Appendix 13-8: Response to ACP Scoping Opinion

Appendix 13-8 Response to ACP Scoping Opinion

1. Introduction

1.1.1 This Appendix presents the response to the following Climate queries raised in the An Coimisiún Pleanála (ACP) Scoping Opinion as set out in Table 13H-1.

1.1.2 The Appendix was completed by Joana Cerejeira BSc, MRes, a Principal Sustainability Consultant in AECOM's Carbon and ESG team, with over eight years' experience in the climate change and sustainability space. Joana specialises in climate and carbon in infrastructure and has undertaken numerous CCRAs and associated work across various sectors in Ireland and the UK.

1.1.3 Chapter 13: Climate (EIAR Volume 2) and its appendices were reviewed by Ian Davies BSc (Hons), a Technical Director in AECOM's Carbon and ESG team, with over 20 years' experience in the provision of environmental sustainability assessment, specialising in greenhouse gas (GHG). These include recent Dublin Airport applications for the proposed Dublin Airport Underpass and for the proposed NRRA, and for the expansion of London Luton Airport.

Table 13H-1:Climate queries raised in ACP Scoping Opinion

An Coimisiún Pleanála (ACP) Scoping Opinion comment	Response
In relation to climate the description of the baseline for GHG emissions should refer to current emissions and trends, drawing on latest EPA greenhouse gas inventories as baseline (Ireland's Final Greenhouse Gas Emissions 1990-2024) and on EPA greenhouse gas projections (Ireland's Greenhouse Gas Emissions Projections 2025-2030).	The GHG baseline and future emissions trajectories are described in Chapter 13: Climate, particularly Sections 13.4–13.6. The assessment draws upon published EPA greenhouse gas inventory information and emissions projections to provide context for current and future emissions. The EPA's Ireland's GHG Emissions Projections 2024–2055 have been used to establish a consistent longer-term trajectory appropriate to the assessment period extending to 2050, aligning with Ireland's net zero target. The supplementary assessments in this Appendix provide further context in response to the ACP Scoping Opinion.
The expected future impact on domestic aviation emissions (IPCC category I.A.3.a.i) should be reported against the 1990-2024 baseline in Table 3.2 of Annex 3.1 of Ireland's National Inventory Document to the United National Framework Convention on Climate Change: Ireland's National Inventory Submissions 2026.	Please refer to Section 2 of this appendix
The expected impact on international aviation emissions (IPCC category I.A.3.a.ii) should be reported against Table 3.1.2 of Annex 3.1 of Ireland's National Inventory Document. The applicant is referred to the submission made to the scoping by EPA in this regard.	Please refer to Section 3 of this appendix
Information should be set out in the context of relevant international, national and sectoral emissions targets as given in relevant agreements, policies and objectives such as those in the EU Emissions Trading Scheme, EU Efforts Sharing Regulation, National Climate Change Policies and the National Climate Action Plan.	Please refer to Section 13.2 of the main EIAR Climate Chapter (Chapter 13).

2. Domestic Aviation Emissions

2.1.1 This section presents the expected future impact of domestic aviation emissions from the Proposed Order against the 1990 – 2024 baseline in Table 3.2 of Annex 3.1 of Ireland's National Inventory Document to the United National Framework Convention on Climate Change: Ireland's National Inventory Submissions 2026[1].

2.1.2 The aim of this section is to provide a contextual comparison to help rationalise emissions in line with the ACP Scoping Opinion. The significance assessment presented in the main EIAR Climate Chapter (Chapter 13) remains the unchanged. Please refer to the main Chapter for the full details of the assessment.

2.1.3 Following the same methodology, assumptions and limitations described in the main EIAR Climate Chapter (Chapter 13), the future domestic aviation emissions were estimated based on the Proposed Order (40mmpa) aviation schedule and projected out to 2050. The applied methodology includes the following future decarbonisation pathways:

- An uptake in sustainable aviation fuel (SAF) has been applied to the aviation emissions in accordance with the mandatory minimum SAF shares established by ReFuelEU Aviation. The assessment assumes SAF uptake of 2% in 2025, increasing to 6% in 2030, 20% in 2035 and 70% by 2050, with a linear increase applied between these milestones.
- To account for anticipated improvements in aircraft and engine technology, the assessment assumes an average improvement in emissions efficiency of 1.4% per year, up to a cumulative improvement of 22% by 2040. This assumption is consistent with the Climate Change Committee (CCC) Balanced Pathway[2], which is informed by historical average improvements in aircraft efficiency.

