Department for Transport

Heathrow Expansion Appraisal Report

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Executive summary

The Department for Transport (DfT) has produced this report to inform the Government's review of the Airports National Policy Statement (ANPS), which provides the policy framework for decisions on nationally significant airport infrastructure. The report presents the updated appraisal of the proposed expansion of Heathrow Airport through the delivery of a Northwest Runway.

This appraisal report updates and consolidates economic, connectivity and environmental analysis. This report is based on the DfT 2026 aviation forecasts[1] which incorporate the latest market data to 2024, revised assumptions on economic growth, fuel prices, technology and decarbonisation policy. The forecasts also reflect airport capacity changes that have occurred or are now consented. These forecasts indicate continued baseline passenger growth in and out of the UK and a more constrained future for the London airport system without additional capacity.

Using these updated forecasts, the report assesses the impacts of Heathrow expansion across five main dimensions:

- **Connectivity**, including changes to domestic and international services, long-haul capacity, and the UK's role as an international aviation hub.
- **Direct economic impacts**, capturing benefits to passengers from reduced airport congestion, increased flight frequency and lower delays, alongside impacts on airlines, airports and Government revenues.
- **Wider economic impacts**, including productivity-related effects associated with imperfect competition and the relocation of economic activity, also in line with in line with DfT's Transport Analysis Guidance TAG[2] and His Majesty's Treasury's (HMT) Green Book[3] guidance. Wider economy Spatial Computable General Equilibrium (SCGE) modelling is also outlined at Chapter 11 and in a separate published report by Frontier Economics (Frontier)[4].

[1] https://government/publications/uk-aviation-forecast-2026
[2] https://www.gov.uk/guidance/transport-analysis-guidance-tag
[3] https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government
[4] DfT plans to publish this report shortly. Whilst some additional tests on the work are ongoing, we do not expect the core scenario and results published in this report to change.

- **Environmental impacts**, including updated monetised assessments of aviation carbon, air quality and noise, alongside qualitative consideration of other environmental effects addressed separately through the Appraisal of Sustainability (AoS).

- **Costs**, including the economic treatment of capital, operating, maintenance and financing costs associated with a privately-funded expansion at Heathrow.

This appraisal shows that Heathrow expansion would deliver additional connectivity and passenger benefits that support trade, business travel and consumer choice. Passenger benefits are estimated at £25.3bn to £35.5bn, reflecting lower fares and improved connectivity. The range represents two different scenarios, one where Heathrow passengers do not face higher costs because of expansion (passenger benefits are estimated at £35.5bn), and one in which they do (passenger benefits reduce to £25.3bn). Together, passenger benefits, additional government revenues and wider economic impacts (those that can be monetised using the aviation model and TAG) increase total benefits to between £29.2bn and £42.4bn.

The estimated cost of environmental disbenefits are greater than when DfT last conducted economic appraisal on Heathrow expansion in support of the 2018 ANPS designation[5]. Previously only additional carbon emissions from airport operations, surface access transport and construction were included in the appraisal. Now, in line with current Department for Energy Security and Net Zero (DESNZ) guidance[6], aviation carbon emissions are included too. Two perspectives when accounting for aviation carbon impacts are included in this appraisal report. Firstly, a UK carbon accounting perspective aligned with our Net Zero legislative obligations. This is where only departing flights are considered in scope of legal carbon limits. Secondly, a global impact is given, including all departing and arriving flights, with and without an estimate of displacement (since some flights using an expanded Heathrow would have flown via other airports in any case).

In the no cost pass through scenario, total benefits exceed the monetised environmental disbenefits for both perspectives - the UK carbon account and the global impact (accounting for displacement). With cost pass through, environmental disbenefits outweigh total benefits.

With Heathrow expansion, UK airlines and airports are forecast to be less profitable. The appraisal also includes private sector costs associated with delivery of the scheme. When the appraisal combines all monetised impacts, the Net Present Value (NPV) is negative, in the range -£23.4bn (no cost pass through, UK carbon account) to -£62.5bn (pass through, global carbon impacts). The NPV is sensitive to: demand assumptions, cost assumptions, cost pass-through mechanisms and carbon policy assumptions. The Department therefore presents results as ranges rather than point estimates.

Another change from the previous DfT economic appraisal of Heathrow expansion is that appraisal figures in this report focus on UK impacts – costs and benefits to UK based residents, to the UK government and to airports and airlines in proportion to their UK

[5] Updated appraisal report: airport capacity in the south-east

[6] https://www.gov.uk/government/publications/valuing-greenhouse-gas-emissions-in-policy-appraisal/valuation-of-greenhouse-gas-emissions-for-policy-appraisal-and-evaluation

ownership. This is in line with Green Book and TAG guidance to focus on UK impacts where possible. This is also explained in Chapter 4.

This majority of report focuses on impacts which can be monetised within the existing TAG cost–benefit framework which does not attempt to capture all strategic, economic, distributional or non-monetisable considerations relevant to decisions on airport expansion - for example some trade impacts, tourism (inbound and outbound) and biodiversity impacts. A complementary assessment has been made however of impacts on the wider economy using a Spatial Computable General Equilibrium (SCGE) model which is outlined in Chapter 11. Chapter 12 goes on to present an assessment of the local jobs – up to 61,000 - which could directly be supported by Heathrow expansion. The appraisal evidence in this report should be considered alongside the wider planning and policy framework, including the draft Heathrow Expansion National Policy Statement (HENPS) and the AoS of the draft HENPS.

Analysis referred to here is based on information available during the review of the ANPS and before publication of the draft HENPS consultation. Ultimately, it will be up to a promoter to bring forward Heathrow expansion proposals which satisfies the Government’s four test including supporting growth across the country and the other requirements of the HENPS.

1 Introduction

Background

1.1 On 29 January 2025, the Government announced its support in principle for a third runway at Heathrow Airport, subject to proposals meeting four tests relating to economic growth, carbon, noise, and air quality.[7] Following this announcement, the Secretary of State for Transport invited proposals for a third runway at Heathrow, which the Department assessed during 2025 against published criteria covering scheme design, deliverability, costs and financing, environmental impacts, and overall suitability to inform the review of the Airports National Policy Statement (ANPS).[8]

1.2 To provide a robust policy framework for any subsequent development consent decision, the Government launched a review of the ANPS on 22 October 2025. On 25 November 2025, the Government confirmed that it would take forward Heathrow Airport Limited's (HAL) Northwest Runway proposal as the basis for the ANPS review[9]. That scheme has informed the updated assessment of impacts set out in this report.

1.3 The Government has renamed the revised ANPS as the draft HENPS and has published it for consultation in June 2026. To support that consultation, the DfT has updated its analytical evidence base, including aviation demand forecasts and economic and environmental appraisal. This Heathrow Expansion Appraisal Report (HEAR) forms part of that updated evidence base.

[7] https://www.gov.uk/government/news/government-backs-heathrow-expansion-to-kickstart-economic-growth

[8] Secretary of State for Transport issued a Letter to potential promoters of Heathrow setting out the information and assessment criteria to be applied to proposals. https://www.gov.uk/government/publications/proposals-for-heathrow-expansion-information-for-potential-promoters

[9] https://www.gov.uk/government/news/heathrow-airport-limiteds-third-runway-proposal-will-be-basis-for-expansion

Purpose of this report

1.4 This report presents the DfT's updated appraisal of proposals to expand Heathrow Airport through the delivery of a Northwest Runway and associated terminal buildings. This report updates the social and economic welfare impacts of Heathrow expansion, using the latest available evidence and appraisal guidance. Its purpose is to:

- update the quantified economic and environmental assessment of Heathrow expansion;
- set out how updated aviation demand forecasts affect connectivity outcomes, economic benefits and environmental impacts;
- describe the assumptions, methodologies and scenarios used in the appraisal;
- set out additional analysis for the impact of expansion informing the strategic case for investment, including results from Computable General Equilibrium Modelling undertaken by Frontier Economics and estimates for local jobs supported by expansion; and
- provide a transparent and consistent part of the evidence base to inform consideration of the revised ANPS.

1.5 This report should be read alongside the Department's 2026 Aviation Forecasts[10] and the AoS of the draft HENPS [11]. The AoS provides a broader assessment of environmental and social impacts, including those that are not monetised in this appraisal. It replaces earlier appraisal outputs used for previous work on the ANPS.

Scope and approach

1.6 The appraisal follows established Government appraisal guidance, including DfT TAG[12] and His Majesty's Treasury's (HMT) Green Book[13]. It considers impacts over a 60-year appraisal period from the planned opening of the third runway, consistent with previous assessments.

1.7 The appraisal assesses the impacts of the Heathrow expansion scenario relative to a counterfactual scenario without expansion. The appraisal considers impacts across the TAG framework, including passenger benefits, airline and Government impacts, selected wider economic impacts, environmental disbenefits from carbon, noise and air quality, and the treatment of scheme costs. Where uncertainty is

[10] 2026 UK Aviation Forecasts, https://government/publications/uk-aviation-forecast-2026
[11] Appraisal of Sustainability 2026, https://government/publications/heathrow-expansion-national-policy-statement-appraisal-of-sustainability
[12] https://www.gov.uk/guidance/transport-analysis-guidance-tag
[13] https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government

significant, results are presented as ranges and supported by scenario and sensitivity analysis.

1.8 The appraisal uses passenger demand forecasts produced using the Department's aviation modelling suite. As with previous appraisals, the results should not be interpreted as precise predictions. Long-term aviation demand, policy frameworks and technological developments are inherently uncertain. The analysis is therefore intended to inform decision-making by illustrating the likely scale, timing and direction of impacts under a range of plausible futures, rather than to provide a definitive forecast of outcomes.

1.9 This report updates the appraisal evidence previous published in support of the 2018 ANPS designation[14].

Structure of this report

1.10 This report is structured as follows:

- Chapter 2 sets out updates to DfT aviation demand forecasts;
- Chapter 3 assesses the connectivity impacts;
- Chapters 4 through to 7 assess the effect of the forecasts and set out the results for each quantified economic impact;
- Chapter 8 then assesses the combined monetised costs and benefits;
- Chapter 9 presents the results for the Technology Development scenario – a scenario focused on assumes a more ambitious decarbonisation pathway;
- Chapter 10 presents scenario and sensitivity analyses to show a range of possible impacts;
- and finally, Chapter 11 provides complementary whole economy analysis including Spatial Computable General Equilibrium (SCGE).

[14] Updated appraisal report: airport capacity in the south-east and Addendum to the updated appraisal report: airport capacity in the south-east

2 Updates to aviation forecasts

Demand forecasting

2.1 Passenger demand forecasts form a key input to the appraisal as they underpin the estimation of monetised impacts of Heathrow expansion.

2.2 The Department uses an aviation modelling framework to forecast passenger demand and allocate that demand across UK airports subject to capacity constraints. The model can be used to estimate the impact of expansion on patterns of demand under different scenarios. Independent reviewers have assessed the suitability of the aviation model, concluding that it is robust and fit for purpose. Further information can be found in the DfT's 2026 UK Aviation forecast report (DfT26).[15]

2.3 The Department has updated the aviation model with the latest market data and made a number of technical developments. Further detail on these can be found in the aviation forecast report. The model has been used to produce a set of forecasts which are presented in this document and are an update to the forecasts used to develop analysis for the 2018 ANPS, published in 2017 (DfT17).

2.4 The overall principles adopted in these forecasts for defining annual airport capacities are based on current runway and terminal capacities and approved airport expansions. Runway capacities are defined by the number of aircraft take off and landings which can be accommodated in a year, also known as Air Transport Movements (ATM). The terminal passenger capacity is the maximum number of passengers an airport's terminal and associated passenger handling infrastructure is assumed capable of serving in a year. Recently approved expansions to Luton, Stansted, London City and Gatwick are all taken into account in both the baseline case and the Heathrow expansion case.

Demand scenarios

2.5 The results in this report predominantly reflect the central 'Current Trends' scenarios, considered to be the most likely estimate of future market conditions. In the Current Trends scenarios, central TAG forecasts are used for GDP and

[15] https://government/publications/uk-aviation-forecast-2026

population growth and fuel price projections. No additional behavioural or new technology shifts or policy changes are assumed beyond standard central inputs in the modelling framework. These assumptions are set out in more detail in the DfT26. The Current Trends projection provides the central trajectory against which all scenario variants are based.

2.6 The modelling and subsequent appraisal assesses two different versions of the Current Trends scenario. This first, known as the 'Current Trends (No pass through)' (NPT), which makes the assumption that any additional charges needed by Heathrow airport to fund the construction of the third runway and associated infrastructure (known as aerocharges, see box below this paragraph), does not get passed through to consumers and therefore does not affect their usage of the airport (and therefore aviation demand). The second, known as the Current Trends Pass Through (PT), assumes that the costs of expansion are passed on to passengers affecting demand at Heathrow and across the wider airport network. Together; these scenarios establish a plausible range of demand and therefore ultimately benefits.

Aerocharges and cost passthrough

When Heathrow expands, the passenger landing charge will likely need to increase to facilitate the construction of the extra runway, terminal buildings and the running of the airport post-expansion. The extent to whether this is larger than the congestion costs (shadow costs) at Heathrow and the amount which airlines choose to pass onto their consumers will impact on whether and how much of an impact this would have on the number of passengers that choose to use Heathrow airport.

2.7 Several additional demand scenarios have been modelled to reflect the uncertainty inherent in long-term forecasting. These are described in full in Chapter 10 (Scenarios and sensitivity analysis).

Baseline forecasts (without Heathrow expansion)

2.8 The Department's 2026 forecasts (DfT26) show significantly higher levels of baseline aviation passenger growth (in the absence of Heathrow expansion). This reflects the range of capacity increases at other airports, particularly in London and the South East, that are currently either planned or underway. While the Covid-19 pandemic had a significant impact on short-term demand, activity levels have now surpassed those forecasted in the Department's 2017 central forecast: total actual UK terminal passenger numbers were 299.2 million in 2025[16], compared to the 2017 forecast of 292.5 million for 2025.

2.9 The figures below present aviation forecasts, without Heathrow expansion, up to the year 2055. One exception is the high demand scenario which is only shown until 2039. The DfT aviation model stops being able to robustly fit passengers to airports with very high levels of demand and capacity constraints in future years. In these cases forecasts do not continue as far into the future. This is also why there is only a limited period of forecasted aviation demand following the final proposed

[16] CAA Airport Statistic https://www.caa.co.uk/data-and-analysis/uk-aviation-market/airports/uk-airport-data/

Heathrow expansion related terminal expansion in 2054. Future model developments are being considered by DfT in this area. DfT17 forecasts are presented to the year 2050, the final year for which they were estimated.

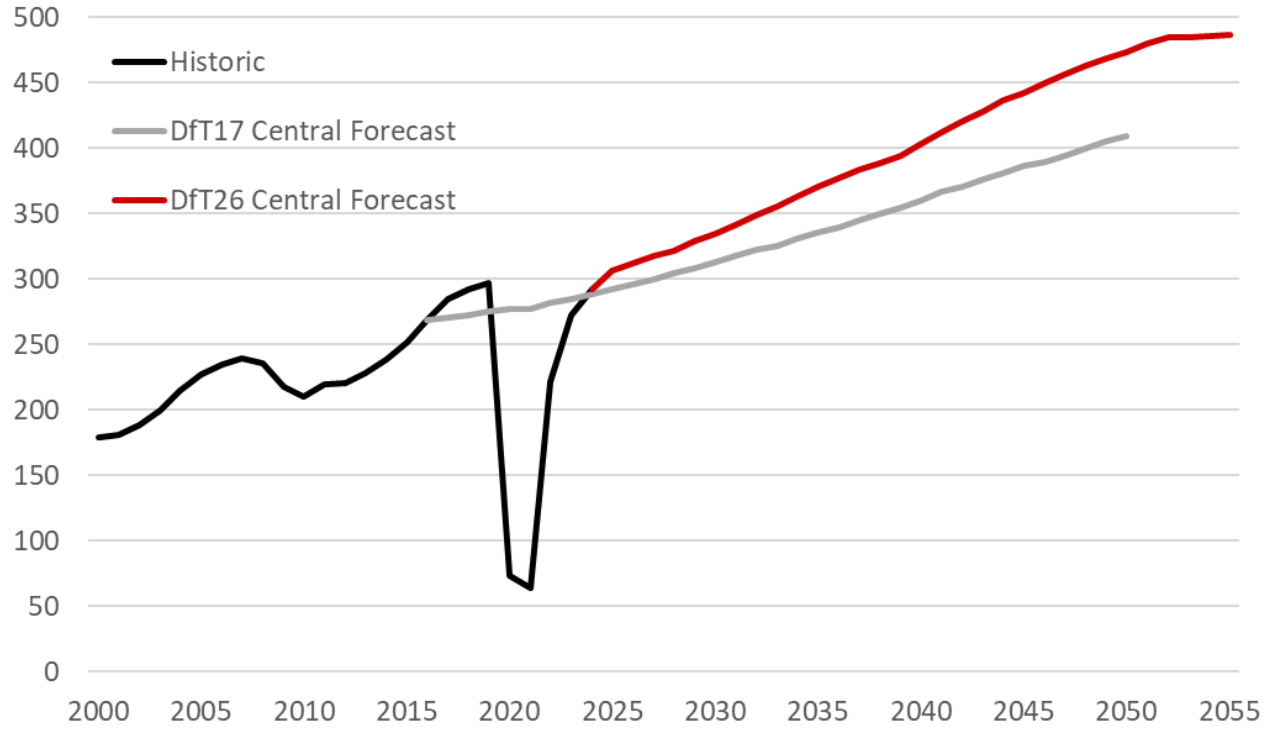

Figure 2-1: Historic and forecast UK passenger numbers, without Heathrow expansion, million passengers per annum (mppa)[17]

2.10 The DfT26 forecasts also show significantly greater variation between the low and high scenarios than was observed in the DfT17 forecasts. This is partly due to a change in the specification of these scenarios, which were previously based on Airports Commission global fragmentation and growth scenarios.

