Statement.

1.1.4 In response to submissions from interested parties the Applicant committed to provide quantification of WTT for Construction, ABAGO, and Surface Access. This note also includes quantification of WTT emissions for Aviation.

1.1.5 This note will also consider how these impact upon the assessment of significance within the Environmental Statement.

## 1.2 Overview of Well-to-tank emissions

1.2.1 Well-to-tank (WTT) emissions are those associated with the supply chain for fuels, reflecting the GHG emissions that arise from the extraction, refinement, manufacture and transport of fuels to the point at which they are sold (i.e. reflecting emissions from the 'oil well' to when they enter the 'tank' of the engine in which they will be used).

1.2.2 Well-to-tank emissions vary by fuel, but typically represent approximately 20-30% uplift on the GHG emissions from when fuels are burnt. The emissions that result from the burning of fuels are commonly referred to as 'tailpipe' emissions. In this way the total GHG impact of a fuel can be calculated as follows:

- Quantum of GHG = Volume of fuel x (carbon factor for tailpipe emissions PLUS carbon factor for WTT emissions).

1.2.3 Specific WTT factors for different fuels (jet fuel, petrol, diesel etc) are published annually for the UK by the Department for Energy Security and Net Zero (DESNZ), formerly the Department for Business, Energy and Industrial Strategy (BEIS), as part of a wider set of carbon factors for corporate footprinting[1]. WTT emissions factors, along with emissions factors for tailpipe emission, do not typically vary significantly from year to year.

## 1.3 Well-to-tank in the context of NRP

1.3.1 As with the wider assessment of GHGs, consideration of WTT emissions for NRP are dominated by those associated with aviation fuel. For the most recent emissions conversion factors for the UK:

- Aviation turbine fuel tailpipe conversion factor: 2.54269 $kgCO_2e$/litre
- Aviation turbine fuel WTT factor: 0.52817 $kgCO_2e$/litre

1.3.2 WTT emissions therefore represent a 20.77% uplift on tailpipe emissions for aviation turbine fuel.

1.3.3 Well-to-tank emissions also arise from other fuel sources in addition to jet fuel. Fuels are also present in the Project GHG assessment as follows:

- **Construction**: fuel for transporting materials and waste; construction workers; and on-site diesel usage for construction plant
- **ABAGO**: diesel usage and natural gas usage
- **Surface access**: petrol and diesel usage in road vehicles

[1] https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2023

1.3.4 The GHG assessment has been reviewed to understand and quantify the scale of WTT emissions arising across all of these sources. The following table presents the total emissions arising from the Project before, and after, the inclusion of WTT emissions.

**Table 1 Total GHG emissions, and total WTT emissions, for the Project between 2018 and 2050**

| | Emissions excluding WTT ($MtCO_2e$) | Additional WTT emissions ($MtCO_2e$) | Emissions including WTT ($MtCO_2e$) | % change |
|---|---|---|---|---|
| Aviation | 18.520 | 3.847 | 22.367 | 20.77% |
| Surface access | 0.380 | 0.043 | 0.423 | 11.26% |
| ABAGO | 0.008 | 0.001 | 0.009 | 8.70% |
| Construction | 1.155 | 0.087 | 1.242 | 7.56% |
| **Total** | **20.063** | **3.978** | **24.041** | **19.83%** |

1.3.5 The percentage uplift arising from WTT is greatest for aviation as this entire emission category reflects only fuel use, whereas other topics include emissions arising from non-fuel activities.

1.3.6 Care is needed when considering the role of SAF within the calculation of emissions from Aviation. In line with the Jet Zero Strategy the assumption is that SAF provides a benefit of a 70% reduction on emissions on a lifecycle basis. This has been modelled as providing a 70% reduction compared to aviation fuel across both the tailpipe and WTT phases of the fuel lifecycle.

1.3.7 As can be seen above, aggregate Project emissions from 2018 to 2050 increase from **20.063 $MtCO_2e$** to **24.041 $MtCO_2e$** when all WTT are included.

## 1.4 Consideration within the assessment

1.4.1 The values above provide the overall scale of emissions associated with the inclusion of WTT in Project reporting.

1.4.2 However, when this is considered within the GHG assessment it is necessary to consider the impact when considered within the scope of the contextualisation exercise.

1.4.3 With regards to contextualisation against UK carbon budgets (as provided within tables 16.9.4, 16.9.6, 16.9.8, 16.9.10, 16.9.11 and 16.9.13 in Chapter 16 of the ES) this must consider what portion of WTT emission will arise within the boundary of the system that the UK carbon budgets reflect.