2.1.4 It is important to recognise that the methodology used to estimate Ireland's National Inventory differs from the methodology used for the assessment in this chapter in several ways as set out below:

- **Geographic coverage**: In line with the United Nations Framework Convention on Climate Change (UNFCCC)[3] approach the Proposed Order only includes flights departing from Dublin airport, whilst Ireland's National Inventory includes all domestic aviation across the country. The departure based approach ensures that each flight within the assessment boundary is counted once, rather than accounting for the same flight at both its departure and arrival airport.
  Greenhouse gases (GHGs) included in the assessment: The Proposed Order assessment initially calculates aviation emissions in carbon dioxide (CO_2), using the European Monitoring and Evaluation Programme (EMEP) / European Environment Agency (EEA) Aviation Emissions Calculator. To express these emissions as carbon dioxide equivalent (CO_2e), the DESNZ 2025 emissions factors for jet fuel were reviewed to establish the difference between CO_2 and CO_2e, including the associated well-to-tank (WTT) emissions. This combined adjustment was applied to the calculated CO_2 emissions, resulting in an overall uplift of 21.72%.WTT emissions comprise the upstream GHG emissions associated with the extraction, processing, refining, transportation and distribution of aviation fuel prior to its combustion. The resulting CO_2e estimate therefore accounts for the additional GHG emissions and upstream fuel supply emissions reflected in the DESNZ factors. In the absence of Ireland-specific emissions factors for this purpose, the DESNZ factors have been applied as an appropriate proxy. Ireland's National Inventory reports CO_2, methane (CH_4) and nitrous oxide (N_2O) for domestic aviation, but does not account for the other four GHGs within the seven-gas Kyoto Protocol basket: hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3) or WTT.

[1] EPA (2026). Ireland's National Inventory Submissions 2026. Available at: https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/irelands-national-inventory-submissions-2026.php [Accessed on: 09/11/2026]
[2] CCC (2020). *The sixth carbon budget – Aviation.* Available at: https://www.theccc.org.uk/wp-content/uploads/2020/12/Sector-summary-Aviation.pdf [Accessed on: 27/05/2026].
[3] United Nations Framework Convention on Climate Change, (2005). Compilation of data on emissions from international aviation. Available at: https://unfccc.int/resource/docs/2005/sbsta/eng/misc04.pdf [Accessed on: 09/11/2026]

- **Emissions calculation methodology**: The Proposed Order follows the calculation methodology developed for the EMEP/EEA Aviation Emissions Calculator[4], whilst the assessment done for Ireland's National Inventory uses the EUROCONTROL[5] software using an Advanced Emission Model (AEM). The EMEP/EEA Aviation Emissions Calculator uses standardised aircraft and distance based emission factors which draws on the Aviation Emissions Calculator draws on the International Civil Aviation Organisation (ICAO) Aircraft Engine Emissions Databank[6]. Whereas the AEM uses flight specific trajectory, aircraft, and engine data to calculate fuel burn and emissions throughout each phase of flight. While AEM can provide more detailed estimates where flight specific operational and trajectory data are available, the Proposed Order carbon assessment is concerned with forecasting emissions associated with future aviation emissions from 2029 to 2050. Given the strategic nature of the assessment and the absence of actual future flight trajectories, routing and operational data, the EMEP/EEA methodology was considered the most appropriate and proportionate approach.
  The EMEP/EEA approach typically produces more generalised estimates based on average operating assumptions, whereas where detailed flight-specific data are available the AEM captures operational factors such as routing inefficiencies, altitude profiles, holding patterns and taxi times. To account for additional flight distances and operational inefficiencies not explicitly captured by the EMEP/EEA methodology, an 8% uplift has been applied to climb, cruise and descent (CCD) emissions, consistent with the distance uplift assumption used in the DESNZ 2025 emissions factor methodology. This adjustment is intended to account for factors such as deviations from great-circle flight paths, airspace restrictions, weather conditions, delays and aircraft holding patterns. Further details of the application of this adjustment are provided in Chapter 13.
- **Aviation activity**: The Proposed Order only includes commercial departing flights whilst Ireland's National Inventory also includes private jets and helicopters. As detailed in the main EIAR Climate Chapter (Chapter 13), private aviation only makes up approximately 2% of flights leaving Dublin Airport, therefore these are not considered a material emission source.