[17] Historic figures are displayed up to and including the DfT26 model base year of 2024.

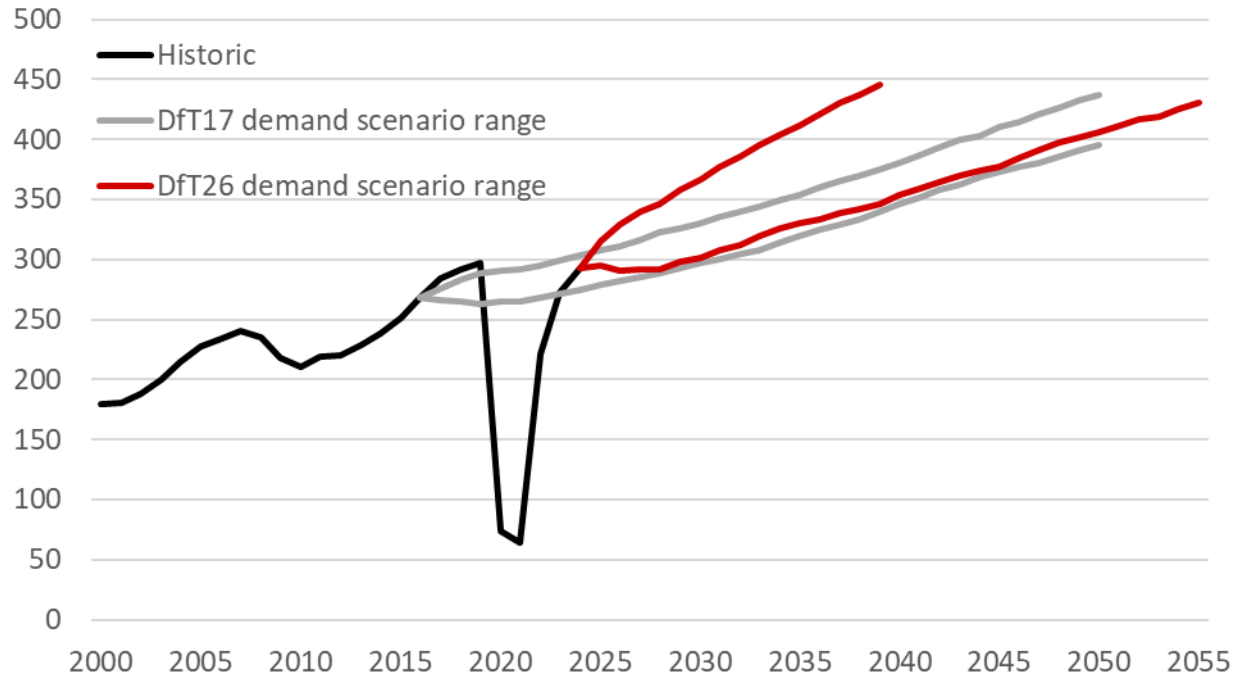

Figure 2-2: Historic and forecast UK passenger numbers, without Heathrow expansion, demand range comparison (mppa)

Heathrow expansion forecasts

2.11 In November 2025 the Government confirmed that it would take forward HAL's Northwest Runway proposal as the basis for the ANPS review. That scheme has informed the updated assessment of impacts set out in this report including the timing and magnitude of capacity increases at the airport. This does not imply support for any particular scheme promoter, but specific assumptions are required to input into the DfT aviation model in order to calculate the effects of expansion.

2.12 A significant difference between the DfT17 and DfT26 Heathrow expansion scenario forecasts is the timing and phasing of additional capacity at an expanded Heathrow. While the runway is now expected to become operational in 2035, passenger volumes are constrained until terminal capacity upgrades occur in 2038, 2049 and 2054.

2.13 This results in the stepped profile visible in Figure 2-3, which shows the historic, 2017 and the Current Trends NPT scenario. The graph shows the pent-up demand at Heathrow rapidly increasing passenger volumes as soon as capacity becomes available.

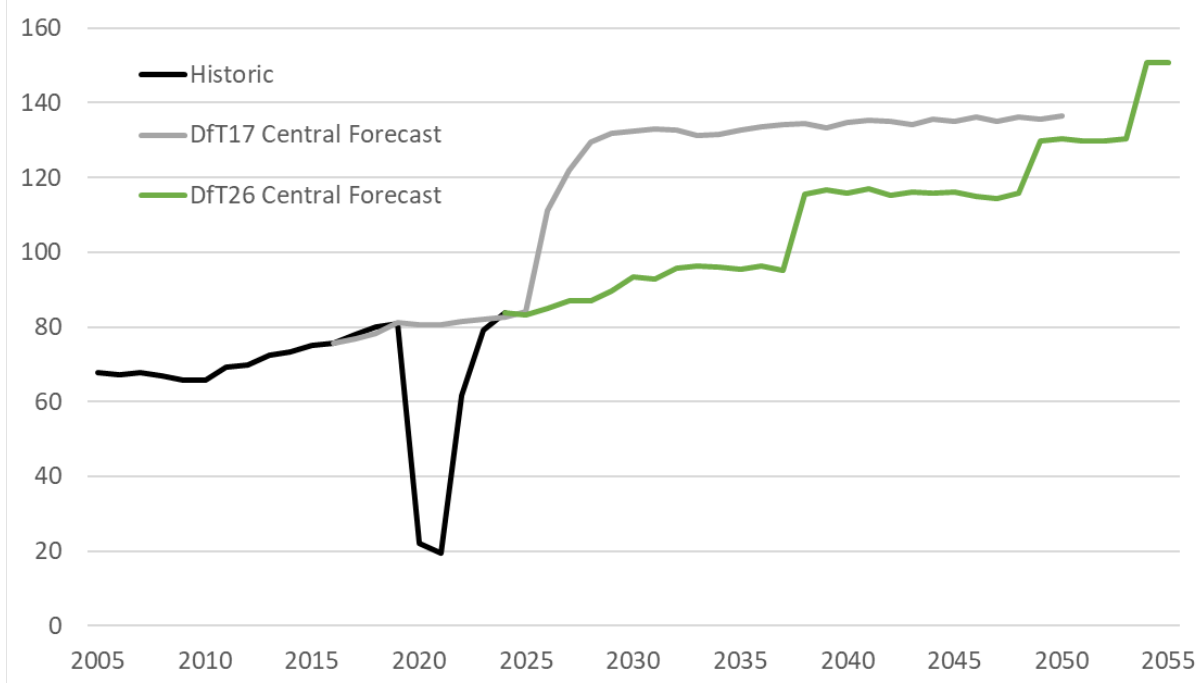

Figure 2-3: Historic and forecast Heathrow passenger numbers, with expansion (no pass through) (mppa)

2.14 When the costs of Heathrow are passed through onto consumers the shape after 2040 remains the same as the no pass through. There is however a period when the additional costs of Heathrow expansion are high enough to impact on consumers leading to a significant drop in demand as shown in Figure 2-4.

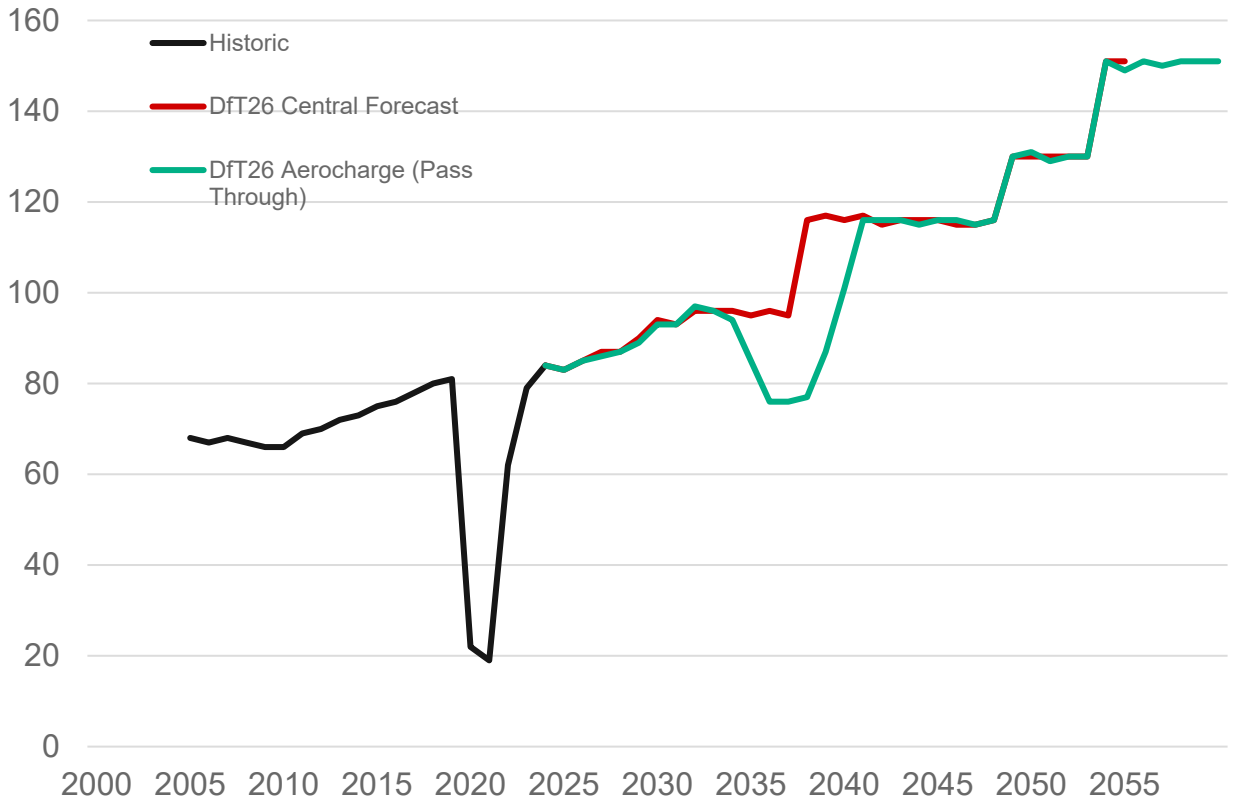

Figure 2-4: Forecast Heathrow passenger numbers, with expansion (Pass through and no pass through) (mppa)

2.15 Further details of demand forecasts assuming Heathrow expansion can be found in DfT26 forecast report. The implications of these updated forecasts for aviation connectivity are considered in Chapter 3 below.

3 Connectivity

3.1 Aviation is about connecting people – allowing businesses to reach new markets, transport products to customers, find new suppliers and share knowledge globally. It also enables people to experience different cultures, meet friends and see family. The ability to provide these connections is dependent on the available capacity at UK airports, with an increase in this capacity allowing for more flights to more destinations worldwide.

3.2 The measurement of connectivity can be approached in numerous ways. To assess the connectivity impacts of expansion this report considers a selection of metrics that summarise how connectivity outcomes align with the Department's strategic objectives for Heathrow expansion.

International connectivity

3.3 By providing more frequent services for passengers and freight operators, aviation can help facilitate international trade and encourage businesses and their staff to locate and remain in the UK. The model uses the number of aircraft take off and landings per year, also known as ATMs as a measure that reflects total connectivity covering the range of destinations and the frequency of operations, and the forecasts of those and how they change are detailed below.

3.4 Compared to the DfT17 forecasts, the DfT26 NPT forecasts show fewer total ATMs under both the no expansion and the Heathrow expansion scenario. This reflects a shift towards larger aircraft and stronger recovery following the Covid-19 pandemic on international routes compared to domestic routes, where flights typically carry more passengers.

3.5 The additional ATMs delivered at the UK level by Heathrow expansion remain relatively low until the later years of the modelled period. This is due to the stepped introduction of terminal capacity at an expanded Heathrow in the DfT26 forecasts and the additional capacity now provided by other London airport expansions. However, once the capacity of an expanded Heathrow is released, and capacity constraints at other airports become increasingly binding, the total

number of additional ATMs begins to significantly exceed that seen at any time under the DfT17 forecasts, with 217,000 more flights a year by 2055.

		Total ATMs (000s)				
		2024[1]	2040	2045	2050	2055
DfT17 Forecasts	No expansion	2,244	2,584	2,754	2,901	-
	Heathrow expansion	-	+113	+100	+111	-
DfT26 Forecasts	No expansion	2,015	2,331	2,559	2,739	2,810
	Heathrow expansion	-	+16	+17	+73	+217

Table 3-1: ATMs at UK airports, without Heathrow expansion, and additional ATMs with expansion (thousands)

3.6 Unlike total ATMs, long-haul ATMs now see higher levels of baseline growth than under the DfT17 forecasts. These long-haul flights are particularly important for connecting businesses to emerging markets, and account for the majority of air freight transported. In 2024 73% of UK long haul flights departed from Heathrow[18] and 72% of UK air freight by value travelled through Heathrow Airport[19]. As for total ATMs, Heathrow expansion does not lead to a significant increase in long-haul ATMs until later in the modelled period, with the additional 38,000 flights in 2055 broadly comparable to that observed under a fully operational expanded airport in the DfT17 forecasts.

		Long-haul ATMs (000s)				
		2024	2040	2045	2050	2055
DfT17 Forecasts	No expansion	241	282	301	315	-
	Heathrow expansion	-	+43	+43	+37	-
DfT26 Forecasts	No expansion	243	337	364	386	406
	Heathrow expansion	-	+2	+7	+22	+38

Table 3-2: Long-haul ATMs at UK airports, without Heathrow expansion, and additional long-haul ATMs with expansion (thousands)

3.7 While ATMs provide an indicator of the frequency and capacity of available services, seat numbers provide further information on the capacity created. Seat numbers, as well as directly reflecting passenger capacities, can be used to infer possible impacts on freight handlers[20]. Larger, wide-body aircraft can typically carry proportionately more bellyhold freight than single-aisle aircraft, so with greater seat provision we would expect greater capacity for imports and exports,

[18] DfT analysis of Civil Aviation Authority (CAA) airport data, 2024.
[19] DfT analysis of HM Revenue & Customs (HMRC) overseas trade data, 2024.
[20] In the model, increases in seats occur because of larger planes. In practice, some increases in seats are possible by reconfiguring existing planes, and which would not therefore impact on available bellyhold space, although this increase would be small in comparison to the increases in seat capacity shown here.

putting downward pressure on costs and thus boosting trade and Gross Domestic Product (GDP).

3.8 The updated DfT26 NPT forecasts show a smaller increase in airline seats as a result of Heathrow expansion than in the previous DfT17 forecasts for much of the period, due to the factors discussed above. By 2055 however, the increase in short-haul seats is higher than at any point in the DfT17 forecasts, while the increase in long-haul seats also remains comparable.