1.4.4 The UK carbon budgets reflect the methodologies used in the assembly of the UK's Emissions Inventory as assembled by the UK National Atmospheric Emissions Inventory[2]. As such they exclude emissions associated with imported goods.

1.4.5 DUKES Chapter 3: Oil and Oil Products[3] provides information on domestic production of aviation fuel (which would feature within the UK carbon budget) compared with imported aviation fuel (where production falls outside the scope of the UK carbon budget). In 2022 domestic production of Aviation turbine fuel was 36% of total demand, which means 64% of WTT emissions associated with aviation fuel would be expected to fall outside the scope of the UK carbon budgets.

1.4.6 Considering the portion of WTT emissions arising from aviation fuel produced within the UK has the following impact on resultant GHG emissions[4]:

**Table 2 Total GHG emissions, with UK produced aviation fuel, for the Project between 2018 and 2050**

| | Emissions excluding WTT ($MtCO_2e$) | Additional WTT emissions ($MtCO_2e$) | Emissions including WTT ($MtCO_2e$) | % change |
|---|---|---|---|---|
| Aviation | 18.520 | 1.385 | 19.905 | 7.48% |
| Surface access | 0.380 | 0.043 | 0.423 | 11.26% |
| ABAGO | 0.008 | 0.001 | 0.009 | 8.70% |
| Construction | 1.155 | 0.087 | 1.242 | 7.56% |
| **Total** | **20.063** | **1.516** | **21.579** | **7.55%** |

1.4.7 Table 16.9.13 within Chapter 16 of the Environmental Statement provides the overall contextualisation of the Project against UK 4th, 5th and 6th carbon budgets. Updating the Project emissions from this table to reflect the inclusion of WTT (within the scope of the UK carbon budget) is presented below:

[2] https://naei.beis.gov.uk/
[3] https://www.gov.uk/government/statistics/petroleum-chapter-3-digest-of-united-kingdom-energy-statistics-dukes
[4] Impacts of import/export of other fuels on surface access, ABAGO, and Construction are negligible and so have not been calculated.

| Carbon budget | Five-Year Carbon Budget ($MtCO_2e$) | Net increase between Project and Baseline Emissions including WTT arising within the domestic UK ($MtCO_2e$) | Contribution to Carbon Budget of Net Future With-Project Emissions including WTT arising within the domestic UK ($MtCO_2e$) | Net increase between Project and Baseline Emissions excluding all WTT ($MtCO_2e$) | Contribution to Carbon Budget of Net Future With-Project Emissions excluding all WTT ($MtCO_2e$) |
|---|---|---|---|---|---|
| Fourth Carbon Budget (2023 – 27)[5] | 1,950 | 0.520 | 0.027% | 0.475 | 0.024% |
| Fifth Carbon Budget (2028 – 32) | 1,725 | 0.623 | 0.036% | 0.577 | 0.033% |
| Sixth Carbon Budget (2033 – 37) | 965 | 6.264 | 0.649% | 5.825 | 0.604% |

1.4.8 Inclusion of WTT within the scope of the UK Fourth and Fifth carbon budgets increases the contribution of the Project by less than 0.01% in each of the relevant UK carbon budget periods.

1.4.9 Inclusion of WTT within the scope of the UK Sixth carbon budget increases the contribution of the Project from 0.604% to 0.649%, i.e. an increase of less than 0.05% of the UK carbon budget for this period.

1.4.10 The additional contextualisation exercises within the ES remain unchanged, as WTT emissions are not reflected in the respective sectoral trajectories (as they are addressed under other economic sectors);

- The Jet Zero Strategy does not consider WTT emissions for fuels within the trajectories included therein, it reflects only tailpipe emissions from aircraft;
- The CCC Balanced Pathway for Building Energy Emissions similarly does not consider WTT emissions;
- The CCC Balanced Pathway for Surface Access similarly does not consider WTT emissions.

[5] Note, as with the contextualisation in the ES, the 4th and 5th carbon budget periods exclude international aviation.

1.4.11 Emissions arising from processes within the scope of Well-to-tank will typically be spread across a range of other sectors in the UK, predominantly within the Industrial and Transport sectors. It is of little use to try and contextualise these given the relatively small scale of WTT emissions, their distribution across sectors, and the likelihood that WTT emissions will also decarbonise over time in line with the wider UK decarbonisation towards 2050.

## 1.5 Conclusion

1.5.1 Given the overall small scale of WTT arising from domestically produced aviation fuel the conclusion on significance of overall Project emissions within the assessment remains unchanged as minor adverse, and not significant.