2.1.5 Based on the differences in emissions calculation methodology and aviation activity outlined above, the emissions estimates produced for the Proposed Order are therefore not directly comparable with those reported in Ireland's National Inventory. Nevertheless, the Proposed Order assessment incorporates additional emissions sources and adjustment factors, including the inclusion of WTT emissions (21.72% uplift) and an 8% uplift applied to CCD emissions to account for operational inefficiencies. These adjustments increase the emissions estimates relative to an assessment based solely on the underlying EMEP/EEA methodology. While the respective approaches differ in their treatment and estimation of aviation emissions, these additional emissions sources and adjustments help to address some of the differences between the methodologies. The resulting estimates therefore provide a useful contextual comparison with the National Inventory, although differences in geographical coverage, aviation activity and calculation methodology should be recognised when interpreting the results

2.1.6 Plate 13A-1 illustrates historic domestic aviation emissions from Ireland's National Inventory, and how domestic aviation emissions are projected to change under the Proposed Order. In the Proposed Order assessment, this includes gross domestic aviation GHG emissions associated with Dublin Airport from 2023 to 2050. The assessment assumes that 40 million passengers per annum (mppa) is reached in 2029, after which passenger numbers remain at this level for the remainder of the assessment period.

2.1.7 Plate 13A-1 demonstrates that the historic domestic emissions peaked in 2006 (91,964 tCO_2e) and dropped significantly in subsequent years primarily reflecting the impact of the global financial crisis and the associated reduction in aviation activity. Emissions subsequently increased from 2012 onwards, with the exception of 2020, when aviation activity and associated emissions fell significantly due to the COVID-19 pandemic.

[4] EMEP/EEA, (2019). 1.A.3.a Aviation 1 Master emissions calculator 2019. Available at: https://www.eea.europa.eu/en/analysis/publications/emep-eea-guidebook-2023/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-a-aviation.3 [Accessed on: 09/06/2026]
[5] EUROCONTROL (2026). Advanced emission model. Available at: https://www.eurocontrol.int/model/advanced-emission-model [Accessed on: 03/11/2026]
[6] EASA. (2023) ICAO Aircraft Engine Emissions Databank. Available at: https://www.easa.europa.eu/en/domains/environment/icao-aircraft-engine-emissions-databank