		Short-haul Seats (millions)				
		2024	**2040**	**2045**	**2050**	**2055**
DfT17 Forecasts	No expansion	230	295	316	335	-
	Heathrow expansion	-	+16	+17	+20	-
DfT26 Forecasts	No expansion	236	295	321	342	351
	Heathrow expansion	-	+3	+3	+10	+30

Table 3-3: International short-haul airline seats available at UK airports, without Heathrow expansion, and additional seats with expansion (millions)

		Long-haul Seats (millions)				
		2024	**2040**	**2045**	**2050**	**2055**
DfT17 Forecasts	No expansion	77	93	100	107	-
	Heathrow expansion	-	+16	+15	+12	-
DfT26 Forecasts	No expansion	70	100	109	117	123
	Heathrow expansion	-	+1	+3	+6	+12

Table 3-4: International long-haul airline seats available at UK airports, without Heathrow expansion, and additional seats with expansion (millions)

3.9 Ultimately it is the movement of passengers and freight that drive the benefits of aviation. As noted in Chapter 2, the baseline growth in passenger numbers is expected to be significantly higher than in the DfT17 forecasts. As is seen for ATMs, scheme impacts at a national level are relatively limited until 2050, but by 2055 additional passenger activity again exceeds any point within the DfT17 appraisal.

		Terminal Passengers (millions)				
		2024	2040	2045	2050	2055
DfT17 Forecasts	No expansion	288	360	386	410	-
	Heathrow expansion	-	+28	+26	+26	-
DfT26 Forecasts	No expansion	292	403	442	474	487
	Heathrow expansion	-	+5	+7	+17	+45

Table 3-5: Terminal passengers[21] at UK airports, without Heathrow expansion, and additional terminal passengers with expansion (mppa)

3.10 It is important to consider not just the number of people using the UK's airports, but how they are doing so. Table 3-6 shows the trends in different passenger categories in the case where Heathrow Airport does not expand. Over time there is a substantive increase in the number of passengers travelling directly to or from UK airports to international destinations, but there is also clear demonstration of the erosion of the UK's hub status. The number of passengers who fly from their local airport to an international destination via a UK hub falls substantially, with a greater number of people forced to change flights at a non-UK airport. This is matched by a significant decrease in the number of international to international interliners[22], who often provide the key additional demand to make marginal routes viable.

	International passengers travelling to, or from, the UK (million passengers per annum)			UK Domestic end to end	Non-UK International to International Interliners
	Direct (not interlining)	Domestic Interliners[23]	International Interliners[24]		
2024	228	9	5	28	22
2040	331	6	6	40	20
2045	368	5	6	46	17
2050	403	4	7	50	9
2055	422	3	7	51	4

Table 3-6: Terminal passengers at UK airports, by destination and route without expansion, DfT26 forecasts (mppa)

[21] A terminal passenger is a passenger joining or leaving an aircraft at a reporting airport. As such, a person on a domestic flight would be counted as two terminal passengers (once at both the departing and arriving airport)

[22] Passengers starting and ending their journeys outside of the UK, but via a connecting flight at a UK airport.

[23] Passengers flying from one UK airport to an international destination, via a connecting flight at another UK airport

[24] Passengers flying from one UK airport to an international destination, via a connecting flight at a non-UK airport

3.11 Under the expansion scenario, there is more capacity to accommodate more domestic routes and international interliners, while fewer people require the use of foreign airports to act as hubs to their final destination. International to international passenger volumes remain robust, ensuring capacity is used to reach the greatest range of possible destinations.

	International passengers travelling to, or from, the UK				
	Direct	Domestic Interliners	International Interliners	UK Domestic end to end	Non-UK International to International Interliners
2040	-1	+2	-0.1	+0.4	+3
2045	+1	+1	-0.2	+0.2	+5
2050	+5	+2	-1	+1	+10
2055	+23	+3	-1	+4	+15

Table 3-7: Additional terminal passengers at UK airports, by destination and route, with Heathrow expansion, compared to no expansion, DfT26 forecasts (mppa)

Connectivity across the UK

3.12 As a nationally significant scheme, the previous breakdowns have considered impacts at a national level. However, it is also important to assess the regional impacts of Heathrow expansion. Whereas the DfT17 forecast saw notable displacement of activity from non-London airports to the London system due to expansion (although while still seeing significant growth over time), the DfT26 forecast finds that expansion primarily results in displacement within the London system. By 2055, passenger volumes at airports outside of London are 1% lower with expansion. Passenger numbers at these non-London airports are forecast to grow by nearly 90% compared to 2024).

			2024	2040	2045	2050	2055
DfT17 Forecasts	No expansion	London airports	175	199	202	205	-
	Heathrow expansion	London airports	175	241	245	248	-
	No expansion	Rest of UK	113	160	184	204	-
	Heathrow expansion	Rest of UK	113	146	168	187	-
DfT26 Forecasts	No expansion	London airports	179	245	263	269	270
	Heathrow expansion	London airports	179	251	272	295	318
	No expansion	Rest of UK	113	158	179	205	217
	Heathrow expansion	Rest of UK	113	158	176	195	214

Table 3-8: Terminal passengers at UK airports, by London and non-London airports, DfT17 forecasts (mppa)

3.13 The table below shows that substantial numbers of passengers from outside of London and the South East will benefit from the improved international connectivity provided by Heathrow expansion. It therefore remains the case that an expanded Heathrow will allow more passengers from across the UK to benefit from access to important international markets from the airport. These reflect Heathrow's strong and improving connections to the UK's strategic road and rail networks, facilitating access for passengers and freight travelling from much of the UK.

		Terminal Passengers (millions)		
		Direct	Domestic Interliners	Total
DfT26 Forecasts	No expansion	18	1	18
	Heathrow expansion	+9	+1	+11

Table 3-9: International passenger trips from or to regions outside of London and the South East using Heathrow in 2055, and additional passenger trips with Heathrow expansion compared to no expansion

Aerocharge cost passthrough

3.14 The section above discusses the connectivity impacts of Heathrow expansion under the Current Trends (No pass through) forecast scenario. Here, we also consider the impacts of a scenario in which the costs of Heathrow expansion are passed on to passengers – Current Trends (Cost pass through).

		Additional ATMs (000s)			
		2040	2045	2050	2055
DfT26 Forecasts	Current Trends (No pass through)	16	17	73	217
	Current Trends (Cost pass through)	25	34	82	221

Table 3-10: Additional ATMs at UK airports with expansion (thousands)

		Additional Long-haul ATMs (000s)			
		2040	2045	2050	2055
DfT26 Forecasts	Current Trends (No pass through)	2	7	22	38
	Current Trends (Cost pass through)	2	10	24	35

Table 3-11: Additional long-haul ATMs at UK airports with expansion (thousands)

		Additional Terminal Passengers (mppa)			
		2040	2045	2050	2055
DfT26 Forecasts	Current Trends (No pass through)	5	7	17	45
	Current Trends (Cost pass through)	3	7	18	44

Table 3-12: Additional terminal passengers at UK airports with expansion (mppa)

3.15 Under this scenario there is a significant increase in additional ATMs in the years immediately following expansion compared to the Current Trends scenario, but by 2055 this difference has become marginal. A higher number of ATMs in the short term occurs as the movement of passengers away from Heathrow is to airports which typically operate smaller aircraft than those used at Heathrow. This means there are more aircraft needed to carry the same number of passengers, leading to the increase in ATM's

3.16 Long-haul ATMs display broadly similar outcomes compared to the Current Trends scenario, with fluctuations both above and below this. Terminal Passengers do not show a significant change under the new scenario, instead remaining almost tied with the baseline, but with possible signs of smaller growth in the short term as the pass-through of aerocharges at Heathrow results in some demand being suppressed rather than diverted. Overall, the long-term connectivity benefits of expansion remain broadly similar under both scenarios.

4 Direct economic impacts

Introduction

4.1 Airport expansion will help remove current capacity constraints, opening up opportunities for more people to travel more often to destinations around the world. Improved connectivity may strengthen the economy by supporting tourism, business travel, and trade both to and from the UK. Alongside these wider benefits (discussed in Chapter 11), passengers themselves will see clear, practical improvements. This section sets out those direct benefits for people who use aviation in the UK, who they fall to, and their magnitude alongside the impacts that arise on Government and airport and airlines.

4.2 The economic appraisal contained in this document is based on the approach described in the Aviation appraisal section of TAG[25]. All costs and benefits reported here are reported in present values over the appraisal period in 2024 prices, the appraisal period ends 60 years after scheme opening in 2095.

Passenger Benefits

4.3 The Department's appraisal captures three categories of passenger benefits:

- **Consumer Surplus:** When an airport is congested, more passengers wish to travel than can actually depart, leading to increases in the overall time and monetary cost to use an airport (termed the shadow cost in the aviation model). This occurs as when more passengers want to fly from Heathrow than it can accommodate this makes the journey more difficult and allows airlines/airports to put up their prices. Increasing the capacity lowers these shadow costs and produces a benefit to both existing consumers and new consumers that fly from the airport, both of which include lower fares.

- **Frequency Benefits:** When an airport is expanded, airlines can offer more flights to the same destination at different times. Passengers therefore benefit from being more likely to be able to travel at their preferred time.

[25] https://www.gov.uk/government/publications/webtag-tag-unit-a5-2-aviation-appraisal-may-2018

- **Delay Benefits:** A congested airport will have a tighter schedule, by increasing airport capacity. These delays are reduced for inbound and outbound flights, resulting in time benefits for passengers, environmental gains through improved operational efficiency, and the corresponding savings for airline operators.

4.4 Passenger benefits are not confined to Heathrow Airport. As the model estimates system-wide effects, when Heathrow expands, the additional capacity attracts new passengers and draws passengers away from other airports. This reallocation of passengers from other airports reduces congestion at other airports as the capacity increase ripples through the UK's airports. This spreads the benefits of Heathrow expansion to a wider range of passengers than just those that use Heathrow.

4.5 Heathrow Airport is an international airport, as are the majority of airports across the UK. This means the passenger benefits that form the appraisal accrue to all users of the airports, both UK residents and foreign residents. The aviation forecasts includes a breakdown of the residency of passengers at each of the airports it models. This is important as TAG advises that, where possible, the costs and benefits of UK and non-UK resident passengers should be identified separately, and the focus of appraisal should be on the UK only effects. In the previous Updated Appraisal Report (UAR)[26], DfT focused on the all-passenger benefits, this time the focus is on the UK only benefits and the all-passenger benefits are provided for context and comparison in Appendix B: All Passenger Benefits.

4.6 The appraisal is based on the aviation forecasts, and as these forecasts stop before the end of the appraisal period, the appraisal needs to extrapolate the results to the end of the period. The methodology used is consistent with that adopted in the UAR. The extrapolation is sensitive to the year when extrapolation starts, with tests showing than an earlier start for the extrapolation processing producing lower economic benefits (and corresponding lower airline/airport profit losses) but a similar combined PV, and a later extrapolation year would be expected to provide higher benefits and airline/airport profit loss, but a broadly similar present value when combined. Additional details on the extrapolation approach are also set out in Appendix A.

4.7 The modelling—and therefore the appraisal—does not fully capture airline behaviour, particularly their short-term commercial responses to aerocharges. As a result, the airline responses assumed in the Pass Through model may differ from those that may occur, potentially leading to different benefit and demand impacts.

4.8 Table 4-1 shows these benefits broken down in the categories as described above. This table shows that the largest source of passenger benefits is the lower shadow cost, which ultimately can feed through into lower fares for passengers, however frequency and delay benefits are also important parts of the benefit story.

[26] Updated appraisal report: airport capacity in the south-east

£bn	UK Economy Only	
	Current Trends (No pass through)	Current Trends (Cost pass through)
Lower Shadow Cost	33.5	23.6
Frequency	1.5	1.3
Delays	0.5	0.4

Table 4-1: Direct passenger benefits, UK economy only (£ billion)

4.9 The aviation model also segments the demand into several journey purposes, which then allow us to understand how the benefits accrue to these different journey purposes. For the purposes of this report, we have broken down the journey purposes into Business, Leisure and International Interliners. Figure 4-2 below shows the breakdown of benefits into these different types, which shows that most benefits (some 87%) accrue to leisure passengers, and a smaller 13% to business passengers. As we are looking at a UK only appraisal – there are no benefits accrued from international interliners in the main appraisal, however this table provides the details of the breakdown for those benefits.

£bn	Current Trends (No pass through)					Current Trends (Cost pass through)				
	UKBus	UKLei	FoBus	FoLei	II	UKBus	UKLei	FoBus	FoLei	II
Lower Shadow Cost	4.0	29.5	1.8	15.1	1.7	2.2	21.5	0.65	9.9	-1.5
Frequency	0.6	0.9	0.3	0.4	0.03	0.6	0.8	0.06	0.4	0.03
Delays	0.3	0.2	0.2	0.1	0.1	0.2	0.1	0.2	0.08	0.1

Table 4-2: Breakdown of benefits by journey purpose and residency (£ billion)

Airline/Airports and Government impacts

4.10 The appraisal of Heathrow expansion also monetises the impacts on airlines/airports and on the government. There are three main components we look at here which are summarised below.

- **Airline/Airports profit impact:** When a congested airport expands, the profits of the airport or the airlines operating out of that airport will be affected as the increase in supply means that they do not receive the benefits they were receiving with restricted capacity (assuming a competitive airline market), this includes the fact airlines and airports are no longer able to charge the higher fares they were able to charge when the airport was congested.

- **Reduced delays to airlines:** In the same way as described for passengers, airlines see benefits from reductions in delays for arriving and departing aircraft through lower fuel use and overall less time in the air.

- **Government revenue changes:** Changes in Air Passenger Duty (APD) from increased passenger traffic and changes in Value Added Tax (VAT) revenue have impacts on the government. The latter arises because additional passengers may be transferring their expenditure from goods and services which are subject to VAT to air fares, which are not subject to VAT (but subject to APD).

4.11 The distribution of impacts between airports and airlines depends on which party controls the capacity constraint, namely the number of ATMs or passengers that can be accommodated. At most airports, the airport operator controls this constraint and therefore captures the economic rents. At Heathrow the regulatory framework differs. Heathrow operates under a price control regime, which limits its ability to set prices. Airlines therefore exert influence over pricing outcomes and the allocation of the economic rent. This distinction is important as it affects the estimation of UK-only impacts. The appraisal allocates changes in profits between airlines and airports based on this to determine how the impacts accrue to the UK economy. The ownership structures further influence the distribution of impacts, as where airports are owned wholly or partially by UK entities, including local authorities, these impacts accrue to the UK economy.

4.12 When we calculate UK-only impacts for Heathrow Airport we look at the breakdown of registration and ownership of airlines at the airport – using shares data and ONS statistics, using these to make assumptions where data is unavailable. For all other airports, we look in detail at the owners of the airports instead and use a broadly similar approach – although because the owners of airports are often infrastructure investors or local authorities there is generally more information available and fewer assumptions are needed. Table 4-3 below shows the breakdown of these components described in this chapter for UK passengers only, and for the No pass through and Cost pass through scenarios.

£bn	UK Resident Passengers	
	No pass through	Cost pass through
Airline/Airport Profit Loss	-24.2	-24.3
Government Revenue Changes	4.7	3.3
Delays	0.7	0.6

Table 4-3: Airline/Airport and Government impacts breakdown (£ billions)

5 Wider economic impacts

Introduction

5.1 Airport expansion is transformational in nature, and its impacts extend beyond the direct effects on passengers, airports, airlines and the Government. By changing the spatial distribution of economic activity and employment, expansion has the potential to affect productivity and, in turn, wider economic outcomes.

5.2 Improved international connectivity from additional airport capacity strengthens Heathrow's role as a global hub and increases the attractiveness of London and the South East for internationally oriented businesses and workers. Expansion enables more frequent long-haul and business travel, which supports firms that rely on access to their global markets.

5.3 In response, firms and workers in the UK are more likely to locate in higher productivity areas, particularly London and the South East, where access to international markets are strongest. This movement supports more efficient matching between firms and workers and facilitates a shift of labour towards higher value activities, especially in producer services. Expansion also supports additional employment in consumer services, particularly within the airport and surrounding areas, including retail, hospitality, and operations, reflecting increased passenger volumes and on-site activity.

5.4 Consistent with Green Book assumptions of full employment, these effects arise through the reallocation of labour across the country rather than an increase in total employment.

5.5 While the Department recognises the potential for these wider economic impacts, the analytical approach of using the DfT aviation model and TAG captures only a subset of potential effects within a cost benefit framework and focuses on channels that can be robustly modelled. It depends on assumptions about labour reallocation, productivity differences across locations, and behavioural responses to improved connectivity. As a result, the estimates should be interpreted as indicative rather than definitive and are intended to reflect a plausible range of impacts rather than a precise measure. The tax wedge (partial estimate of move to

more productive jobs), imperfect competition and agglomeration impacts are set out below.

5.6 In addition, to supplement this analysis and attempt to capture other impacts across the whole economy from Heathrow expansion, DfT commissioned Frontier to undertake Spatial Computable General Equilibrium (SCGE) modelling, discussed in more detail in Chapter 11. This tries to capture economy-wide adjustments beyond the transport appraisal framework.

Tax wedge

5.7 Improved international connectivity increases the attractiveness of London and the South East for internationally focused businesses. Labour then moves to take advantage of this attractiveness leading to more firms clustering near Heathrow. This has a particular focus on internationally traded and high-value sectors such as the service economy (e.g. finance, legal services) and other high productivity activities. This movement leads to higher average earnings and increased business profitability, which generates higher taxes.

5.8 Expansion also supports growth in consumer service employment such as roles in airport operations, retail, and hospitality — many because of airport expansion itself. In a similar fashion to the wider service economy, these jobs contribute positively to tax revenues where they reflect a movement from less productive regions to more productive areas such as London and the South East. In these cases, even relatively lower-wage employment can result in higher earnings compared to previous roles, thereby increasing tax contributions.

5.9 Taken together, the redistribution of labour towards more productive locations and sectors generates benefits for the Exchequer.

Imperfect competition

5.10 Transport investment can also generate economic benefits where firms operate in imperfectly competitive markets, in which output is constrained and prices exceed marginal cost.

5.11 By improving international connectivity airport expansion enables firms, particularly in internationally traded sectors, to expand output through improved access to markets and supply chains, thus lowering costs overall and providing benefits. The value of this additional output can exceed the direct cost savings captured in standard business user benefits.

5.12 As a result, conventional appraisal can understate total welfare impacts. In line with DfT guidance, an uplift is applied to business user benefits to reflect these additional gains and capture the increase in output that arises when firms respond to improved connectivity. However, the TAG approach is based on local domestic marketplaces and surface access schemes. This means there is more uncertainty in the level of benefits that can be generated from this approach. For example, it

may be that for international markets the use of this approach may under or over estimate the benefits.

Agglomeration

1.1 Agglomeration is a positive externality arising from job reallocation, where increased clustering of firms and workers in London and the South East raises effective density. This can improve productivity by reducing labour and firm matching frictions and enabling knowledge spillovers. In appraisal, consistent with TAG, these effects are proxied through changes in effective density. However, this approach also requires consideration of the disbenefits associated with higher density, most notably congestion on transport networks, in order to estimate a net agglomeration impact.

1.2 In this appraisal, it has not been possible to robustly quantify both the positive effects of increased effective density and the associated congestion impacts within a consistent analytical framework. This reflects limitations in modelling capability, particularly in relation to transport network performance and uncertainty around how relocation would affect population distribution and travel behaviour.

1.3 Given these constraints, net agglomeration impacts are subject to a high degree of uncertainty and have therefore been excluded from the appraisal. This approach is consistent with TAG principles and aligns with the treatment adopted in the UAR.

Final Results

5.13 In the Current Trends scenario, the density and TAG approaches define a range of tax wedge estimates from £0.7–1.5bn. The density approach incorporates a limited form of sorting, as it reflects the movement of workers towards more productive locations. However, it captures productivity gains only through changes in economic density and does not account for differences in the types of workers or firms involved. In particular, it does not reflect that more productive workers may be more likely to relocate, that workers may match into higher-productivity roles, or that firms in high-productivity areas are inherently more productive. As a result, it captures only part of the productivity gains associated with relocation and therefore provides a lower bound estimate.

£bn	No pass through	Pass through
Tax Wedge	0.7 to 1.5	0.2 to 1.2
Business output	0.7	0.4

Table 5-1: Wider Economic Impacts breakdown (£ billion)

5.14 The TAG approach provides the upper bound because it assumes workers fully adopt the average productivity of their destination area, implicitly capturing the full productivity differential and assuming no adjustment frictions. In practice, labour

market frictions limit these gains, so the true impact is likely closer to the lower bound.

5.15 In the pass through scenario, the tax wedge falls to £0.2–1.2bn, with a larger reduction in the density-based estimate. Higher aerocharges suppress demand at Heathrow in the early years and temporarily shift employment to less dense areas. The density approach reacts strongly to this loss of concentration, leading to a larger decline in estimated productivity gains, particularly as early-year impacts carry greater weight in net present value terms. Although this effect reverses over time as Heathrow demand recovers, the early redistribution drives the overall result. The TAG approach falls by less because it reflects average productivity levels, which remain relatively high as employment redistributes to other metropolitan centres despite reduced demand at Heathrow.

5.16 Business output is lower than in previous modelling, at £0.65bn in the Current Trends scenario and £0.4bn with aerocharges. This reflects weaker business travel demand following Covid-19, which reduces business user benefits. However, the reduction in the aerocharge scenario is more limited, as business passengers are less price sensitive and therefore reduce demand by less in response to higher charges.

6 Costs of Heathrow expansion

Introduction

6.1 When assessing the impact of Heathrow expansion costs on the UK economy the appraisal needs to consider the different types of cost and how stakeholders pay for them, as both factors affect their use in the economic case. However, in all of these, Government has been clear throughout the process so far that Heathrow expansion must happen at no expense to the taxpayer.

6.2 This means that the expansion promoter needs to recover these costs instead through time with charges to users, with upfront costs coming from private financing. Although expansion is to be privately financed, the HMT Green Book approach to cost benefit analysis is to include cost (whoever pays) since they represent either an opportunity cost to the economy (that investment could otherwise be spent elsewhere in the economy and the benefits are dependent on those costs) or an actual cost to part of the economy relative to if expansion happened (UK consumers pay more to use the airport for their flights).

Scope of Appraisal

6.3 Costs for transport infrastructure as accounted for in standard transport appraisal fall into the following categories.

- **Capital costs:** There are two main areas of capital cost associated with airport expansion, the capital expenditure to build and fit out the new runway, terminal buildings and all associated connecting infrastructure needed to make the airport work (referred to as “scheme costs”) and the expenditure related to surface access (discussed further below).

- **Operating costs:** These costs relate to operating the additional terminal buildings and managing the airport following construction of the third runway. This covers costs such as energy costs, ground handling, retail, cleaning, security and other costs.

- **Maintenance and renewals:** Once the operator has constructed the terminals and runway, they will not last for the 60 year life of the appraisal without any maintenance or renewal costs – the runway will likely need re-

surfacing during the period, terminal buildings will also need updating/refreshing or upgrading.

6.4 For privately funded schemes there are additional costs, such as the cost to raise the money to construct and/or own the infrastructure through debt and equity.

6.5 In addition, increased surface access trips due to expansion are expected to result in various costs to promoters, airport passengers, and the wider public including:

- Cost to promoters from delivering new public transport infrastructure and services required to meet proposed surface access targets;
- Increased costs for some passengers if promoters introduce measures to disincentivise driving to the airport; and
- Disruption for road users and local communities from increased surface access trips during the construction and operational phases.

6.6 The draft HENPS therefore sets out surface access public transport mode share targets to mitigate the impact of expansion on road users and local communities. The Government expects these targets to deliver various from new public transport or services. There may be second order benefits as well such as increased revenue for transport providers for example from new public transport infrastructure and services.

6.7 The environmental assessment incorporates some of the surface access carbon disbenefits. However, analysts have not estimated the full costs and benefits of additional surface access schemes beyond those included in previous work. This is due to uncertainty around what measures promoters will deliver to achieve surface access targets and their associated impacts.

Methodology and results

6.8 A standard TAG/Green Book appraisal assesses a government-owned or funded scheme by evaluating the costs that the government incurs when it raises funding from the economy and spends it. However, for a privately funded scheme, users pay the costs over time rather than at the point when the scheme promoter spends money in the economy to build the scheme. In the case of Heathrow expansion, the scheme promoter will raise equity/debt, use this to construct the scheme and then they will pay this back over time through aerocharges (as already discussed above in Chapter 4).

6.9 This different approach to when costs are paid for in the economy necessitates a different way to appraise the costs. The appraisal should therefore assess these costs when consumers pay them. This approach broadly reflects recent updates to the Green Book on the use of private finance for public schemes. These

updates treat government use of private finance as a disbenefit when the appraisal includes the cost stream in the net present value.[27]

6.10 The economic case requires costs for the whole 60 years of the appraisal period. This means that the approach used extends cost assumptions provided by HAL as part of their submission to the ANPS review to the whole of the appraisal period. This extension is relatively straightforward and uses a simplified regulatory model with estimates or assumptions of known costs.

6.11 The assessment of scheme costs over a 60-year appraisal period is inherently complex. This is because the overall cost and timing depend on several uncertain factors, including the regulatory framework, levels of competition, total cost and associated risks, operating and maintenance assumptions, income forecasts, and financing costs. As a result, the costs included in the economic case are highly uncertain. The figures rely on assumptions made solely to illustrate their potential impact on the economic case. These cost estimates draw on information provided by HAL, including its proposal for a third runway, which was reviewed during summer and autumn 2025. However, they do not represent firm commitments on costs, Government views on the regulatory approach, or any agreed position on the final level or distribution of aeronautical charges. These elements will be defined more clearly as the scheme is developed further by the promoter and stakeholders through the regulatory and planning processes.

6.12 With these caveats, the approach provides an NPV cost that would apply to an appraisal of all passengers. As already discussed in the report, the appraisal here must adjust the cost NPV to reflect costs in the UK economy. There are different approaches subject to how the appraisal and modelling deals with aerocharges.

- **No Pass Through**: When they are not passed through to consumers then the appraisal assumes the costs are paid for by airlines at Heathrow out of their excess profit from the restrictions in capacity. This applies the approach as used in the UK appraisal of airlines/airport profit loss for Heathrow only.

- **Cost Pass Through**: The appraisal incorporates the majority of costs as part of the passenger benefits and the airline/airport profit loss. However, with demand falls there would not be enough income from aerocharges in some years without the scheme promoter increasing aerocharges further. This effect is not included in the modelling due to technical constraints. Ideally, the appraisal and modelling should pass these onto consumers, generating further demand effects and thus losses of consumer welfare (but also carbon savings). Therefore, the appraisal must include these additional costs. The treatment of these additional costs depends on whether they fall when there are shadow costs in the model or not. The calculation uses the residency makeup of the consumers when there are no shadow costs, and the same approach as above for when there are shadow costs.

[27] The Green Book (2026) - GOV.UK

6.13 The table below shows the final costs used:

£bn	No pass through	Cost pass through
Costs	8.3	5.8

Table 6-1: Costs attributed to the UK economy (£ billion)

7 Environmental impacts

Overview

7.1 This chapter assesses and monetises environmental impacts relating to carbon, air quality and noise. These are the most important to analyse given their likely size and impact, with the remaining environmental impacts (including biodiversity and water quality) addressed in the AoS and not monetised or discussed here.

7.2 Environmental appraisal depends to varying degrees on the updated aviation forecasts, and the appraisal discusses this in further detail in each section below.

Carbon

7.3 Aviation has a negative carbon impact on society through the effect of carbon emissions contributing to climate change. It is therefore important to assess the magnitude of these emissions and monetise the costs to society of the additional emissions created because of expansion.

7.4 The Airports Commission considered the impact of airport expansion on emissions from four sources, and these are considered to still be the key contributors:

- ATMs: extra flights across UK airports will increase carbon emissions.
- Airport operations: emissions will be created from the additional heating and power required at airport buildings, as well as transporting new passengers, baggage and freight around the airport site.
- Surface access**:** increased passenger demand will cause an increase in emissions from more vehicles accessing airports.
- Construction: the construction required to provide the additional capacity and surface access infrastructure itself will also create additional carbon emissions.

Emissions from ATMs

7.5 Emissions from ATMs are contingent on aviation forecasts and have therefore been fully updated for this appraisal. The carbon analysis covers a full set of scenarios, including high economy and regional growth. This, alongside more detailed assumptions for all scenarios, can be found in the Aviation Forecast Report published alongside this appraisal report.

7.6 This section focuses on the Current Trends scenario. Current Trends has a range based on whether aerocharges are passed through to passengers or not and is the central case in this appraisal.

Scope of appraisal of aviation carbon

7.7 For the 2018 ANPS and economic appraisal, the Department assessed two carbon scenarios: 'carbon traded' and 'carbon capped'. The carbon traded policy regime assumed that UK aviation emissions are part of a fully functioning global trading scheme and total global aviation emissions are limited in line with international stabilisation targets. The carbon capped policy regime assumed that total emissions from UK departing flights are capped at 37.5 MtCO2 per annum in 2050, as per the planning assumption made by the Committee on Climate Change (CCC).

7.8 The Department and the Airports Commission at the time concluded that under these policy assumptions, the increases in emissions from flights would not be additional overall either at international level (in the carbon-traded forecast) or within the UK economy (in the carbon-capped forecast). These therefore were not monetised.

7.9 In 2021, the Department for Energy Security and Net Zero (DESNZ) updated their guidance to recommend that any emissions increase in both the traded or non-traded sectors be valued in appraisal. In the case of aviation this now means monetising aviation carbon using the full carbon appraisal value minus the UK Emissions Trading Scheme (ETS) permit price paid for European or domestic flights or the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) offset price paid on non-European international flights.

7.10 This appraisal presents two sets of aviation carbon appraisal results, to assess both the impact on UK territorial emissions and global emissions.

- The first represents the monetised disbenefits from a UK carbon accounting perspective and is aligned with our net zero legislative obligations (where only departing flights are considered in scope of legal carbon limits).

- The second represents monetised disbenefits from a global perspective including departing and arriving flights but net of any displacement which might happen at a global level. Displacement here refers to a passenger whose end-to-end trip occurs whether or not Heathrow expands, but in a scenario with Heathrow expansion they switch from using a foreign hub to using Heathrow.

7.11 The appraisal presents the global metric as a range because of uncertainty over the scale of global displacement. The upper end of this range reflects all emissions from departing and arriving flights. The lower end of the range reflects carbon impacts if there was a proportionate reduction from the departing and arriving total in line with the share of total passenger increases (from expansion) who are interliners.

7.12 The two scenarios (UK carbon accounting and global) are not specifically intended to represent a range and instead have independent interpretations, as above.

Post-2050 carbon and extrapolation

7.13 The Aviation Forecast Document sets out the assumptions feeding Current Trends and other scenarios and presents carbon trajectories for different scenarios up to 2050[28]. It is expected that carbon efficiencies will continue to grow past 2050 based on a combination of technological development and ongoing decarbonisation policies. This includes via ongoing operational efficiency improvements, the assumed continuation of carbon pricing schemes (CORSIA and the UK ETS[29]), the introduction of ultra-efficient and zero-emission aircraft[30] and continued uptake of Sustainable Aviation Fuel. For the Current Trends scenario SAF uptake is held constant at 17% from 2050 onwards, consistent with meeting the SAF Mandate in full[31].

7.14 The Aviation Model can only run to 2055 for the Current Trends scenario for this appraisal[32], after this point the impacts are extrapolated as discussed in Chapter 4. Generally, this extrapolation methodology looks to capture increases in demand past these dates. To capture the decarbonisation assumptions set out above, the Department has developed a bespoke carbon extrapolation methodology based on CO2 per available seat-km from alternative model runs using the same economic assumptions. These model runs extended further into the future due to differences in capacity assumptions applied to those in the draft HENPS scenarios. The CO2

[28] Carbon trajectories are also published to 2060 in the associated data tables

[29] UK ETS and CORSIA prices increase at 1.5% annually after 2050, in line with TAG databook assumptions for ETS and applying the same principle for CORSIA.

[30] See Table 5-14 in the UK Aviation Forecast for entry into service dates of ultra-efficient and zero-emission aircraft https://government/publications/uk-aviation-forecast-2026

[31] Under the SAF Mandate, the number of certificates issued depends on the greenhouse gas (GHG) savings of the fuel. Where SAF supplied has 70% GHG savings, it will receive one certificate per litre and therefore lead to a SAF uptake of 22% in 2040. If GHG savings are higher than 70%, more than one certificate is issued per litre: this means that a supplier can discharge their obligation with a lower volume of SAF if that SAF has higher GHG savings. The latest assumptions (set out in 2026 Aviation Forecasts) are that GHG savings will be higher than 70%, therefore mandate can be met with lower volumes of SAF and assumed uptake is 17% from 2040 onwards.