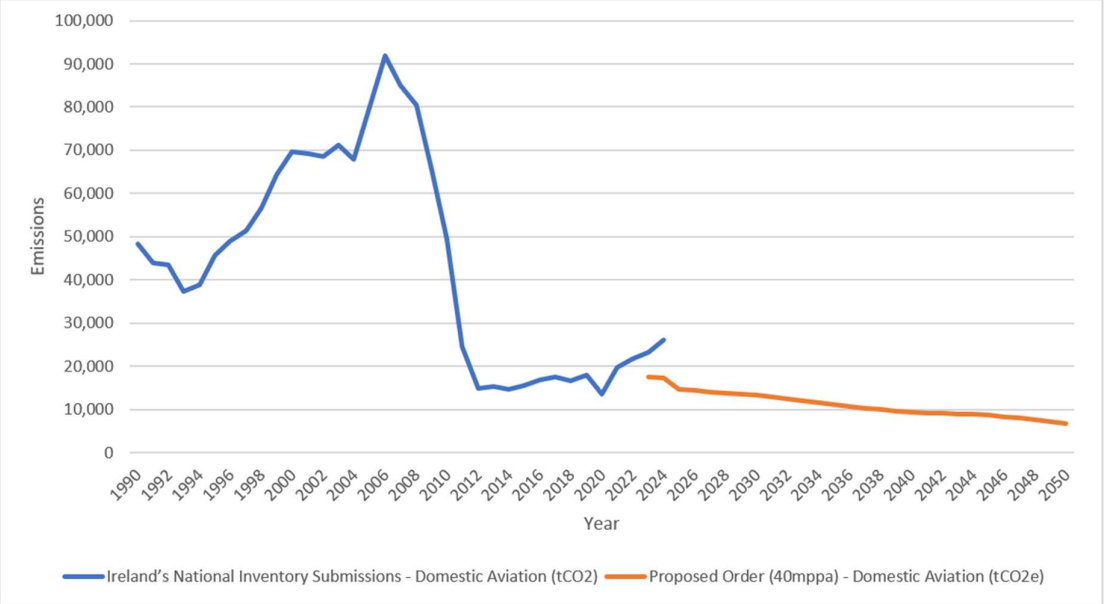


Plate 13A-1: Ireland's domestic aviation emissions

2.1.8 In the years where the Proposed Order assessment gross emissions estimate overlaps with Ireland's National Inventory, Plate 13A-1 demonstrates that the emissions for departing domestic flights represent around 76% of emissions in 2023 and 67% in 2024. These proportions are considered broadly reasonable given Dublin Airport's position as Ireland's largest airport and its contribution to national domestic aviation activity. However, the comparison should be interpreted with consideration of the differences in geographical coverage and emissions calculation methodologies between the two datasets.

2.1.9 Beyond the overlapping historic inventory years (2023 and 2024) even with the increase in estimated aviation activity associated with the Proposed Order from 2029, domestic emissions are forecasted to decrease over time. This projected reduction reflects the assumed improvements in aircraft and engine efficiency and increasing SAF uptake described in paragraph 1.1.3. These measures are assumed to progressively reduce the emissions associated with aviation activity over the assessment period, such that emissions decrease despite passenger numbersremaining at the 40 mppa cap from 2029 onwards.

2.1.10 As described in the main EIAR Climate Chapter (Chapter 13), fundamental to managing and controlling GHG emissions from the aviation sector are two market-based-measures, the EU ETS[7] and CORSIA[8]. Domestic aviation flights operating within the European Economic Area (EEA), including applicable flights within Ireland, fall within the scope of the EU ETS. The EU ETS operates on a cap-and-trade principle to lower greenhouse gas emissions across power, industry, aviation, and maritime transport. Under the EU ETS aircraft operators must purchase EU Allowances equal to the carbon dioxide equivalent (CO2e) on intra EU flights. The total cap on emissions decreases annually to meet EU climate goals (targeting a 62% reduction in ETS sector emissions by 2030 compared to 2005, which places a declining cap on the available allowances in turn reducing CO2e emission.. CORSIA provides a complementary carbon offsetting mechanism for eligible international aviation emissions but does not apply to domestic flights.

2.1.11 The effect of the EU ETS has not been deducted from the gross aviation emissions presented in the assessment. Meaning that the projected emissions from the Proposed Order will arise within an established and progressively developing regulatory framework for aviation decarbonisation.

2.1.12 This comparison between the projected emissions associated with the Proposed Order and Ireland's National Inventory is provided for contextual purposes only. It does not alter the scope, methodology, significance assessment or conclusions presented in the main EIAR Climate Chapter (Chapter 13).

[7] European Commission, (2022). EU Emissions Trading System (EU ETS). Available at: https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets_en
[8] ICAO, (2023). Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). Available at: https://www.icao.int/environmental-protection/CORSIA/Pages/default.aspx

3. Aviation Bunker Emissions

3.1.1 Plate 13A-2 below presents Ireland's historical aviation bunker emissions, as reported in the National Inventory for 2023 and 2024, alongside the projected gross aviation emissions associated with the Proposed Order (40 mppa) scenario from 2023 to 2050.