[32] The appraisal needs a scenario without Heathrow Expansion occurring and this scenario does not run beyond 2055. Impacts are therefore extrapolated past 2055 as tighter capacity constraints in the scenario limit the model running beyond this year

per seat-km methodology isolates the impact from fleet and fuel efficiencies past the final modelled year and applies this to the extrapolated impacts.

7.15 The appraisal period totals for carbon are shown below for the Current Trends scenarios. Impacts are appraised over the period 2024 to 2095[33].

	Current Trends (No pass through)		Current Trends (Cost pass through)	
	Carbon (MtCO2e)	**Monetised impact (£bn)**	**Carbon (MtCO2e)**	**Monetised impact (£bn)**
UK Scope	185.6	-26.4	192.9	-27.6
Global Scope	244.2 to 365.9	-34.1 to -52.3	259.2 to 380.4	-36.6 to -54.5

Table 7-1: Appraisal period aviation carbon impact under different scenarios

7.16 For carbon impacts in Million Tonnes of CO2 for departing flights broken down by carbon budget period for Current Trends (and Technology Development), please see the AoS which is published alongside this report.

Emissions from surface access, airport operations and construction

7.17 The appraisal assumes that emissions from non-aviation carbon do not vary across aviation demand and carbon scenarios. Also, only one carbon metric is presented, because they are domestic impacts (unlike the UK Scope/ Global Scope split for aviation carbon).

7.18 The Department has retained analysis of the carbon impact from non-aviation sources from the 2018 ANPS due to scheme similarity and a likely improvement to baseline conditions. These have been reprofiled in line with when impacts are expected to occur (see Appendix C for detail) and updated carbon values have been applied to calculate disbenefits. Changes since 2018 which could impact these estimates are summarised below and discussed in more detail in Appendix C.

[33] Carbon is appraised from prior to scheme opening year due to some small differences in capacity pre-opening. The appraisal runs to 60 years after scheme opening (2095), in line with TAG guidance.

Area of carbon	60-year carbon impact estimated in 2018 and retained in 2026 (MtCO2e)	Value of monetised carbon impacts- Current Trends (No pass through)[34] (£bn)	Changes since 2018 and impact
Surface access	9.5	-1.6	**Expected improvement** since 2018 in passenger surface access carbon in scope of calculations. Exclusion of freight from this number (as in 2018) means this could still **underestimate** total surface access carbon.
Construction	11.3	-3.2	**Similar or a slight improvement** since 2018.
Operations	2.7	-0.4	**Improvement** since 2018.
Total	23.5	-5.2	Likely **similar or slight improvement** since 2018

Table 7-2: Non-aviation carbon impact and expected changes since 2018

Reduction in Delay related emissions

7.19 Increased runway capacity at Heathrow can reduce the carbon cost of delays by lowering congestion and enabling more efficient aircraft operations. With fewer capacity constraints, aircraft spend less time in airborne holding patterns and ground queues with engines running, both of which increase unnecessary fuel burn.

£bn	Current Trends (No pass through)	Current Trends (Cost pass through)
Carbon Delay benefits (UK departing only)	0.1	0.1

Table 7-3: UK only carbon delay benefits (£ billion)

Air Quality

7.20 Emissions of air pollutants are created by aircraft, airport operations and surface access, and these all have an impact on air quality. At the local level, poor air quality has an adverse effect on health, quality of life, and the functioning of ecosystems. Emissions and concentrations of air pollutants are also of concern nationally.

7.21 This appraisal retains air quality monetised disbenefits from the 2018 Addendum to the Updated Appraisal report[35], applying scaling factors to the analysis to reflect

[34] Monetised impact varies slightly 'Cost pass through' scenario because carbon has been profiled in line with passenger increases. Total appraisal period monetised carbon in the 'Cost pass through' scenario is £5.1bn compared to £5.2bn in the 'No pass through' scenario.

[35] https://assets.publishing.service.gov.uk/media/5b0af93d40f0b673fc7952ed/addendum-to-the-updated-appraisal-report-airport-capacity-in-the-south-east.pdf

latest evidence on damage costs and impact pathway values (value-of-a-life-year).

7.22 The Airports Commission estimated the aggregated effect of nitrogen dioxide (NO2) and particulate matter (PM10) concentrations. These impacts were updated and monetised in 2018 for the Updated Appraisal Report (UAR) to account for DfT17 forecasts, applying scaling factors to account for updated aviation passenger and surface access demand. Following scrutiny by the Transport Committee in early 2018, the Department found that in updating its air quality analysis for the publication of the UAR there was an unintended omission in monetising some health impacts. The approach set out in the UAR assessed the health impacts on populations living within 2km of the expanded airport but did not assess impacts on those people living outside of this area.

7.23 The analysis was then refreshed for the Addendum to the Updated Appraisal Report given the critique above which includes impacts assessed to those living within and outside of a 2km radius. This combined assessment is the basis of the monetisation in the 2026 ANPS.

7.24 This updated analysis applies both an impact pathway and damage cost approach. The impact pathway approach values changes in concentrations directly, making use of the dispersion modelling undertaken for the Airports Commission. The damage cost approach values changes in emissions (rather than concentrations[36]) and is used to capture impacts outside of the 2km study area. At the time of the 2018 ANPS these monetised estimates were deemed to be an overestimate (due to high demand forecasts used and the analysis not accounting for any mitigations to reduce roadside traffic).

7.25 As the underlying air quality impacts have not been quantitatively re-estimated since 2018, the DfT has commissioned additional indicative analysis looking at the trends since 2018 which may impact NOx and PM10 which are the basis of the monetisation. The review of road vehicle emissions source data and trends indicates that vehicle emission assumptions used in the 2018 ANPS are generally considered conservative for these pollutants, tending to overestimate future emissions. The review did not include an update of other assumptions such as congestion, speed and traffic growth, which affect outputs. The review concludes that the impact from airside related activity is likely to be broadly similar overall for NOx emissions. It concludes impacts are likely lower than the 2018 analysis for PM10- this is due to technological improvements such as the decrease in Auxiliary Power Unit usage, increase in Ground Power Unit usage and the increasing electrification of the Ground Support Unit fleet. The DfT has also commissioned an indicative assessment of the impacts on PM2.5 concentrations which were not assessed in 2018. Further detail can be found in the AoS and supporting reports, published alongside this report[37].

[36] Emissions reflect pollutants emitted into the air from activity such as transport or agriculture, concentrations are the amount of pollutant present in a certain volume of air and depend on factors such as meteorological conditions as well as emissions.

[37] https://government/publications/heathrow-expansion-national-policy-statement-appraisal-of-sustainability

£bn	Monetised impact
Air quality	-0.9

Table 7-4: Monetised air quality disbenefit (£ billion)

Noise

7.26 Airport expansion creates a negative noise impact on the area surrounding the expanded airport. Exposure to noise from increased flight activity around an airport is an annoyance, can disturb sleep and can increase the risk of adverse health outcomes (acute myocardial infarction (AMI), stroke and dementia).

7.27 The monetised health impact of noise is based on population exposure during the day and night, accounting for differences in health and annoyance impacts across time periods and noise levels. The noise predictions are sensitive to a number of outputs from the aviation model, including the number of ATMs and the composition of the aircraft fleet mix.

7.28 Following updates to the aviation demand forecasts and corresponding ATM forecasts, a key input to the aviation noise modelling, the Department has carried out new local noise forecasts for a Northwest Runway at Heathrow. Further details can be found in the AoS Noise Annex[38]. This forms the basis of the monetisation below. No new ground noise or surface access noise assessment has been undertaken, as aviation noise will be the predominant source of adverse impacts.

7.29 Whilst the updated aviation ATM forecasts could affect noise impacts at airports other than Heathrow due to changes in flight numbers, the noise impacts this appraisal assesses due to airport expansion are focused on local impacts at the expanded airport. This means that any potential positive impacts of reduced noise at other airports have not been captured.

£bn	Monetised impact
Current Trends (No pass through)	-1.6

Table 7-5: Monetised noise impact (£ billion)

7.30 These results are sensitive to inputs to the noise modelling, including aviation demand and fleet mixes, flight paths, airspace assumptions, and population forecasts for the ground area exposed. Monetised results are also sensitive to the years modelled, the weightings assigned to different impacts, and the noise thresholds that determine when some impacts take effect.

7.31 The methodology for monetisation is based on the TAG unit A3 which follows guidance published by the World Health Organisation and Defra. Rather than linearly interpolating the monetised value of impacts between modelled years

[38] Noise annex, https://government/publications/heathrow-expansion-national-policy-statement-appraisal-of-sustainability

(2035, 2045 and 2055), impacts have been scaled between modelled years in line with expected activity increases at Heathrow in terms of flight numbers to better reflect when noise impacts are expected to occur. The monetised impact is held constant after the last modelled year (2055) until the end of the appraisal period. In reality there may be technology improvements after this point, so this is a conservative estimate.

7.32 Minor adverse noise impacts may occur prior to opening. These have not been captured within the assessment, as modelling an additional scenario before 2035 would be disproportionate to the scale of likely effects.

8 Combined costs and benefits

Introduction

8.1 This chapter brings together the costs and benefits presented across the previous chapters to present the full, monetisable economic impacts of Heathrow expansion as assessed using TAG welfare approaches. This chapter presents the figures and provides several other summary metrics that are relevant to understand the benefits and costs of the case. We discuss these summary metrics further in the box below.

*The **Net Present Value** provides a measure of the overall social value of Heathrow expansion compared to a counterfactual without expansion. This includes the addition of all costs and benefits. Its use is recommended in TAG for schemes which do not impact on the broad transport budget.*

*The **Passenger Benefit** contains the positive benefits which accrue to passengers and comprise of the lower shadow cost, frequency benefits and delay benefits (except where aerocharges are passed through in which case this incorporates part of the cost of expansion). This includes discounting to a present value.*

*The **Net Social Benefit** excludes the costs but includes the passenger benefits, environmental costs and the change in profit/loss to airports and airlines. The latter is more important for the UK-only results as that incorporates the direct social benefit to the UK. This is not calculated where aerocharges are passed through and includes discounting to a present value.*

8.2 These different metrics provide a wider view of the expected impacts of Heathrow expansion on the UK and the UK economy; they do not though necessarily tell the whole story as not all impacts can be monetised. These figures should therefore be considered alongside the wider strategic case for expansion, particularly the findings on GDP impacts using Spatial Computable Generalised Equilibrium modelling (SCGE) presented in the later chapter and the results seen from the

range of scenarios which also help understand the implications of Heathrow expansion.

Combined costs and benefits

8.3 In interpreting the results presented below, it is important to bear in mind several key considerations.

- Several core inputs such as passenger benefits, wider economic benefits and carbon are subject to uncertainty and the analysis therefore presents these as ranges rather than point estimates.
- Not all impacts represent net economic gains at the UK level; some reflect transfers (for example, between airlines, airports and passengers) rather than additional value to the economy.
- Environmental impacts, particularly those associated with carbon emissions, are also a critical component of the assessment, with two carbon results presented, a UK-only view and a global view with a range taking account of the potential for displacement across economics.

8.4 The main economic case is summarised in Table 8.1, which brings together the monetised impacts that affect the UK as discussed in the preceding chapters. This includes direct user benefits, wider economic impacts, producer impacts, and environmental effects for both carbon approaches, presented on a consistent basis and discounted over the appraisal period. The table provides a consolidated view of the scheme's passenger benefits, net social benefits and net present value (NPV).

£bn NPV	Current Trends (No pass through)		Current Trends (Cost pass through)	
	UK Only		UK Only	
Passenger Benefits	35.5		25.3	
Government Revenue	4.7		3.3	
Wider Economic Impacts	1.3 to 2.1		0.6 to 1.6	
Total Benefits to Passengers and the wider economy	**41.6 to 42.4**		**29.2 to 30.2**	
Carbon Approach	Impact to UK carbon account*	Global impact (with/without displacement)✞	Impact to UK carbon account*	Global impact (with/without displacement) ✞
Environmental Benefits	-34.0	-59.8 to -41.7	-35.1	-62.1 to -44.2
Airline/Airport Profit Loss	-23.5		-23.8	
Net Social Benefit	**-15.9 to -15.1**	**-41.7 to -22.8**	[39]	
Scheme Cost	-8.3		-5.8	
Net Present Value	**-24.2 to -23.4**	**-50.0 to -31.1**	**-35.5 to -34.5**	**-62.5 to –43.6**

* The impact to the UK carbon account monetises the additional from departing flights only

✞ The Global Impact carbon approach monetises the additional carbon generated by both departing and arriving flights, with the range showing the impact with and without displacement in carbon from flights that would otherwise have occurred at a foreign hub

Table 8-1: Current Trends 'No pass through' and with 'Cost pass through' economic case (£ billion)

8.5 The table and preceding chapters indicate that the scheme will deliver a range of passenger benefits, wider economic benefits, and additional income to government. However, these come with an impact, primarily the reductions in profits at airports and airlines around the UK (when compared to a world where Heathrow does not expand), and the overall environmental costs; carbon, air quality and additional noise. This leaves the overall net social benefit as negative, and the net present value even more negative. The impact of different growth assumptions are provided in Chapter 10.

[39] As net social benefits are defined as being the change in benefits not including the costs – and the benefits in this scenario include some costs, we cannot calculate a net social benefit.

9 Technology Development Scenario

Introduction

9.1 This chapter presents the carbon Technology Development scenario. This scenario is discussed in greater depth than the other additional scenarios presented in this report due to how it is used in the context of Jet Zero and other carbon analysis, including carbon budget planning purposes.

9.2 Compared to the Current Trends scenario, this scenario assumes a more ambitious decarbonisation pathway with stronger improvements in fuel efficiency and reduced fuel burn per seat-km. This chapter covers the additional assumptions made and also presents the core metrics for the UK only.

Details

9.3 The Aviation Forecast document sets out the assumptions feeding Current Trends and Technology Development and presents carbon trajectories for different scenarios up to 2050[40]. It is assumed that carbon efficiencies will continue to grow past this point based on a combination of technological development and ongoing decarbonisation policies in both scenarios. This includes via ongoing operational efficiency improvements, the assumed continuation of carbon pricing schemes (CORSIA and the UK ETS[41]), the introduction of ultra-efficient and zero-emission aircraft[42] and continued uptake of Sustainable Aviation Fuel. For the Current Trends scenario SAF uptake is held constant at 17% from 2050 onwards, consistent with meeting the SAF Mandate in full[43]. For the Technology

[40] Carbon trajectories are also published up to 2060 in the associated data tables

[41] UK ETS and CORSIA prices increase at 1.5% annually after 2050, in line with TAG databook assumptions for ETS and applying the same principle for CORSIA.

[42] See Table 5-14 in the UK Aviation Forecast for entry into service dates of ultra-efficient and zero-emission aircraft https://government/publications/uk-aviation-forecast-2026

[43] Under the SAF Mandate, the number of certificates issued depends on the greenhouse gas (GHG) savings of the fuel. Where SAF supplied has 70% GHG savings, it will receive one certificate per litre and therefore lead to a SAF uptake of 22% in 2040. If GHG savings are higher than 70%, more than one certificate is issued per litre: this means that a supplier can discharge their obligation with a lower volume of SAF if that SAF has higher GHG savings. The latest assumptions (set out in 2026 Aviation Forecasts) are that GHG savings will be higher than 70%, therefore mandate can be met with lower volumes of SAF and assumed uptake is 17% from 2040 onwards.

Development scenario, SAF uptake increases linearly from 33% in 2050, to 57% by 2075.[44]

9.4 The aviation model runs to 2060 for the Technology Development scenario, after which the appraisal extrapolates the impacts needed. The methodology used for the carbon extrapolation for the Technology Development scenario is a replicated version of that applied to the Current Trends scenario described in Chapter 7.

9.5 The appraisal period totals for carbon are shown below for Technology Development (and Current Trends) for comparison.

	Current Trends (No pass through)		Current Trends (Cost pass through)		Technology Development (No pass through)	
	Carbon (MtCO2e)	Monetised impact (£bn)	Carbon (MtCO2e)	Monetised impact (£bn)	Carbon (MtCO2e)	Monetised impact (£bn)
UK Scope	185.6	-26.4	192.9	-27.6	88.3	-8.9
Global Scope	244.2 to 365.9	-34.1 to -52.2	259.2 to 380.4	-36.6 to -54.5	109.3 to 174.9	-10.3 to -17.5
UK Scope: The impact to the UK carbon account monetises the additional from departing flights only Global Scope: This approach monetises the additional carbon generated by both departing and arriving flights, with the range showing the impact with and without displacement in carbon from flights that would otherwise have occurred at a foreign hub						

Table 9-1: 2024 to 2095 aviation carbon impact under different scenarios

Noise in a Technology Development scenario

9.6 The Department has updated noise impacts for a Technology Development scenario because more optimistic assumptions on technological progress are expected to reduce overall adverse impacts. For further detail on this underlying modelling, please see the AoS Noise Annex[45].

£bn	Total
Current Trends (No pass through)	-1.6
Technology Development (No pass through)	-1.5

Table 9-2: Monetised noise impact with Technology Development scenario (£ billion)

9.7 The lower monetised noise disbenefit in the Technology Development scenario indicates a modest reduction in adverse impacts, particularly during night-time, by 2055 (the final modelled year used for monetisation in this scenario). This

[44] Continuing to assume (as with Current Trends) that SAF delivers more than 70% GHG savings
[45] https://government/publications/heathrow-expansion-national-policy-statement-appraisal-of-sustainability

overestimates noise impacts across the appraisal period as it does not capture technology developments that occur later than 2055.

Combined Results

9.8 This scenario has not been assessed at the same level of detail across all components as the Current Trends scenario. The assessment focuses on the key areas of change between the scenarios; lower shadow cost benefits, frequency benefits, government revenues, airline/airport profit loss and the carbon disbenefits.

£bn	Current Trends (No pass through)		Technology Development (No pass through)	
	UK Only		UK Only	
Passenger Benefits	35.0		21.7	
Government Revenue	4.7		2.6	
Carbon Approach	Impact to UK carbon account*	Global impact (with/without displacement)✞	Impact to UK carbon account*	Global impact (with/without displacement) ✞
Environmental Disbenefits	-34.3	-60.1 to -42.0	-16.4	-25.0 to -17.8
Airline/Airport Profit Loss	-24.1		-11.8	
Present Value	-58.4	-84.2 to -66.1	-28.2	-36.8 to -29.6

* The impact to the UK carbon account monetises the additional from departing flights only

✞ The Global Impact carbon approach monetises the additional carbon generated by both departing and arriving flights, with the range showing the impact with and without displacement in carbon from flights that would otherwise have occurred at a foreign hub

Table 9-3: Change in benefits for Current Trends and Technology Development (£ billion)

10 Scenarios and sensitivity analysis

Introduction

10.1 Future aviation demand is subject to considerable uncertainty, yet its trajectory could materially influence the results presented in this report. It is therefore important to consider a range of different future demand scenarios when analysing the impacts of Heathrow expansion.

10.2 This chapter shows a range of scenarios which include different economic assumptions, technology assumptions, behavioural assumptions and capacity assumptions. The full list of scenarios discussed in this chapter was initially introduced in Chapter 2 and below forms a reminder of the key elements of the scenarios. Many of these are based on standard sensitivity tests as found in the common analytical scenario (CAS), with a few exceptions.

10.3 For these scenarios we do not run the full appraisal, rather we run a shorter appraisal by looking at the lower shadow cost, frequency benefits, airline/airport profit loss and the government revenue impacts only and not the wider economic impacts, delay benefits and other environmental disbenefits. The following graphs/graphics show how these tests perform on these metrics before we discuss the implications of these tests on the metrics and the overall economic case.

10.4 One important element however, is due to modelling restrictions – the High Economy scenario fails to run to a point in the model where we can do an appraisal – this is due to the level of demand reaching a sufficiently high point that means the model fails to establish a stable solution that would allow us to appraise the full Heathrow expansion scheme as it stops before the final capacity is unlocked in 2054. Effectively using the model outputs to appraise without

including this capacity, would only end up appraising part of the expansion scheme and not be comparable to the other results.

Modelled demand scenarios	Features of the scenario
High Economy	Stronger domestic and international GDP growth increases incomes, with a higher population growth and lower oil prices reducing airlines' fuel costs relative to the Current Trends which all increase demand to travel. All other assumptions (technology, behaviour, policy coverage) are held as in Current Trends scenarios.
Low Economy	A low economy future with economic developments that lower the growth of air passenger demand. Notably weaker domestic and international GDP growth, low trade levels, reduced population growth and higher oil prices. All other variables held constant as in Current Trends scenarios.
Regional Distribution	National population growth assumptions remain consistent with Current Trends for national demand forecasting. Population growth is redistributed across UK districts/regions (less concentrated in the wider South East, with higher growth elsewhere). This alters the spatial distribution of demand and airport allocation, while total national unconstrained demand remains unchanged.
Behavioural Change	Applies a targeted behavioural "penalty" to selected aviation markets in light of emerging evidence on post-Covid shifts. This focuses on business travel and selected short-haul leisure markets. For business this would include the continued use of remote and hybrid working arrangements, as well as a greater reliance on virtual meetings, which may substitute for some types of business travel. All non-behavioural assumptions (economy, technology, policy, costs) remain as in Current Trends.
Less constrained Regional Airport Development	The Current Trends assumes that airports outside of Heathrow do not expand further than is either part of their granted planning (e.g. Stansted and their 51mppa), or what their infrastructure is capable of. This test relaxes the passenger infrastructure constraints and allows all airports except those with planning caps near London giving them the ability to grow as much as possible (within Air Transport Movement (ATM) limits) and for the whole aviation system to allow higher numbers of passengers to fly.

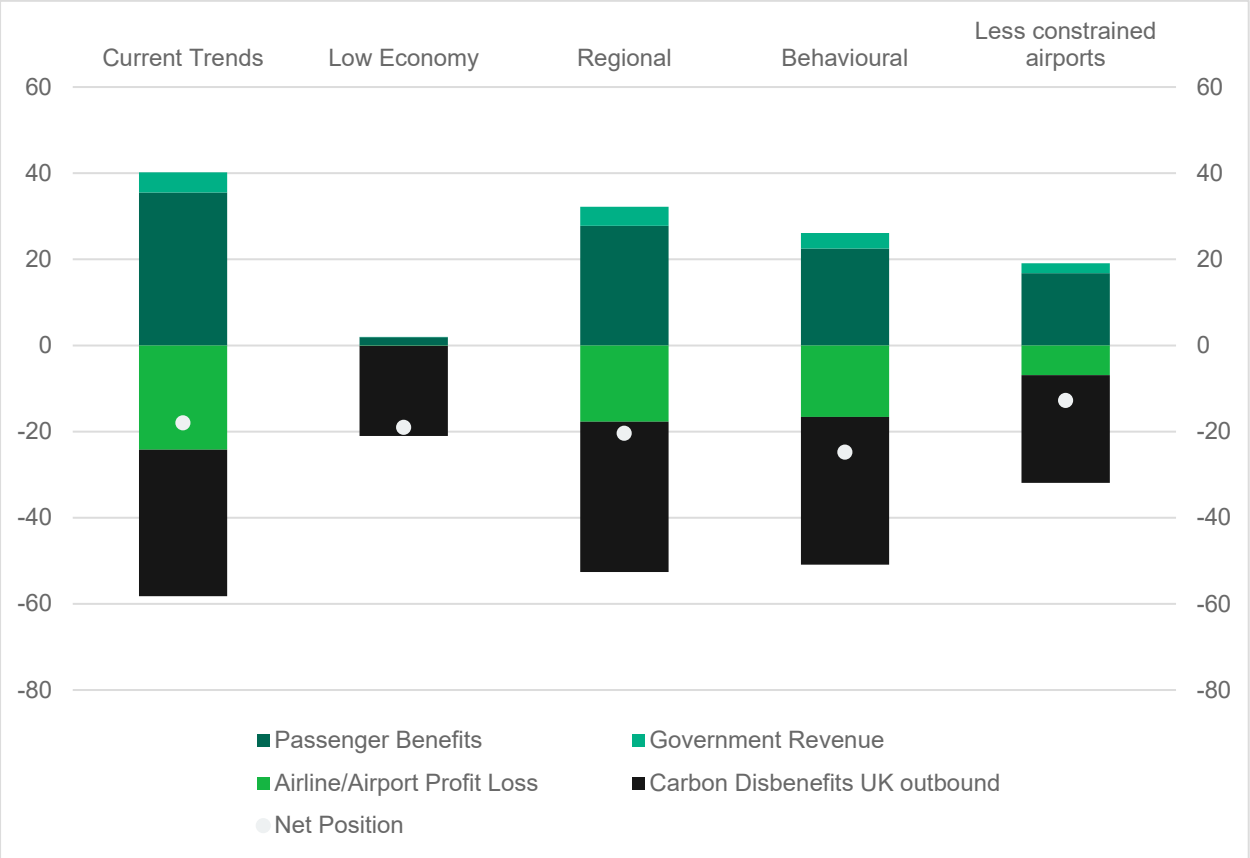

Figure 10-1: Change in benefits for Current Trends (No cost pass through) and other scenarios (£ billion)

10.5 Figure 10-1 above shows the changes in passenger benefits for the set of scenarios modelled – this shows that the low economy scenario stands out as seeing a significant reduction in passenger benefits, government revenue and airline/airport profit loss as a result of significantly lower levels of demand. However, it still retains significant carbon disbenefits. The Regional scenario shows lower passenger benefits and the corresponding airline/airport profit loss, because of the different distribution of demand, however the overall position remains similar to the Current Trends scenario. The Behavioural change scenario has lower benefits again over the Current Trends and regional scenarios, but retains similar levels of carbon disbenefits, leading to an overall worse position. The less constrained scenario also has lower passenger benefits and correspondingly lower carbon disbenefits.

11 Further analysis

11.1 The chapters above consider impacts utilising Green Book and DfT TAG appraisal guidance, which aim to estimate the national welfare impact of policy interventions. In this chapter we consider an alternative approach that calculates the economic impact of Heathrow expansion in terms of Gross Domestic Product (GDP), as well as the impact on jobs within the local area.

GDP effects

11.2 National level GDP modelling provides a complementary, but fundamentally different approach to typical welfare analysis. While both assess the impacts of a policy, the types of impact in scope vary to some extent between the two methods. The effects discussed below are not wholly additional to the welfare estimates discussed elsewhere in the report and should therefore be considered separately.

11.3 Computable General Equilibrium (CGE) models are large-scale numerical models that provide a stylised representation of core economic interactions within the economy. CGE models, based on economic theory and observed relationships, have been used by numerous governments and institutions to analyse the effects of major policies.

11.4 General equilibrium models inherently operate at a higher level of aggregation than the partial equilibrium approach used in conventional appraisal. While partial equilibrium models may allow more detailed modelling of local impacts (e.g. noise), such models do not necessarily provide full information on second and third round effects.

11.5 It is these subsequent effects that are central to the generation of wider economic impacts. They provide many of the impacts on third parties not always taken into consideration by decision makers and not captured in assessments of direct scheme costs and benefits.

11.6 SCGE (Spatial CGE) models add an additional dimension to the framework, explicitly considering the relationship between different regions within the economy. This allows a more nuanced, sub-national picture to be developed. This is important when considering a localised increase in infrastructure investment, which will naturally have distributional effects.

11.7 DfT have procured SCGE modelling from Frontier Economics. Frontier Economics modelled the effects of capacity expansion at Heathrow Airport on economic growth in the UK and its regions. To do this, they drew on data supplied by DfT on the expenditures related to airport capacity expansion, and on its operational

effects in terms of passenger movements to and from the UK. This data is then used in a CGE model of the UK, TERM-UK, developed by the Centre of Policy Studies, in Melbourne, Australia.

11.8 TERM-UK is a regionally disaggregated CGE model. It enables the simulation of the effects of airport capacity expansion versus a baseline case of no expansion. The model includes a detailed database capturing economic activity in the UK, including inter-regional linkages, and international linkages such as exports and imports. It also includes, notably, markets for labour, optimising behaviours of producers and households, and the government sector. The model is dynamic as it allows the simulation of changes over time, by comparing projections under the expansion case to projections under the base case.

11.9 The model captures the effects of expenditures on capacity expansion, and the operational effects of increased passenger movements in and out of the UK. These passenger movements generate economic effects through a variety of channels. First, changes to spending by inbound visitors and outbound UK residents are calculated based on the changes in forecast passenger movements. Increased spending by inbound visitors can be characterised as an expansion of demand facing the domestic tourism industry; while spending by outbound passengers can be characterised as an increase in demand for tourism imports. Secondly, a body of empirical evidence suggests that increased air connectivity, as captured by increases in air passenger numbers, can reduce trade costs between partners, notably by reducing transaction costs associated with the conclusion of contracts. Trade costs are measured in sector-specific ad valorem terms. These ad valorem reductions are imposed on the UK's external trade. Thirdly, changes to trade – both exports and imports – can induce further effects by increasing productivity. A conservative trade openness to productivity elasticity of 0.3 is assumed - i.e. a 1% increase in the sum of export and imports increases productivity by 0.3%.

11.10 GDP effects are reported for the following scenarios:

1. The core scenario applies trade cost reductions to the UK's trade with all of its partners, and applies a productivity response as a result of greater trade openness.

2. As with (1) above, but the productivity response is removed.

3. Trade cost reductions are restricted to the UK's non-European partners, while maintaining a productivity response to greater trade openness.

4. As above with (3), but the productivity response is removed.

5. As with (1) above, but passenger forecasts assume a full pass through of the costs of capacity expansion to passengers via aero-charges.

11.11 The modelling period is 2024-2056. Real GDP uplifts are reported relative to the baseline in year, in monetary terms and percentage terms for the 5 scenarios.

Scenario	Increase in annual real GDP in 2056 relative to baseline (millions of pounds)	Increase in annual real GDP in 2056 relative to baseline (%)
Scenario 1 (Core)	2602	0.052
Scenario 2	1815	0.036
Scenario 3	1576	0.032
Scenario 4	1414	0.028
Scenario 5 (Alt pax forecast)	2638	0.053

Table 11-1: UK GDP effects relative to baseline, all scenarios

11.12 Table 11-2 reports results GDP effects for each region. The results are percentage changes relative to baseline GDP for that region. For example, if regional real GDP in London is £668.9 billion in 2056, then a 0.19% uplift would be equal to around £1.3 billion.

Region	Scenario 1 (%)	Scenario 2 (%)	Scenario 3 (%)	Scenario 4 (%)	Scenario 5 (%)
North East	0.03	0.01	0.00	0.00	0.03
North West	0.03	0.01	0.01	0.00	0.03
Yorkshire	0.03	0.02	0.01	0.01	0.03
East Midlands	0.02	0.01	0.00	0.00	0.02
West Midlands	0.03	0.01	0.00	0.00	0.03
East	0.03	0.02	0.01	0.01	0.03
London	0.19	0.17	0.17	0.17	0.19
South East	0.04	0.02	0.02	0.01	0.04
South West	0.04	0.02	0.02	0.01	0.04
Wales	0.04	0.02	0.02	0.01	0.04
Scotland	0.03	0.01	0.01	0.01	0.03
N.Ireland	0.02	0.01	0.00	0.00	0.02

Table 11-2: GDP effects relative to baseline, all scenarios, all regions, in 2056 relative to baseline

11.13 DfT plans to publish a full report providing further detail on the methodology and results shortly. Whilst some additional tests on the work are ongoing, we do not expect the core scenario and results published in this report to change.

12 Local Economy Impacts

Local jobs supported by Heathrow expansion

12.1 Airport expansion is expected to generate additional local employment because of increased airport operations. The types of employment that may occur from expansion can be categorised as follows:

- **Direct** – employment and Gross Value Added (GVA) supported by activities wholly or largely related to the operation of the airport or air services (passenger or cargo) and located on the airport site or in the immediate vicinity
- **Indirect** – indirect – employment and GVA supported in the supply chain to the direct activities;
- **Induced** – employment and GVA supported in the economy by the expenditure of wages and salaries earned in relation to the direct and indirect activities.

12.2 This analysis forecasts the increase in direct jobs resulting from Heathrow expansion assuming that direct full-time employment increases proportionately with forecasted passenger growth but assuming the ratio of staff to passengers declines over time as the airport becomes more efficient. The lower bound forecast for local jobs assumes current efficiencies continue over time, whereas the upper bound forecast assumes that further efficiencies are only achievable once new terminal capacity opens. Direct off-airport jobs were calculated using a multiplier derived from a Heathrow employee survey. This fed into the direct employment number. Indirect and induced employment have been estimated based on multipliers from the Optimal Economics study[46] from 2009 that was previously used.