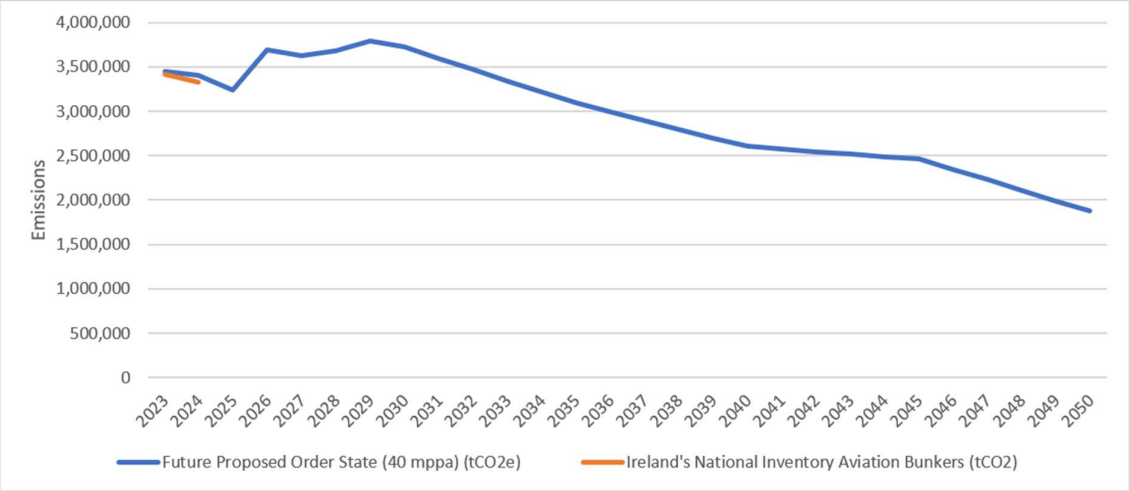


Plate 13A-2: Comparison of Ireland's National Aviation Bunker emissions against the Proposed Order (40 mppa) Gross Aviation Emissions.

3.1.2 The 2023 aviation bunker emissions reported in Ireland's National Inventory (2025)[9] total approximately 3,412,525 tCO_2e. This compares with approximately 3,450,740 tCO_2e estimated for the 2023 baseline as part of the Proposed Order assessment, representing a difference of approximately 38,215 tCO_2e (approximately 1.1% higher). International flights account for over 90% of the emissions estimated within the Proposed Order baseline.

3.1.3 Similarly, the 2024 aviation bunker emissions reported in Ireland's National Inventory (2026)[10] total approximately 3,325,863 tCO_2e, compared with approximately 3,402,429 tCO_2e estimated for the Proposed Order assessment in 2024. This represents a difference of approximately 76,566 tCO_2e (approximately 2.3% higher). While the two datasets indicate broadly comparable overall emission magnitudes, the differences in their respective accounting methodologies and emissions boundaries mean that they should not be interpreted as directly equivalent, as explained in the subsections below.

3.1.4 Plate 13A-2 illustrates that the projected peak in gross aviation emissions associated with the Proposed Order in 2029 is approximately 470,907 tCO_2e higher than the 2024 aviation bunker emissions reported in Ireland's National Inventory. This comparison provides an indication of the potential scale of aviation emissions associated with the Proposed Order relative to recent historical national aviation bunker emissions. This is due to the increase in passenger numbers up to 40 mppa, but before the efficiencies and the uptake of SAF have fully taken effect. Following the initial peak in 2029, these measures are projected to progressively reduce aviation emissions, reaching approximately 1,875 $ktCO_2e$ by 2050. This represents a reduction of approximately 49% in the Proposed Order's gross emissions relative to the 2029 peak.

3.1.5 As described in the main EIAR Climate Chapter (Chapter 13), and the previous section of this appendix, the EU ETS and CORSIA will be key in managing and controlling the remaining GHG emissions from the aviation sector which cannot be mitigated by the introduction of efficiencies. Flights falling within the scope of the EU ETS, including applicable domestic and international flights (within the EU), are subject to a declining emissions cap for aviation CO_2 and require aircraft operators to surrender allowances against their covered emissions. CORSIA provides a complementary carbon offsetting mechanism for eligible

[9] https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/irelands-national-inventory-submissions-2025.php
[10] https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/irelands-national-inventory-submissions-2026.php

international aviation emissions (outside of the EU) on routes covered by the scheme, subject to its applicable scope and requirements.

3.1.6 The effect of the EU ETS and CORSIA has not been deducted from the gross aviation emissions presented in the assessment. Consequently, the projected emissions represent the gross GHG emissions associated with the Proposed Order before accounting for any wider regulatory or offsetting mechanisms.

3.1.7 Despite the analysis above, a direct comparison between the estimated Proposed Order's aviation GHG emissions presented in the EIAR and Ireland's 2023 and 2024 historical aviation bunker fuel in Table 3.1.2 of Annex 3.1 of Ireland's National Inventory Document should not be interpreted on a like-for-like basis due to the differing methodologies used. The aviation bunker figures from Ireland's National Inventory are based on the annual quantity of fuel sold within Ireland's territory for aviation purposes, including both domestic and international flights. It is not possible to easily split out the proportion of this fuel and the associated emissions for international flights only. Hence, the comparison in Plate 13A-2 has been done on total gross emissions including both international and domestic flight emissions associated with departures from the Proposed Order.

3.1.8 Furthermore, the aviation emissions in the assessment present emissions from the Proposed Order operations and quantify emissions associated with fuel used by departing flights, based on aircraft type and distance travelled. This does not account for where the fuel is purchased, which is likely from a range of airports and countries outside the Irish bunker fuel National Inventory allocation.