[46] Optimal Economics – Heathrow Related Employment

12.3 Table 11-1 presents the most recent estimates for the increase in local jobs from Heathrow expansion in the relevant forecast years.

	Employment type (000s)			
	Direct	Indirect	Induced	Total
2030	3	0.3 to 0.4	1	3 to 4
2040	16 to 20	2 to 3	4	22 to 27
2050	24 to 30	3 to 4	5 to 7	33 to 40
2055	37 to 45	5 to 6	8 to 10	50 to 61

Table 11-1: Increase in local jobs due to Heathrow expansion

12.4 The updated estimates indicate that airport expansion would support tens of thousands of additional local jobs by the forecast years. This reflects both the scale of additional capacity provided by the scheme and the expected nature of airport activity following expansion. An expanded Heathrow is more likely to offer greater services that may be more complex, particularly with a higher number of full serviced airlines expected to be operational, thus requiring more employees.

12.5 Employment impacts are estimated to be predominately regional in nature because they are tied to on-site activities and nearby supply chains, which tend to draw on the surrounding labour market rather than being spread across the UK.

Appendix A: Economic appraisal, data and methodology updates

Appraisal updates

A.1 There have been several changes to the appraisal approach since the 2018 ANPS. The key changes are listed below including a high-level assessment of the impact on the appraisal for the Heathrow Scheme.

- **Value of Time:** Since the last ANPS, the Department has reviewed and updated the value of time used in the aviation model and as part of the appraisal process. This has led to lower values of time, especially for business passengers which then has a knock on effect on both the distribution of demand at airports, and also how this feeds into the overall passenger and frequency benefits.

- **Delays model:** The delays model uses the same approach as originally used by the Airports Commission and previous use by the Department. It has been updated with new modelled outputs and some changes to how it deals with terminal and runway constraints. Overall, these changes have increased benefits from those seen in the last ANPS review.

- **Core appraisal calculations:** The approach used previously, of using the equations as detailed in the aviation TAG unit[47] at the lowest level of detail (airport, route, journey purpose level) has continued. There has been some improvements in the approach around cases where routes move between airports (reduce at one airport and increase at another) – in previous economic cases these were ignored, these now follow TAG in how to appraise these situations.

- **Tax wedge methodology**: The methodology applied in this assessment is unchanged from the ANPS[18] approach, with no updates to the analytical approach or assumptions. The analysis estimates changes in service sector employment between the Do Minimum and Do Something scenarios at local authority level. Employment gains around the expanded airport are constrained to equal employment losses elsewhere, ensuring zero net national

[47] TAG unit A5-2 aviation appraisal - GOV.UK

employment change. Manufacturing and construction employment remain unaffected.

- **Extrapolation:** As the model does not run to the end of the appraisal period an extrapolation process is needed. This extrapolation uses long term national demand forecasts to grow passengers in the extrapolation subject to capacity constraints keeping overall passengers per ATM fixed. Alongside this it grows the shadow costs in line with income growth and national demand growth. This combined multiplier increases shadow costs in a way broadly consistent with the underlying rationale: (a) airports becoming progressively busier and requiring higher shadow costs to ration excess demand, and (b) passengers placing greater monetary value on journey time, thereby requiring higher shadow costs to influence route or airport choice. This shadow cost growth approach is simpler than the model calculated approach and as such is considered to be a conservative approach to the extrapolation period.

- **Wider Economic Impacts:** Wider economic impacts capture additional welfare effects arising from changes in productivity and output that are not reflected in standard user benefits. In the context of airport expansion, three channels are relevant: the tax wedge, agglomeration, and imperfect competition.

  The tax wedge reflects the fiscal impact of changes in labour productivity when workers relocate between areas. Airport expansion is assumed to induce job reallocation towards London and the South East, where average productivity is higher. As a result, relocating workers experience increases in output and wages, a proportion of which is captured through taxation. Two approaches are used: under the TAG approach, workers' productivity adjusts to the average productivity of the destination area, while under the density-based approach it changes in line with differences in effective density between origin and destination locations. The tax wedge is estimated under a zero net employment assumption, so total job gains are offset by losses elsewhere, ensuring the effect captures reallocation rather than net new economic activity.

  Agglomeration is a positive externality arising from increased economic density. In TAG, it is defined as the change in productivity associated with changes in effective density, which reflects the connectivity of firms and workers based on generalised travel costs. In this context, job reallocation towards London and the South East increases economic concentration, improving productivity through better labour matching and knowledge spillovers. These effects are proxied through changes in effective density. However, higher density can also generate disbenefits, particularly congestion on transport networks, and TAG requires that both effects are considered to derive a net impact. As set out above, it has not been possible to robustly quantify these competing effects, and agglomeration impacts have therefore been excluded from the appraisal.

Imperfect competition effects arise where firms operate with mark-ups over marginal cost. Improvements in connectivity reduce marginal costs, leading to output increases that are not fully captured in conventional user benefits. This additional output represents a welfare gain. This channel is distinct from tax wedge and agglomeration, as it reflects changes in output due to cost reductions rather than spatial reallocation or changes in effective density.

There is potential overlap between tax wedge and agglomeration impacts, as both relate to spatial productivity differences and use effective density. However, the methodologies mitigate double counting. The tax wedge captures productivity differences between locations, while agglomeration captures productivity changes from within-area density. The density-based tax wedge approach uses Do Minimum densities, meaning productivity gains from post-expansion increases in density are excluded and instead attributed to agglomeration. The zero net employment assumption further ensures both effects reflect redistribution rather than creation of activity. Differences in scope also reduce overlap, with the tax wedge limited to relocating workers in affected service sectors, while agglomeration captures wider connectivity-driven effects.

Appendix B: All Passenger Benefits

B.1 The table below presents the benefits and costs for the Heathrow Expansion scheme if all UK and foreign benefits/disbenefits are included.

£bn	Current Trends (No pass through)		Current Trends (Cost pass through)	
	All Passengers		All Passengers	
Passenger Benefits	56.0		35.3	
Government Revenue	4.7		3.3	
Wider Economic Impacts	1.3 to 2.1		0.6 to 1.6	
Total Benefits to Passengers and the wider economy	**62.1 to 62.9**		**39.2 to 40.2**	
Carbon Approach	Impact to UK carbon account*	Global impact (with/without displacement)✞	Impact to UK carbon account*	Global impact (with/without displacement) ✞
Environmental Disbenefits	-41.8	-78.0 to -59.9	-44.2	-79.9. to -62.0
Airline/Airport Profit Loss	-53.7		-55.1	
Net Social Benefit	**-33.4 to -32.6**	**-69.6 to -50.7**		[48]
Scheme Cost	-49.6		-24.8	
Net Present Value	**-83.0 to -82.2**	**-119.2 to -100.3**	**-84.9 to -83.9**	**-120.6 to -101.7**

* The impact to the UK carbon account monetises the additional from departing flights only

✞ The Global Impact carbon approach monetises the additional carbon generated by both departing and arriving flights, with the range showing the impact with and without displacement in carbon from flights that would otherwise have occurred at a foreign hub

Table B-1: All Passenger economic case – benefits and disbenefits

[48] Cannot calculate as net social benefits does not include costs and the passenger benefits includes costs

B.2 This approach is in line with that presented in the Updated Appraisal Report which supported the original designation of the ANPS[49].

[49] https://assets.publishing.service.gov.uk/media/5b0af93d40f0b673fc7952ed/addendum-to-the-updated-appraisal-report-airport-capacity-in-the-south-east.pdf

Appendix C: Non-Aviation Carbon summary

Non-aviation carbon evidence summary

C.1 For non-aviation carbon (surface access, construction, operations) the appraisal has retained the 2018 quantitative analysis due to scheme similarity, alongside a qualitative discussion below of changes since the publication of the existing ANPS and their resultant impact on the direction of carbon emissions.

C.2 Whilst the calculations of carbon emissions themselves are not being quantitatively re-estimated, these have been re-profiled[50] in light of new timescales and expected timing of impacts and latest DESNZ carbon values applied, meaning the monetisation of impacts has changed since 2018.

C.3 The quantified impacts are summarised in the table below:

Area of carbon	60-year carbon impact estimated in 2018 and retained in 2026 (MtCO2e)	Changes since 2018 and impact
Surface access	9.5	**Expected improvement** since 2018 in passenger surface access carbon in scope of calculations. Exclusion of freight from this number (as in 2018) means this could still **underestimate** total surface access carbon.
Construction	11.3	**Similar or a slight improvement** since 2018.
Operations	2.7	**Improvement** since 2018.

Table C-1: Non-aviation carbon impact and expected changes since 2018

[50] Surface access emissions have been profiled in line with surface access passenger increases with expansion, operations emissions in line with total passenger increases and construction emissions in line with construction costs.

Surface access

C.4 Surface access analysis was carried out by DfT for the 2018 ANPS and found that 9.5Mt of carbon would be generated across the 60-year appraisal period through additional surface access journeys to the airport.

C.5 The principal development since this analysis was carried out is the implementation of the Zero Emission Vehicle (ZEV) Mandate[51] which became law in 2024. Government has committed to reviewing the mandate by early 2027.

C.6 The ZEV Mandate requires an increasing proportion of new car and van sales to be zero emission between 2024 and 2030, towards a pathway to 100% by 2035, driving decarbonisation of the new car and van fleet. Most passenger trips to Heathrow are carried out by private vehicle (58% in 2024[52]) therefore the phasing out of petrol and diesel cars is likely to result in significantly lower carbon emissions across the appraisal period. Figure C-1 below compares forecast car vehicle-km based on latest TAG databook[53] assumptions (accounting for the ZEV mandate) compared to assumptions at the time of the 2018 ANPS (when the ZEV mandate was not in place). Based on assumptions from the time of the 2018 ANPS (and calculation of carbon), the proportion of car vehicle-km operating in electric would be 15% in 2035, increasing to just below 25% by 2050. Latest assumptions have seen this rise to 60% of car vehicle-km operating in electric in 2035 up to over 80% by 2050.

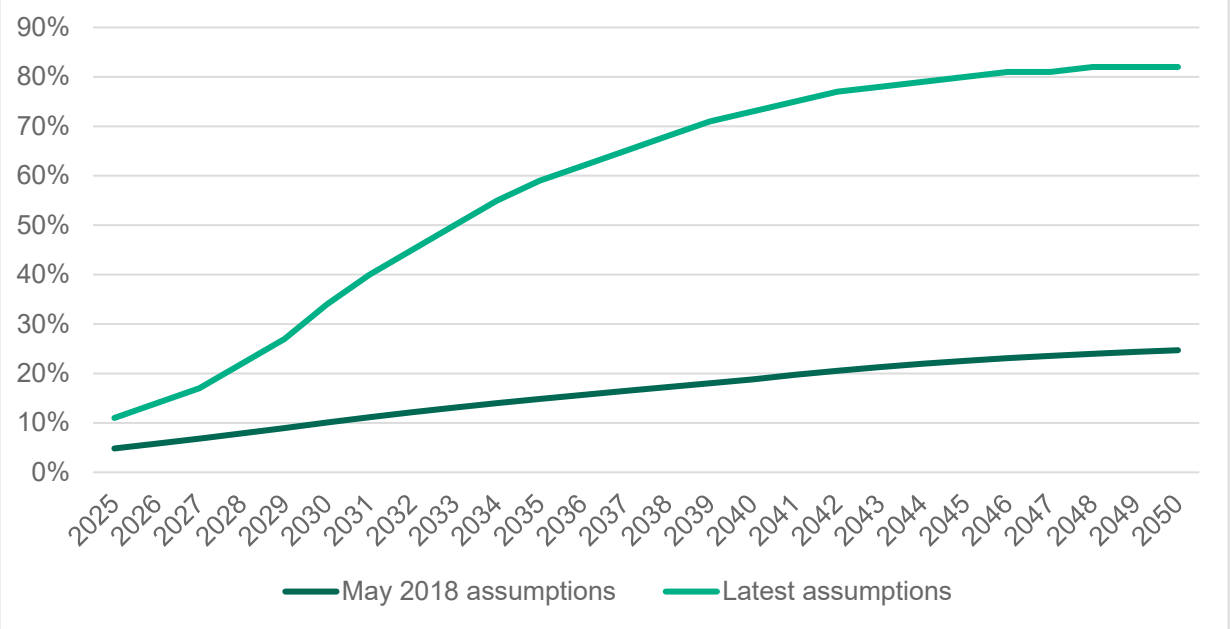

Figure C-1: Forecast UK car kilometres by Electric Vehicle as a percentage of all car kilometres assumed in 2018, compared to latest assumptions (TAG databook)

[51] https://www.gov.uk/government/news/pathway-for-zero-emission-vehicle-transition-by-2035-becomes-law

[52] Departing Passenger Survey 2024. Private vehicle includes private car, hire car, taxi/minicab/uber

[53] https://www.gov.uk/government/publications/tag-data-book

C.7 Similarly, since the 2018 ANPS there has been progress in the electrification of the bus and coach fleet. In 2021, TfL announced that all new buses ordered will be zero emission, with a commitment for 100% of TfL's bus fleet to be zero emission by 2034[54]. National Express, one of the primary provider of coach services to Heathrow Airport[55], has also announced plans to transition to zero-emission vehicles by 2035. They announced this in 2020[56], after the 2018 ANPS. Bus or coach trips to Heathrow made up 10% of all passenger trips in 2024 so this further indicates carbon figures would be lower than those calculated and published in 2018.

C.8 An expansion to London's Ultra Low Emission Zone in 2023 to include outer boroughs has also been announced since the calculation of surface access carbon[57]. The Greater London Authority has previously estimated that London-wide ULEZ has reduced carbon emissions by 2% across the period 2019-2024[58].

C.9 As well as the carbon efficiency of surface access trips to Heathrow, the volume of passengers travelling to Heathrow as a result of expansion will also impact emissions from surface access. Total passenger increases at Heathrow assessed in 2018 compared to latest modelling are shown below in Figure C-2- this analysis is based on outputs from DfT's Aviation Model which informs the calculation of aviation carbon and the wider economic case for the HENPS[59]. Noting in 2018 there was an earlier opening date assumed (2026) whereas latest analysis is based on a 2035 opening date with further increases in capacity until 2054.

C.10 Current estimates of overall passenger increase across a comparable 60 years from opening is very similar as assessed in 2018 (both around 2.6bn additional trips over that period). However, the profile of passenger increases has changed due to capacity increases as a result of expansion now being more staggered with the final capacity uplift occurring in 2054.

C.11 Figure C-2 shows forecast additional terminal passengers at Heathrow. This is shown here to give an indication of the change in overall activity at Heathrow and how this has changed since the 2018 assessment, as a proxy for surface access activity. However, some of these passengers will be transfer passengers who do not require surface access. Meanwhile, these numbers do not include staff trips or account for changes to mode-share. Mode share (how people travel to Heathrow Airport) is naturally important to carbon emissions. For example, rail and the tube are electrified and therefore zero-emission at the tailpipe. On mode share, the proportion of passengers using public transport to access Heathrow has increased[60] with the opening of the Elizabeth line since the 2018 ANPS.