3.1.9 Irish aviation bunker emissions reported in the National Inventory are calculated for national GHG inventory reporting purposes and do not provide a like-for-like representation of the gross aviation emissions associated with departing flights from Dublin Airport. Differences in scope, coverage and emissions accounting methodology mean that the two estimates represent different emissions datasets. Three key reasons explaining this are set out below:

- Fuel tankering (e.g. refuelling in other countries).
- Aircraft not arriving fully empty and efficiencies.
- Temporal mismatches.

Fuel Tankering

3.1.10 A particular limitation arises from fuel tankering practices, often driven by differences in fuel prices between airports and countries, and so airlines deliberately refuel at one airport to reduce refuelling requirements or costs at subsequent destinations. For example, where aviation fuel is comparatively more expensive in Ireland than at certain other European airports, airlines may seek to minimise fuel purchases in Ireland by carrying additional fuel from lower-cost locations. Consequently, aircraft operating flights associated with a given country may consume substantial amounts of fuel that were purchased elsewhere. This disconnect means national bunker fuel statistics can significantly under or overestimate the fuel burned by aircraft.

Aircraft Not Arriving Fully Empty and Efficiencies

3.1.11 The quantity of fuel consumed during a flight is influenced by several aircraft and operational characteristics such as aircraft-model efficiency and how it is operated (e.g., routing, holding patterns, payload). In addition, the amount of fuel loaded onto an aircraft is not necessarily equivalent to the amount of fuel consumed during a flight. Aircraft must carry contingency, alternate, and reserve fuel for operational and safety reasons, and may therefore land with a significant quantity of fuel remaining in their tanks. Consequently, fuel purchase data do not directly correspond to fuel burn or associated emissions with specific flight paths.

3.1.12 Bunker fuel figures do not capture these operational and fuel management factors, further limiting their suitability as a proxy for aviation emissions and reducing the value of direct comparisons between the two datasets.

Temporal Mismatches

3.1.13 Temporal mismatches can also occur, such as fuel purchased within a given year not necessarily being consumed within that same year. For example, bunker fuel may be purchased at the end of the reporting year and subsequently consumed on flights during the following year. This creates a disconnect between

the timing of fuel sales and the timing of the associated emissions. As a result, emissions may be attributed to a different reporting period than when the fuel was purchased, potentially leading to apparent overestimation or underestimation when comparing annual bunker fuel statistics with annual aviation emissions estimates.

Summary

3.1.14 The aviation bunker fuel emissions reported in Ireland's National Inventory and the aviation emissions calculated for the Proposed Order are derived using different accounting boundaries and methodologies. The National Inventory figures have therefore been considered as contextual information in response to the ACP Scoping Opinion, while the assessment of international aviation emissions associated with the Proposed Order is presented in Chapter 13: Climate.

3.1.15 Chapter 13: Climate assesses the Proposed Order's aviation emissions against Ireland's projected total National Emissions Inventory[11], and Ireland's projected total Transport Emissions Trajectory out to 2050. While these inventory projections do not include international aviation emissions, they include domestic aviation emissions and provide a useful national, and sectoral, context against which the scale of aviation emissions associated with the Proposed Order were considered. National and transport emissions are directly linked to climate policy objectives and decarbonisation pathways, enabling assessment of aviation's contribution within the wider emissions landscape. By contrast, aviation bunker fuel emissions are primarily compiled for national inventory reporting purposes and, due to their different accounting boundaries, do not provide a directly comparable basis for assessing the Proposed Order's contribution to Ireland's national and sectoral emissions trajectories or progress towards associated climate targets.

3.1.16 Accordingly, Chapter 13: Climate provides an assessment of the Proposed Order's aviation emissions in the context of Ireland's projected national GHG emissions and transport sector emissions trajectories to 2050. This provides an appropriate basis for understanding the relative scale and contribution of the Proposed Order's emissions within the wider national and sectoral decarbonisation pathways, and for informing the assessment of significance in accordance with the ISEP GHG Assessment Guidance. The additional comparison with Ireland's historical aviation bunker fuel emissions presented in this appendix is provided for contextual purposes in response to the ACP Scoping Opinion and does not alter the scope, methodology, significance assessment or conclusions presented in the main EIAR Climate Chapter (Chapter 13).

[11] National Emissions Inventory. Available at: https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/irelands-greenhouse-gas-emissions-projections-2024-2055.php