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[54] https://www.london.gov.uk/press-releases/mayoral/mayor-host-zero-emission-bus-summit-at-city-hall
[55] https://www.heathrow.com/content/dam/heathrow/web/common/documents/transport/LHR-National-Coach-Map.pdf
[56] https://cbwmagazine.com/national-express-group-sets-out-a-zero-emission-vision/
[57] ULEZ Expansion 2023 - Transport for London
[58] https://www.london.gov.uk/sites/default/files/2025-03/London-wide%20ULEZ%20One%20Year%20Report_Mar2025.pdf
[59] Passenger numbers are extrapolated (not modelled) after 2050 in 2018 and 2055 in latest runs hence scope of graph
[60] https://www.caa.co.uk/data-and-analysis/uk-aviation-market/consumer-research/departing-passenger-survey/survey-reports/

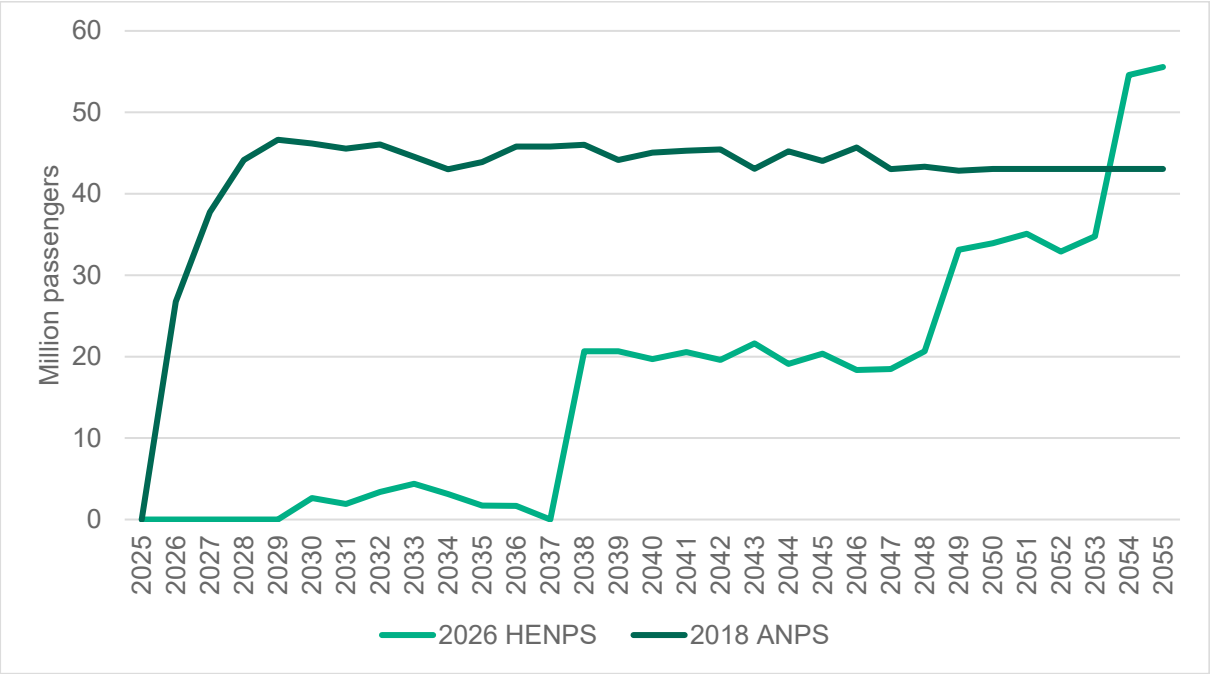

Figure C-2: Passenger uplift (additional passengers) at Heathrow due to expansion (as estimated in 2018 compared to latest assumptions)

C.12 A limitation of the quantified carbon for surface access is that it does not include any emissions from freight. Heavy Goods Vehicles (HGVs) which transport freight are highly polluting and technology to decarbonise these is less advanced than other surface access modes like cars and buses. In the 2018 Appraisal of Sustainability[61] it was noted that these emissions could equal calculated emissions from passenger surface access. Since then, government has announced the consideration of regulatory measures to reduce emissions from HGVs, including confirmation of the ambition to phase out the sale of new HGVs of 26t and under by 2035 and for all HGVs by 2040[62]. An initial consultation on high-level proposals closed on 17 March 2026. A Government response alongside a further consultation on detailed proposals will follow in due course.

C.13 Overall, therefore the quantified surface access carbon likely slightly underestimates the carbon impact of additional road traffic associated with airport expansion (the exclusion of freight likely more than outweighing the expected reduced passenger surface access carbon). This was acknowledged as a limitation in the 2018 ANPS and remains in this update.

Construction

C.14 The original quantitative analysis for construction carbon was carried out by the Airports Commission in 2014[63] and is 11.3MtCO2e throughout construction, the

[61] https://www.gov.uk/government/publications/appraisal-of-sustainability-for-the-draft-airports-national-policy-statement
[62] https://www.gov.uk/government/consultations/new-hgv-co2-emissions-regulatory-framework-for-the-uk
[63] https://assets.publishing.service.gov.uk/media/5a7d82a9ed915d269ba8b1c7/8-carbon--assessment.pdf

majority of which (97%) is embodied carbon, with the small remainder being carbon emissions due to fuel use in construction.

C.15 Heathrow Airport Limited's current Northwest Runway proposal is very similar to the Northwest Runway assessed in 2014 in terms of the physical design and therefore these emissions calculations are still deemed relevant.

C.16 Practices to reduce the carbon-intensity of the construction sector and to decarbonise fuel mean that emissions today would be expected to be similar or slightly improved. Figure C-3 below shows the amount of CO2 per tonne of material used since 2014 using DESNZ assumptions[64]- as can be seen the average CO2e produced per tonne of construction material (averaged across several materials commonly used in construction[65]) is level and there has been a slight improvement in the carbon intensity of concrete.

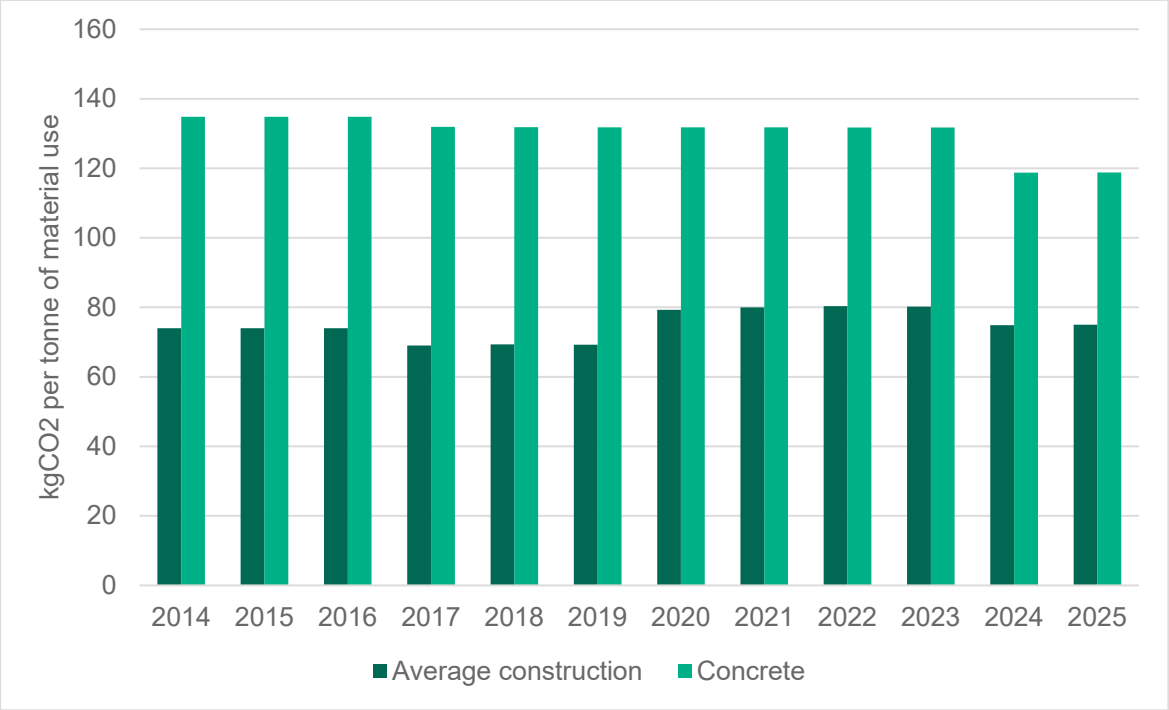

Figure C-3: Carbon conversion factors for carbon emissions per tonne of material use over time

C.17 In 2023, the British Standards Institution changed its specification for concrete to allow limestone powder to be used[66] in combination with other supplementary cementitious materials (fly ash, GGBS), to reduce clinker content (clinker is a carbon-intensive element within concrete production). This may have contributed to a reduction in the carbon intensity of concrete, potentially explaining some of the dip in intensity shown above. Considering these points, it seems reasonable to conclude that carbon emissions from construction could be similar or slightly improvement compared to the previous assessment.

[64] Government conversion factors for company reporting of greenhouse gas emissions - GOV.UK
[65] Bricks, asphalt, insulation and others
[66] British Standard concrete recipe changes to allow more ingredients

Airport operations

C.18 Previous analysis found that across the 60-year appraisal period 2.6MTCO2e would be produced from operation of the expanded airport. This is comprised of carbon arising from gas and electricity use to power the expanded airport's buildings as well as fuel used for ground support equipment (including support vehicles and on-site transportation).

C.19 The scheme assessed today is very similar in terms of physical design as the one assessed by the Airports Commission in 2014[67] and therefore these emissions calculations are still deemed relevant.

C.20 As well as size of the new infrastructure at Heathrow, increased passenger numbers also fed into the original calculations of airport operations carbon shown above. The increase in passenger numbers because of Heathrow expansion are broadly similar over a 60-year period as those estimated in 2018. This analysis is based on outputs from DfT's Aviation Model which informs the calculation of aviation carbon and the wider economic case for the HENPS.

C.21 In 2018 the government committed to decarbonise the electricity grid by 2030[68]. This would effectively eradicate estimated emissions from increased electricity by the time the expanded airport opens if re-calculated today.

C.22 Additionally, many airports including Heathrow Airport have signed up to the Airport Council International's (ACI) Airport's Carbon Accreditation scheme, the global framework for managing and reducing airport carbon emissions. Heathrow has already achieved the second highest level of accreditation under this scheme, which requires setting a target for absolute emissions reduction for Scope 1 and 2 emissions. In line with this, Heathrow has committed to reducing these emissions by 45% by 2030 against a 2019 baseline.

C.23 Furthermore, as part of Heathrow Airport's Net Zero Plan[69], they have also set a goal for all airport vehicles to be zero emission or use biofuels by 2030 and have a target for all their buildings and infrastructure to be net zero by the mid-2030s.

C.24 Therefore overall, it's expected that the calculation of airport operations carbon above is a conservative one which would be lower if re-calculated today.

[67] https://assets.publishing.service.gov.uk/media/5a7d82a9ed915d269ba8b1c7/8-carbon--assessment.pdf
[68] https://assets.publishing.service.gov.uk/media/677bc80399c93b7286a396d6/clean-power-2030-action-plan-main-report.pdf
[69] https://www.heathrow.com/company/about-heathrow/heathrow-sustainability-strategy/our-carbon-strategy

Glossary

Term	Definition
ACI	Airport Council International
Aeronautical charges (Aerocharges)	Charges levied by airports on airlines for the use of airport infrastructure and services (e.g. runways, terminals), which may be passed on to passengers in ticket prices.
Agglomeration	Benefits which accrue when firms and individuals are located near each other
Air Passenger Duty (APD)	A UK tax applied to passengers departing from UK airports.
Air Transport Movements (ATMs)	The total number of aircraft take-offs and landings at an airport.
ANPS	Airports National Policy Statement
AoS	Appraisal of Sustainability
Bellyhold freight	Cargo transported in the hold of passenger aircraft
Carbon accounting	The process of measuring direct and indirect emissions in CO2e
Carbon cap	A regulatory limit set on the total number of CO2 emissions allowed
Carbon displacement	Aviation activity which is not entirely new, but has shifted from another location
CGE	Computable General Equilibrium
CO2	Carbon dioxide

CO2e	Carbon dioxide equivalent
Consumer surplus	The difference between what passengers are willing to pay for travel and what they actually pay, representing a key element of passenger benefits.
CORSIA	The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) is a global market-based scheme that applies to aviation; agreed and implemented by Internation Civil Aviation Organisation (ICAO) member states.
Counterfactual scenario	The baseline case used for comparison in appraisal, representing a future without Heathrow expansion but including already approved airport capacity elsewhere.
Delay benefits	Benefits arising from reduced congestion, resulting in time savings for passengers and efficiency gains for airlines.
DESNZ	Department for Energy Security and Net Zero
DfT	Department for Transport
DfT17 Forecasts	The Department for Transport's aviation demand forecasts published in 2017, used in previous appraisals.
DfT26 Forecasts	The Department for Transport's updated aviation demand forecasts (2026), incorporating revised assumptions on growth, policy and technology.
Discounting	Converting future impacts into present values
Effective density	A proxy measure of economic clustering used in appraisal
Emissions Trading Scheme (ETS)	A market-based system for limiting emissions through tradable carbon permits.
Extrapolation	Extending model results beyond their final forecast year
Frequency benefits	Benefits to passengers from increased availability of flights, improving travel flexibility and scheduling.
GDP	Gross Domestic Product, the total value of goods and services produced in a country in a year
GGBS	Ground Granulated Blast-Furnace Slag, a cementious material
HENPS	Heathrow Expansion National Policy Statement
HGVs	Heavy Goods Vehicles

HMT	His Majesty's Treasury
Hub airport	An airport which is frequently used as a connection point between flights
Imperfect competition	Market structure where firms have pricing power, meaning transport improvements can generate additional output beyond direct cost savings.
International interliners	Passengers transferring between international flights at a UK airport without starting or ending their journey in the UK.
Jet Zero	UK government framework and plan for achieving net zero aviation by 2050
Labour reallocation	Movement of workers between regions or sectors
MtCO2e	Million tonnes of carbon dioxide equivalent
Narrowbody aircraft	A one aisle airliner with a 3-4 metre fuselage mainly for short to medium-haul flights.
Net Present Value (NPV)	The total value of all monetised costs and benefits, discounted over the appraisal period, used as a summary measure of economic value.
Net social benefit	The change in benefits for society, excluding scheme costs
Net Zero	State where the amount of greenhouse gasses emitted is equal to those removed, UK's aim for 2050
NOx	Nitrogen oxides (NOx) refers to nitric oxide (NO) and nitrogen dioxide (NO2), both of which are mainly formed during the combustion of fossil fuels
ONS	Office for National Statistics
Opportunity Cost	Value of the next best alternative use of resources
Particulate Matter (PM)	Particulate matter (PM) is everything in the air that is not a gas. This covers a variety of compounds, some of which can be toxic. PM10 and PM2.5 refers to articles which are less than 10 and 2.5 micrometres in diameter respectively
Present Value (PV)	Value of impacts in today's prices
Producer Surplus	Profits earned above the firm's costs
Scenario	A defined set of assumptions used in modelling

SCGE	Spatial Computable General Equilibrium
Sensitivity analysis	Testing how results change when assumptions vary
Shadow costs	Implicit costs within the aviation model representing congestion and capacity constraints.
Surface access	Modes of transport available for passengers and staff travelling to and from the airport
Sustainable Aviation Fuel (SAF)	Lower-carbon alternative fuels used in aviation to reduce lifecycle emissions.
TAG	Transport Analysis Guidance
Tax wedge	Fiscal benefits arising from increased tax revenues when labour shifts towards higher productivity locations.
Terminal capacity	Maximum number of passengers an airport can process
Terminal passengers	Passengers using airport terminals, including departing, arriving, and transfer passengers.
TfL	Transport for London
UAR	Updated Appraisal Report
ULEZ	Ultra Low Emission Zone
Widebody aircraft	A two-aisle airliner with a 5 to 6+ metre fuselage mainly for long-haul or high-capacity flights
Wider Economic Impacts (WEIs)	Additional economic effects beyond direct user benefits, including productivity gains and agglomeration impacts.
Zero Emission Aircraft (ZEA)	Aircraft that produce no direct carbon emissions during operation.
Zero Emission Vehicle (ZEV)	A vehicle which does not emit any pollutants during operation

Modelled scenario definitions

Scenario	Definition
Current Trends (No pass through)	The central forecast scenario using standard assumptions on economic growth, demand, technology and policy.
Current Trends (Cost pass through)	A scenario in which increases in airport charges associated with Heathrow expansion are passed on to passengers, affecting demand at the airport.
High Economy	Stronger domestic and international GDP growth increases incomes, with a higher population growth and lower oil prices reducing airlines' fuel costs relative to the Current Trends which all increase demand to travel. All other assumptions (technology, behaviour, policy coverage) are held as in Current Trends scenarios.
Low Economy	A low economy future with economic developments that lower the growth of air passenger demand. Notably weaker domestic and international GDP growth, low trade levels, reduced population growth and higher oil prices. All other variables held constant as in Current Trends scenarios.
Regional Distribution	National population growth assumptions remain consistent with Current Trends for national demand forecasting. Population growth is redistributed across UK districts/regions (less concentrated in the wider South East, with higher growth elsewhere). This alters the spatial distribution of demand and airport allocation, while total national unconstrained demand remains unchanged.
Behavioural Change	Applies a targeted behavioural "penalty" to selected aviation markets to reflect post-COVID shifts in travel behaviour. Reductions focus on business travel and some short-haul leisure markets (e.g., due to remote working and modal substitution). All non-behavioural assumptions (economy, technology, policy, costs) remain as in Current Trends.
Technology Development	Scenario assuming faster technological progress and decarbonisation, including greater fuel efficiency, SAF uptake and carbon pricing impacts.